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Regional Organization for Conservation and Use of Native Plant Genetic Resources in Mesoamerica

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In this paper we discuss the importance of national and regional networks for strengthening capacities for the management of native, underutilized plant genetic resources (PGR) in Mesoamerica. At the national level, the commissions of plant genetic resources of Mexico, Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, and Panama raise awareness and advocate the conservation of the rich agrobiodiversity of the area. These commissions, with the support of the International Plant Genetic Resources Institute (IPGRI), the Inter-American Institute for Cooperation on Agriculture (IICA) and the Tropical Agricultural Research and Higher Education Center (CATIE), formed the Mesoamerican Network of Plant Genetic Resources (REMERFI) in order to strengthen regional research capacity. Amongst REMERFI's achievements are documentation of the diversity, conservation and use of Anonaceae and Sapotaceae, two families of native fruit trees, and also capacity building in prioritized subject areas, including documentation of *ex situ* collections, *ex situ* and *in situ* conservation, valorization of plant genetic resources, biosafety, and germplasm access. The network has played an important role in building local expertise in plant genetic resources management.

This paper analyzes some of the key lessons learned from regional research in plant genetic resources and also provides concrete recommendations to enable REMERFI to widen its focus on the use of the region's wealth of agrobiodiversity.

March 2004

Background

The region between the south of Mexico and Panama, known as Mesoamerica, is one of the major centers of origin and diversification of many species of agricultural importance. Food security of the region's poor largely depends on maintaining this diversity in farmer's fields and its availability in the market. Unfortunately, this wealth of plant genetic resources (PGR)¹ is under serious threat due to progressive deforestation, agricultural practices that discourage the use of landraces, and increasing use of uniform and narrow-based varieties. This loss of genetic variability limits crops' capacity for adapting to new pests and diseases and coping with climate and soil changes. The frequent occurrence of hurricanes and droughts also has devas-

tating effects on the provision of basic foods for the resource-poor. Thus research and development organizations together with farmers must be equipped to reintroduce diversity and minimize these losses.

When ratifying the Convention on Biological Diversity (CBD), the Mesoamerican countries committed themselves to implementing mechanisms for conservation and sustainable use of their rich biodiversity. Several countries within the region are also signatories to the International Treaty on Plant Genetic Resources for Food and Agriculture, which was adopted in November 2001. The Treaty facilitates access to genetic resources for more than 60 crops and forages under a multilateral system, and has provisions for sharing any generated benefits justly and equitably. Unlike the CBD, which allows for bilateral negotiations to establish the terms of access and benefit sharing for each particular exchange, all germplasm exchange under the Treaty's multilateral system is subject to a Material Transfer Agreement. The Treaty also proposes a fund that will be used to support conservationist farmers and promote the sustainable use of PGR. The Parties have also agreed to integrate activities involving conservation and sustainable use of PGR into their agriculture and

1. In this paper, a distinction is made between agrobiodiversity and plant genetic resources. Agrobiodiversity is the component of diversity that contributes to food security, to farmers' livelihoods and to conservation of vital species within agricultural production. Agrobiodiversity includes plant genetic resources, which are defined as the variability of plant species of actual and potential economic interest for their utilization in genetic improvement programs, biotechnology and other sciences (Henríquez 2002).

development programs. As a consequence of these commitments Mesoamerican countries need to build technical and negotiating capacities at a time when all countries in the region are suffering from restricted technical and financial resources. To make best use of these limited resources there needs to be cooperation at an international scale, particularly geared towards capacity-building, increasing international activities involving PGR, strengthening interinstitutional cooperation, and implementing the Treaty's funding strategy, chiefly the World Conservation Fund².

PGR management: stakeholder analysis

Agriculture, especially subsistence agriculture, is a risky enterprise. To manage this risk, farmers are continually experimenting and innovating, using a variety of strategies including diversification of their activities within and outside the farm. Mesoamerican farmers have developed highly diversified agricultural systems, such as *milpa* (intercropping maize, beans and squash), the basis of which are domesticated PGR. Through such utilization this "informal" sector of the innovation system not only conserves PGR, but also generates an invaluable wealth of knowledge, practices and abilities.

There are many nongovernmental organizations (NGOs) in the region that, together with local farmer's organizations, carry out activities in support of agrobiodiversity conservation. For example, Via Campesina is an international movement that coordinates the actions of small farmers, rural women and indigenous groups in Asia, Africa, America and Europe. Via Campesina has campaigned effectively for PGR conservation as the basis for food security, advocating fair representation for farmers in policy formulation on issues of biotechnology and access to PGR, including the protection and promotion of farmers' rights (Via Campesina 2000).

The "formal" sectors of the innovation system are chiefly represented by national research organizations (NAROs) with mandates that encompass the conservation and utilization of PGR via research activities. However, with the exception of the Instituto Nacional de Investigaciones Forestales, Agrícolas y Pecuarias (INIFAP) in Mexico, NAROs in Mesoamerica are small, with wide, oversized mandates, and are seriously underfunded due to cuts in public spending. These constraints limit the resources available for the collection, characteriza-

tion and documentation of *ex situ* collections and even for basic research, for example in prebreeding and specific evaluations. Most of the NAROs have not even established a national program on PGR and their activities are based primarily on introducing the germplasm of commercial crops. These programs are generally carried out in partnership with members of the Consultative Group on International Agricultural Research (CGIAR), chiefly the International Plant Genetic Resources Institute (IPGRI), the International Centre for Maize and Wheat Improvement (CIMMYT) and Centro Internacional de Agricultura Tropical (CIAT). The lack of resources also means that many germplasm banks have serious difficulties in guaranteeing the viability and availability of their germplasm (REMERFI 2001) and collections are extremely vulnerable.

There are several universities, agricultural research centers, botanical gardens, herbariums, and museums that also contribute to PGR conservation and management in the region, within similar resource limitations. Those of most relevance are as follows:

- The Tropical Agricultural Research and Higher Education Center (CATIE) collects, conserves, and improves native and introduced germplasm. CATIE maintains collections of international importance, such as those of coffee and cocoa, and also some of regional importance, including native vegetable and fruit crops. Recognizing the importance of using conserved germplasm, CATIE emphasizes characterization, evaluation, and prebreeding activities.
- The Universidad de San Carlos de Guatemala and the Instituto de Ciencia y Tecnología Agrícolas (ICTA), work with local farmers collecting and characterizing germplasm of several native crops, including underutilized species such as *Amaranthus* and *Crotalaria*.
- The Programa de Recursos Genéticos Nicaragüenses (REGEN) of the Universidad Nacional Agraria encourages rural women to start home gardens to increase the use of native species such as malanga (*Xanthosoma*), which is an important component of the rural poor diet.
- The Universidad Católica de Occidente (El Salvador) conserves several native species *in vitro* for reforestation purposes. Natural forest in El Salvador has been severely reduced and now covers only 5% of the country.
- The Centro Universitario Regional del Litoral Atlántico de Honduras (CURLA) maintains an important collection of fruit trees, spices, and other species of the humid tropics.

Private sector involvement in conservation and research on native crops is obviously focused on those which provide opportunities for appropriation through legal protection for new varieties. An example is Maseca, in Mexico, that accounts for 70% of total market share in production of maize flour *nixtamal* (corn "cured" with calcium carbonate for making

2. The aim of the World Conservation Fund is the maintenance of crop collections in perpetuity by financially assisting all centres (regional, national, and international) and also farmers who act as curators. This effort is promoted by the centers of the Consultative Group of International Agricultural Research (CGIAR) and the Food and Agriculture Organization of the United Nations (FAO), and aims to reach a fund of US\$260 million. Approximately US\$25 million has been pledged so far by the United Nations, the Gatsby Foundation, and the governments of the USA, Switzerland, Egypt, and Colombia. In May 2003, the Government of Australia also pledged \$16.5 million to the Fund.

tortillas). By supporting INIFAP breeding programs Maseca ensures the availability of materials with the particular characteristics that the industry requires.

National and regional organization for native PGR management

The organizations and institutions mentioned above represent the social capital that provides the structures and processes for agrobiodiversity management. They provide a platform for collective action for planning, carrying out, monitoring, and evaluating PGR interventions and are the key to implementing institutional innovations for resource management, such as biosafety regulations. Here we describe the efforts of the stakeholders in the agricultural innovation systems of seven Mesoamerican countries in promoting conservation and utilization of native PGR through regionalized research and capacity building activities. This involves negotiations across highly diverse arenas and between diverse sets of actors (public/private, formal/informal). A key factor to success has been promotion by highly motivated and active people with support from exemplary leadership.

National-level organization: Plant Genetic Resources Committees

Just as it was the pioneer in formulating its Biodiversity Law, Costa Rica was also the first Mesoamerican country to implement PGR-related institutional change with the establishment of its Comisión Nacional de Recursos Fitogenéticos (CONAREFI). CONAREFI was created by Presidential Decree in 1988 with the objective of promoting research on native, underutilized crops and disseminating the knowledge generated by this research.

Following Costa Rica's lead, five other countries in the region had established similar committees by the end of the 1990s. The composition of each committee varies depending on the degree of organization, promotion, and awareness that the topic of PGR has reached within each country (REMERTI 2001). However, in general terms, all have a membership formed from the NARO, state and private universities, Ministries of Agriculture and Environment, the Science and Technology Committee, Biodiversity Committee, and NGOs. To a lesser extent farmers and farmers' organizations and indigenous groups also participate in these bodies.

All of the committees have formulated their working plans in line with the Global Action Plan for the Conservation and Utilization of Plant Genetic Resources for Food and Agriculture, simply referred to as PAM. The key aims of which are: (1) *in situ* conservation and improvement, (2) *ex situ* conservation, (3) utilization of genetic resources, and (4) institutional capacity building.

Because of its large territorial size and geographical and cultural diversity, the creation in Mexico of the Sistema Nacional

de Recursos Fitogenéticos para la Agricultura y la Alimentación (SINAREFI) represents a significant collaboration between formal and informal stakeholders (see Box 1).

Box 1. Sistema Nacional de Recursos Fitogenéticos para la Agricultura y la Alimentación (SINAREFI) in Mexico

Mexico has 32 biomas and 56 ethnic groups speaking 20 languages, putting it among the six nations with the highest biocultural wealth worldwide. Approximately 60% of plant species are endemic, about 7,000 of which are considered useful (including 1,600 edible and 3,300 of medicinal use). At least 102 cultivated species originate from the southern Mexican states that are part of Mesoamerica (Rzedowski 1993). There is long history of cultivation with evidence that the Mayans managed no fewer than 24 cultivated plants in the *Milpa* system and 28 in the *Rancho Maya*. Mexico also has a 60-year tradition of scientific plant breeding for several native crops of economic importance (Ortega-Paczka 1999), and several Mexican universities are considered pioneers in ethnobotanical studies and participatory research.

Recognizing the importance of conserving its PGR wealth, the Mexican government, in its National Development Plan 2001–2006, noted that support for the establishment of the Sistema Nacional de Recursos Fitogenéticos para la Agricultura y la Alimentación (SINAREFI) was a key priority. The formation of SINAREFI in 2002 consolidated efforts led by INIFAP, the Secretaría de Agricultura, Ganadería, Desarrollo Rural, Pesca y Alimentación (SAGARPA), and the Servicio Nacional de Inspección y Certificación de Semillas (SNICS) to organize stakeholders engaged in agricultural research and germplasm utilization.

Twenty-one organizations are members of SINAREFI, including the Sociedad Mexicana de Fitogenética (SOMEFI) and local farmers. The private sector is represented through the Unión General Obrera Campesina Popular (UGOCEP) and the PRODUCE foundation, which are civil groups that voice producers' demands for technology and support agricultural research and technology transfer.

SINAREFI is organized into seven national networks that carry out specific projects in response to national priorities and international obligations. These networks emphasize conservation and use of maize, nopal (*Opuntia tomentosa*), agaves (particularly blue agave, *Agave tequilana*, used in the production of tequila), fruit species (including Anonaceae), and native vegetable species. Given the immense diversity maintained in Mexico's national *ex situ* collections and their potential vulnerability, a network to support genebanks has also been formed. In SINAREFI's first request for proposals (2003) it was stipulated that research and technology projects must be in line with PAM.

Regional-level organization: Mesoamerican Network of Plant Genetic Resources – REMERFI

PGRs have become a topic of extreme importance at the political level in the Mesoamerican countries, and remain a crucial point for debate in agricultural and environmental fora in the region. Several important mechanisms have been designed to strengthen institutional arrangements for PGR management in Latin America (Alarcón *et al.* 1998).

In 1992, supported by regional and international agricultural cooperation organizations, seven Mesoamerican countries formed the Red Mesoamericana de Recursos Fitogenéticos (REMERFI) (Box 2). The objective of REMERFI is to improve conservation and sustainable utilization of PGR by strengthening national systems and coordinating actions at both the national and Mesoamerican levels (Henríquez and Carnap 2001). The formation of REMERFI is an indicator that the governments of all these countries are aware of the importance of coordinating efforts in conservation and sustainable use of their agrobiodiversity.

REMERFI was originally conceived exclusively for carrying out PGR regionalized research, however, it was realized that there was also a need to strengthen capacities and so this was added to REMERFI's remit. REMERFI is governed by a Steering Committee formed by members of the signatory organizations.

Box 2. Signatories to the Cooperation Agreement That Created the Mesoamerican Network of Plant Genetic Resources (REMERFI)

- México: Instituto Nacional de Investigaciones Forestales, Agrícolas y Pecuarias (INIFAP)
- Guatemala: Instituto de Ciencia y Tecnología Agrícolas (ICTA)
- El Salvador: Centro Nacional de Tecnología Agropecuaria y Forestal (CENTA)
- Honduras: Dirección de Ciencia y Tecnología Agropecuaria (DICTA)
- Nicaragua: Instituto Nicaragüense de Tecnología Agropecuaria (INTA)
- Costa Rica: Ministerio de Agricultura y Ganadería de Costa Rica (MAG)
- Panama: Instituto de Investigación Agropecuaria de Panamá (IDIAP)
- Tropical Agricultural Research and Higher Education Center (CATIE)
- International Plant Genetic Resources Institute (IPGRI)
- Inter-American Institute for Cooperation on Agriculture (IICA)

The Steering Committee approves research proposals (based on a prioritization carried out by the participating countries), supports project formulation, and identifies sources of funding. The national PGR committees are responsible for carrying out research and capacity-building activities and for raising national awareness. Figure 1 shows the interaction between REMERFI, the national commissions and sponsors.

Advances in regionalization of research on native underutilized crops

Regionalization of research involves organizations from several countries, usually organized into networks, which are coordinated supranationally (Gijssbers and Content 1996). Regional network research provides the opportunity to take advantage of economies of scale and scope, maximizing the use of limited resources and enabling knowledge diffusion. PGR represent an excellent topic for regionalized research in the Mesoamerican countries for several reasons (Box 3).

Between 1997 and 2001, working under the umbrella of REMERFI, the national committees carried out two regionalized projects on Sapotaceae and Anonaceae, which had been prioritized regionally. These families are composed of native tropical fruit trees and are of economic and nutritional importance in all seven countries. The most important results of these efforts were the generation and use of descriptors of the phenotypic variability for the most important species in both families. Species of importance in local markets, such as chicozapote (*Manilkara zapota*), were also characterized using isoenzyme techniques. Technical staff from NAROs and NGOs, as well as local farmers, received training on a variety of vegetative propagation methods for the species. Local clonal gardens were established for the most important species ensuring their conservation and availability for future breeding programs. Agricultural researchers in the region were trained in participatory research methodologies for carrying out ecogeographical and ethnobotanical studies (Henríquez 2001). These projects were carried out with funding from the Inter-American Cooperation Bank (IDB) and the German Government.

REMERFI also contributed to an analysis of agrobiodiversity losses caused in 1998 by Hurricane Mitch in Honduras and Nicaragua, where local production and seed exchange constitute an integrated form of conservation and breeding. The study not only confirmed the vulnerability of several landraces to these natural disasters, but also their loss due to progressive substitution by other crops and modern varieties. These activities formed part of the project Seeds of Hope coordinated by CIAT.

Capacity building and institutional strengthening through organization

Regional capacity building through training has been one of the key approaches to strengthening organizational capacities

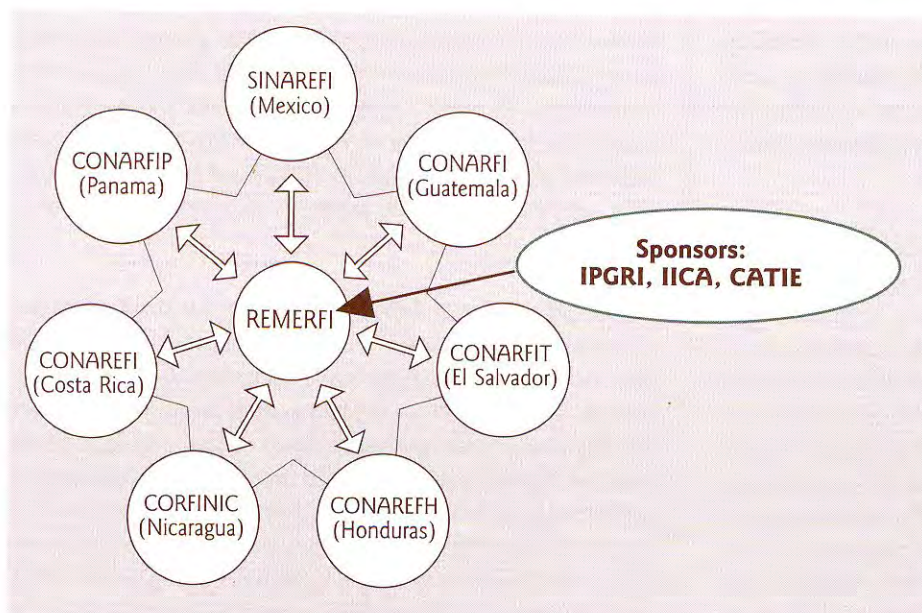


Figure 1. Interaction between members of REMERFI and the National Plant Genetic Resources Committees

Box. 3. Reasons Why PGR is a Good Theme for Regionalized Network Research

- All Mesoamerican countries share the same underutilized native PGR since plants do not recognize borders.
- The rich genetic diversity of the area has been poorly documented to date and some species are vulnerable to loss of diversity for a variety of reasons and consequently their conservation is a priority.
- Native crops are in both local and regional demand, and also have potential in international markets, but they have not been commercially exploited and there is a need for improved varieties.
- Native crops are frequently managed by women, thus the technological change brought about by research has the potential to contribute to nutrition, improving the welfare of women and children.
- Since it is rich in PGR of key importance for biotechnology and genetic engineering, Mesoamerica as a region attracts worldwide attention and scientific interest.
- Advances in information and communication technologies facilitate technical cooperation and exchange of important information, such as that related to germplasm.
- NAROs and other research organizations all face similar financial restrictions, consequently funding for research, especially for native underutilized crops is being continuously reduced. Regionalized network research is a cost-effective system which maximizes the impact of limited financial resources.
- Donors have a marked interest in regionalization as a means to maximize impact of their investments in development.
- Mesoamerica has become a recognized block for commercial negotiations with other countries and regions, which emphasises the need to strengthen technical organization and cooperation between Mesoamerican countries.
- With the exception of Belize, the Mesoamerican countries share the same official language and similar political and cultural backgrounds, which facilitates working as a network.

for conservation and utilization of agrobiodiversity. The national committees and REMERFI carried out an initial needs-assessment exercise to determine PGR-related training needs. From this exercise it was established that three topics were of regional priority: (1) biotechnology and biosafety, (2) intellectual property rights and access to PGR, and (3) improving documentation of the germplasm banks.

To establish a baseline, REMERFI carried out a study of the legal and political framework for agrobiodiversity conservation and management in all seven member countries. In each country, the state-of-the-art in the formulation of legislation for conservation, germplasm access and biosafety was documented and then delivered at a scientific regional workshop. Then further regional workshops were carried out to discuss policies and legislation, and identify elements for policy formulation in each country, from which recommendations for regional policy harmonization were derived. One of the key results of this capacity building effort was strengthening of the committees, in particular in Panama and Nicaragua. These two committees went on to act as advisory boards to decision-makers responsible for legislation to comply with the Cartagena Biosafety Protocol³.

The Mesoamerican countries also expressed a need for technical support in linking individual PGR databases. Thus, supported by IPGRI, germplasm bank staff were trained in the use of the system pcGRIN, and in the use of descriptors to ease information exchange. Through REMERFI's efforts it was also possible to increase the criti-

3. The Cartagena Biosafety Protocol entered into effect in September 2003. The Protocol aims to protect biological diversity from potential risks derived from the genetically modified organisms that are products of modern biotechnology. The Protocol has been signed by all of the member countries of REMERFI, with the exception of Guatemala, and by September 2003, had been ratified by Nicaragua, El Salvador, México, and Panama.

cal mass of qualified people in other subject areas, including methodologies for ecogeographical and ethnobotanical studies, economic valuation of PGR, management of transgenic seeds, environmental impact assessment, and planning, monitoring, and evaluation of PGR projects.

Strong emphasis was put on strategic planning exercises to support the organization of the PGR committees. Thus, the committees in each country defined their organizational structure in several subprograms and formulated annual operational plans. However, financial limitations prevented programmed activities from being executed as planned and therefore only projects that enjoyed international support were carried out. However, despite such constraints, the national committees have made concerted efforts to implement awareness and information dissemination programs. For example, the Comisión Nacional de Recursos Fitogenéticos (CONARFI) in Guatemala organized a national PGR forum in which several important topics were discussed, including the potential effects of genetically modified living organisms on the environment. This event brought together professionals from agriculture and science, researchers, decision makers, and representatives of the private seed-producing sector. Similarly, the Comisión Nacional de Recursos Fitogenéticos de Nicaragua (CORFINIC) has carried out several national activities to raise awareness and promote the use of native PGR. These events have contributed to gaining the support of local farmer's organizations for CORFINIC and its activities.

Lessons learned

It is clear that regionalized research in PGR can be carried out in Mesoamerica, while simultaneously increasing capacity and supporting the stakeholders in the innovation system. The main lessons learned from these national and regional organizational arrangements are highlighted below.

Regionalization maximized the benefits derived from research

The collaboration among countries provides mechanisms for producing and sharing new knowledge and public goods. REMERFI's policy is also to protect research results by publishing them and putting them in the public domain. Regionalized projects also provide opportunities for training that otherwise would seldom be accessible to individual researchers, and are beyond the financial reach of several organizations. This contributes to forming a critical mass of skills and technical expertise for PGR research and management.

Organization of research by thematic groups

Organization of research into thematic groups maximizes the contribution of researchers. These subgroups are supra-national and regional horizontal structures that focus on particular PGR topics and prioritized native crops, such as those of the Anonaceae and Sapotaceae families mentioned

above. The advantage of these thematic groups is obvious as specialists from several countries and also international experts get to work together. This leads to the project proposals formulated in these subgroups being of a high technical quality due to their multinational and regional character, and also potentially increases their chances of finding funding.

The importance of defining the rules for participation

In initiatives of this sort it is very important to study how the new research arrangements affect allies and other stakeholders, and how policies in place in each country might affect the implementation of these efforts. When regional initiatives are organized it is important that the individual national partners decide what level of authority they are prepared to give to the regional bodies, if they decide to give any at all. A clear definition of research objectives and priorities that take into account stakeholders' interests is essential from the start if these mechanisms are to gain legitimacy. A balance also needs to be found between national and regional activities. That is, the participating countries must have autonomy to decide which projects are of national importance and so should not be executed in the framework of regional cooperation.

REMERFI's position in the debates

Many subjects related to PGR, such as intellectual property rights, farmers' rights, biosafety, and the impact of transgenic crops in the rural economy, are very sensitive topics. Although the members of REMERFI come from a diverse range of public and private sector backgrounds and often have very different opinions on these topics, their shared passion for the conservation and sustainable use of PGR means that there is universal concern if political decisions might limit the availability of resources which help to sustain the regions' food security. However, the national committees and the network have all agreed to avoid entering into partisan discussions. REMERFI has become a forum for reflection, debate, and dialogue, focusing on regional harmonization on topics of agrobiodiversity that are within its technical competence.

Recommendations for widening the focus of REMERFI

Several recommendations are given below, with the aim of optimizing REMERFI's regional performance.

Focus on complementarities of ex situ and in situ conservation

The focus of regional research must not only include the study of diversity of economically important cultivated plants, but also their wild and semidomesticated relatives, as well as the traditional knowledge associated with them (i.e. traditional practices, uses, local knowledge) (REMERFI 2001). Through REMERFI and the national PGR committees it is possible to develop regional competencies in *in situ* conservation, focus-

ing on *on farm* conservation involving local farmers and communities. REMERFI has already started promoting actions in this direction. For example, in coordination with the Comisión Centroamericana de Ambiente y Desarrollo (CCAD)⁴, projects will be submitted to the Global Environment Fund (GEF)⁵ that will emphasize on farm conservation and be carried out with participation of the Coordinadora Centroamericana del Campo (CCC)⁶.

However, it remains necessary to maintain *ex situ* collections as a complementary strategy to *in situ* conservation. Here the mechanisms promoted by the GEF are important for REMERFI's members. Initially, this fund was formed to maintain the collections in the CGIAR, but it has now been expanded to provide funding for maintaining national germplasm banks and to provide technical support and capacity building in order that such collections reach international management standards. Towards this goal, REMERFI and members have already documented the state of all *ex situ* collections in the region, defining priority areas that need strengthening (REMERFI 2000). It is of paramount importance that REMERFI continues receiving support from IPGRI to access the Fund.

Focus on the value of innovation

In the long run, the conservation of PGR can only be sustained if these resources are also utilized. This process must be based on the economic valuation of agrobiodiversity and must be oriented to the needs of agriproducing chains, guided by market demands and export potential. This focus is necessary in Mesoamerica if it is to be competitive with other Latin American countries, which already have a relatively high level of PGR development. Agricultural innovation also involves the adoption of new technologies, transformation of raw materials into marketable products, and getting those products to the market. This is an area that depends on the cooperation of competent stakeholders, including NGOs, other development projects and the private sector, served by researchers with strong competencies due to capacity built through the regional network.

4. The Comisión Centroamericana de Ambiente y Desarrollo (CCAD) is formed by the Ministries of Environment of seven Central American countries. Its objective is to protect biological and ecosystem diversity, establishing collaboration between the countries to adopt models of sustainable development and promote coordinated actions to rationally use the regions' natural resources (<http://ccad.sgsica.org/antecedentes/antecedenteshistoricos.htm>).
5. The Global Environment Fund (GEF) is an international funding organization established in 1990 by UNDP, UNCED, the World Bank, and 166 countries. More than 150 GEF projects are in progress in collaboration with NGOs. One of the activity windows of GEF is biodiversity (<http://www.gefweb.org/>).
6. The Coordinadora Centroamericana del Campo (CCC) is a forum for coordination of regional organizations of indigenous peoples, blacks, and peasants, with the aim of defending the interests of rural families in Central America (<http://www.frentesolidario.org/fr/alanzas/ccc/01.html>).

Another challenge is to maximize the use of agrobiodiversity's PGR in a way that still enables the participation of local farmers and indigenous communities. Here, for example, support to the informal seed sector is crucial and can be attained through participatory research. Some possible fields of action for regional activities are seed quality, participatory breeding, local germplasm banks and exchange, and communal activities in support of seed management.

Participation in harmonization of regional policies

Organization at the national and regional level enables REMERFI's members to develop competencies and competitive advantages in advising policymakers. This is a challenge that the committees in Panama, Nicaragua, and Costa Rica have already tackled. Members can give advice that promotes regional policy harmonization, for example, on germplasm exchange and access mechanisms, and that benefits the actors that use the resources, mainly farmers. It is important that sponsors such as IICA and IPGRI continue supporting REMERFI in advocating adequate agrobiodiversity policies.

Conclusions

Researchers and scientists are responsible for finding solutions so that the growing human population can live within the sustainable limits of ecosystems. To do this they present plans for conserving and using agrobiodiversity in a sustainable way. However, the authority to implement these plans is generally not in the hands of researchers and scientists, but rests with policymakers. Members of conservation networks, such as REMERFI, have the potential to become spokesmen and to voice their concerns publicly and appropriately to all sectors of civil society. Such awareness-raising at all levels is important because only active public involvement can exert the necessary pressure on policymakers to prompt them to implement the actions required to guarantee conservation and sustainable use of the wealth of Mesoamerican biodiversity.

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