



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

No endorsement of AgEcon Search or its fundraising activities by the author(s) of the following work or their employer(s) is intended or implied.

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

WAITE MEMORIAL BOOK COLLECTION
DEPT. OF AG. AND APPLIED ECONOMICS
1994 BUFORD AVE. - 232 COB
UNIVERSITY OF MINNESOTA
ST. PAUL, MN 55108 U.S.A.

isnar

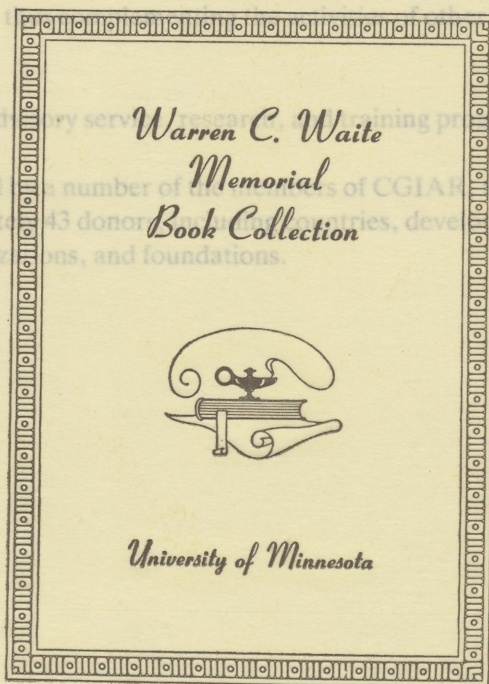


The International Service for National Agricultural Research (ISNAR) began operating at its headquarters in The Hague, Netherlands, on September 1, 1980. It was established by the Consultative Group on International Agricultural Research (CGIAR), on the basis of recommendations from an international 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. ISNAR provides technical assistance to government agencies.

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

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



630.72
I57
C435

THE CHANGING DYNAMICS OF GLOBAL AGRICULTURE

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

Edited by

Emil Javier

International Service for National Agricultural Research, The Netherlands

and

Ulf Renborg

Department of Economics and Statistics, Swedish University of Agricultural Sciences,
Sweden

DSE/ZEL Feldafing

Germany

22-28 September 1988

Sponsors:

International Service for National Agricultural Research (ISNAR)
The Hague, The Netherlands

German Foundation for International Development (DSE)
Feldafing, Federal Republic of Germany

The Technical Centre for Agricultural and Rural Cooperation (CTA)
ACP-EC Lom Convention
Wageningen, The Netherlands

Conservation and Management of the Environment and Natural Resources in Developing Countries – Policy Implications for ACP States

W. Treitz and T. M. Narain

CTA

(ACP-EC Technical Centre for Agricultural and Rural Cooperation)
Ede/Wageningen, The Netherlands

Introduction

The relatively short history of international agricultural research has been characterized by a number of slogans, catchwords, and phrases during different phases: *green revolution*, *resource-poor farmer*, and recently, the discussions are dominated by the term *sustainability*. All these terms were introduced by politicians, administrators, or other so-called decision makers, rather than scientists. The catchwords have advantages and disadvantages. One advantage is that such terms draw attention to urgent problems which may have been overlooked or neglected, and are now being given high priority in outlining agricultural policies, and formulating research and development projects.

The term *green revolution*, coined approximately two decades ago, made clear that the introduction of high-yielding varieties of wheat and rice was not the only factor for increased production of these two crops, but that a completely new agricultural technology with high inputs of fertilizer, pesticides, and water was required to bring to fruition the research activities of the International Maize and Wheat Improvement Center (CIMMYT) and the International Rice Research Institute (IRRI). However, during the first years of the green revolution, a structural change detrimental to resource-poor farmers, especially in India, took place. Donor countries and donor agencies became aware of this problem and insisted that special attention should be given to problems of the resource-poor farmer in outlining and implementing research projects. Later on, farming systems research was another attempt to analyze and understand the problems of a farm in its broad context, and to identify research projects using this holistic approach.

The disadvantage of utilizing catch phrases is that research managers may take an opportunistic attitude only to obtain the necessary funds to match the requirements of the slogans. They may design research programmes in a manner similar to the

couturiers in Paris or Milano who design ladies' fashion for each season according to the taste and *zeitgeist* of rich international society. Such an attitude is reflected by statements in the minutes of the report of the Consultative Group on International Agricultural Research (CGIAR) on the 1988 Mid-Term Meeting, which says that to provide agricultural technology which could secure sustainability, "increased flows of assistance would undoubtedly be sought as this process got under way" (CGIAR, 1988).

However, the term *sustainability* is not only useful but essential. Definitions of sustainability in standard reference books are inadequate, and in the context of our considerations are not very helpful. Only in specific recent publications is the problem of sustainability dealt with more comprehensively with a more precise definition.

The Brundtland report (World Commission on Environment and Development, 1987) explained sustainability:

Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

It contains two key concepts:

1. *needs* (in particular the essential needs of the world's poor) which should receive overriding priority;
2. the idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs.

TAC's (1987) definition is that:

Sustainable agriculture should involve 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.

The Concern about Sustainability

The responsible farmer has always returned to the soil what the crops removed from it, either in the form of manure, inorganic fertilizers, or both. Even the resource-poor farmer practising shifting cultivation has practised, knowingly or unknowingly, a farming system on a sustained basis for hundreds of years.

However, during the last decades considerable changes have taken place. Most developing countries have experienced a rapid population increase. As a result, the

pressure on the land has increased at a rate never before known. Millions of hectares of tropical forests have been cleared for food production, in most cases without consideration for ecologically sound agricultural practises after deforestation. The results are frightening: land degradation, erosion, silting of rivers and lakes, to name only a few. The stocking rate of animal populations has been augmented at a rate which in many countries exceeds the carrying capacity of the land. Shifting cultivation, which does not allow the soil to recover after its exploitation, is taking place at an ever-increasing rate due to land shortages.

As a result of these calamities, economists, administrators, and scientists recall the theories of Robert Malthus, who at the end of the 18th century, concluded that the human population has a tendency to increase geometrically, whereas agricultural production increases in an arithmetical progression. However, this theory appears to be incorrect.

Fortunately, because of scientific advances and technological progress, especially in the biological sciences during the last two centuries, the theories of Malthus have been proved wrong, at least in Europe, North America, and even other parts of the world. In Europe, governments are confronted with the problem of surplus production.

However, the present surplus production in Europe or North America should by no means be taken as an indication that food production will attain similar levels in tropical countries. On a global basis, the most serious problem during the next century will be to feed people without destroying our natural resources. In other words, to implement systems of sustained agriculture. It is not by chance that the environmental and food crises have received increasing attention from international organizations, national governments, political parties, and society as a whole during the last few decades.

As early as the 1950s, the Paley Commission in the USA expressed concern about the use and abuse of natural resources. During the 1960s, the Club of Rome played an influential role in announcing the so-called "Limits of Growth." Early in the 1970s, under the auspices of the United Nations, the Stockholm Conference on Human Environment took place, subsequently leading to the establishment of the United Nations Environmental Programme (UNEP). And the 1974 World Food Conference in Rome resulted in the establishment of the International Fund for Agricultural Development (IFAD). In 1980, in collaboration with the International Union for the Conservation of Nature, the World Wildlife Fund, FAO, and UNESCO, UNEP submitted a paper entitled "The World Strategy for Conservation." FAO also submitted a study in 1980 under the title "Agriculture 2000."

The last decades witnessed a series of international conferences dealing with problems of environment and sustainability such as desertification, housing, water, energy, and deforestation. More recently, in 1983 the United Nations established a special commission "to propose long-term environmental strategies for achieving sustainable development to the year 2000 and beyond." The report of the World Commission on Environment and Development (1987), *Our Common Future* (also known as the Brundtland Report, named after the commission president, Norwegian Prime Minister Mrs. Gro Harlem Brundtland), came out in 1987.

On the other hand, for a long time the World Bank expressed only limited interest in environmental problems and gave priority to projects aimed at increased production. Responding to criticism, the World Bank now considers environmental problems a high priority.

Also very late, the CGIAR took note of the problem of harmonizing food production for a rapidly increasing population while maintaining and even improving natural resources, especially soil and water. By the end of 1986, a special subcommittee of the Technical Advisory Committee (TAC) of the CGIAR was created to address the problem of sustainability in the research activities of the international agricultural research centres (IARCs). In March 1988, TAC submitted a first paper on this issue. Two research organizations, the International Board for Soil Research and Management (IBSRAM) and the International Irrigation Management Institute (IIMI), may finally be incorporated into the CGIAR system. With this step, the CGIAR will end the stagnation resulting from its philosophy of concentrating only on yield increases of important crops and creating green revolutions, and embark on a new phase of research activities.

Sustainability: The Physical Factors of Climate and Soils

Africa

Among all the factors that influence agricultural production, climate and soils are the most important. This is most dramatic in Africa, where the high temperatures and high humidity of equatorial Africa provide ideal conditions for pests and diseases. This includes livestock diseases such as trypanosomiasis, which has a profound effect on the whole pattern of agriculture in Africa. An area of around 10 million km², or about half the nondesert area of Africa, is affected by this disease; all domestic livestock, even sheep and goats, are at very high risk. The integration of livestock into farming and the use of animals for labor is virtually impossible in these areas.

Outside the equatorial belt lie the arid and desert regions. The Sahel region in the north has had its share of notorious publicity and is now fairly well known by all. What is less familiar is the southern arid region which includes Botswana, Zambia, and Mozambique, where agricultural production is severely depressed in most years.

Africa's rains are torrential and more destructive to the soils than the gentler rains of temperate zones. Water run-off carries off fertile soil, and if ploughing and planting are not carefully timed, weeds can depress yields. A particularly despairing feature is the unpredictability of rain in Africa, from year to year as well as within seasons. From what we have recently witnessed in Africa, it appears that the less rain an area gets, the greater its variability. In this respect, the drought this year in the USA has led scientists to assume that desertification of the whole planet has already started. However, we should be cautious about taking annual or periodic fluctuations as irreversible trends.

The soils in Africa are no less crucial than the climate. Acid tropical soils, Oxisols and Ultisols with pH values lower than 5, cover the largest area of Africa, approximately 470 million ha, or 27% of the continent, in Central, Southern, and West Africa. Until recently, most acid soils were covered with forests, which are now increasingly being cleared to open new lands for agriculture. The management of these newly cleared lands requires special technologies to ensure sustained production. However, only limited experience in this respect is available (IBSRAM, 1988). The deforestation in Africa is estimated at 11 million ha per year (UNEP, 1984), and because these technologies are either unavailable or are not used, approximately 6 million ha are reduced to desert-like conditions each year.

The heavy rains in Africa leach nutrients and degrade the soils. The high temperatures rapidly break down organic matter and inhibit nitrogen fixation by rhizobacteria. All these factors tend to produce soils that are among the least fertile in the world. Wind erosion does much damage in the dry areas.

Exports of agricultural products are the main foreign exchange earner for African countries, especially the least developed. With increasing populations and decreasing prices for primary commodities, these countries face enormous economic pressures to overexploit their environmental resource base.

Caribbean and Pacific islands

As in Africa, the main base of the economy of the Caribbean and Pacific island countries is agriculture. Agriculture, including forestry, generates over 70% of the gross national product of the majority of the African, Caribbean, and Pacific (ACP) states. In the Caribbean and Pacific islands, agriculture (including forests and

fisheries) also provides food, fuel, and raw materials for processing, building, and other domestic uses. Now almost all the islands are dependent on imported food, partly for historical reasons, partly because they have outgrown their resource base.

Moreover, shifting cultivation is becoming more and more difficult with the pressure of population growth. The flatter lands of the volcanic islands are relatively fertile, whereas others such as the atoll islands of the Pacific region, e.g., Kiribati and Tuvalu, are mere deposits of rubble, arid sand with some rock, and hard pan. Soil development is poor and agricultural potential limited.

Sustainability: Research Implications

When the first international agricultural research centres were created some 20 to 25 years ago, only the need for rapid increases in production was considered. The fathers of the CGIAR were anxious to increase agricultural production in developing countries at any rate. As a result, they saw the best chances to reach this goal by concentrating agricultural research on crops with a high potential in regions with good soils, adequate water, and a workable infrastructure to procure inputs such as fertilizers and pesticides. The results of this research policy were impressive.

According to statistical data prepared by the CGIAR centres, cereal production is at present 50 million tons higher each year, which corresponds to the annual consumption of approximately 500 million people, and this is due to the introduction of high-yielding varieties. A rough calculation reveals that these research projects can be considered as having the highest cost-benefit ratios. Assuming an average price of US\$ 150 per ton, 50 million tons corresponds to US\$ 7.5 billion per year, whereas the total expenditures for CIMMYT and IRRI over the first two decades may have been US\$ 700-800 million. Even if the additional costs for fertilizer, pesticides, water, salaries, etc., are deducted, the results for farmers are outstanding. If the secondary and tertiary benefits are taken into the economic calculations, the value is even higher.

However, there are certainly a number of disadvantages connected with this success story. First, as a result of this research policy, less-favoured regions have up to now benefited only to a limited degree from the green revolution. This is the case for nearly all ACP countries, which face the greatest constraints because of poor soils and weak infrastructure.

Moreover, although yields have increased substantially, maintaining the high yield level is becoming more and more difficult, in spite of continued high inputs and the growing managerial skills of farmers (TAC, 1987). As a result of the introduction of

high-yielding varieties of cereals, monoculture production systems have emerged, very often replacing legume crops. Furthermore, experience shows that for technical, infrastructural, and socioeconomic reasons, certain modern agricultural technologies may not be applicable to all parts of Africa or to all ACP countries.

From these experiences and observations, some general principles for research priorities can be summarized:

More attention to special situations. International agriculture must give more attention to regions with special constraints due to extreme climatic conditions, poor soils, weak infrastructure, and high population pressure, which among other problems, leads to indiscriminate forest clearing for food production, followed by desertification.

Food crops. Food crops other than wheat and rice which also improve the soil should be given higher priority. Improved cultivars of cassava, cowpeas, and potatoes are already available, but need to be introduced more widely through national agricultural research systems (NARS). Research on other crops that improve the soil is being conducted, but these activities should be intensified. Research on other traditional crops should also be pursued.

Soils research. Research on soil conservation, maintenance, and improved soil fertility has to be strengthened, even at the cost of crop research. The development of appropriate agricultural technologies to be used after forest clearing is of the highest priority, and land-use patterns for agroforestry have to be developed.

Fertilizers. Optimal utilization of manures and inorganic fertilizers is of great significance both for sustainable agricultural systems as well as for meeting the needs of small farmers and regions with special constraints.

Trypanosomiasis research. Research on this livestock disease is required for sustainable agricultural production systems, especially to introduce animal traction in specific regions of Africa.

Water use. Optimal water utilization for both irrigated and rainfed agriculture is an important factor for sustainable agriculture, and needs a higher priority from both IARCs and NARS.

Breeding for resistance. In view of the damage to the environment caused by pesticides, as well as their high cost, breeding for resistance should be given more attention, even to the detriment of yield. Conservation of plant and animal genetic resources is fundamental for sustained agricultural production.

On-farm research. Socioeconomic and on-farm research of farming systems or technologies, especially for ACP countries, is required for studies of sustainability.

Some of these research priorities have been dealt with in the TAC paper on research priorities (TAC, 1985). Others should be considered in a new context as a result of the introduction into the CGIAR systems and NARS of new research policies for sustained agriculture.

Sustainability: Organizational Aspects for Research

Approximately 25 years ago, when the first IARC was founded, it was assumed that research centres concentrating on a few crops would achieve good results in short time periods. The success of the green revolution proved this strategy. However, research aiming for sustainable agriculture is complex and difficult because it must be more location specific.

These considerations have implications for the future organization of international agricultural research. Because of the more complex and location-specific problems, IARCs may have to relocate more research from the centres to different locations.

Such a recommendation is also included in the TAG priority paper. Furthermore, much more research will be needed where the farmer is not an object of research, but rather an active participant. If farmers are actively involved in research projects for sustained agriculture, expensive experiments without much probability for success can be avoided.

To introduce research on sustained agriculture, NARS are indispensable. As a result, IARCs have to cooperate and collaborate much more intensively with NARS. New forms of cooperation, including financial support from the IARCs to NARS may be required. Research with very specific objectives, planned and evaluated on a standardized basis, and executed in different locations through networks, may be of special value in organizing activities for sustained agriculture. Such networks are already operated by IBSRAM, IIMI, ILCA (International Livestock Centre for Agriculture), ICRAF (International Council for research on Agroforestry), and other centres. NARS cooperating in these networks are obtaining not only logistic and scientific support, but also some funds for relevant research projects. It may be useful to study the advantages of such relationships in more detail, both from the aspect of research results and with a view to strengthen the NARS.

Sustainability: Agricultural Policies

The facts of life are sometimes different from theoretical discussions and the recommendations that come out of international conferences. People struggling for

survival will not and cannot care about long-term sustainability if they will destroy even their long-term basis for survival. Politicians, administrators, and scientists should be careful not to blame the resource-poor farmer for this attitude and refrain from being arrogant. One resource analyst recently cited in a professional magazine said that "in India a great deal of painstaking and patient work will have to be done to wipe out the backlog of ignorance, inertia and complacency." It is not the ignorance of the farmers, it is not the farmers who are to be blamed, but society as a whole, if agricultural production is carried out, not on a sustainable basis but by mining or *raubbau* (plundering).

Agricultural policy must provide a framework that allows farmers to exercise farming systems on a sustainable basis. In this respect, however, it is very easy for those who don't make the decisions to draw up a long list of what will be required to ensure sustainable agricultural development.

The TAC paper on sustainability discusses socioeconomic and legal determinants. It suggests that national and local governments give a higher priority to agriculture, pricing policies for both export and import commodities, the need to develop the necessary infrastructure to overcome constraints in the delivery of inputs to farms, transportation of commodities to market, the provision of marketing facilities, credit, extension, education, and research, including adequate staffing of such institutions.

Furthermore, tenurial rights should be determined in such a way as to sustain agriculture, especially in regions where women have no right to own land yet do most of the farm work. It is especially important to note that the TAC paper emphasizes the necessity of laws and regulations to control the use of land, to protect forests and rangelands from indiscriminate exploitation, and to control the use of water resources for irrigation and other purposes. This list could be extended to cover even more areas of concern.

However, it would be expensive to meet all these requirements, and unpopular laws and regulations would have to be introduced in poor African countries and in the small island countries of the Caribbean and Pacific. We know from political discussions in Europe and North America how difficult it is to provide funds for environmental activities, even in these rich countries.

This may lead to the conclusion that sustained agriculture in the developing countries may not be achievable and, as a result, decision makers may close their eyes to these problems. Such a pessimistic outlook may even be based on the normal time horizon for politicians of 10 to 12 years, with a maximum of 20 years. However, to speak of sustained agriculture requires many more long-term considerations. What can be done

under these conditions? First of all, decision makers have to realize that sustainability is essential to the survival not only of people but of whole countries. Their inhabitants are threatened if preventive measures are not adopted. Furthermore, it has to be understood that these are problems to be solved on national, as well as on regional and international levels.

In order to achieve sustainability, priorities have to be set for national laws and regulations, as well as in agreements, or even treaties, drawn up for regional and international cooperation. There are a number of activities that can be launched without serious budget implications, but other activities require a reallocation of funds from less important projects to programmes of sustained agriculture. In donor-funded programmes, sustainability should be given the highest priority. Developing countries should be assisted, especially in areas, such as conservation of plant and animal genetic resources, that serve the international community as a whole.

In this respect, the Lomé Convention may be a model for less-developed countries and donors alike on how to accelerate both food production and sustainability.

Dissemination of Scientific and Technical Information for Sustainability

The literature on environmental problems is growing, and is consequently more difficult to digest. However, the bulk of this literature is on soil erosion, land degradation, indiscriminate forest clearing, and overuse of pesticides and fertilizer, all of which provide important evidence of the destruction of natural resources.

However, finding any practical scientific or technical information on achieving, implementing, or practising sustained agriculture under different climatic and soil conditions is very difficult, even in Europe and North America. In Africa and other parts of the developing world, scientific and technical information on sustainable agriculture appears to be virtually nonexistent.

The reasons are evident. First, until recently, research on sustainability, especially for tropical countries, was not a high priority. Only plant genetic resources or breeding for resistance received attention. Consequently, research results on sustained agriculture are meagre. Furthermore, scientists and experts working on problems of sustained agriculture in most cases do not have the time or interest to describe the methodology, analysis, and evaluation of trials and experiments. Others who may be interested do not have the means.

Normally, it is very difficult for young scientists to find magazines and journals that will publish their articles, and the fact that there are very few scientific journals in Africa

and other parts of the developing world only serves to make it more difficult. As a result, scientific and technical information on sustainable agriculture is not widely disseminated and gets lost over the years because it is not properly documented or published. It is difficult to estimate how much research is repeated because it has never been written up and disseminated. Moreover, a great quantity of so-called grey literature is available in many agencies, but even this is not disseminated. For a number of reasons, this literature has not been published, but the information it contains could be invaluable to scientists, planners, and others interested in the field. Sometimes, it would be sufficient to merely duplicate and disseminate this information in its original form, and possibly translate it. In other cases, revision and compilation of a number of related texts would be useful.

One example of how grey literature can be made available for sustained agriculture is the *Atlas on the Agropastoral Potential of Sahel Countries* published by CTA (Technical Centre for Agricultural and Rural Cooperation) and IEMVT (the French Institute for Tropical Veterinary Medicine). This atlas includes statistical information, research results, and other information on livestock development, including botanical studies, transhumance, and mineral resources, a large part of which was collected over a period of more than 100 years by French institutions. This document gives planners, scientists, and other experts substantial scientific and technical information on sustainable agriculture in these countries. It is an especially valuable contribution to the field because these countries have been experiencing such severe problems with desertification.

Apart from the preparation of useful scientific and technical information, its availability is another serious problem in ACP countries. Governments and other institutions have only limited funds to purchase professional publications. Contrary to the situation in Europe and North America, developing countries are not confronted with the problem of how to manage the increasing professional literature, but of how to obtain it in the first place.

In this respect, the provision of coupons for the purchase of professional literature, the supply of books and subscriptions to professional magazines, and the delivery of hardware and microfiche to relevant institutions in developing countries will give decision makers, experts, and producers access to scientific and technical information on sustainable agriculture. Question-and-answer services, such as the one maintained by CTA for ACP countries, are also useful.

At present, together with the CGIAR Secretariat, CAB International, the U.S. National Agricultural Library, the Rockefeller Foundation, the Royal Tropical Institute, IBM (Europe), and a number of other donors, CTA is working on a new technology for scientific and technical information that will have great implications for

sustainable agriculture in ACP countries. This CD-ROM technology (compact disc/read-only memory) would establish a large number of decentralized data banks in developing countries. This appears to be feasible for developing countries, since the cost and maintenance requirements for the system are reasonable, and it can be used by scientists who have not had special training in documentation and data processing. CTA is preparing a project to supply the system along with relevant training to ACP countries.

The Lomé Convention: Agricultural Cooperation and Sustainability

The EEC and ACP states signed the Lomé Convention to promote cooperation on economic, social, and cultural development in ACP countries, and to consolidate and diversify their relations in a spirit of solidarity and mutual interest.

The ACP countries are a varied group with different climates and constraints on agriculture and food production. The continent of Africa is deeply involved in searching for ways to combat drought and desertification in the Sahel and Southern regions, and to find alternatives to deforestation in the tropical areas. The island states of the Caribbean and the Pacific are concerned with the management of acid soils and also with the gradual disappearance of their tropical forests.

Concerned by the alarming reports of drought and desertification in the Sahel and other regions of Africa, while at the same time acknowledging that food and agricultural production were lagging behind population growth, the Lomé Convention advanced agricultural cooperation to the forefront of its several Titles of Cooperation. Among the various objectives of agricultural cooperation, it stated that agricultural research should be tailored to the national and human environment of the countries and the region. It called for improved farming methods while conserving soil fertility, and better integration of arable land and livestock farming.

The first part of the Convention, entitled "General Provisions of ACP-EEC Cooperation," recognizes that agricultural production, including forestry and fisheries, occupies a crucial position in the economies of the majority of ACP states.

Drought and desertification control became a special chapter in the Third Lomé Convention signed in December 1984. The text of the Convention reads:

The ACP States and the Community recognize that the physical, economic and political existence of certain ACP States is threatened by endemic drought and growing desertification which destroy all efforts at development, in particular those aimed at achieving the priority objective of self-sufficiency and food security. (Art. 38.1)

The ACP-EEC Joint Assembly, also concerned about issues of development of sustainable agriculture, set up a working party to examine rural development and environmental problems in ACP states. From the recent trend of events concerning environmental degradation, it is almost certain that the next ACP-EEC Convention will stress agricultural and rural development based on sustainability.

Conclusion

The development of sustainability in agriculture is essential for two reasons:

1. to allow the necessary increase of food production to feed a rapidly growing population;
2. to protect and develop the productive potential of soils, water, and genetic resources.

Research for such harmonious development should be an on-going process and must be location-specific. NARS have to play a more central role in such a venture. Networking of research and the dissemination of its findings through scientific and technical information are becoming more and more important in the development of sustainable agricultural systems. The Lomé Convention, in its chapter on agricultural cooperation, shows concern for sustainability by encouraging protection of the natural environment. The Technical Centre for Agricultural and Rural Cooperation, established under the same chapter, is responsible for collecting and disseminating appropriate information to support this objective.

References

CGIAR. 1988. Mid-Term Report. Washington, DC: CGIAR (Consultative Group on International Agricultural Research).

IBSRAM. 1988. IBSRAM's Strategy, Programmes and Budget Plans. Bangkok: IBSRAM (International Board for Soil Resources and Management).

TAC. 1987. Sustainable Agricultural Production: Implications for International Agricultural Research. Rome: TAC (Technical Advisory Committee)/CGIAR.

UNEP. 1984. General Assessment of Progress in the Implementation of the Plan of Action to Combat Desertification. Nairobi: UNEP (United Nations Environment Programme).

World Commission on Environment and Development. 1987. *Our Common Future*.
Oxford and New York: Oxford University Press.