Role of International Organizations in Global Genetic Resources Management

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Abstract

No country, however rich in genetic diversity, can be self-sufficient in plant genetic resources. Both developed and developing countries rely on introduced crops for a large part of their production and consumption. In some countries, crops introduced from other parts of the world have become a national dietary staple and a major export. The fact that nations may be dependent on genetic diversity found outside their borders brings with it a global responsibility to ensure the availability of plant genetic resources to those who need them. This requires an effective international system for the conservation and use of plant genetic resources. To succeed, such a system must complement national capacities to conserve and utilize plant genetic resources. Not only are countries uniquely placed to identify their own genetic resources needs, it is ultimately their responsibility to conserve their natural heritage. It is in turn the responsibility of the global community to ensure that these national programs have the capacity to safeguard the diversity of useful and potentially useful plants. Many international organizations can play an important role in supporting the development of the national capacity and thereby develop a global system for plant genetic resources management.

Introduction

Biological diversity encompasses the total variability of life forms existing on the earth. Plant genetic resources, a subset of biodiversity, contain the genetic material which is the source of the vast variety of plant life on the planet. Plant genetic resources hold the key to food security and sustainable agricultural development. The world's growing population, which depends on fixed areas of farmland, will increase the need to produce new higher yielding, disease resistant, and environmentally suitable plant varieties. This requires that breeders have continuous and reliable access to genetic resources, especially landraces and related wild plants.

The Convention on Biological Diversity (hereafter referred as the Convention) is a very significant milestone in ensuring safe conservation and sustainable use. At the United Nations Conference on the Environment and Development (UNCED) in Rio de Janeiro, the Convention was signed by more than 150 countries. The ways in which the Convention will be implemented, and the possible develoment of protocols to the Convention, are of major interest to all players in the biodiversity community.

This paper will discuss the potential impact of the Convention on the work of national and international organizations, in addition to roles of national programs and international organizations. In view of the focus of this symposium, this paper mainly covers the conservation and use of plant genetic resources for food and agriculture.

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National programs

National programs on plant genetic resources are the basic building blocks of the overall global effort. Working with national programs offers a number of major advantages that will maximize the impact of international efforts. National programs clearly understand the needs of their respective countries in terms of plant genetic resources, the strengths and weaknesses of their programs, and the potential contribution they can make to regional and international activities. In addition, national programs understand their own political, social, and economic climate. Therefore they can advise on the most efficient mechanisms to address the problems of the concerned audiences within the country.

National programs throughout the world are very different in their composition. Some are confined to a national plant genetic resources unit; others include NGOs, seed companies, university researchers, plant breeders, herbaria and botanic gardens. Some are coordinated through a national plant genetic resources committee. In others the various groups are linked informally.

An important component of national research includes evaluation in crop-specific environments to give better estimates of genotype-by-environment interactions. Local evaluation consolidates the links between national programs and regional active collections. International support to active or working collections makes them an integral part of development efforts by linking genetic resource systems with conventional breeding programs and assisting in the characterization and evaluation of germplasm (Cohen and Bertram, 1989). These and other potential advantages derived from the enhancement of national capabilities are listed as follows:

1. Ability to participate in international germplasm exchange.
2. Provide for species-specific evaluation often beyond the scope of the international agricultural research centers.
3. Evaluation in agreement with plant breeding objectives, facilitated through active collections.
4. Better estimates of genotype by environment interactions.
5. Coordinated user information network.
6. Centralized control over germplasm quarantine procedures.
7. Catalyst for collaborative collection and conservation.
8. National systems will develop a broader base of support in host-county scientific community.

Role of international organizations

No country, however rich in genetic diversity, can be self-sufficient in plant genetic resources. Both developed and developing countries rely on introduced crops for a large part of their production and consumption. In some countries, crops introduced from other parts of the world have become a national dietary staple and a major export. For example, rice, which is widely grown in Africa and South America, had its origins in Asia. Coffee, a major export crop for Central America, Colombia and Brazil, originated in Ethiopia.

The fact that nations may be dependent on the genetic diversity found outside their borders brings with it a collective responsibility to ensure the availability of plant genetic resources to those who need them. Fulfillment of this responsibility requires an effective international system for the conservation and use of plant genetic resources. To succeed, such a system must complement national capacities to conserve and use plant genetic resources. Individual countries are uniquely placed to identify their own genetic resources needs, and it is ultimately their responsibility to conserve their natural heritage. It is in turn the responsibility of the global community to ensure that these national programs have the capacity to safeguard the diversity of useful and potentially useful plants.

The term "international organizations" is used in a general sense, encompassing all organizations, agencies and groups active in international development. Numerous international organizations provide technical and financial assistance to countries to carry out activities aimed at promoting the conservation and sustainable use of plant genetic resources. Only six are covered in this paper: the Food and Agriculture Organization (FAO) of the United Nations, the United Nations Environment Program (UNEP), and the United Nations Educational, Scientific, and Cultural Organization (UNESCO); the Consultative Group

on International Agricultural Research (CGIAR), a network of 18 international agricultural centers with global coverage and multilateral donor support; and The World Conservation Union (IUCN) and The World Wide Fund for Nature (WWF), non-governmental organizations with global coverage.

1 The Food and Agriculture Organization of the United Nations (FAO)

FAO, headquartered in Rome, plays an important role in coordinating and implementing agricultural and forest genetic resource policy within its overall aim of providing technical assistance. Resulting from discussions with and at the request of its member countries, FAO has, since 1983, developed a global system on plant genetic resources which is based on the principle that plant genetic diversity is the heritage of humanity. This system aims to ensure safe conservation, sustainable use and unrestricted availability of plant germplasm for the present and future generations (Esquinas-Alcazar, 1991). The system includes: (1) the International Undertaking on Plant Genetic Resources, (2) the Commission on Plant Genetic Resources, and (3) the International Fund for Plant Genetic Resources. The Commission has offered a unique global discussion forum and the Undertaking has provided a framework for formal agreement. Future roles of the system will be greatly influenced by the Convention as further discussed in a later section.

The Panel of Experts on Forest Gene Resources is mandated to mainly advise FAO on programs and priorities. Its influence extends beyond this due to its global coverage, neutrality and well balanced representation from developed and developing countries (Palmberg and Esquinas-Alcazar, 1990).

2 The United Nations Environment Program (UNEP)

UNEP, headquartered in Nairobi, was established in 1973 and charged with working with governments, other UN organizations, and nongovernmental organizations around the world to monitor the state of the global environment. UNEP essentially provides a catalyst for actions to be taken to address the resource conservation needs of member nations. Its actions are largely undertaken in collaboration with other UN agencies, such as FAO, but it works closely with organizations outside the UN umbrella, such as IUCN and IBPGR.

UNEP was a key UN coordinating agency for the development of the text of the Convention. Resolution 2 of the Nairobi final act requested UNEP to convene meetings of an Intergovernmental Committee on the Convention starting in 1993 and also to provide the Convention secretariat on an interim basis. Thus, UNEP will continue to play a critical role of global coordination toward successful implementation of the Convention. UNEP is also coordinating a project on "Global Biodiversity Assessment, with financial support from the Global Environmental Facility. This project aims to provide a scientific and technical base for the implementation of the Convention.

3 The United Nations Educational, Scientific, and Cultural Organization (UNESCO)

UNESCO, headquartered in Paris, is involved in gene conservation primarily through its Man and Biosphere (MAB) program. The objectives of MAB have evolved from establishing project areas based on an ecosystem concept (including human activity), to conserving representative ecosystems with zoned management, to developing biosphere reserves that conserve biological diversity and its genetic resources. In cooperation with various UN and other agencies (e. g., IUCN, the U. S. Smithsonian Institution), MAB is engaged in a program of inventorying and monitoring all the vegetation in the biosphere reserves and creating a system of inventory that will enable a global estimate to be made on the extent to which biosphere reserves are assisting in the conservation of genetic resources and biodiversity.

"Diversitas" is a new program launched by UNESCO in order to increase scientific knowledge on biodiversity, including an ecosystem function and the origin and maintenance of biodiversity. UNESCO's experience and activities for *in-situ* conservation will be useful for the agricultural community's new emphasis on on-farm conservation and *in-situ* conservation of wild relatives of crop species.

4 The Consultative Group on International Agriculture Research (CGIAR)

The CGIAR is a global network of agricultural research centers supported by public and private sector donors. Today, more than 1,800 scientists representing 60 different nationalities conduct research at

the 18 CGIAR centers and in ca. 40 developing countries where they work with national program partners. The research carried out at the CGIAR centers covers crops that provide 75% of food energy and a similar share of protein requirements in developing countries.

The work of the CGIAR center is based on the conviction that sustainable agriculture is a key to development and that the conservation and use of plant genetic resources are essential to agriculture. From its start, approximately 30 years ago, the CGIAR system has been in the forefront of plant genetic resources efforts. Thirteen of the CGIAR centers are directly involved in the conservation and use of plant (including forest) genetic resources.

While the conservation of endangered plant genetic resources is an important objective of the CGIAR system, it is not an end in itself. The CGIAR's larger goal of improving the productivity of agriculture requires the use of these resources for crop improvement. The centers' genebanks provide raw materials for plant breeders. Collectively, they distribute more than 600,000 samples of germplasm each year to individuals and institutes in 120 countries. The centers' crop improvement programs draw heavily upon the collections which they hold in trust. This has resulted in significant agricultural advances over the years, including the production of dwarf strains of wheat and rice receptive to intensive fertilization and irrigation. These varieties now provide food for an estimated 500 million people. In addition, developing countries have released several hundred varieties of crops which were bred or selected with input from center-based collections and scientists (IBPGR, 1993).

5 The International Union for the Conservation of Nature and Natural Resources (IUCN)

IUCN, headquartered in Gland, Switzerland, is a unique international agency in that it includes both governmental and nongovernmental membership. It was created in 1948 with the support of UNESCO. Funded by UNEP and the World Wide Fund for Nature (WWF), IUCN prepared the World Conservation Strategy, with the technical assistance of FAO and UNESCO (IUCN *et al*., 1980). Measures to protect genetic and biological diversity were a major component of the strategy. The Global Biodiversity Strategy was published in 1992 with the collaboration of IUCN, UNEP and the World Resources Institute (WRI) with similar objectives. In the past decade, IUCN became concerned with species-level conservation and paid increasing attention to plant genetic resources, especially *in-situ* conservation aspect.

6 The World Wide Fund for Nature (WWF)

WWF, located in Gland, Switzerlant, seeks to promote the conservation and sustainable use of plants through field programs and policy work. Its priorities include germplasm conservation of economically important plants, notably *in-situ* conservation of wild relatives of crops and, with less emphasis, medicinal plants and species useful for land reclamation and agroforestry.

Major issues for global plant genetic resources conservation efforts

The Convention is legally-binding and should enter into force by the end of 1993. The Convention sets a clear framework for biodiversity conservation and use activities at local, national, regional, and international levels. The ways in which the Convention will be implemented will shape the future development of a global system for plant genetic resources conservation and use. In this section, several major issues in relation to the Convention that affect national and international organizations are discussed. The outcome of previous and on-going efforts on development of a global plant genetic resources conservation system, such as the Keystone Dialogue (Keystone Center, 1990, 1991) and FAO's International Undertaking, will be superseded by the legally-binding Convention.

1 Development of national systems

Countries are key players in genetic resources activities as defined in the Convention. According to the Preamble of the Convention, States are responsible for conserving their biological diversity and for using their biological resources in a sustainable manner. However, many countries still lack experience, infrastructure and competence in relation to the safe conservation and active use of their own genetic resources. Significant national and international efforts to enable nations to take the necessary action to

fulfill the requirements of the Convention are urgently needed.

2 National sovereign rights and international common heritage

One of the key concepts of the Convention is national sovereign rights over their own biological resources as stated in its Preamble. Article 15 (Access to Genetic Resources) clarifies that access, where granted, shall be on "mutually agreed terms" and shall be subject to "prior informed consent". This article makes a sharp contrast to the previous consensus shared by many agricultural people that genetic resources are a "common heritage of human kind." It has been suggested by many that "mutually agreed terms", at least for genetic resources in agriculture, could be agreed on a "multilateral basis" within the framework of a multilateral agreement since every country depends upon many others for genetic resources.

3 Future of CGIAR's international collections

The Resolution 3 of the Nairobi final act recognizes the need to seek solutions on "access to *ex-situ* collections not acquired in accordance with the Convention." This concern applies to all germplasm collected and conserved by genebanks in the world before the Convention, but the CGIAR's *ex-situ* collections have attracted particular concern. This is due to the large size and comprehensiveness of the CGIAR collections and the CGIAR's policy of free distribution of conserved germplasm. Some parties have considered that these features might undermine the bargaining power of countries on their genetic resources.

4 Harmonizaion of FAO's International Undertaking on Plant Genetic Resources with the Convention

FAO's Inernational Undertaking on Plant Genetic Resources has been the most influential intergovernmental mechanism to ensure global efforts. It has considered plant genetic resources for agriculture and food uses "common heritage for human kind" with unrestricted access to germplasm as one of its principles. This is in contrast to the Convention's national sovereign rights. Therefore, Resolution 3 of the Nairobi final act calls for harmonization of the Undertaking with the Convention. Successful harmonization, led by FAO and other relevant parties, would be the most critical for the development of protocols for handling genetic resources for food and agriculture, including the CGIAR collections.

5 Intellectual Property Rights (IPR)

The application of intellectual property rights (IPR) in agriculture has seriously implications for collaboration, especially at the international level. The on-going GATT negotiations and some landmark patent applications, will alter the patent climate and inevitably influence the development of a framework for collaboration. Careful analysis of the implications of IPR legislation for countries should be carried out. The Crucible Project, involving a wide range of groups such as CGIAR centers, NGOs, private sector and the donor community, spcifically aims to assist countries in making such analysis.

6 Science and technology for biodiversity conservation and use

The Convention acknowledges a general lack of information and knowledge regarding biological deversity and calls for the urgent need to develop scientific, technical and institutional capacities to provide a basic understanding upon which to plan and implement appropriate measures. Our knowledge on the structure of genetic diversity is still limited and adequate conservation methodologies require further development. This international symposium sets a clear example of international efforts to generate and share knowledge towards the development of a technological base for the safe conservation and active use of genetic resources.

Conclusions

The Convention on Biological Diversity is a major step forward in global efforts to conserve and use genetic resources. All players, including national and international organizations, should make their utmost efforts to fully subscribe to the objectives of the Convention. With well-coordinated global efforts, it

may be possible to arrest the alarming pace of loss of plant genetice resources, most precious human heritage. A key component of such efforts will be harmonious collaboration between national and international bodies working together to ensure that their plant genetic resources are able to make the fullest contribution to sustainable development. Goodwill alone will not be enough. The collaborations will require a clear structure within which to work. Responsible international bodies should expeditiously work together to develop proper protocols.

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Discussion

Hamamura, K. (Japan): 1. Until when will the name IBPGR be maintained? 2. I believe that gene banks should distribute some of the materials freely while some should be charged. For example in Japan the gene bank distributes materials free of charge to research institutes but charges a fee to private organizations. This money can then be used for research purposes.

Answer: 1. IBPGR will become IPGRI after ratification by the Italian parliament, presumably in late 1993. 2. The distribution of germplasm always involves a cost (mail, seed production, etc.). A charge could be used for recovering the handling cost. However one should avoid to charge developing countries where the materials have often been collected.