REGIONAL WORKSHOPS ON CONSERVATION AND USE OF FOREST GENETIC RESOURCES: THEIR CONTRIBUTION TO A GLOBAL ASSESSMENT OF FOREST GENETIC DIVERSITY

S. Hald[1], J.-P. Barnekow Lillesø
Danida Forest Seed Centre, Humlebaek, Denmark

&

P. Sigaud
Food and Agriculture Organization of the United Nations, Rome, Italy

Background

In many countries, growing concerns over the long-term sustainability of forest ecosystems, species and genetic resources have led to the development of national policies and plans. These reflect the view that conservation, improvement and sustainable use and management of tree genetic diversity are related, interdependent activities that require a holistic approach at the national level. For example, tree genetic resources can be conserved in specially designed conservation stands, managed forests, protected areas, plantations, agroforestry systems, tree improvement programmes or seed banks. These repositories are generally under distinct jurisdictions and systems of ownership and management. Integrated approaches that combine various spatial and management systems are now recognized as efficient strategies to reduce potential genetic degradation risks. The Convention on Biological Diversity (CBD), which is based on the principle of national sovereignty over genetic resources, reinforces the need for voluntary, country-based action.

Programmes confined to national boundaries, however, have obvious limitations. Many species have regional or global ranges. A number of introduced species, which have developed into well-adapted land races, may have economic importance outside their original ranges. Conservation and improvement programmes for these species may be a common concern to several countries.

The resources available for activities in the field of forest genetic resources are often limited. It is essential, therefore, that programmes do not overlap or duplicate effort. Areas of increasing national and international concern are access to, transfer and use of genetic resources, and equitable sharing of their benefits. Rapid developments in biotechnology create opportunities, challenges and risks for the forestry sector, and require coordinated responses at national and supranational levels.

Such considerations introduce regional and international elements into the conservation and use of genetic resources. Regional and international programmes of collaboration, based on the needs, requirements and priorities of each country, and closely linked to national development plans, can increase the efficiency of national programmes (FAO 1999a).

[1] Deputy Director, Danida Forest Seed Centre, Krogerupvej 21, 3050 Humlebaek, Denmark, Tel: +45-49-190 500, Fax: +45-49-160 258, E-mail: shd@sns.dk.

Information on the status of forest genetic resources is still fragmented, and reliable data, if available, are seldom gathered according to common objectives or standard methodologies. Information may accumulate under various local or national programmes, and is available in national reports on plant genetic resources for food and agriculture, biological diversity status and action plans, forest inventory publications and so on. Lists of threatened or endangered plants, including trees and shrubs, are also generally available at the country level. Although some countries have developed mechanisms to conserve forest genetic resources, up-to-date information for most developing countries is available only at the regional level. Such information can be obtained through FAO's Panel of Experts of Forest Gene Resources, which regularly updates lists of priority tree species for each ecoregion of the world.

In the course of preparing for the International Technical Conference on Plant Genetic Resources (held in Leipzig in 1996), three regional workshops on European, North American and boreal forest genetic resources were held in 1995 and 1996. These reviewed issues concerning the genetic diversity of forest trees and shrubs at national and regional levels. The workshops provided a useful forum to exchange experiences, identify areas of common interest or concern, express needs and requirements, and prepare regional State of Forest Genetic Resource assessment reports and action plans (Rodgers & Ledig 1996).

In 1997 the Committee on Forestry (COFO), FAO's highest governing body in forestry, discussed regional and international collaboration in forest genetic resources. COFO recognized the need to strengthen national, regional and international activities in forest tree genetic resources, and recommended that FAO support additional regional workshops. Subsequently, a series of such workshops was organized as part of a wider process aimed at better assessment of forest and tree genetic diversity, and the development of regional plans of action. The objectives of this process are to: i) assist countries in preparing and agreeing common methodologies for assessing the status of forest genetic resources; ii) define priorities based on national needs and requirements; iii) identify priority actions amenable to regional cooperation; and iv) make recommendations for immediate follow-up and implementation (FAO 1999b).

Two workshops in the Sahel region

In 1997 and 1998, FAO, IPGRI and ICRAF joined forces to support a regional workshop on the conservation, management and sustainable use of forest genetic resources in the sub-Saharan dry-zone of Africa, or Sahel.

Training workshop for francophone African countries

In March 1998, IPGRI, in collaboration with FAO, the Danida Forest Seed Centre, CIRAD-Forêt and other partners, organized a training workshop on forest genetic resources for the French-speaking countries of Western and Central Africa, and Madagascar. The workshop, the first of its kind in the region, covered all aspects of forest genetic resources management, and prepared the ground for the subsequent regional workshop (see below). Participants at the workshop discussed and recommended the development of a research programme for forest genetic resources in the region (known as SAFORGEN). This programme would be based initially on four networks: fruit and food tree species, fodder tree species, African timber species and non-wood forest products. Participants recommended that IPGRI facilitate this programme, in collaboration with interested regional and international organizations (Ouédraogo & Boffa 1999).

Regional workshop for Sahelian and North-Sudanian Africa

The regional workshop itself was held in Ouagadougou, Burkina Faso, in September 1998. Thirty-five participants attended, including national experts from 15 countries, and representatives from the organizing institutions (FAO, IPGRI and ICRAF) and CIRAD-Forêt, DFSC, UNEP, IUCN and IUFRO. National experts presented country reports on the status of forest genetic resources identifying priority species, listing key issues and providing recommendations to tackle major constraints (Sigaud *et al*. 1998). A draft regional synthesis, prepared before the meeting, was discussed and amended. The country reports identified 310 priority species. Sixteen of these, distributed across 18 countries, were identified as priority species by ten or more of the countries at the workshop (Eyog Matig & Ouédraogo 1999) (Table 1).

Table 1. *List of priority forest tree species in Sahelian and North Sudanian Africa. NWFP = Non-wood forest products. Source: Eyog Matig and Ouédraogo (1999).*

Priority Species	Countries Listing Species	Percentage of Total Countries	Main Uses
Faidherbia albida	15	83	Fodder, shade, soil and water conservation, agroforestry, fuelwood
Tamarindus indica	15	83	Food, NWFP, shade
Khaya senegalensis	14	78	Timber, fuelwood, NWFP
Acacia nilotica	12	67	Fuelwood, NWFP
Adansonia digitata	12	67	Food, shade, NWFP
Anogeissus leiocarpa	12	67	Fuelwood, roundwood (poles etc.)
Parkia biglobosa	12	67	Food, agroforestry
Acacia senegal	11	61	NWFP, fodder
Azadirachta indica	11	61	Roundwood, fuelwood, NWFP
Borassus aethiopum	11	61	Roundwood, food, timber
Diospyros mespiliformis	11	61	Food, timber, fuelwood
Pterocarpus erinaceus	11	61	Timber, fuelwood, NWFP
Balanites aegyptiaca	10	56	Food, NWFP
Eucalyptus camaldulensis	10	56	Roundwood (poles etc.), fuelwood
Vitellaria paradoxa	10	56	Food, fuelwood, NWFP
Zizyphus mauritiana	10	56	Food, fodder

Participants also identified the need for, and agreed to prepare, a sub-regional plan of action on forest genetic resources, for which three main themes and their associated areas of activity and concrete activities were specified (Table 2).

Participants recommended the establishment of a regional research-oriented programme for forest genetic resources in Sub-Saharan Africa. IPGRI's new Sub-Saharan Africa Forest Genetic Resources Programme (SAFORGEN) was identified as the implementing mechanism. A satellite meeting was held to discuss SAFORGEN's scope, objectives, functioning and funding.

Table 2. *Themes and areas of possible collaboration in Sahelian and North Sudanian Africa*

Theme	Area of activity	Examples of recommended activities
Improved management and use of forest genetic resources	Resource assessment	• Compile available information on distribution, variation and biology of priority species. • Define common ecological zones to be used in inventories by different countries.
	Conservation	• Inventory genetic resources of priority species. • Assess the effectiveness of conservation of priority species in protected areas. • Survey populations under severe pressure.
	Sustainable use	• Promote productivity studies of natural stands and development of sustainable harvest principles. • Information and extension campaigns on economical resource use for local people.
Enhanced availability of superior germplasm	Seed supply and demand	• Assess local and national seed supply and demand in economic, technical and institutional terms. • Promote establishment of local seed storage centres.
	Selection and improvement of priority species	• Identify and protect seed sources. • Set up networks for germplasm exchange with the purpose of establishing provenance trials.
Enhanced institutional capacity	Awareness raising	• Identify national awareness-raising strategies, defining target public and mobilization tools. • Promote participation by women and villagers in decisions concerning management of forest genetic resources.
	Institutional strengthening	• Identify national capacities, facilities and programmes regarding priority species and collate information at the regional level. • Prepare lists of potential partners for specialized actions
	Training	• Identify institutions capable of providing training programmes and disseminate this information within the region • Prepare suitable short-term and long-term courses on subjects identified each year as a priority within the region.

Immediate outcomes and follow-up

The two workshops provided a valuable forum for discussion within the ecoregion. They brought together ideas previously developed separately in anglophone and francophone countries. Interpretation was provided at the regional workshop and entailed the development of common understanding and approaches.

The country reports prepared for the regional workshop are being edited and published with support from IPGRI, FAO and DFSC. The draft regional synthesis and action plan have been finalized and are being published as *The State of Forest Genetic Resources in Sahelian and North-Sudanian Africa & Sub-regional Action Plan for their Conservation and Sustainable Use* (Eyog Matig *et al*. 2001). This document, together with the country reports, will be made available on the Internet.

SAFORGEN was launched officially in 2000. The programme currently concentrates on supporting the publication of country reports and providing coordination services to two networks, namely food tree species and medicinal tree species. IPGRI is supporting the programme and has financed the post of a full-time coordinator based at Cotonou in Benin.

Regional workshop in the South Pacific

A workshop for the South Pacific Islands was held in Apia, Samoa, in April 1999. This built on the support given by the Heads of Forestry of the Pacific Island countries and territories in September 1998, and the recommendations of COFO in 1997 (see above). The main sponsors and organizers of the workshop were the South Pacific Regional Initiative on Forest Genetic Resources (SPRIG), the Australian Agency for International Development (AusAID), FAO, the Pacific Islands Forests and Trees Support Programme of the Secretariat of the Pacific Community (SPC/PIF&TSP), the South Pacific Regional Environment Programme (SPREP) and the Forestry Division of Samoa. Other regional and international organizations gave additional support, including IPGRI, CSIRO and ACIAR (Australia); the Pacific/ German Regional Forestry Project; and the Queensland Forestry Research Institute.

As in the Sahel meeting, the objectives of this workshop were to: i) assist countries and territories in preparing common methodologies for assessing the status of forest genetic diversity; ii) discuss issues relevant to forest genetic resources; iii) identify priority actions amenable to cooperation between islands; and iv) make recommendations for immediate follow-up and implementation. During the workshop, participants presented reports on forest tree genetic diversity and identified the main constraints to conservation in the ecoregion.

Four thematic areas were proposed for discussion and possible incorporation into a regional action plan:

i) Prioritization of species and operational needs;
ii) Ways to support conservation, sustainable use and management of forests and trees;
iii) Issues related to germplasm collection, exchange and access; and
iv) Institutional strengthening, training and regional collaboration.

To discuss the first and second thematic areas, participants split into three eco-geographic groups. These groups debated the relevance of an initial single-species focus, which was suggested as a point of entry for the action plan. It was agreed that such a strategy, based on a limited number of tree species, could help to focus discussion on operational needs, and would complement other conservation strategies focusing on the landscape or ecosystem level.

Theme 1: Identification of priority species and activities

Using information from participants and from the country reports, each working group identified ten, high-priority native species:

- **Melanesia and Southwest Pacific**: *Acacia* spp., *Agathis macrophylla*, *Calophyllum* spp., *Cordia subcordata, Diospyros* spp., *Endospermum medullosum*, *Intsia bijuga*, *Pometia pinnata, Pterocarpus indicus* and *Santalum* spp.

- **Polynesia and Eastern Pacific**: *Calophyllum inophyllum*, *Calophyllum neo-ebudicum*, *Cordia subcordata, I. bijuga*, *Planchonella samoensis*, *Pometia pinnata, Santalum* spp., *Syzygium inophylloides, Terminalia richii* and *Thespesia populnea*.

- **Micronesia and North-Central Pacific**: *Artocarpus* spp., *Barringtonia asiatica, Calophyllum inophyllum*, *Cordia subcordata, I. bijuga*, *Morinda citrifolia*, *Pandanus tectorius*, *Pisonia grandis*, *Terminalia* spp. and *Thespesia populnea*.

Some of these genera and species were identified by only one ecoregional group; others were common to all islands (*Calophyllum* spp., *Cordia subcordata* and *I. bijuga*). Other species were common to Melanesia and Polynesia (*P. pinnata, Santalum* spp.), or to Polynesia and Micronesia (*Terminalia* spp., *Thespesia populnea*). The working groups augmented the lists by identifying and scoring priority technical activities for each species (including exploration and collection of germplasm, evaluation, improvement and *in situ* or *ex situ* conservation).

Production forestry is a major economic sector in several Melanesian islands. The identified priority species, therefore, are mostly commercially valuable timber trees. In the Northern and Central Pacific region, however, which includes many small atolls and has a less diverse tree flora, the identified priorities differ accordingly. Here they consist of widely distributed, multipurpose coastal tree species.

Theme 2: Conservation, sustainable use and management of forests and trees

Participants discussed ways of promoting and implementing sustainable forest management practices for ecosystems and priority tree species. They recommended plantations and agroforestry systems of both native and introduced species as means of reducing pressure on native forests. They also recommended that forest-related agencies working in the region take action to conserve populations of identified priority species. Participants encouraged the involvement and commitment of all stakeholders, especially landholders, in forest conservation and management, for example by integrating traditional practices and leadership into modern, scientific conservation and use plans.

Theme 3: Germplasm collection, exchange and access

Participants addressed the complex issues surrounding access and exchange of germplasm (both within and among countries) from several perspectives. Both legal considerations and general issues concerning sharing of benefits from the use of genetic resources, quarantine and plant protection regulations and invasive species were presented and discussed. In the area of germplasm exchange, participants recommended that databases on species characteristics and seed availability be further developed and made available to all islands. In addition, they recommended that a pest risk analysis be prepared for the safe movement of tree germplasm within the region. Participants recognized that access to genetic material remains an issue of national sovereignty. The experience of SPRIG, which has developed an internal code of conduct for access and transfer of forest genetic materials (see Thomson, Midgley, Boland & Whimp in these proceedings), was commended as a basis for developing regional transfer agreements.

Theme 4: Institutional strengthening, training needs and regional collaboration

Most Pacific countries have small forestry and environment departments, with limited personnel and budgets. It is difficult, therefore, to ensure that all staff are trained and informed in the conservation, management and use of forest and tree genetic resources. A number of collaborative programmes, projects and initiatives on forestry, forest conservation and forest genetic resources were identified, including the Pacific Islands Forests and Trees Support Programme, SPRIG, the South Pacific Biodiversity Conservation Programme (GEF/SPREP) and the Pacific/German Regional Forestry Project. These initiatives have proved effective in enhancing national strategies and activities. More specifically, participants recommended that capacities be strengthened by both formal training and informal sharing of technical skills, and a number of priority subjects were identified. As for seed collection, participants emphasized the need for local storage facilities and on-the-job training (Sigaud *et al*. 1999).

Immediate follow-up

After a period of consultation and revision, the Pacific Islands Heads of Forestry officially endorsed the action plan in May 2000. The plan is complemented by a regional assessment of the status of forest genetic diversity, based on data available in country reports. Once edited and published, the country reports will be made available on the Internet. The action plan and the draft regional status report recently served as important sources for the formulation of a second phase of the SPRIG project.

Two workshops in Southern and Eastern Africa

SAFORGEN Training Workshop

In December 1999, the SAFORGEN programme organized a training workshop on the conservation and sustainable use of forest genetic resources in Southern and Eastern Africa. This was held at the Kenya Forest Research Institute in Nairobi. The workshop was supported by UNEP, IPGRI, DFSC, ICRAF, Oxford Forestry Institute and FAO, and attended by 24 participants from 13 countries. The objective of the meeting was to strengthen institutional capacities within the field of conservation and use of forest genetic diversity. Training provided by SAFORGEN contributed to the success of the SADC regional workshop held six months later (see below). The proceedings of the training workshop are being finalized (Eyog Matig *et al*. 2001).

SADC Regional Workshop

The SADC Regional Workshop on Forest and Tree Genetic Resources was held in Arusha, Tanzania, on 5–9 June 2000. Twenty-two participants from nine countries attended the meeting, which was organized by the Forestry Sector Technical Coordination Unit (FSTCU) of the Southern African Development Community (SADC). The main collaborators and sponsors of the workshop were FAO's Forestry Department, IPGRI, SAFORGEN, DFSC, ICRAF and IUFRO.

During the meeting, national experts underlined the diversity of values and functions traditionally attached to forest trees and shrubs. Although some countries in the region still have a high proportion of forest cover, heavy exploitation pressures on forests and woodlands are causing an overall loss of biological diversity and forest genetic resources. In some countries, a clear and urgent need exists for conservation measures targeting particular tree species. In addition to technical issues, strengthening national capacities and addressing policy issues were also reported as crucial factors in planning and implementing conservation plans. The meeting identified a wide range of issues common to several countries, as well as opportunities for exchanging experience and technical know-how.

Five thematic areas were discussed and incorporated into a regional action plan: i) prioritization of species and operational needs; ii) ways to support sustainable use and management of forest and tree resources; iii) issues related to germplasm exchange and access; iv) institutional strengthening and training; and v) identification of mechanisms for regional cooperation.

Ten native priority species were identified in mainland countries and in island countries (Mauritius). Only one species was of common concern to all mainland countries, namely *Pterocarpus angolensis.* This reflects the wide range of ecological conditions and forest types in the SADC area. Nine species were identified as high priorities in at least two countries:

Afzelia quanzensis, *Baikiaea plurijuga*, *Colophospermum mopane*, *Dalbergia melanoxylon*, *Faidherbia albida*, *Khaya anthotheca*, *Milicia excelsa*, *Sclerocarya birrea* and *Warburgia salutaris*. The species lists were validated and augmented by identifying and scoring priority technical activities (Table 3).

Table 3. *List of priority forest tree species in mainland countries of Eastern and Southern Africa.*

Species	Exploration & germplasm collection			Evaluation, improvement, seed supply			Conservation		Remarks
	Biological information	Geneco-logical studies	Germplasm collection & research	Field testing and evaluation	Selection & breeding	Seed supply	*Ex situ*	*In situ*	
Pterocarpus angolensis	1	2	2	2	2	2	2	1	Timber species Over-exploited Slow growing, fire prone
Sclerocarya birrea	2	2	2	2	1	2	2	3	Fruit tree, fodder, oil ICRAF priority species
Milicia excelsa	2	2	1	2	2	2	2	1	Timber species Over-exploited
Baikiaea plurijuga	2	1	2	2	2	3	2	1	Timber species Over-exploited Regeneration difficult.
Afzelia quanzensis	2	2	1	2	2	3	2	2	Timber species Over-exploited Shade, shelter
Dalbergia melanoxylon	2	3	1	2	3	2	2	2	
Khaya anthotheca	2	2	1	2	2	2	1	1	Timber species Over-exploited
Faidherbia albida	2	2	1	2	3	3	2	2	Fodder, charcoal, agroforestry, soil conservation
Colophospermum mopane	2	2	2	1	2	3	2	1	Fuelwood, timber, termite and drought resistant
Warburgia salutaris	1	2	1	1	1	1	1	1	Food species Endangered

One session of the meeting addressed the complex issues of access and exchange of germplasm, both within countries and among countries, using the example of the International Neem Network. Participants noted that both the Organization of African Unity and the SADC Plant Genetic Resources Centre are developing framework approaches to these issues. They recommended the exploration of regional agreements on access to and transfer of forest genetic resources, compatible with national laws and based on mutually agreed terms and definitions.

A number of institutions are addressing forest genetic resources at the country level, although they do not always coordinate their policies and efforts. Greater interaction and sharing of information among partners is needed. At the operational level, a number of collaborative mechanisms, projects and initiatives in forestry, forest conservation and forest genetic diversity exist in the region (for example IUFRO-SPDC, SADC/FSTCU and SAFORGEN). Participants agreed that such efforts should be continued and encouraged, and proposed that SAFORGEN's activities in the region be enhanced by cooperating with FSTCU.

The detailed elements of a regional status assessment of forest tree genetic diversity in Eastern and Southern Africa, based on country reports and a plan of action, are being completed by FSTCU and FAO. Information on the workshop and its outputs and documentation will be

provided to other fora and meetings through technical channels in SADC, FAO and IPGRI. The information will also be made available on the Internet.

Lessons and experiences learned

The outcomes of the regional workshops suggest a number of preconditions for fruitful regional discussions, providing relevant information, preparing status assessments, and formulating and implementing action plans:

- The process must be country-driven. All national institutions and stakeholders should be informed and given the chance to participate. Information collected by national experts (focal points) should reflect the full range of users of forest genetic resources. Enough time should be given to allow national institutions to take action and collaborate in preparing the workshop.

- Priority should be given to those regions or ecoregions where a political commitment to regional cooperation already exists, and where a regional mechanism or instrument for conservation is willing and able to prepare the workshop and pursue follow-up activities.

- National reports should reflect the status of the important tree genetic resources, and propose national priorities, needs and requirements. The format of the reports should be harmonized among countries to aid compilation of a regional status assessment.

- The objectives and expected outcomes of the regional workshop, and the formulation of an action plan, should reflect the willingness and commitment of countries to engage in and assume responsibility for the process.

- A regional approach should be based on national plans, programmes and priorities. It will only be effective if there is a critical mass of national resources and personnel. In particular, a minimum amount of supporting information should be available in each country.

- If the regional assessment and action plan are to serve as points of reference for national institutions, they will need to be officially recognized or endorsed. Governments will also have to actively support their implementation.

- Implementation of the plan should be discussed at an early stage. Implementing mechanisms at regional and national levels should be identified before or during the workshop.

- The plan should refer to practical, tangible, mutually agreed and measurable activities. The number of activities should also be limited.

Follow-up and planned activities in other regions

Between 1995 and 2000, at least two regional training courses and six workshops on the regional status of forest tree genetic diversity were held in six different regions of the world. These workshops were important fora for discussing regional approaches to forest genetic resources, and have produced six regional or ecoregional action plans of varying complexity.

In Europe, the workshop was organized under the European Forest Genetic Resources Programme (EUFORGEN), coordinated by IPGRI in collaboration with FAO. Several of the recommendations made during the workshop have been incorporated into the work programmes of the five species-specific networks operated by EUFORGEN.

In Sahelian Africa, the development of an action plan has been accompanied by the formal establishment of the SAFORGEN programme. In the Pacific region, phase two of the SPRIG project, which started in 2001, is based on the action plan. In the Pacific northwest of North America, private and public landowners have taken action to implement a framework for planning conservation of forest genetic resources. Southern and Eastern Africa, and the boreal region, have yet to take specific steps to implement their action plans.

Assuming that requests for similar processes are submitted by other countries, additional workshops could reasonably be considered for regions such as Central Africa, Central America, the Mediterranean/Near East and East Asia. The Southeast Asian region has been addressed separately by the workshop documented in these proceedings.

Action has already been taken to facilitate ecoregional country assessments and the preparation of regional workshops in Central Africa and Central America in 2001–2002. FAO, IPGRI and DFSC have already expressed their interest in supporting activities in some of these regions. A number of relevant programmes, projects and network already exist, including the Central American PROSEFOR project hosted by CATIE and assisted by DFSC, and IPGRI's SAFORGEN programme which covers a number of countries in Central Africa and moist Western Africa.

Contribution to global assessment of forest genetic diversity

Although a large number of initiatives and activities support assessment and conservation of forest biological diversity at various levels (landscape, ecosystem, species), fewer instruments address genetic diversity at the global level. Issues of crop tree genetic diversity are addressed in the Global Plan of Action and covered in the *State of the world's plant genetic resources for food and agriculture* (FAO 1998). The Forest Resources Assessment (FRA 2000) provides maps of global forest cover and global ecological zones and some elements for defining and measuring forest biological diversity for forest management. The *2000 IUCN Red List of Threatened Species* and the WCMC *World List of Threatened Trees* provide information at the species level and only limited coverage of intra-specific diversity. At the global level, FAO's worldwide system of information on forest genetic resources (Reforgen) can generate lists of important tree species and a summary of their genetic management by country. FAO's Panel of Experts on Forest Gene Resources, which meets every two years, updates lists of priority species and recommends action according to ecoregions (FAO 2000).

The country reports prepared for the regional workshops provide data to support national policies, planning and activities, and are intended primarily for use by national authorities and stakeholders. These data can also be used to update existing databases, such as Reforgen, and to provide benchmarks for the work of the Panel of Experts on Forest Gene Resources. Qualitative and quantitative data compiled at the ecoregional level, in the form of status assessments of forest genetic resources and action plans, represent unique and valuable elements of a global assessment of forest genetic diversity. Such an assessment would be an important contribution to our understanding of forest biological diversity.

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