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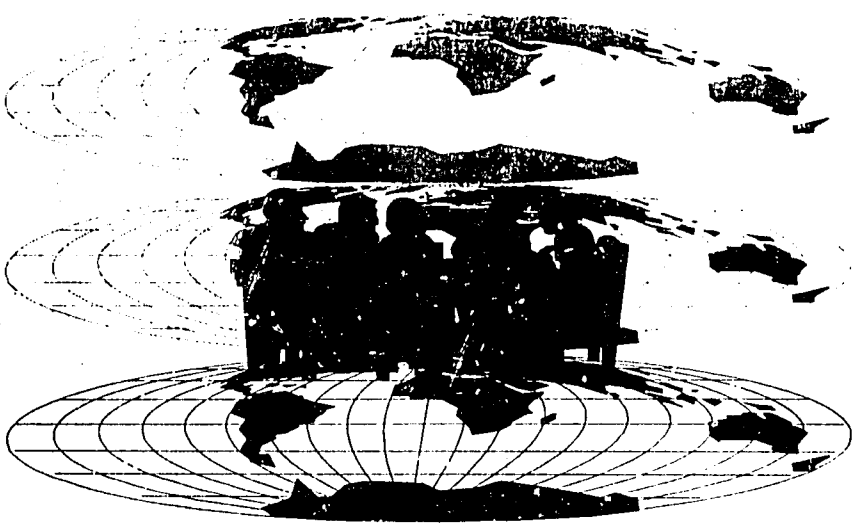
Highlights of a policy dialogue

Future Challenges for National Agricultural Research

Berlin, January 12-18, 1992



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

Of the 16 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 the CGIAR, an informal group of donors that includes countries, development banks, international organizations, and foundations.

Highlights of a policy dialogue

Future Challenges for National Agricultural Research

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Highlights of the international conference entitled "Challenges and Opportunities for the NARS in the Year 2000: A Policy Dialogue," held in Berlin, January 12-18, 1992. This conference was jointly sponsored by the German Foundation for International Development (DSE) and ISNAR.

ISNAR

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Foreword

ISNAR's first policy dialogue for agricultural research leaders and policymakers from developing countries took place in Berlin from 13 to 18 January 1992. Cohosted by the Deutsche Stiftung für Internationale Entwicklung (DSE), the meeting was scheduled to coincide with the International Green Week Exhibition. This gave participants an opportunity to see the quality and abundance of agricultural produce available in developed-country markets — and to measure the challenges they must meet if they are to enter these markets successfully.

The dialogue was attended by developing-country ministers and policymakers, leaders of national agricultural research systems, and officials from regional development agencies. The thought-provoking papers that were presented and the stimulating discussion among the participants resulted in an event that was meaningful and productive for all who attended.

The full proceedings of the policy dialogue are forthcoming. This summary highlights the papers presented and the resulting discussions. It also lists the recommendations that grew out of the dialogue.

Agricultural research is essential to meeting the challenges of the future. And the part to be played by strong linkages between research leaders and policymakers cannot be ignored. This is an idea that was reiterated in the opening speech given by the Deputy Minister of Development Cooperation, Mr. H. P. Repnik. The publication of this summary and the proceedings of the dialogue is also intended to underscore the importance of these linkages and to emphasize the necessity for ongoing policy dialogues — to take place every two years or so. It is hoped that the German Government and the DSE will continue as ISNAR's partners in this endeavor.

C. Bonte-Friedheim
Director General
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Opening Remarks

The workshop was opened by the **Deputy Minister of Development Cooperation, Mr. H. P. Repnik**, who congratulated the organizers, DSE, and ISNAR on bringing together an outstanding group of speakers and participants for a timely dialogue on agricultural research policy. The German Government, through the Bundesministerium für Wirtschaftliche Zusammenarbeit (BMZ) and Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ), were pleased to offer their support to this event. It was appropriate that it was held in Berlin, a symbol of what politics can achieve, and at the time of Green Week, one of the world's major food fairs. Over its 60-year history, Green Week has evolved from a winter fair, demonstrating the latest in technology to farmers, to an integrated exhibition of agriculture-related products and processing technologies attracting worldwide participation.

He outlined the challenges and opportunities for national agricultural research systems (NARS) and the policies of the German Government which emphasize poverty alleviation, environmental protection, and education and training. He stressed that the attention being given to Eastern European problems should not lead to a weakening of cooperation with Third-World countries, and the Government will fulfill its responsibilities to developing countries.

Turning to the challenges, he noted that the development of stable food supplies in developing countries requires that attention be given to the entire system, including policies, credit, processing, and marketing. An essential part of this total system is a well-functioning research system. However, this does not mean that every country requires its own fully fledged system covering all problems. Increased attention must be given to regional burden-sharing and sharing of responsibilities in research.

The importance of a commitment from policymakers to supporting research institutions and agricultural faculties was stressed: external funds will only be granted where governments have given evidence of their commitment.

Dr. Peter Soetje, on behalf of Deutsche Stiftung für Internationale Entwicklung (DSE), was pleased that Berlin had been chosen as the venue: it was a symbol of a process of unification. The government is addressing serious policy issues attendant to the unification of two research systems and the merging of their differing philosophies.

He noted that developing countries, with limited industrial sectors, weak financial bases, debt burdens, and poor infrastructures, were confronting problems of population growth and pressures on marginal lands. Clear policy decisions were required, recognizing that decisions taken in one sector have important impacts on other sectors. Priorities are many and resources are few.

DSE, which is financed by the federal and state governments, emphasizes training, conferences and seminars, and the exchange of experiences. It has cooperated with centers from the Consultative Group on International Agricultural Research

(CGIAR) before, as evidenced by the recent policy dialogue at the International Food Policy Research Institute (IFPRI) on sustainability.

There will be an increasing demand for institutional change and the evaluation of institutional performance. It is up to research to demonstrate that the returns to research as an investment remain high and that research itself is efficient. He questioned whether the existing division of labor in research is optimal. Participants were challenged to look at the efficiency of their present organization before creating new institutions. This includes an examination of whether the incentives for carrying out productive research exist. The advance of communications is making the world smaller and is improving the opportunities for sharing responsibilities.

Dr. Christian Bonte-Friedheim, on behalf of ISNAR and the CGIAR system, thanked the participants for their presence and thanked the Deputy Minister for the strong personal support he has given to the CGIAR system, recently demonstrated by special assistance given by BMZ to the International Rice Research Institute (IRRI).

He indicated that a dialogue between policymakers and research leaders was timely, as the world is facing three crises, which could occur at a national level, a regional level, or even the international level. These three crises are

- the possibility of a food crisis;
- the continuing crisis of rural poverty;
- the environmental crisis.

It was his hope that the present meeting would be a South-South dialogue. Participants were invited from the smallest to the largest systems and represented both policymakers and research leaders.

Bonte-Friedheim noted that the history of publicly funded agricultural research is recent. The first research began with farmers, later assisted by village artisans. It was only in the late 1800s that governments created the first publicly funded research institutes. Transfer among temperate countries was relatively easy. The developing countries of the tropics copied the Northern model and largely trained their people in the developed countries. However, there is a continuing search for improved institutional models. With the patenting of technology, transfer is no longer free. Moreover, the technology developed in the North is not appropriate and there are few spillovers. Regional research can make an important contribution if it avoids the dangers of draining human and financial resources from the national systems and if it can work on research that is a priority for national agricultural research systems.

He argued that agriculture must participate in the broader policy dialogue. To do this, it must succeed in two things: in the South, it must gain a place at the table where decisions are made; in the North, it must overcome the perception that agriculture is conservative, protected, and selfish. It must also demonstrate that it is concerned with "fairness." In the North, the concern is with intergenerational equity, sustaining the production environment for future generations. In the South, governments must also be concerned with intragenerational fairness in the clients it serves.

In closing, he expressed confidence that this dialogue would be successful in sharing knowledge and experience, and in creating friends who will help each other in achieving the "institutional sustainability" of research systems. He hoped that our recommendations would lead to a demand for regular dialogues of this type to monitor our progress towards this goal. Above all, he called for understanding, compassion, and solidarity with the developing countries.

Dr. Paul Perrault introduced the objective of the workshop: an understanding of the agricultural research needs of developing countries — the challenges facing NARS in the policy environment, opportunities available through new technologies and new research approaches, and the institutional adjustments that are required at the national, regional, and global levels. The goal of the dialogue was to identify key improvements in policy and technology and in the institutions needed to achieve growth and sustainability and to alleviate poverty.

Keynote Address

Challenges Facing Agriculture in the Next Century: Issues for National Agricultural Research Systems

Louis Emmerij

Dr. Emmerij set the stage by noting that we are faced with several challenges that will probably still be with us into the next century. These include the elimination of hunger (a redistribution issue); the elimination of agricultural protectionism, with its implications for developing countries; and the necessity of increasing agricultural yields in developing countries. The fourth challenge (and crucial one) is that of technological change and innovation in agriculture.

In looking at the forces influencing the pace and nature of technological change, he argued that:

- Innovation is an interactive process involving *network relationships*, without which developing countries would be frozen.
- Innovation and diffusion are a reflection of learning by doing and learning by interacting (called a process of *technological accumulation*).
- In the process of globalization of economic activities, the creation of international oligopolies raises new questions of access to scientific and technological information, particularly for developing countries.

For developing countries to benefit from these trends, we should recognize a number of things:

- The process of catching up may be impeded by a combination of technological backwardness and a lack of *social capability*, the physical and institutional infrastructure to adopt technology.
- The principle of *cumulativeness* would imply that developing countries should devote more effort to "development" (rather than to "research") and to adapting technologies developed elsewhere.
- In agriculture, technology transfer and imitation may be inhibited by the location-specific character of agricultural technology.
- Producers can be expected to respond to market and price incentives by making incremental technological changes, but public participation is essential in developing the infrastructure and social capability.

The paper then turned to the challenges presented by biotechnology and the way in which it affects the strategic position of the seed and agrochemical industries, the concentration of effort on countries with established markets and favorable legal environments, and the roles of private firms, international centers, and national systems.

A further challenge to agriculture was the link between structural adjustment and technology. In the long run, structural adjustment is "pro-agriculture." However, the process increases the risk to small farmers in the absence of institutions to manage risk. The deregulation of prices, removal of subsidies, and impact on budgets of public institutions serving farmers may be expected to change the pattern of technology used and the products traded. Public institutions will have to adjust at a time when donor fatigue and failures in coordination persist. Problems are compounded by the lack of any domestic technical and managerial capacity to ensure implementation.

The challenge for NARS would be to define their contribution to sustainable rural development in a context of liberalization and adjustment. The comparative advantages of the state and the private sector need to be carefully analyzed and the role for the NARS identified in the production of public goods. They have to meet the needs of small, resource-poor farmers through technological accumulation that builds on network relationships.

Dr. Emmerij complemented his written paper on the challenges facing NARS in the next century with a vision of a world in transition. His message was optimistic, based on a dynamic rather than a static viewpoint.

In a static view of the world, one could see a continuing crisis in Africa, slow economic growth, and the division of the world into those moving on a fast track (OECD countries and East and Southeast Asia), those on a middle track (Latin America and China), and those struggling to make it onto a faster track.

In a dynamic world, one can see the emergence of a new generation of political leaders, the emergence of democracies succeeding military dictatorships, and the success of certain heavily indebted countries attracting new flows of productive capital. The largest countries in the world, India and China, are seeing renewed growth.

It was in the West (the OECD countries) where one could see immobility, both in governance and economic policy. Agricultural policies continue to be dominated by protectionism and subsidization. Commodity agreements "temporarily" restricting markets to developing countries remain permanently in force, and a small club of G-7 countries have elected themselves to set the economic rules of engagement. There will be growing tensions between national and international governance, with implications for international trade and price policies.

In the agricultural sector, the food situation is improved but remains precarious. Predictions about the growth of demand and the projected supply of food vary but do not give rise to optimism. There is a need for a technological revolution. Biotechnology offers one prospect, but the transfer of the technology from the North to the South must be ensured.

Emmerij suggested a number of broad policies for the South:

- diversification of the structure of production and exports;
- pragmatism in determining the respective roles of the public and private sectors, focusing on the incentives for technological progress;

- exploitation to the maximum of existing technological knowledge to get food security at the household level (the immediate prospects of biotechnology do not offer a solution);

- identification of the needs of small farmers.

For the West, the direction is clear, but the political process is difficult:

- liberalize agricultural policies — the present structure of protectionism and subsidization cannot continue;

- study the implications of the regional economic blocs — North American Free Trade Area, Europe 1992, and the emerging Pacific Rim bloc.

The issues for NARS were

- to create the conditions for stimulating technological change and adoption;

- to exploit the potential of biotechnology in the context of local climates and social conditions;

- to define the contribution of developing-country NARS to sustainable rural development in an environment of economic liberalization.

It was asserted that NARS must continue to be a public good dealing with the problems of small, poor farmers. They must maintain the networks and, along with the CGIAR, help alleviate international tension.

Discussion: Francis Idachaba

Dr. Idachaba raised a number of complementary issues with which NARS leaders must deal:

- National institutions continue to have the responsibility for meeting technological needs in producing food, feed, and fiber.

- The South is not monolithic. Some countries are moving forward and expanding their share in world markets, while others are losing. Those that are moving forward have put their own house in order and created an enabling environment for research and agricultural development.

- Not all developing countries can expand in traditional areas; there is a need to provide an alternative to the old portfolio.

- The challenge of technical change is location-specificity. Countries must capture the benefits of known technologies before jumping to the promise of the new (e.g., biotechnology).

- Countries must interpret the sustainability problem according to their own circumstances. In Africa, for example, the problem may be underutilization of chemical fertilizer, rather than pollution of the environment from overuse of agricultural chemicals.

- Institutional structures in developing countries are unstable, reflecting political changes at the national level. Institutional discontinuity may exacerbate the problem of overcoming the lags experienced in identifying problems, finding technical solutions, and disseminating them to farmers. Unfortunately, the major foundations and other donors are moving away from institutional development precisely when their help is most needed.

- Farmers have a low rate of participation in setting priorities for agricultural research and development (R&D). This tends to form a vicious circle: policies biased against the agricultural sector lead to low incentives for mobilizing resources within the sector, which leads to low productivity, an appearance of low return to research, a low demand for participation, and therefore, a low commitment from policymakers.

- There is a need for sustained commitment by policymakers at the highest level.

The Role of Research in the Global Agricultural Development Challenge: An International Perspective

Michel Petit

Dr. Petit assessed the impact of international developments on agricultural research. The framework for discussion treated agricultural research as a productive activity in which one could look at the demand for the outputs of research and the potential sources of supply.

The demand for research outputs has to be an effective demand; i.e., accompanied by purchasing power. Is stagnation in funding evidence of a lack of demand for research? Do low international prices for agricultural products mean there is no need for research? The answer is "no." Following Lester Brown, Petit argued that the environmental crisis will provoke a food crisis. Studies by the World Bank project a long-term growth of demand for cereals of 2% to 3% per annum. The historical sources of growth of supply (increase in irrigated areas, growth of chemical inputs) will no longer be available at an acceptable economic and environmental cost. To meet the needs, one must look at research requirements:

- growth, "to increase the pile of rice";
- better management of resources;
- development of the entire food chain (approche de filière).

In looking at the management of natural resources, Petit commented on several aspects:

- Water — competing demands for urban and industrial uses will force an adjustment in the use of water in agriculture, requiring additional research and changes in technology.
- Land — we have inadequate data on the extent and degree of land degradation, but we have several hypotheses about its causes in individual profit-seeking behavior and rates of discount, and we recognize the need for collective action.
- Genetic resources — there is a lack of consensus on a plan of action to conserve ecosystems because of a lack of knowledge about what should be done.

In looking at the availability of resources for research, Petit noted that the state of public finance in developing countries depends on the existing macroeconomic situation: prospects for growth, debt burdens, and the like. However, countries could do many things to improve their situation, even within these limited budgets. Agricultural research does not receive the priority it should because it does not have credibility with policymakers. At the national level, donors often play a disproportionate role, including the introduction of biases imposed on them by their own policymakers and their own institutional mandates. However, donors now seem to be willing to explore new mechanisms of support to research. Finally, Petit expressed concern with the degradation of agricultural education in developing countries.

Looking at support to international agricultural research, Petit noted a consensus coming out of the last meeting of CGIAR donors that multilateral funds should support genuine agricultural research activities of an international character and not be seen as a source of support to NARS. Bilateral sources of support for NARS exist. Making the best use of all types of funding will occasion new forms of partnership between NARS and international agricultural research centers (IARCs).

In conclusion, Petit noted that there was a reason for optimism: the need is there. However, he was less optimistic about solving our own credibility problem; we need to convince policymakers.

Discussion: Hussein Faraj

Mr. Faraj saw some reason for optimism in the fact that donors now appeared willing to look at the overall development of NARS, to move away from their previous concern with only infrastructure. The main responsibility for NARS remains, however, with national policymakers. He saw the need for new mechanisms at the national level:

- Development projects should retain a portion of their funding for research.
- Research should be involved in planning development.

With respect to the international centers, he noted that they are only one source of knowledge and training. There should be a move towards a new international agricultural research order, with joint involvement of all partners. IARCs themselves must also follow the advice they give to NARS to improve the management of their financial and human resources. Models such as the Special Program for African Agricultural Research (SPAAR) should be studied carefully: are they experiments to be evaluated or models to be extended? Finally, with respect to the role of the public and private sectors, Faraj expressed concern that the public sector will find its credibility problem exacerbated if it is left with only the long-term or basic research and the rest is devolved to other actors. It needs research with short-term successes to demonstrate its impact to policymakers.

The Role of Research Facing the Global Agricultural Challenge: The View from a National Agricultural Research System

Sjarifuddin Baharsjah

Dr. Baharsjah presented a view of the challenges to research from the perspective of a NARS. He stressed the following issues:

- Globalization of the world economy — developing countries are moving to science-based agriculture at a time of protectionism in developed countries and the failure to reach agreement in the Uruguay round of the negotiations on General Agreement on Tariffs and Trade (GATT).
- Changing structure of the economies of developing countries — using Indonesia as an example, Baharsjah noted that while the share of agriculture in Indonesia's GDP has fallen from 40% to less than 20% in the last 20 years, its share in the active labor force has only fallen from 67% to 55% — clear evidence of continuing low productivity.
- Sustainable agriculture — policies must address the three goals of growth, sustainability, and poverty alleviation simultaneously. Failure to address all three will mean that each is unattainable in the long run.
- Decreasing availability of resources — this trend includes land, water, energy, and biodiversity.

To address these issues, NARS must adopt the following policies:

- Find less water-dependent varieties.
- Improve crop management techniques.
- Protect against the extinction of certain species or the loss of special characteristics of familiar species.
- Economize on energy through recycling.
- Increase the value-added in agriculture through further transformations.
- Benefit from privatization (including efforts not to fall too far behind developed countries in areas like biotechnology).
- Address the fundamental task of poverty alleviation through diversification, which will generate employment and contribute to conservation.

This agenda is a full one for the NARS and has a number of implications:

- NARS will have to interface with other institutions at all levels: international, regional, national, and subnational. This includes agribusiness.

- The policy dialogue must include the finance and industry ministries.
- International agricultural research centers might help NARS convince their governments of the importance of research.

Discussion: Janice Reid

In the discussion, Janice Reid emphasized the importance of educating ministers of finance on the long-term needs of the country and the benefits of research. To achieve these benefits, a number of conditions must prevail:

- There must be a research-client symbiosis. Technologies must be appropriate to the needs of clients, and research must address the entire chain (filière).
- Research must convince policymakers that agriculture is sure (if slow) in addressing the real needs of farmers.
- Research must be multidisciplinary, including social sciences at the start.
- Scientists must learn to be politicians.
- Research must do creative planning, rather than just reacting to emergencies.
- Research must be prepared to propose innovative approaches, including some that may be considered retrograde, if they are appropriate (e.g., animal traction).
- Training must occur at all levels (scientists, technicians, administrative support).
- The benefits of networking must be recognized but not considered a panacea. It is one way to convince policymakers and donors that duplication is avoided and their money is well spent.
- Impediments shouldn't be put in the way of the private sector if it is willing to invest its money.

Plenary Discussion

A number of issues came up in plenary discussion:

- Agricultural research is not included in political discussions. In international restructuring efforts, research reform or the implications for research are seldom discussed. It was noted that policy lending by the Bank aims at quick disbursement and balance of payment support — areas dominated by the macroeconomists on evaluation teams. While operational divisions are generally favorable to research, this is not a priority in their short-term objectives. The debate is really one that must take place *within* national governments.

- The World Bank is a lending institution. Out of a portfolio of $22 billion, it lends some $100-200 million to NARS and $4 billion to agricultural-sector projects; it has only $65 million for grants ($35 million of which supports the CGIAR) in a multilateral mode.

- Two wishes were formulated for the World Bank:

  - Allocate 10% of World Bank profits to agricultural research.

  - Request the president of the World Bank to call an annual meeting with ministers of finance and planning to get their commitment to research.

- Studies of the returns to research in Africa are needed.

- Development projects, which benefit from past research, should have a fixed percentage of their budget allocated to research, not just to serve the project, but to provide a basis for future projects. This also recognizes the contribution of past research to present development.

- The World Bank signs its agreements with sovereign governments — which puts the responsibility for the appropriateness of the loan with the government.

In concluding the first plenary session, it was cautioned that the discussion was moving too rapidly to focus on funding and resource issues. This should not lead us to forget other ideas. The world is changing rapidly. The crucial question is whether our *institutions* and *concepts of agriculture* fit the needs of the changing world. "Institutional innovation" will emerge as the key policy issue. We should enlarge the concept to deal with the innovative capacity of the agricultural sector to deal with evolving challenges.

NARS Trends and the Structure of Support

Philip Pardey

Dr. Pardey presented an analysis of trends in the growth of national systems and the structure of support to them, based on the work of ISNAR's research policy group. The quantitative evidence bearing on the sustainability of agricultural research institutions brings out the following points:

- Over the period 1960-65 to 1980-85, the NARS in developing countries increased their share of the total numbers of scientists in publicly funded research from 33% to 58%. However, their share in total funding rose from 33% to only 43%. The problem has shifted from concern with the numbers of scientists available to developing-country NARS to their quality and the operating resources with which they work.

- Developing countries retain a strong commodity orientation (two-thirds are working in crops, 19% in livestock, 7% in forestry, and 6% in fisheries). According to the presenter, a congruence analysis would show that forestry research is slightly overrepresented in relation to the reported value of forestry production, even though forestry research units remain very small and possibly below critical mass.

- Over the period studied, large numbers of small systems (fewer than 25 scientists) grew to the above-100 size, giving the possibility of critical mass if the research scope is defined carefully.

- Pardey noted that developing countries that succeed in raising their growth rate in agriculture may have difficulty raising the share of agricultural GDP that is reinvested because the denominator (AgGDP) is growing as fast as their ability to expand the system (e.g., China). He recommended research into the political economy of support to research — an endeavor that ISNAR is undertaking.

- He underlined the need to look at alternative sources of funding for research. Proposals for cesses, check-off schemes, joint ventures, and contract research need to be evaluated for their efficiency and distributional effects. Research that increases productivity offers the possibility of capturing tax resources. However, such taxes may act as disincentives in commodity areas in which the country has a comparative advantage.

- Pardey drew a distinction between the funding of research and the execution of research. The private sector may execute research funded by the public purse, while the private sector may fund research executed by public agencies.

He noted a number of trends:

- There has been a slowdown since the mid-1970s in the growth of support to NARS. The agricultural research intensity ratio (ARI), or the share of agricultural GDP reinvested in research, is falling. The decline has been asymmetrical; it was more pronounced in Latin America, while Asia was better able to maintain growth in line with production.

- Real expenditures per scientist declined in all developing regions except Asia, while the developed countries increased spending per scientist significantly.
- Pardey described trends in four elements embodied in the ARI ratio:
  - the share of research expenditures in agricultural expenditures;
  - the share of agricultural expenditures in all government expenditure;
  - the share of government expenditure in the gross domestic product;
  - the share of agriculture in the gross domestic product.
- Available data show that the low-income countries spend as much of their agricultural budgets on research as the more-developed countries, and even a higher percentage of their total budgets on agriculture. However, they have lower fiscal capacity and a larger (relative) agricultural sector to deal with. This explains why they do not come up to the 2% ARI of the more-developed countries.
  - The more-developed countries are able to achieve an ARI of 2% because their relatively large nonagricultural sectors help finance agriculture (and agricultural research).

Discussion: Kurt Peters

In his discussion of Pardey's paper, Dr. Kurt Peters brought out a number of points:

- The structure of NARS is both diverse and complex. One has to look within systems to see how scarce resources compete with other sectors.
- Priority setting must address social needs and environmental needs as well as growth needs.
- Private-sector research is concerned with the speed of returns on its investment. Will the public sector be left with poor farmers and long-term research, where it is difficult to demonstrate success?
- Unfortunately, there is a very thin data base for demonstrating impact, and NARS have a continuing credibility problem with donors, governments, and their clientele. In developing countries, there is no organized lobby to keep research relevant. Is there a suitable structure for learning about the client and keeping research relevant?
- Project protocols should include the means of evaluation.
- NARS participate in a global system. We must seek complementarity in addressing research needs. Some groups (e.g., SPAAR) have raised expectations, but the support structures have yet to be created.

In his response to issues raised in the plenary discussion, Pardey noted that we are concerned with the capacity of NARS to deliver on a *broader agenda* in a time of *shrinking resources*. We need to understand what motivates different groups to support research, especially research of a long-term nature.

A Policy Perspective on the Sustainability of Production Environments: Towards a Land Theory of Value

C. Ford Runge

Prof. Runge's paper on the sustainability of production environments attempted to synthesize the "agricultural research" and the "environmental research" perspectives around the issue of targeting research and policies to production environments. It was noted that production environments are diverse, and therefore the mix of policies and research strategies must be appropriate to the circumstances.

To reconcile the views held by agricultural research and environmental research proponents, it is useful to contrast them. The importance of each perspective may vary according to the economic situation of the country concerned. Some illustrative points are listed below:

- The developed North, which has solved its food problems, will be more likely to give priority to the environmental approach than will a poor country. Environmental "goods" (and prevention of environmental damage) are in the consumption priorities of higher-income populations — and there are political processes for this demand to enter the agenda.

- Agricultural research has been product oriented, market driven, and reasonably optimistic about the prospects for research to find a solution to problems of resource scarcity. On the other hand, environmental research has been process oriented, concerned with issues that the market fails to handle, and pessimistic about the availability of resources.

In an attempt to bring these two approaches together, Runge proposes a targeted approach to production environments that takes a systems view. He recommends a different mix of policies and research strategies for the use of land of differing characteristics. He characterizes "land" (production environments) in a 2 X 2 matrix:

1. Low Production Potential / Low Vulnerability to environmental damage. In this environment, he would accord low policy intervention and low research priority. There is little to be gained from research and little to be lost through environmental damage.

2. High Production Potential / Low Vulnerability to environmental damage. Here he recommends yield-promoting policies and yield-promoting agricultural research, the "agricultural research paradigm."

3. Low Production Potential / High Vulnerability to environmental damage. In this environment, he would use regulatory measures and penalties to prevent abuse of the environment, while carrying out environmental research.

4. High Production Potential / High Vulnerability to environmental damage. In this one, he would have special policies promoting "high-precision farming" and would carry out "sustainability research."

In conclusion, Runge argued for policies that differentiate according to the way a product is produced and for a research approach that is differentiated at the national, regional, and farm levels. The principle of "decoupled policies" argues for one policy instrument per policy target. Blanket policies such as "get the prices right" cannot solve all the problems. He warned that the liberalization of world trade and integration of the world market would lead to a trade in "environmental goods" and "environmental bads" (damage). Freer trade should not be the occasion to exacerbate the problem of environmental degradation in developing countries through inappropriate policies at either the national or international level.

Discussion: Leki Dorji

In presenting complementary ideas to Runge's paper, Mr. Dorji drew on the experience of Bhutan to bring out the following points:

- The production process is intrinsically land based. Research on production systems deals with the interface between people and the resource base.
- Conservation of the environment is not exclusively a concern of developed countries; developing countries are aware of it and have structured their research on production systems accordingly. Bhutan, for example, has structured its research around six production systems.
- Sustainability is recognized as a multifaceted problem and there is a need to seek sustainability in all types of systems in a country.
- Systems must deal with "people-centered problems." Technologies cannot be introduced without discussion with the 40% of the South Asian population who are ostensibly targeted by international efforts.
- Research on renewable natural resources must fit biophysical and socioeconomic contexts. In Bhutan, farmers are often producing in three or more production systems at the same time: wetlands, drylands, and forest.
- The integration of approaches begins with integration of training programs.

Plenary Discussion

In the plenary discussion, a number of new points came up with respect to the concept of sustainability policies needed and their institutional implications. The following points were stressed at the conceptual level:

- Sustainability as a concept must include both *institutions* and *production systems.*
- The term *sustainability* has become a buzzword that may not be sustainable. We are really dealing with an obvious phenomenon: the growth in importance of environmental and natural-resource research. The World Bank is becoming environmentally active and will use both its carrots and its sticks to promote these concerns.
- There is a need to treat sustainability as a dynamic problem. One suggestion is to put the farm, as a multienterprise unit, at the center of the system. We need to define and agree upon what it is that needs to be sustained. Before the widespread use of nonfarm inputs, the goal was "sustainable survival of the farmer's family and his descendants," not sustainability of production, per se.
- The South is not monolithic. As countries become richer, they will become more concerned with environmental degradation concerns.

At the policy level, the following points were made:

- Traditional farmers and customary laws incorporate ideas of sustainable systems. The question of whether customary laws are still appropriate to present circumstances needs to be examined.
- There is an interaction between structural adjustment policies and sustainability. For example, the reduction of subsidies on cooking gas as a measure to reduce budget deficits has led to the destruction of forests for the production of fuelwood, with no attempt at replenishment.
- Policies must penalize polluters, not reward them.
- The crucial issue for developing countries is the sustainability of policies and institutions. This requires agreement on basic goals.

At the institutional level, the following points were made:

- Sustainability is a concept with no well-developed constituency in developing countries. Attention to it raises a dilemma: it makes research institutions responsible for an issue with no political constituency when they have already failed as institutions to deal satisfactorily with more clearly demanded concerns.

- Many systems still have bureaucratic barriers between the types of research needed to do sustainability research.

- The role of various actors and their limitations need to be examined: donors influence agendas, the private sector does little innovation (mostly final adaptation), and nongovernmental organizations (NGOs) are often technically weak.

- NARS structures are changing very rapidly. Leaders face different approaches: the horizontal approach of the farming-systems research proponents versus the vertical *approche de filière*. When is each approach appropriate?

- The implications for national systems in adopting the Runge suggestions for targeted policies are serious. NARS would require the following:

  - new sources of funding;

  - management structures to support the approach;

  - new forms of training;

  - new approaches to programming;

  - mechanisms to implement differentiated recommendations for targeted areas;

  - involvement of Northern countries with vested interests in existing systems.

In his response to the plenary discussion, Runge reiterated that the objective was not to oppose agricultural research and environmental research, but to bring them together in a more integrated approach with targeted policies, decoupled policy instruments, and research strategies. The North has not done a good job in meeting environmental concerns. (The European Economic Community's Common Agricultural Policy and United States subsidies have produced massive environmental damage.) How can we prevent this in developing countries, where the demand for environmental protection is weaker? It is important for the agricultural research establishment to seize control of the sustainability debate and propose solutions that are technically and economically feasible; otherwise, outside groups will force solutions on them that may be neither cost-effective nor technically feasible.

ISNAR's Director General noted several activities underway at ISNAR to address policy and institutional issues facing NARS:

- updating of the information base on trends in NARS capacity in Africa;

- examination of linkages between national research institutes with new actors (universities, NGOs, IARCs, regional organizations, networks);

- studies of the financing of research, including the factors affecting the division of the total resources supporting agriculture, many of which come from outside the agricultural budget.

Working Group Reports on the Policy Environment

Working groups were organized on a regional basis to identify the major trends and policy issues that influence the effectiveness of research. Groups were asked

to consider this for NARS in general and for their own region. They were further asked to look at what NARS leaders, policymakers, the international research community, and donors should do to overcome constraints to effective research systems.

A number of trends were identified by the working groups. Not every trend was cited as a problem in all regions. The following, however, were mentioned as being of overriding concern:

- population pressure leading to land degradation (highlighted especially by West Asia-North Africa [WANA]);
- increasing dependence on food imports (WANA, sub-Saharan Africa);
- declining terms of trade for exports (Asia).

No particular recommendations were put forward in this session for dealing with these factors. However, some of the later recommendations cover the need for analysis and policy recommendations.

A number of external constraints were noted as facts of life, but not indicative of any trends:

- lack of an enabling environment, including physical infrastructure such as transport, ports, refrigeration, processing facilities (WANA);
- high energy prices and the need to find alternative or cheaper sources (WANA).

Institutional issues were also cited in all regions:

- The importance of regional collaboration, which was said to be working well in Latin America. In WANA, however, speakers drew attention to the lack of political will, even in the presence of formal structures and available funding.
- The efficiency and effectiveness of research systems. ISNAR's assistance was requested in developing approaches to evaluating the performance of systems.
- Institutional instability, which often reflects the instability in governments themselves and political structures (Africa, Latin America). It is often associated with a high turnover in leadership.
- Human resources. The numbers of scientists working in developing-country NARS do not seem to be the limiting factor. There is some concern with experience profiles, disciplinary appropriateness for new challenges, and an aging of the scientific cadre as entire cohorts hired during the expansion years come up to retirement age. However, the call for outposting of expatriate scientists to NARS was not general, but was related to specific skills, systems, or niches (Africa).
- The integration of research and technology transfer was a theme that was mentioned at various points in the debate and was not exclusive to any region.

Policy issues can be broken down into those relating to the international economic environment of the country and national- level policies.

At the international level, the following were discussed:

- Protectionism, subsidization, and the GATT negotiations. It was generally accepted that trade liberalization would be pro-agriculture. However, the concern was that agricultural research has had no input to the negotiations and that the institutional capacity to deal with adjustment was weak.

- Intellectual property rights (IPR). This is a major discussion in the GATT negotiations, but it is unlikely that NARS have had any input in the discussions or that the eventual agreements will show any specific consideration of the agricultural research sector in developing countries.

At the national level, the following issues were highlighted:

- Macroeconomic situation and structural adjustment. There was no adequate understanding of the special characteristics of NARS when structural adjustment measures are applied across the board in the public sector.

- Private sector. It is necessary to define the respective roles of the public and private sectors, stressing their complementarity. Above all, the public sector should not put impediments in the way of the private sector when it wants to work in an area (Latin America).

- Relations with policymakers. Research has a credibility problem with its own policymakers, and it is unable to influence many decisions that have an impact on its effectiveness.

- Policy framework. In the absence of a policy framework (or in unstable policy environments), research has difficulty setting priorities and later demonstrating impact.

- Priority setting. The need for improved methods of priority setting was mentioned in all areas. The need to develop methods for priority setting in a regional framework was brought out strongly in the case of Africa and Latin America, where regional approaches are becoming an institutional reality.

- Legislation. To help create an enabling environment for research, legislation providing protection for intellectual property rights was seen as an urgent need. Legislation providing incentives to researchers was also highlighted.

- Level of funding. Funding was said to be inadequate in all regions. The need for commitment by national policymakers was considered essential if donors were to be convinced to help.

A number of specific recommendations were made to different actors in the system.

Addressing NARS leaders and policymakers jointly, the working groups came up with the following suggestions:

- Improve the policy analysis capability.

- Educate key policymakers to the needs and opportunities presented by NARS.

- Improve interinstitutional coordination within the agricultural sector for a stronger policy dialogue with policymakers.

- Find the means to involve research's rural constituency in putting pressure on policymakers.

A number of themes and activities were recommended to ISNAR:

- Assist NARS in their policy dialogue with domestic policymakers. This was not universally seen as a role that ISNAR should play. For some it was seen as unnecessary; for others, inappropriate. However, helping to develop a national capacity to participate in the policy dialogue was accepted as an appropriate role for ISNAR.

- Study the impact of structural adjustment on NARS and provide advice on alternative strategies.

- Assist NARS in understanding the technical issues underlying legislative issues, such as intellectual property rights and biosafety, as well as their institutional implications.

- Provide methodologies and assist NARS in evaluating institutional performance and demonstrating the impact of their research to policymakers.

For donors, recommendations concentrated on resources. These dealt with the level, the approach to obtaining them, and methods of disbursing them:

- Build into development projects a percentage of the overall budget that will go to finance research. This would not necessarily be linked to research in support of the project in question, but it would serve instead as a recognition that all projects benefit from past research and should contribute to research that will support future development.

- Propose a fixed percentage of development-bank profits to be earmarked for agricultural research.

Two suggestions were made to raise the profile of agricultural research in the minds of the world's policymakers:

- Recommend to the Food and Agriculture Organization of the United Nations (FAO) that International Food Day (October 16th) be dedicated to the theme "Food from Research."

- Bring together key actors in the international development community and international research community to prepare and ratify an "International Research Charter."

Plenary Session
Scientific Advances in Agricultural Technologies as Opportunities for National Systems

The objective of this session was to initiate a discussion on the contributions that technology can make to the goals of growth, poverty alleviation, and sustainability. To do this, a brief presentation on technology assessment was designed to put forward some critical questions about new technologies. Four examples of "new" approaches (biotechnology, agroforestry, integrated pest management, and information systems) were presented by specialists in these fields. The presenters were asked to provide an introduction to the approach with enough elements of assessment to permit participants to examine the technologies in depth in working groups.

A Technology Assessment Perspective
Jock Anderson

The presenter set out a framework and a few general principles to take into account in technology assessment:

- Don't underestimate the difficulties with risk and cost that resource-poor farmers have when adopting new technologies. (And once having introduced a technology which fails, don't abandon the farmer.)
- Note the true cost of support services; don't build in incorrect prices from the start through inappropriate policies.
- Policies that reduce distortions in prices generally tend to be environmentally friendly.
- Following the Green Revolution, research became more "managerial" — it dealt increasingly with location-specific issues that, by their nature, create difficulties in transferability.
- Technology may not be the best instrument for dealing with distributional objectives. Examples were given where technology was designed to meet the specific needs of a client group, but Anderson cautioned against using technology to solve equity problems.
- Sustainability was interpreted as "the consequences for the resource base of adjustments to agricultural techniques." The challenge of developing measures to look at the long-term consequences of technological modifications is being taken up.
- Institutional sustainability, defined as a "structure that sustains performance," is a necessity. Many donor projects suffer from design failure with respect to the institutional sustainability of the NARS we seek to develop.

- There is evidence of economies of scale and scope in research, and consequently, there is an opportunity for gain through technology-sharing arrangements.

In conclusion, Anderson noted that the specific technologies to be discussed in the following sessions were all environmentally friendly, so we would not be dealing with a representative sample of technologies currently being promoted in NARS.

Biotechnology as an Opportunity for NARS
Gabrielle Persley

Dr. Persley introduced biotechnology as a gradient of technologies going from traditional uses (fermentation) to the most complex and costly forms of genetic engineering. The explosion of knowledge in the area was illustrated by a simple plot of significant breakthroughs taking place over the last few decades. Most have occurred in the very recent past.

It was stressed that biotechnologies are, in fact, techniques and not technologies per se. Persley discussed the techniques being used for crops (rapid propagation, diagnostics using monoclonal antibodies, genetic engineering, and genetic mapping). The principal advantages of these techniques are a decrease in time (research lags) and an increase in accuracy in breeding programs.

She described the expected time frame for biotechnology to realize substantive progress in certain crops:

0–5 years:	potato, rapeseed, rice
5–10 years:	banana/plantain, cassava, coffee
10+ years:	coconut, oilpalm, wheat

Most of these were described as "orphan commodities." An orphan commodity is of little interest to the private sector in developed countries because there is no way to appropriate the benefits. It is of little interest to public institutions in developed countries because the commodity is not grown there.

Biotechnology is likely to have some distributional effects. On the positive side, it might improve the export competitiveness of those using it, permit cultivation of food on presently marginal land, and reduce the use of agrochemicals. On the negative side, it might provide substitutes grown in tissue culture for natural products (vanilla).

Specific issues raised for discussion include the following:

- designing creative partnerships between public- and private-sector interests;
- evaluating the benefits and costs of intellectual property rights in developing countries;
- providing a safe and efficient regulatory environment for biosafety;
- incorporating biotechnology into existing programs rather than creating new institutions.

In the plenary discussion, a number of points were brought out:

- There is a need to evaluate the targets for which biotechnology is being used as a technique. Dr. Persley agreed that biotechnology is not always the best technique for addressing a problem, and problems should not be identified simply because they can use biotechnology.

- A number of issues on industrial organization were raised with respect to the biotechnology industry. These included the shake-out of small firms, the impact of regulatory policies on the structure of the industry, the use of biosafety regulations as nontariff barriers, different policies on biosafety between Europe and the US, and the appropriateness (or lack thereof) of conventional quarantine regulations to deal with different levels of risk.

Problems and Perspectives of New Approaches to Pest Management
Thomas Odhiambo

Prof. Odhiambo's presentation announced the "end of the pesticide era." Over much of its fairly recent history, integrated pest management (IPM) has been rediscovering techniques used by farmers for millennia, but the science base for the technology is often weak. There is a need to find out why and in what circumstances the concept works.

Techniques tried by IPM include intercropping, plant resistance, pheromones, and biocontrol using predators and pathogens.

Dr. Odhiambo stressed the multidisciplinary approach that is required for a successful IPM program. Entomology, biochemistry, and social sciences are all needed for understanding "the part that pests play in a man-made ecosystem."

In plenary discussion the following points were put forward:

- In spite of certain successes in IPM, it was wondered why the concept was still not widely accepted. A number of possible answers referred to the characteristics of particular commodities, institutional problems, and broader issues of policy:

  - The conditions for IPM's success in cotton in the US are not present in food crops in developing countries.

  - The absence of a traditional extension system in developing countries has been a hindrance; IPM was seen as being most effective where scientists participated as part of the extension system.

  - The must also be a "social" policy that provides incentives for the group to adapt IPM to their own situation.

Opportunities for NARS: The Case of Forestry and Agroforestry
Bruce Scott

Dr. Scott introduced the subject by noting that we are talking about age-old practices. However, *agroforestry* may be defined as "the deliberate introduction of trees and shrubs in farming systems." It is concerned with both the production

aspects (food, fuel, fodder) and the service functions of woody species (protection against erosion, maintenance of fertility). Much of the work being done by the International Council for Research in Agroforestry (ICRAF) deals with the competition between species above and below the ground how these relationships work.

Scott introduced the wide range of agroforestry practices of differing intensity and differing degrees of integration with crops. The list includes, among other things, a parkland system of dispersed trees, intercropping, boundary planting, and alley cropping. He noted that multipurpose trees and shrubs (MPTS) are neglected by traditional forestry research because of their limited commercial value, but they have multiple functions for farmers. Agroforestry is seen as an approach rather than a separate discipline. It requires cooperation with the disciplines in agronomy and with forestry research for the tree components. It is a challenge to existing institutions to work together at the field level to improve the quality of land.

In the brief plenary discussion the following points were raised:

- There are implications for extension and training in an approach that requires more technical and managerial knowledge than ordinary commodity extension.
- Certain species (eucalypts) were not included by ICRAF as a multipurpose tree, and the commentator concurred with this.

The discussion was followed up later in a working group dedicated to agroforestry.

Opportunities Presented by Information Technologies
Roelof Rabbinge

Prof. Rabbinge, of Wageningen Agricultural University, introduced the use of computer science and information systems in research. He saw agriculture as a science changing from an empirical approach to one based on insight into how things work. He illustrated his talk with examples from the field of theoretical production ecology which uses information to explore the flows of materials and energy to achieve the most efficient biological use. It is aimed at the exploitation of living systems to reach various objectives (high productivity, reduced environmental damage).

The development of information systems has implications for agriculture, research methods, and policymakers. The following points were brought out:

- The price of hardware is falling, and the capacity of computers is rising rapidly.
- Expert systems and supervised control systems have immediate uses in the agricultural sector. Software is increasingly available for research purposes.
- The organizational implications of information technology are substantial. Much depends on whether the operation is centralized or decentralized.
- Information systems need continuous upgrading and servicing. NARS will look to IARCs and others for backstopping. The private sector is becoming involved in providing support to producers.

- The information revolution is probably not neutral across countries. In production, the most advanced producers are likely to adopt it first. Research can benefit from information technology in developing countries, but many do not have access to it at the present time. For policymakers, the technology may enhance the support structures for decision making that already exist.

- A country wishing to improve its information systems needs to train groups of people, not individuals.

- Communications technology enhances networking and the spread of information.

- Geographic information systems (GIS) and simulation studies can be used to facilitate land-use evaluations for deriving decision-making options. They can contribute to sustainability by improving our understanding of how to target resources for productivity and sustainability.

- The quality of information put into the system is of crucial importance.

It was noted that not everything has to be done by the NARS and there is scope for collaboration in this area.

Plenary Discussion

In a brief plenary fixing some points for working groups, the following additional comments were made about specific technologies:

- Integrated pest management. IPM in cotton in the Sudan was forced on farmers by the failure of the government to import the necessary chemicals. After two years of declining yields, a natural equilibrium among insects was established and yields recovered without pesticides. Another example of success was noted: in 70% of Dutch greenhouses, pests are controlled by biological means.

- Information systems. GIS and simulation models are already rationalizing the need for multilocational trials and helping to target research.

- The discussions of the technologies pointed out the importance of maintaining national agricultural research systems in support of these more managerial and location-specific approaches.

Long-Term Vision of the CGIAR

Alex McCalla

Dr. Alex McCalla, Chairperson of the Technical Advisory Committee (TAC) of the CGIAR, described the process by which TAC became involved in a study of the expansion and priorities for the system. During the May 1988 mid-term meeting of the CGIAR in Berlin, the donors called for a study of the possible inclusion of 10 additional (already existing) institutes, which would broaden the coverage and increase the scope of the CG system. This implied the need to assess long-term priorities for research, the role of the CG system in addressing these priorities, and the need for the particular institutes proposed for entry.

The strategy exercise involved identifying the long-term trends, deriving the kinds of activities that would be needed, and preparing a medium-term vision of the system that would lead the system to its long-term role.

The starting point was a recognition of the fact that if we are to feed a population of eight billion people in the year 2025, the national agricultural research systems must be strengthened. The question was posed as to what kinds of transnational institutions are needed to produce the "international public goods" that other parts of the global system require. A number of assumptions underlay their vision:

- NARS will be stronger. Evidence from ISNAR has shown that greater numbers of scientists and stronger programs have been built up over the last 25 years.
- As NARS become stronger, networking will become more feasible.
- More research will be carried out in a regional mode.
- Basic research is needed in NARS for the development of scientific maturity. The definition of NARS includes universities and research in collaboration with the private sector.
- Improved partnerships will involve changes in who pays for research and who carries it out.
- International strategic research will be of particular relevance in this vision.
- The research agenda will become broader.

The CG system would take on a selective task of transnational and global research of a more strategic nature as NARS take on adaptive and applied research. This would imply a smaller CG system in the long-term vision. It would include activities in the following areas:

- germplasm (conservation, maintenance of collections, and basic manipulation);
- research of a strategic nature on natural-resource management;

- research policy and management;
- global information.

In the medium term, the CG sees the emergence of two types of institutions: (a) those organized on an ecoregional basis, concentrating on research on the natural-resource management, land use, and commodity farming systems for the ecoregion, and (b) institutes with global activities, carried out in one place because of their strategic nature, economies of scale in their execution, or applicability across ecoregions. It was emphasized that the strategy deliberately did not identify these activities with particular institutions or centers, leaving open the possibility that in some regions such activities could be carried out by lead national institutions or regional programs.

Discussion
Lydia Makhubu

In discussing Dr. McCalla's presentation, Dr. Makhubu made the following comments:

- The environment in which this vision takes place is one of rapid change. Institutions must be designed to cope with rapid change.
- The *long term* is defined in the TAC vision as the period in which "NARS are able to meet their national research needs by their own efforts or in collaboration with others." This will involve the mobilization of all institutions, including universities (which, themselves, are in the process of redefining their own mandates).
- The need for national institutions to be involved in basic and strategic research in certain areas was strongly endorsed.
- Regional research mechanisms can only work if the national systems are strong.
- The movement of the CGIAR into issues that are truly transnational and global must not lead to a disengagement of CG institutes from the NARS.
- There will be a continuing need for the upgrading of developing-country scientists.
- The success of the CGIAR will be measured by the degree to which NARS are properly led to their expanded responsibilities.

In plenary discussion of the paper and the discussant's report, the following points were highlighted:

- The CGIAR institutes account for a small portion of the global effort in research (2%) and of research expenditures in developing countries (5%). Roles and expectations should be commensurate with the resources allocated.
- At the present time, funding of the CG institutes comes from development ministries concerned with the development of sustainable institutions in NARS.

The ultimate objective, however, is one of providing the technology needed for development. Development ministries should note this role in determining their support. Bilateral desks should provide properly for institutional development of national agricultural research systems. Support to international research comes from multilateral desks and these funds should not be seen as competitive with support to NARS. As the CG system moves upstream, ministries of science should recognize their interest in it, and new sources of funding should also be explored with such ministries.

- The long-term vision recognizes that there will be heterogeneity in NARS and that the strategy will have to be differentiated on a regional basis or by level of development of NARS.

The Role of Research Networks and Regional Cooperative Programs in Latin America

Eduardo Trigo

The long-term vision of the CGIAR presented by Alex McCalla provided a good introduction for a view of Latin American regional organizations. Latin America has the longest history of regional institutions and cooperative networks. Trigo drew the distinction between *networks*, characterized by informal mechanisms linking researchers concentrating on a single commodity, and *cooperative programs* with formal links among institutions working on several crops. The directors of these institutions make up the boards of these programs and provide the mechanism for joint planning and evaluation.

Subregional networks offer the following characteristics and prospects:

- Subregional groupings will be defined by the sharing of common problems and common political agendas.
- They have historically been initiated by the region but strongly supported by donors during their establishment. They face the problem of survival beyond the initial grant-sponsored establishment. The experience of Programa Cooperativo de Investigación Agrícola del Cono Sur (PROCISUR), the oldest of the regional programs, is promising.
- There is complementarity between NARS, IARCs, and networks.
- Natural-resource management and land use involve research in sensitive political issues for which regional cooperative programs offer special advantages.
- Through institutional consolidation, regional programs could eventually substitute for the outreach of international centers (activities largely associated with the "ecoregional role" of centers in the medium-term vision of the CG).
- An increased role is foreseen for cooperative programs which includes direct participation in research (not just coordination) in areas such as biotechnology.

Discussion: Tijan Jallow

Dr. Jallow was pleased with the way Dr. Trigo's paper made the case for regional cooperation. This case is recognized fully by the member countries in his region. In West and Central Africa, 16 ministers of agriculture identified collaboration in agricultural research as one of the priority areas for action. He identified the issues facing regional organizations:

- the stability of the organizations;
- the stability of the political environment;

- potential conflicts between NARS and regional institutions.

He also identified three pressing issues:

- The diversity of regional models of collaboration (institutional networking, regional coordination, and regional research centers) — conditions for success seem to involve restricted size (for sustainability and to avoid draining resources from NARS), emphasis on "clearinghouse" and technical service roles, and clear and unequivocal control of policies and orientations of programs by NARS.

- Priority setting in a regional context — there is a need to go beyond intuitive approaches and consultative (political) processes to a more rigorous method to inform decision making. The method should emphasize the complementarity among institutions of the region.

- The interface between regional organizations and IARCs — IARCs will have a continued role in strengthening NARS, in helping mobilize support for research, and in technical backstopping for research of a strategic and international character.

The corollary of these observations is that a concrete plan to meet these objectives is required.

The International Division of Labor: The View from Large National Agricultural Research Systems

Adel El-Beltagy

Dr. El-Beltagy emphasized that an international flow of information and scientists is vital for NARS. The CG institutes have a key role in fostering the necessary linkages and ensuring constructive interaction among NARS.

He used the Egyptian system to discuss the international division of labor. In his presentation, he brought out a number of contributions that large systems can make to the achievement of a second Green Revolution:

- They can serve as strong partners in regional collaboration.
- They can provide skills that cannot be found in smaller systems, particularly with respect to sustainability research.
- They can put their expertise in areas like biotechnology and expert systems to the service of other NARS.

For this to be productive, however, there must be political will to collaborate, both among scientists themselves and at the level of policymakers. He argued that agricultural collaboration among developing countries is a necessity and also a means of increasing the interest of industrialized countries in collaborating with them.

Discussion: Manuel Lantin

In discussing the ideas and examples put forward by Dr. El-Beltagy, Dr. Lantin brought out the following points:

- Sustainability and environmental concerns are being given a high priority by the CGIAR institutes and their donors. NARS are already dealing with this agenda, but it is not necessarily the province of large NARS.
- Regional integration is more difficult than the presentation would lead us to believe. The examples of success were countries sharing frontiers and a common natural resource (Nile Valley).
- Large NARS usually have fully fledged breeding programs of their own and are better able to cooperate among themselves. The capacity to do this is essential to the long-term vision of the CGIAR and its move upstream.
- The NARS are building a basic research capacity.

Returning to the international division of labor between NARS and IARCs, he expressed the hope that donors would not lose interest in the CGIAR as it moved upstream.

The International Division of Labor: The View from Small National Agricultural Research Systems

Mario Contreras

In his presentation on small NARS, Dr. Contreras felt it was important to emphasize the fact that small NARS are not only recipients of technology and methodology, but they also develop technology in specialized areas. Costa Rica, for example, has produced the highest yields of quality coffee in the world. Honduras has been a leader in banana and plantain research. The contributions of small NARS in the international system include the following:

- contributing to the understanding of the social and economic forces at work locally;
- providing technology to other countries through networks, particularly where a country serves as the node or lead center on a specialized research problem or commodity.

He identified the principal factors affecting the performance of small NARS as follows:

- an inadequate policy framework;
- scarce human resources;
- weak information management systems, both for accessing information and for disseminating their results.

Factors contributing to the success of small NARS were seen by Contreras to include the following:

- sustained domestic support;
- clearly focused participation in regional programs;
- client and private-sector participation;
- acceptance of international assistance only if it meets national needs;
- effective use of limited resources.

The expectations of small NARS from IARCs and regional organizations include

- information, research materials, and training;
- institutional development support;
- linkages for the flow of technology;

- continuity of support for programs (often suffering from lack of continuity from other sources).

There is a good record of collaboration on research in export crops where all producers share a common problem, do not compete in a way that depresses markets, and have a limited supply of technical knowledge to serve them all.

In looking for improvements, Contreras noted that collaboration would be enhanced by global planning with donors for the region.

Discussion: Jean Ndikumana

Speaking largely with respect to small African NARS and illustrating his discussion with the Burundian case, Dr. Ndikumana highlighted a number of points:

- Diversification of export portfolios is a common concern for small NARS.
- Systems have inadequate domestic funding and may be dependent on external sources for as much as 75% of their resources.
- Many systems still have a scarcity of human resources, with expatriates accounting for as much as 40% of staff.
- Dependence on external funding and staffing may distort national priorities and neglect the concerns of farmers.
- A stronger networking approach is needed.
- Competition among small countries in export crops is not a problem, because none of them can significantly affect world prices or markets.

Plenary Discussion

In plenary discussion of the two papers, participants added the following comments:

- Management mechanisms are crucial for effective collaboration on critical problems.
- Innovative approaches to getting funding are needed. For example, trade negotiations leading to free entry of Central American coffee to the EEC market created a windfall for exporters. It should be a source of increased support for research, but it has not yet been tapped. Industrial countries can help in identifying and tapping new funding sources.
- Small NARS may have to devote relatively large portions of their budgets to generating information about the local biophysical and socioeconomic environment and to accessing technology from the outside, rather than carrying out conventional research per se.
- In Central Africa (the case of the Institut de Recherche Agronomique et Zootechnique [IRAZ]) both NARS and international centers have bypassed the established regional center. The case illustrates the need for a regional center to have a role based on the needs of NARS and not to be competitive with or marginal to their interests.

The discussion of the emerging international system was carried forward to the following day.

ISNAR and the Needs of NARS

C. Bonte-Friedheim

Dr. Bonte-Friedheim introduced the revised ISNAR strategy by stressing the breadth of the mandate and the limitation of resources for doing the job. Its mandate is evolving with the expansion of the CGIAR mandate, the growth and increasing maturity of NARS, and the need to include a wider range of actors in the definition of NARS.

The definition of a *NARS* includes all national organizations responsible for organizing, coordinating, or executing research that contributes explicitly to the development of the country's agriculture and the sustainability of its natural-resource base.

The criterion for direct assistance from ISNAR in institution building will be one of accountability to national research and development goals. The strategy confirmed that public research agencies will be needed to serve as the core of the system dealing with resource-poor farmers and issues of social concern, where market failure occurs. Other entities meeting the criterion of accountability will be eligible for assistance where the probability of ISNAR's making a significant contribution to system improvements exists.

ISNAR has identified three types of services it will provide to the range of clients and stakeholders it faces:

- intensive partnership in system and institution building;
- support to NARS in strengthening specific institutional and research policy components;
- generation and dissemination of knowledge and information.

These three types of services attempt to reconcile the broad mandate held by ISNAR with its limited resources by differentiating the services available to NARS. Not all NARS need or request an intensive collaboration across the range of management issues. However, a limited number of *long-term partnerships* will be maintained where a NARS is undergoing significant reorganization or development efforts. The limitation in number of such partnerships will allow ISNAR to reach a wider range of NARS through its response to requests for strengthening those *specific components* in which ISNAR has specialized expertise. The experience gained in these two modes of collaboration will permit it to generate new knowledge and approaches to strengthening NARS, in both a holistic fashion and on specific components. Its synthesis of field experience and knowledge gained from research will be disseminated as "public goods" to the broader community, with targeting of certain publications to specific regional groups or to the global community.

In meeting the needs of its clients, ISNAR will increasingly seek partnerships with other entities (universities, regional organizations, international centers) in developing new knowledge and delivering service.

Discussion:
M. H. Faraj

In commenting on the draft strategy for ISNAR, Mr. Faraj noted that ISNAR has done a good job and that its clients are happy. The ISNAR strategy document in its complete form will need to provide more information about the activities ISNAR has done, the countries it has served, and the evidence of ISNAR's impact. He indicated a number of points that need to be clarified:

- The three services. Does this create three classes of clients who receive different classes (or qualities?) of service?
- Meeting the demand. The strategy is strong on identifying the needs of NARS but does not go into the way ISNAR itself can meet the demand. Even with its strategy of differentiated service, does ISNAR have the resources to meet the demand?
- Collaboration. In developing its collaboration with the "partners and multipliers" of its services, will ISNAR be able to develop them, guarantee the quality of service, and still meet the demand of its primary clients, the NARS?
- New skills. The broadening of the mandate and the inclusion of new clients as partners implies not only the need for *more* resources but *new* skills within ISNAR.
- New clients. ISNAR has assisted a fellow CGIAR center in its program formulation exercise using approaches developed in association with the Moroccan system. This is a positive example of collaboration among institutions. Does it also presage a new class of client for ISNAR within the CG system, with resource implications or implications for NARS?
- Regional balance. Will the strategy imply a *relative* reduction of the support ISNAR accords to sub-Saharan Africa along the lines laid out in the long-term vision of the CG? Mr. Faraj stressed the importance of the problems facing NARS in that region.

In conclusion, Mr. Faraj recommended that donors create a special (non-core) fund that would allow ISNAR to respond rapidly to NARS requests for assistance. Rapid response to requests for specific component-strengthening activities cannot be effectively provided at the levels demanded if individual project support must be sought each time.

Plenary Discussion

In plenary discussion the following points were brought out:

- The recent external review of ISNAR confirmed that ISNAR was basically healthy but required additional resources to do its job. A wealth of background information for the review panel documented its activities and impact.

- In its revised medium-term plan, ISNAR will propose a slight reduction of the activities it directs at Africa from 50% to 40% of its portfolio, with an increase in activities directed towards Asia from 20% to 30%. This reflects a concern with this large region and the proportion of its population at poverty level. ISNAR will review its allocations every two years since it is a demand-driven institution.

- A special fund to enhance ISNAR's response capacity would be sought. This would include resources for experts coming from NARS in support of other NARS. In this way ISNAR would enhance the ability of "partners and multipliers" to meet the needs of fellow NARS.

- The demand for ISNAR's services is evolving from assistance for general system diagnosis and recommendations to a demand for specific technical guidance on methodologies or management tools. In some cases, NARS seek only access to ISNAR's "public goods" (information, publications).

- By differentiating among its services, ISNAR hopes to meet the largest number of high-priority demands coming from its NARS partners.

- In the final analysis, it will be difficult for a NARS to perform better than the rest of the institutions in the country in which it operates. This underscores the importance of ISNAR's work in the policy area and the general need to create an enabling environment for NARS.

Plenary Session
Institutions in Agricultural Research and the International Division of Labor

Participants felt that a final plenary session would be the most effective way to bring together the ideas that emerged during the course of the workshop. The final plenary concentrated on defining roles in the emerging global research system and making recommendations for the actors.

The general consensus in this plenary session seemed to focus on the following:

- The emerging global research system is being driven by a number of trends, which include
  - political and economic integration at both the global and regional levels;
  - a broadened agenda requiring research solutions;
  - the growing maturity of NARS;
  - changes in science and information technology;
  - the need to include new institutions in the research process.
- The revised agenda for the global research system will require adjustments in institutional structures, mechanisms, and policies on the part of all participants and stakeholders in the system, including the donors who fund it. New partnerships and alliances will have to be formed.
- The common task of all those present is to produce innovations that serve clearly defined goals, not just to carry out research per se. This requires the creation of an enabling environment for technology development and adoption. Attention must be given to the entire system and its linkages, since agricultural research cannot be separate from (and perform better over the long term than) the environment in which it works.
- The CGIAR system is recognized as a small part of the global research system and of research focusing on developing countries. It should not be seen as an aid organization or as a vehicle for passing resources through to national systems. Its long-term vision calls for it to work on research of a global nature and to produce "international public goods." Its evolution towards this goal depends on the existence of strong national research systems. It must function as an excellent research system and should not be called upon to perform tasks for which it does not have a comparative advantage.
- Regional entities and regional mechanisms, emerging from the bottom-up demand of national systems, are playing a role in the transition to the long-term vision of the CGIAR.
- There is a need for structures and mechanisms to harmonize the roles of the actors in the system. These will involve changes in the *internal* operating style

of NARS, regional entities, the CGIAR, international centers, and donors, as well as accommodations in the way they *interact* with each other.

- Not all NARS and regions are homogeneous. The structures and mechanisms developed must take this into account so that there are no "orphans" in the global system.

Recommendations

The final plenary discussion generated a number of specific recommendations for each of the participants present at the meeting. These are summarized below.

Specific recommendations for NARS and national policymakers

- Create a capacity to influence the policy dialogue on issues like intellectual property rights, GATT negotiations, and domestic policies influencing the success of technology generation and adoption.
- Recognize that donors deal with sovereign governments, and these must ultimately assume responsibility for the agreements they make.
- Recognize the special characteristics of research in responding to structural adjustment pressures. Be prepared to use structural adjustment to make the necessary adjustments in the research system but do not let blanket measures destroy long-term research and break up productive research teams. How restructuring is implemented is an internal policy debate.
- Be innovative in seeking new sources of funding at national and regional levels. This involves analyzing potential sources of taxation and the incidence of taxes on incentives and efficiency, as well as revenue.
- Strengthen linkages with national universities. Help the educational system mobilize support for its needs and redefine its role in relation to agricultural research.
- Strengthen collaboration with other NARS.
- Assert control collectively and individually over the agenda of networks and other entities purporting to serve NARS.
- Build a scheme into project design to evaluate the impact of research.

Specific recommendations for regional programs and organizations

- Create structures and mechanisms that ensure that programs are guided by the NARS they serve.
- Assist NARS in harmonizing their policy objectives and creating the enabling environment in which they work.
- Take leadership in subregional roles of technical service and harmonizing policies of a transnational (but regional) nature.
- Ensure that the role of facilitator is not one of gatekeeper to the region.

- Ensure institutional stability by remaining small in size so that resources are not diverted from NARS.

Specific recommendations for the CGIAR and TAC

- Ratify the long-term vision of the CGIAR system. Make sure that the productivity objective is not unduly discounted in the priority-weighting scheme used in strategizing. The task of feeding eight billion people by the year 2025 will still require strong attention to production.

- Ensure better representation of NARS in the guidance and governance of the CG system. This includes consultation with subregional organizations as representatives of NARS, if NARS cannot be consulted individually.

- Review relations between IARCs and NARS and the ways they can be improved.

- Encourage individual IARCs to serve as catalysts between NARS and their sources of funding.

- Participate with NARS in informing and influencing policymakers on technological policy issues.

Specific recommendations for ISNAR

- Update and increase the flow of information to research leaders and policymakers about NARS.

- Advise NARS on the implications of structural adjustment policies and help them demonstrate to policymakers the long-term danger of institutional instability and loss of human capital resulting from shortsighted policies.

- Assist NARS in master planning for research at the national level.

- Develop methodologies for planning in a regional context, stressing the complementarities among NARS.

- Help NARS manage change.

- Adopt a clear strategy towards the development and use of partner organizations and individuals as "multipliers" of ISNAR's impact.

Specific recommendations for donors

- Develop funding mechanisms that will facilitate the sharing of responsibilities in the changing global system. Donors must collaborate. Multilateral and bilateral sources of funding must come together to encourage partnerships among institutions working at the global, regional, and national levels.

- Strengthen regional funding mechanisms to facilitate partnerships among NARS and their collaborators.

- Earmark a fixed percentage of agricultural development projects to research, not only to include support for research for a project's immediate needs, but also to provide for the results that development will require in later years.

Closing Remarks

In presenting the foregoing report, **Dr. Howard Elliott** recalled that the objective of the workshop had been to engage in a policy dialogue between policymakers and research leaders. It was inspired by the need for a strong global agricultural research effort, based on strong national research systems, to meet the challenges of the new millennium. Presentations had been structured around the idea that policies, technological opportunities, and institutions must interact if we are to achieve growth, alleviate poverty, sustain production resources, and safeguard the environment. Success cannot be achieved if any one of these is ignored.

Dr. Jean Ndikumana, speaking for the African participants, expressed the hope that ISNAR would continue to give strong priority to the region, that the recommendations of this dialogue would serve as guidelines for action, and that they should be disseminated widely to research leaders and policymakers. He stressed the importance of continued collaboration with ISNAR in priority setting, establishing institutional mechanisms for involving users in research planning, developing national agricultural research master plans in each country, and strengthening networks.

Dr. Shen Jinpu underlined the importance of policy issues. For the Asian region, cost-reducing technology and research to increase the value-added in agriculture were taking on particular importance. The larger Asian NARS could make strong contributions in biotechnology, while building on their strength in conventional research. However, he noted that regional collaboration remained weak and called for partners in international research to help foster greater collaboration among NARS. Training at the postdoctoral level will continue to be a priority, as will training the next generation of NARS leaders in management. He encouraged ISNAR to do more in the Asian region, concentrating on assistance in developing and applying new management methods, undertaking studies of experience in the region, and sharing this knowledge among NARS. Through partnerships in the region, both ISNAR and the NARS can learn and share.

Dr. Mario Contreras noted that our discussions confirmed that we share a common objective. However, regions and subregions are different and respond to external forces in different ways. The liberalization of trade generates needs for new and different technologies. Large NARS in Latin America are moving to assume responsibilities previously ensured by international centers. Small NARS are accentuating their collaborative alliances. And all NARS will need to manage change and become more entrepreneurial.

Mr. Hussein Faraj emphasized that West Asia and North Africa need agricultural research. The task is for research leaders to market their product better and to convince policymakers of the need for research and their interest in supporting it. This would require permanent mechanisms for a dialogue between researchers and policymakers. This meeting had demonstrated the value of such a dialogue.

Dr. Christian Bonte-Friedheim recalled the three possible crises he mentioned in opening the workshop. Our deliberations confirmed that there is no justification

for complacency. He thanked the participants for making this a South-South dialogue and the resource persons for helping this to come about. He expressed the hope that research would be both wanted because it is needed and needed because it is wanted. In thanking the German Government and DSE for their collaboration, he looked forward to a future dialogue in similar circumstances two years hence which would help keep the issue of support to developing countries high on the agenda of the developed countries.

Dr. Kruesken, on behalf of DSE, felt that associating a policy dialogue with Green Week was a good idea. The exposition demonstrated the results of research at the consumer level and the importance it has played in the exports of the developing countries represented. DSE will continue to play its part in strengthening research by organizing dialogues of this type that can help develop a constituency for research among developed-country taxpayers. It will continue to use its skills in organizing and facilitating conferences to bring this about.

In closing the workshop, **Major-General Majid Ul-Haq, Minister of Agriculture for Bangladesh,** described how he had come to the decision to devote a full week to attend this dialogue. The communications gap between research and policymakers and between North and South needs to be bridged. Such an event has proven the value of organized dialogue on how policy formulation can interact with technical matters. In formally closing the meeting, he expressed the hope that ISNAR would collaborate even more intensely with national systems and that international agencies would provide ISNAR with the resources to meet the expectations of the NARS.