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THE CHANGING DYNAMICS OF GLOBAL AGRICULTURE

A Seminar/Workshop on
Research Policy Implications for
National Agricultural Research Systems

DSE/ZEL Feldafing
Germany
22-28 September 1988

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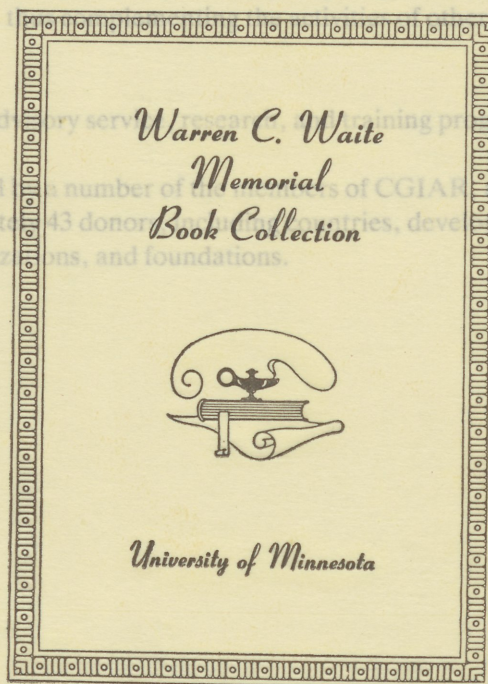


The International Service for National Agricultural Research (ISNAR) began operating at its headquarters in The Hague, Netherlands, on September 1, 1980. It was established by the Consultative Group on International Agricultural Research (CGIAR), on the basis of recommendations from an international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

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

ISNAR has active advisory services in research planning programs.

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



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Session III Summary

Sustainability of Agricultural Production Environments

Introduction

Definitions

Both plenary speakers began their presentations with a brief review of the definitions and usages of *sustainability*. Carter observed that "sustainability as a concept has intellectual and emotional roots from different disciplines where it is used in a variety of contexts," and this has given rise to some confusion. Nevertheless the speakers found some definitions useful.

The Brundlandt Report on Environment and Development (Our Common Future) defined sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

As applied to agriculture, the CGIAR/TAC report described sustainable agriculture as one which "involves the successful management of resources for agriculture to satisfy changing human needs while maintaining or enhancing the quality of the environment and conserving natural resources."

These definitions capture the essence of the issue in a nutshell: the dual responsibility to satisfy human needs and to maintain the environment, now and for the future.

Carter noted the several dimensions of agricultural sustainability stressed by different authors, and supplied the list enumerated by Harwood:

- sustainability over time and generations;
- social sustainability of rural communities;
- economic sustainability;
- maintenance of genetic resources;
- minimization of environmental pollution;

- lowered use of industrial inputs (demand on fossil energy).

After describing very briefly the status of modern agriculture and the impressive gains that have been achieved with this type of agriculture, Carter raised several concerns which provide the impetus to change the current system, as well as the impediments to change. He discussed some of the methods that have received the most attention, such as integrated pest management, use of pest-resistant varieties, improved tillage practices, use of manure, legumes, and other chemical fertilizer substitutes. Carter concluded by pointing out that our inquiry into sustainability should go beyond the farm production unit to the whole of society, and that the analysis of alternatives should be viewed from a benefit/cost framework not only to producers, but also to consumers and the general public.

The Lomé Convention and agricultural sustainability

The contribution from one of the co-sponsors, the Technical Centre for Agricultural and Rural Cooperation in Agriculture, revolved around the concern of the Africa, Caribbean, and Pacific member-states of the EEC-ACP Lomé Convention for agricultural productivity and sustainability, the special problems they face, and the efforts necessary to assist them. Treitz and Narain stressed how the "Lomé Convention may be a model for both LDCs and donors on how problems of accelerating higher food production on the one hand and sustainability on the other hand can be dealt with," and recounted CTA's contribution to this objective by way of dissemination of scientific and technical information on sustainability.

Treitz and Narain also dealt with both development and research policy implications of sustainability as far as the ACP countries were concerned and their significance to the work of the IARCs and the donors who are dedicated to assisting these countries.

Group Discussions

Clarification of concept of sustainable agriculture

Two working groups sought to clarify Carter's use of low-input agriculture as a synonym for sustainable agriculture. Sustainability as a concept for one working group meant "increasing productivity while maintaining or improving the natural resource base," which "by necessity is a dynamic process." The other working group contended that "since demand inevitably expands through time, consideration of sustainability as a goal must be balanced with productivity objectives. Sustainability therefore should not and need not necessarily be equated with a low-input type of agriculture."

The origin of the terminology was traced by the first working group to the "substantial food surpluses which currently exist in developed countries and which have forced

these countries to consider alternative patterns of land use or to reduce levels of investment in agriculture." The members of the group argued that "while this may be appropriate for high-input systems in developed countries, it may not be appropriate for low-input systems in developing countries."

For many developing countries whose agriculture is still struggling to modernize, the NARS leaders present wanted to make sure that the public concern for the environment does not overwhelm what they perceive as an equally compelling need to modernize their agriculture through additional external inputs. This concern was not lost on Carter, who, even as he used sustainability interchangeably with low-input systems, expressed that "in present farming areas using low-input practices that have evolved over generations, the pressure to boost food productivity via Green Revolution techniques and turn a profit means a shift toward the chemically intensive practices of the developed world."

The second working group proposed that in dealing with sustainability in agriculture, one should consider two broad agricultural production systems: high-input and low-input.

High-input systems. These systems are normally associated with inherently highly productive environments where the excessive application of pesticides and fertilizers and unsound agronomic practices can and have led to adverse environmental consequences. In these production systems, the emphasis will have to be on trying to maintain high production levels while moderating and/or controlling environmental degradation. The working group stressed that increased productivity from the naturally fertile production areas can be a means to relieve the pressure on less productive, marginal, and usually very fragile environments.

Low-input systems. These production systems depend largely on resources occurring in those environments or those which are available to the farming communities. They are less dependent on external inputs. The working group further noted that "there is increasing, though as yet limited, knowledge and practice which demonstrates that inherently less fertile and marginal environments can be managed more responsibly."

Predisposing conditions that lead to degradation of the environment

This section was contributed by one working group which correctly recognized a set of concerns expressed by all working groups as causes or predisposing conditions which lead to degradation of the environment. These same factors were cited elsewhere by the other working groups but in slightly different contexts. The fifth phenomenon was emphasized by both plenary speakers.

Five major causes or predisposing conditions can be identified as leading to widespread degradation of the environment:

- Increasing population pressure forces the cultivation of land not ecologically suited for food production.
- Poverty forces large segments of the population to eke out a living on marginal and fragile environments.
- Domestic energy shortages lead to excessive clearing of forests for fuelwood.
- Land tenure and social arrangements are not conducive to responsible stewardship of the environment.
- The rush towards modernization, made possible by advances in science and technology and the availability of cheap fossil fuel, has led to excessive use of fertilizers, pesticides, and other chemicals, and to the loss of genetic variability associated with monoculture and widespread adoption of genetically homozygous high-yielding varieties.

Degradation of the environment occurs even with low population growth and affluence but obviously environmental problems are aggravated by high population growth and poverty. And they are mutually reinforcing in their negative impact on the environment.

Land tenure and social arrangements stand for the web of social, economic, and political interactions which make sustainability so intractable. The complexity and human conflict pervasive in any consideration of sustainability derive from the differential costs and benefits of human activities. Thus, practices that appear justified individually in a private sense have a way of ultimately combining into a trend which is in conflict with the broader, longer-term interests of society. Much of the problem, and therefore, solution, lies in the extent to which these oftentimes conflicting interests can be reconciled.

Physical manifestations of environmental degradation

Three sets of concerns expressed by all working groups related to the physical manifestations of environmental degradation:

- soil and water losses;
- pollution;

- loss of genetic resources.

Land degradation, desertification, salinization, and other similar terms apply to conditions where there has been substantial and often almost irreversible loss of soil and water resources. Many consider soil erosion by far the more severe and urgent problem.

Pollution of the environment was described in terms of the residues from pesticides, fertilizers, and other chemicals used in agriculture which find their way into underground water, the food chain, and the agricultural produce which people consume directly. It was pointed out that misuse of inputs often results from ignorance, inadequate regulations for input use and enforcement, and inappropriate pricing policies. The exports to the developing countries of chemicals banned in the industrial countries were also deplored.

Moreover, there was some concern expressed over the safety of the farmers and workers who apply the pesticides. As Carter noted in the plenary, the danger these chemicals pose to farm workers is more acute and immediate. Surprisingly there was no discussion of farm manure and other wastes which is of great concern in developed countries and around major urban centers in many developing countries.

The development and widespread use of high-yielding varieties and livestock breeds, and the tendency towards monoculture associated with modern agriculture, lead to a potentially risky narrowing of their genetic bases. The violent swings of insect pests and diseases associated with the widespread adoption of HYV are manifestations of this increased vulnerability. The loss of genetic resources and variability is considered a serious threat to the long-term sustainability of agriculture itself.

Development Policy Actions

The development policy actions generated by the working groups may be organized in a number of alternative, equally plausible ways. One such array is

- population and poverty;
- land tenure and social arrangements;
- environmental conservation and management;
- public health and safety;
- genetic resource conservation;

- promotion of environmentally benign technologies;
- development and reorientation of research capacity in NARS towards sustainability;
- information, education, and political will and commitment.

Population and poverty as generic issues

The impact of population and poverty on sustainability in agriculture was recognized by all working groups, but these discussions were very brief. One working group suggested the management of demand as an obvious but necessarily easy remedial measure. Population control and changes in consumption habits and lifestyles would reduce demand.

Land tenure and social arrangements

One working group asserted that responsible stewardship of the land and the environment is often associated with ownership or traditional attachment to the land by community residents. Regardless of how true this may be in different societies and specific country situations, the principle is that governments must recognize the social, economic, and political complexities that govern the use of natural resources, and must therefore be prepared to adopt policies that promote the kind of behavior and production practices conducive to the conservation and proper use of the environment. Such policies will certainly include policies on private ownership of the land and tenurial management of lands in the public domain.

Environmental conservation and management

The proper use and conservation of natural resources would require various development strategies and actions. These were contributed during the discussions:

- establishment of monitoring and early-warning systems, both national and transnational;
- land classification and appropriate zoning regulations;
- rehabilitation and conservation of forests, watersheds, mangroves, grasslands, bodies of water, and other fragile environments;
- reforestation, including fuelwood production and agroforestry;
- land development such as terracing, irrigation, and drainage (especially to deal with salinity);

- outmigration and resettlement from fragile environments;
- provision of incentives to long-term private investments in proper resource use and development.

Public health and safety regulations

One working group suggested "stricter public health and safety regulation and monitoring" on the use and release into the environment of farm chemicals and pesticides. The monitoring should include the movement of these toxic chemicals not only in farm produce but also in groundwater and in animal life along the food chain, as well as their immediate impact on farm workers themselves.

Genetic resource conservation

Part of genetic resources are collected and maintained in genebanks, while others are kept in situ in natural reserves. Governments must be ready to commit their fair share of resources in the global effort to preserve and maintain our heritage of genetic resources.

Promotion of ecologically benign technologies

In the plenary, Carter discussed a number of practices under the rubric of low-input farming systems which are deemed innocuous or not as harmful to the environment as other current practices.

These technologies include integrated pest management, multiple cropping, manuring, use of pest-resistant varieties, zero tillage, etc. As the adoption of these technologies is influenced by their availability and price, governments must adopt policies that promote the adoption of ecologically benign technologies, and conversely, they must adopt policies that will penalize or discriminate against technologies that contribute to the degradation of the environment. For example, excessive levels of certain very dangerous pesticides are used because their availability is not regulated, and because they are imported very cheaply.

Moreover, one working group reiterated Carter's speculation that these new and different production practices will probably require different back-up institutions or service industries. Policies to promote the establishment of such support systems need to be established.

Development and reorientation of NARS research capacity towards sustainability

This policy action requirement was assumed in the working group discussions. Speaking of his experiences in the U.S., Carter noted that agricultural academic institutions are allocating only a small percentage of their budgets to sustainability or low-input research projects. The U.S. Department of Agriculture is funding a relatively small program of research and education on low-input sustainable agriculture. However in both cases the current support level is several-fold more than previous levels. His impression that the level of activity is similar in other countries was not challenged by any of the working groups.

Information, education, and political will and commitment

There was consensus on the general lack of awareness and understanding by the public of environmental issues in developing countries. According to one working group, "this lack of awareness is pervasive and should therefore be addressed as part of the curriculum from primary to tertiary evaluation. Moreover this must be supplemented by parallel efforts in non-formal education, i.e., through extension." This campaign for public awareness and understanding should include the political leaders as well to build a national consensus and commitment for sustainability and the enhancement of the environment. In fact, one working group observed that the lack of awareness of environmental problems applies even among scientists and researchers themselves.

The same working group strongly urged the formulation of a "Strategic Plan for the Environment" covering both national and regional levels.

Research Policy Actions

The priorities for research listed by the working group discussions fall into four broad research areas:

- social science;
- resource management;
- genetic resources;
- public health and safety.

Social science research

The social, economic, and political underpinnings of land ownership and use were recognized by all working groups as a very high-priority research concern in order to provide a more rational basis for policy. Research on the impact of land tenure on sustainable agricultural practices, the estimation of private and social costs and benefits, and the macro consequences of alternative low-input systems need to be undertaken to understand the problems better.

Resource management research

By far this broad area received the most attention from the working groups. The researchable topics mentioned by the working groups included:

- characterization and mapping of agroecological zones;
- soil erosion studies and utilization of marginal lands;
- salinity and water quality studies;
- irrigation, drainage, and efficient water use;
- integrated pest management; the farming systems research;
- watershed management;
- agroforestry;
- renewable energy sources and energy flows in agriculture.

These topics are usually included in the research portfolios of most developing countries. However compared with another broad research category, commodity research, allocations to resource management research are usually only a fraction of the former. This set of recommendations implies a substantial increase in research allocations for resource management research. Whether this is to the extent of "even at the cost of commodity research" as suggested by Narain was not resolved.

Genetic resource conservation research

The concern for genetic resource conservation research was expressed very strongly in only one working group. Perhaps one explanation is that genetic resource conservation and research are historically associated with the predominant commodity-type

research now existing in most NARS and IARCs, and therefore do not need additional stress. The researchable topics mentioned included studies on land races, maintenance of gene banks, and application of biotechnology, particularly tissue culture for genetic conservation.

Public health and safety research

Included in this area were risk management, toxicology, and tolerance-level studies for pesticide residues, and environmental and water-quality monitoring research.

Open Questions and the Future Agenda

The time devoted to the discussions was sufficient to provide an opportunity for a lively exchange of views on this very complex issue, and to establish the need for NARS in developing countries to reorient current agricultural research from the type of research largely associated with commodities to that which increasingly looks at resource management and the social, economic, and political complications.

The working groups devoted quite a bit of time to the major themes for sustainability research; however, none of the working groups felt they had the time, expertise, or information to address the tough decisions of balance, priorities, division of labor, and comparative advantage and structure. One working group left the following very pertinent questions on future NARS and the international research policy agenda:

- What is the appropriate balance between research on sustainability and research on other concerns?
- What is the relative priority among the different sustainability issues?
- What should the division of labor be among the NARS, the IARCs, and the developed country research institutions and the universities?
- In terms of research structure and organization, how should the NARS organize their efforts to address sustainability questions more effectively?

Session IV

Mobilizing and Sustaining Support for Agricultural Research

