

## Strategy for the Conservation and Sustainable Use of Spanish Forest Genetic Resources

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### Abstract

In the last decade, forestry policies in Spain have undergone changes needed to comply with the European and world directives on forest conservation. The elaboration of strategic plans has to take into account the State organization (Central and Autonomous Regional Governments share the responsibilities), resulting in agreed documents, effective at a national level and fulfilling the peculiarities and aspirations of each region. The most recent development has been the elaboration of a Strategy for Conservation and Sustainable Use of Forest Genetic Resources, which can be seen as a consequence of, among other factors, the implementation of the Spanish Strategy for Conservation and Sustainable Use of Biodiversity along with Spain's participation in the European Forest Genetic Resources Programme. This document arose from the lack of approaches to the conservation of population diversity of forest species in the current policies, and as a means to promote and coordinate activities on conservation and use of genetic resources.

The Strategy has been arranged through a participative process involving the Forest Administration, Research Centres and Universities. The document includes a definition of priorities and proposals of activities, which are mainly focused on optimising the efficiency of existing tools and infrastructures and on increasing synergy among different initiatives. Implementation of the Strategy is expected to occur through the development of National Action Plans. Finally, coordination mechanisms must be enhanced in order to maintain the levels of cooperation achieved during the elaboration process.

**Key words:** National Strategy, Genetic Resources, Forest Policy, Spain, Europe.

### Resumen

#### Estrategia para la Conservación y Uso Sostenible de los Recursos Genéticos Forestales en España

Durante la última década se han producido importantes cambios en la política forestal española relacionados con la adaptación a las directivas tanto europeas como internacionales en materia de conservación de bosques. La elaboración de planes estratégicos tiene que tener en cuenta la organización del Estado donde Gobierno Central y Comunidades Autónomas comparten responsabilidades. Los documentos generados tienen que resultar efectivos a nivel nacional pero también atender a las necesidades y aspiraciones de cada región. Recientemente se ha elaborado la Estrategia Española para la Conservación y Uso Sostenible de los Recursos Genéticos Forestales, que puede contemplarse como consecuencia, entre otros factores, del desarrollo de la Estrategia Española para la Conservación y el Uso Sostenible de la Biodiversidad, junto con la participación española en el Programa Europeo de Recursos Genéticos Forestales. La Estrategia surge como consecuencia de la carencia de iniciativas para la conservación de la diversidad de las poblaciones de especies forestales en las recientes políticas del sector, e intenta promover y coordinar actividades relacionadas con la conservación y uso de los recursos genéticos. El documento ha sido consensuado tras un proceso participativo compartido por la administración forestal y distintos centros de investigación y universidades, e incluye la definición de prioridades y la propuesta de actividades que se centran básicamente en la optimización de la eficiencia en el uso de las herramientas e infraestructuras existentes, y en el incremento de las sinergias. La implementación de la Estrategia se llevará a cabo a través del desarrollo de distintos Planes Nacionales de Actuación. Finalmente, se mejorarán los mecanismos de coordinación de cara a mantener los niveles de cooperación alcanzados a lo largo del proceso de elaboración de la Estrategia.

**Palabras clave:** Estrategia Nacional, Política Forestal, Recursos Genéticos, España, Europa.

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## Introduction

The “sustainable use of biodiversity” has been one of the most influential concepts in determining forest policy in European countries during the last decade, as a result of the Convention on Biological Diversity (CBD, 2005) and the application of the Pan-European Process of Protection of Forests in Europe (Strasbourg, 1990; Helsinki, 1993; Lisbon, 1998; Vienna, 2003; Warsaw, 2007). Forest tree species (and their genetic diversity) are vital in determining terrestrial biological diversity (see as an example the Network of Excellence *Evoltree*, [www.evoltree.org](http://www.evoltree.org)) and play an important role in the adaptation and mitigation of ecosystems to climatic change, as well as in rural development programmes (Pérez and Fernández, 2006; San Cristóbal, 2007). These three aspects (biodiversity, global change, rural development) are the main drivers behind national forest policy in most European countries (Elands and Wiersum, 2001; Schanz, 2002).

Long term adaptation processes require the existence of certain levels of genetic diversity (Reed and Frankham, 2001). In order to ensure preservation as well as both present and future utilization, it is necessary to include forest genetic resource conservation within the objectives of forest policies. However, to our knowledge, there has been no attempt in previous national strategies to combine the aspects of conservation and use of genetic diversity, even though it is not possible to make separate proposals for these two aspects given that the conservation and utilization of resources are essential elements in the relationship between society and forests, and the use of the latter by future generations. Today, forest management has to deal with the challenges of the “sustainable management” paradigm, so many of the activities have to be considered in terms of either conservation for sustainable use, or sustainable use for efficient conservation.

A set of stages for collective decision-making can be identified in the preparation of a National forest programme (Ellefson, 1992), including agenda setting, formulation, selection, legitimating, implementation and evaluation. From a more technical point of view, different steps have been distinguished in the process of formulation of a National strategy for the conservation of forest genetic resources (Graudal et al., 2004): definitions, selection of priority species, evaluation of the genetic diversity, evaluation of the conservation status, identification of the populations to conserve, organization and planning of specific activities for conservation,

and preparation of specific management guidelines and conservation activities. In the elaboration of these schemes, certain aspects are often overlooked. One of these neglected aspects is the sustainable use of the genetic resources. A second deficiency arises where different administrations coordinate the activities and the optimisation of activities is carried out by different organisations.

At a broad-scale level (e.g. Europe or the United States), the conservation and use of forest resources commonly face problems derived from challenges in the coordination (Niskanen and Lin, 2001; Kilgore et al. 2006). Decisions associated with the conservation and sustainable use of genetic diversity cannot be made at a local level since these genetic resources are shared among the different regions, and some of the threats being targeted might originate in other regions. Therefore, it is necessary to establish mechanisms to implement cost-effective and efficient strategies, coordinating the activities between the different regions

This paper describes the development process for the Spanish Strategy on conservation and sustainable use of forest genetic resources, defining the aspects considered in the elaboration of an effective National Strategy and taking into account the administrative organization of the State. Above all, a special effort was made to take advantage of instruments and tools employed in the development of previous forest strategies, focusing particularly on the coordination of activities between the different regions.

## The Spanish case

Forests represent more than 50% of the total surface area in Spain, a percentage higher than that in the rest of the Mediterranean region. They are characterized by an extremely diverse environment (both over time and space), with high levels of diversity (especially in terms of plant and genetic diversity), high vulnerability (Thullier et al., 2005), and an important cultural, ecological and economic value (Table 1). Timber production is around 15 million cubic meters, around 80% of which is obtained from *Eucalyptus* spp, *Pinus pinaster*, *Pinus radiata* and *Populus* spp, which cover less than 16% of the total area, mainly in the Atlantic regions. Forest resources and services play a significant role in Spanish culture as well as in the economy. Forest policy is driven not only by the economic importance of forests by

**Table 1.** The Spanish forestry sector (MAPA, 2007)

| Autonomous<br>Regional Government | Forest area<br>(ha) | Private Forest<br>(ha) | Timber<br>(euro) | Timber and non timber products |                         |                 |                 |
|-----------------------------------|---------------------|------------------------|------------------|--------------------------------|-------------------------|-----------------|-----------------|
|                                   |                     |                        |                  | Cork<br>(euro)                 | Forest fruits<br>(euro) | Fungi<br>(euro) | Other<br>(euro) |
| Andalusia                         | 2,106,252           | 1,484,933              | 29,162,534       | 53,144,715                     | 12,426,189              | 39,105          | 1,104,619       |
| Aragon                            | 1,185,532           | 577,481                | 5,993,682        |                                | 7,500                   | 2,769,200       | 2,343,988       |
| Asturias                          | 368,129             | 233,798                | 13,851,366       |                                |                         |                 | 793,043         |
| Balearic Islands                  | 122,475             | 118,712                | 108,375          |                                |                         |                 | 5,315           |
| Basque Country                    | 390,005             | 229,938                | 43,514,139       |                                |                         |                 | 829,849         |
| Canary Islands                    | 104,914             | 40,831                 | 432,040          |                                |                         |                 | 877,425         |
| Cantabria                         | 165,543             | 48,902                 | 11,373,159       | 40,500                         |                         |                 | 32,400          |
| Castile and León                  | 2,119,139           | 1,203,281              | 39,930,091       | 1,462,967                      | 10,557,916              | 33,131,630      | 9,953,691       |
| Castile-La Mancha                 | 1,851,221           | 1,261,838              | 7,875,751        |                                |                         |                 | 863,780         |
| Catalonia                         | 1,394,074           | 1,170,126              | 8,860,273        | 3,163,840                      | 303,917                 | 14,268,200      |                 |
| Extremadura                       | 1,457,591           | 1,340,355              | 4,192,846        | 32,685,000                     | 11,888,400              |                 |                 |
| Navarre                           | 372,468             | 125,100                | 6,362,603        |                                |                         |                 |                 |
| Galicia                           | 1,045,377           | 841,487                | 229,575,147      |                                | 8,780,516               | 2,034,426       | 1,404,340       |
| La Rioja                          | 128,917             | 19,768                 | 1,671,720        |                                |                         | 2,889           | 1,097,615       |
| Madrid                            | 195,465             | 122,638                | 1,272,291        |                                | 117,000                 |                 | 5,120           |
| Murcia                            | 269,278             | 171,012                | 62,940           |                                |                         |                 | 464,136         |
| Valencian Community               | 628,280             | 383,158                | 2,421,888        | 94,500                         |                         | 76,404          | 269,111         |
| Total                             | 13,904,660          | 9,373,359              | 406,660,846      | 95,369,742                     | 44,081,438              | 52,321,853      | 20,045,230      |

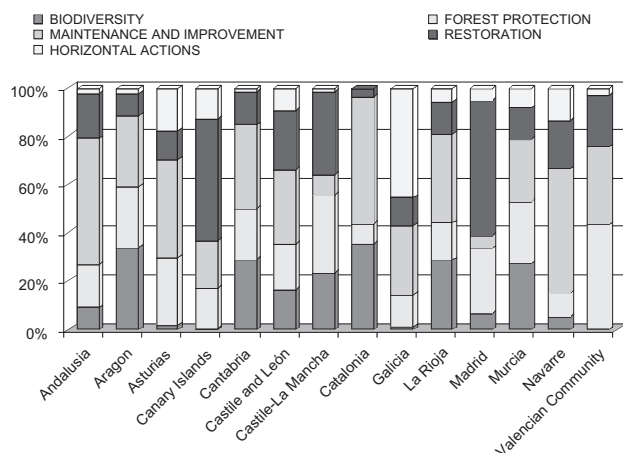
also by their significance in rural development (particularly in relation to the externalities of forests) and the cultural value of many of the ecosystems (dehesas, maquis, etc.) (Pérez and Fernández, 2006). Despite the importance of biodiversity in forests, the value of forest genetic resources has not been taken into consideration when setting priorities in forest policies.

Spain is a highly decentralized country, with most of the competences regarding forestry lying with the different Autonomous Regional Governments (Montiel and Galiana, 2005), employing different mechanisms for coordinating policies in the forestry sector. The Forestry Act (BOE, 2003) sets out the responsibilities as regards forest policy. The National Forest Strategies and Plans must be approved by Central Government, and the different Autonomous Regional Governments have the opportunity/power to establish their own forestry programmes in order to achieve specific objectives. These forestry plans (MIMAM, 2004) differ in their procedures, structure, content, principles and priorities, due to the special characteristics of each region. Depending on the region, the funds devoted to the main objectives (biodiversity, protection, maintenance and improvement, restoration, or horizontal actions) can vary greatly (Figure 1). In the majority of cases, the conservation and use of genetic resources is not defined as an important objective of these plans.

### Reasons, constraints and formulation process for a forest genetic resource strategy

The Spanish Strategy for the Conservation and Sustainable Use of Biodiversity (MIMAM, 1999) was the first document at national level to incorporate the preservation of biological diversity as an objective. It considers different sectors with an involvement in biodiversity, one of these being forestry, for which biological diversity is of paramount importance. In spite of this, no explicit measures were proposed in relation to the conservation and sustainable use of forest genetic resources, but rather, a general recommendation that a specific strategy should be developed. Therefore, the forest genetic resource Strategy can be seen as the application of the Biodiversity Strategy to the case of forest genetic diversity.

The elaboration of National breeding and genetic resources conservation programmes is assumed by Central Government through the Environment Ministry. The initiative to elaborate the forest genetic resource Strategy emerged from the Office of Biodiversity (Environment Ministry), with the clear purpose of preparing a participative document. The involvement of the National Committee for Forest Genetic Resources assured the participation of Autonomous Regional Governments. The Committee approved the creation of a Working

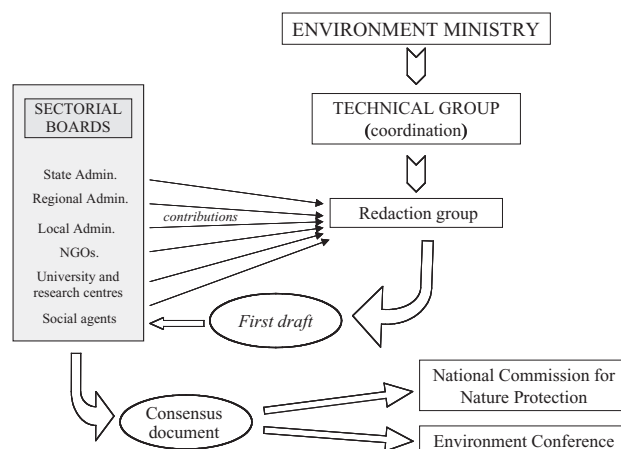


**Figure 1.** Distribution of resources for the main actions in the Forestry Plans of the Autonomous Regional Governments.

Group, which was assisted by a Board of Experts formed by researchers, technicians and forest administration staff. The document was elaborated through a feed-back process, with continuous communication between the Working group and the Board of Experts, including three discussion meetings.

The elaboration was conducted through a participative process although strictly at a technical and professional level since the general framework had previously been established in the Biodiversity Strategy. The result constitutes an example of a consensus document (Figure 2), established after a broad participatory analysis. A board was set up for each of six sectors with an interest in biodiversity (forestry being one of them). These boards included representatives from Central as well as Regional Governments, local administrations, environmental NGOs, Research Centres, Universities and social collectives. Each board worked separately on a document describing the main aspects to be included in the Strategy. A working group elaborated a first draft on the basis of the results from each board, which was then discussed by all the participants in order to produce a consensual document. This document was approved by higher coordinating bodies, namely the National Commission for Nature Protection and the Environmental Conference.

A key purpose when promoting the Strategy was to create political and institutional mechanisms that assure the support and promotion of activities related to the conservation and use of forest species, taking into consideration the role of the different actors involved (central and regional governments, international agencies, and social sectors). Since conservation efforts usually



**Figure 2.** Participatory approach followed in the development of the biodiversity Strategy and applicable to the forest genetic resource Strategy.

include the whole range of a species (or at least a large part of the range), it is recommended that these mechanisms function at national (or supranational) level.

Two main constraints must be taken into account when designing a Strategy such as this. Firstly, a stable funding source is needed to support both the old and the new instruments. This element often imposes a severe challenge to the full implementation of a conservation programme since it depends to a large extent on political decisions. A second limitation to the attainment of conservation objectives is the existence of redundant structures or the lack of coordination between different tools. In order to optimise the use of economic resources, effectiveness and efficacy must be a priority. In this sense, the most strategic approach is, on the one hand, to enhance the performance of the existing tools rather than create a lot of new structures, and on the other, to create coordination mechanisms between administrations, centres and infrastructures.

The legitimization procedure involves submitting the document for approval to the coordinating organisms at Central and Regional level: the National Committee for Forest Genetic Resources and the National Commission for Nature Protection. It was approved by these organisms in May 2006 and June 2007, respectively.

## Contents of the strategy

The strategy includes an analysis of the current status, a survey of the available tools as well as non-covered needs, and the actions to be carried out.

### *Objectives, actions and priority setting*

The general objective is the conservation and sustainable use of the forest genetic resources, preserving their capacity for evolution and guaranteeing their availability for future generations, according to the CBD (1992) and the EUFORGEN Programme through the Strasbourg Resolution S2 (Turok and Borelli, 2000).

The Strategy aims to achieve this objective through the promotion of different areas of work: analysis of the conservation status of forest genetic resources, identification of the needs and priorities for conservation and breeding, support activities associated with *in situ* and *ex situ* conservation, development of a theoretical framework for the management of forest genetic resources, inclusion of the principles of conservation and sustainable use in forest management initiatives, and the promotion of cooperation between the different administrations and other social sectors involved in the conservation and sustainable use of forest genetic resources.

Priority assessment (activities and species) is an essential step in any conservation programme since technical, human and economic resources will always be limited. Although the Strategy is aimed at “forest species”, as defined by the Spanish Forestry Act (BOE, 2003), a list of priority species has been identified on the basis of utilization and conservation value (e.g. species used in forestation and restoration programmes in the different Regions, species under forest management, species with traditional non-wood uses or those included in the EUFORGEN programme).

### *Tools, measures and action plans*

Tools play an essential part in the implementation of the Strategy. An attempt has been made to achieve a cost-effective Strategy by keeping new tools to a minimum. Whenever possible, existing instruments will be used although certain modifications to their attributes may be required.

Several types of tool can be identified among those proposed in the forest genetic resource Strategy:

- Existing instruments, which will be updated: e.g. National Breeding and Conservation Centres, National Register and Databanks, all of which are supported by the Ministry of Environment. At present, these mainly focus on breeding and utilization of resources, and in the future these will be expanded to include conservation (*ex situ* and *in situ* activities, collections and databases).

- Instruments for increasing the synergy between existing tools: Forest Genebank Network, Virtual Laboratory for Forest Genetic Resource evaluation. Since the latter bring together different centres and infrastructures, the challenge is to define which of the various institutions will act as a central node in order to assure the coordination and establish both a contract of adhesion and a collaborative framework.
- Newly introduced tools: National System for evaluation and monitoring of forest genetic resources, National Register of Conservation Units, Guidelines for Forest Genetic Resource management and sustainable use, Legislation aimed to fill “gaps”. These initiatives will be implemented through the approval of National Action Plans which will include them as activities to develop. Some of these tools will require the participation of existing structures (Biodiversity Databank, National Forest Inventory).
- Instruments for training and dissemination.

### *Coordination mechanisms*

The success of this Strategy depends largely on an effective coordination between the different administrations and between ongoing initiatives. At national level, the main coordination organism is the National Commission for Nature Protection in which all the representatives of the Central and Autonomous Regional Governments are present. Several committees have been set up as off shoots from this commission (e.g. Protected Natural Areas, Wildlife and Flora and Forests among others) for the coordination of activities in each field. Among these, the National Committee for forest genetic resources coordinates activities between different administrations as well as between the different strategies (i.e. Biodiversity, Forestry) and initiatives (Natura 2000 Network).

A Consultative Group will be created to work alongside the National Committee for forest genetic resources in order to advise the Committee on the matters which concern it. This Group will be formed by researchers, technicians, representatives from the forestry sector and other experts and stakeholders. In addition, the EUFORGEN National Coordinator and the coordinators of the plans established as a result of the Strategy will become part of the group.

The Spanish participation in the EUFORGEN programme provides the opportunity of sharing knowledge,

methodologies and experiences with other European experts, and gives important support to the promotion of international initiatives in cooperation with international institutes (Bioversity International, FAO, IUFRO among others). Within the VI EU Programme Framework, several Initiatives and Networks have been developed (ENSCONET, EVOLTREE, TREEBREEDDEX, EUFGIS), and the participants from Spanish groups are currently working on objectives aimed at conservation and/or breeding.

### Involvement in strategy development

Implementation of the forest genetic resource Strategy will require local objectives to be met whilst also maintaining the level of cooperation shown during the elaboration process. The functions and authority of the National Committee, as well as that of the rest of communication and coordination tools, must be reinforced. Central Government must assume a major role in most of the activities, although this should not prejudice the initiatives of the Autonomous Regional Governments. Involvement of other agents apart from

administrations and research centres (forestry associations, environmental collectives, etc.) is highly recommended.

The objectives of the Strategy are to be achieved through the implementation of *Action Plans*. These Plans integrate different tools and measures and will have a national character, though adherence to these plans remains at the discretion of each administration. Participation is also open to any other interested agent. The elaboration procedure for the plan begins with a proposal to the Committee from the Consultative Group, one or more Autonomous Regional Governments or by any social agent. The Committee would approve a working group to prepare a descriptive document with a complete description of the action plan. The Consultative Group then produces a non-binding report on the document, based on which the Committee will approve or reject the Action Plan. Although any Action Plan can be proposed, four topics are considered to be of particular importance and urgency and are included in the Strategy: Conservation and Sustainable Use of Forest Genetic Resources, Forest Breeding, Threatened Populations, Monitoring and updating the forest genetic resource Strategy (Table 2).

**Table 2.** Tools included in the Strategy for conservation and sustainable use of forest genetic resources

| Coordination Tools and Instruments                  | National Action Plans |                     |                    |                    |
|-----------------------------------------------------|-----------------------|---------------------|--------------------|--------------------|
|                                                     | GenRCons <sup>a</sup> | TrBree <sup>b</sup> | ThPop <sup>c</sup> | MonUp <sup>d</sup> |
| National System for evaluation and monitoring       | ***                   | *                   | ****               | ****               |
| Network for the monitoring of FGR                   |                       |                     |                    |                    |
| National network of genetic trials                  | -                     | ****                | -                  | -                  |
| Facilities                                          |                       |                     |                    |                    |
| Forest Genebank Network                             | **                    | **                  | ****               | -                  |
| National Centres for Genetic Resources              | ***                   | ***                 | *                  | -                  |
| Virtual laboratory for Genetic Resource evaluation. | ***                   | **                  | ***                | -                  |
| Registers and Databases                             |                       |                     |                    |                    |
| National Register of Conservation Units             | ****                  | -                   | **                 | -                  |
| National Register for Basic Material                | *                     | ****                | -                  | -                  |
| Database on forest stands origin                    | **                    | **                  | -                  | ****               |
| Guidelines for management and sustainable use       |                       |                     |                    |                    |
| Utilization of forest reproductive material         | ***                   | ***                 | *                  | -                  |
| Management of forest stands                         | ***                   | -                   | ***                | -                  |
| Normative development                               | ****                  | **                  | ****               | *                  |
| Training                                            | ****                  | ****                | ****               | **                 |
| Dissemination and public awareness                  | ****                  | ****                | ****               | **                 |
| Research, Development and innovation (R+D+i)        | ****                  | ****                | **                 | **                 |

<sup>a</sup>GenRCons: Forest Genetic Resources Conservation; <sup>b</sup>TrBree: Tree Breeding and Seed Supply. <sup>c</sup>ThPop: Threatened Populations; <sup>d</sup>MonUp: Monitoring and Updating.

Once the Strategy is up and running, it will be necessary to evaluate the efficacy of both the Strategy *per se* and the derived tools. Instruments for evaluation are previewed in the document, principally the Monitoring and Updating Action Programme. Objective indicators for assessing the functioning of structures must be developed, for example, the number of centres participating in the Forest Genebank Network or in the Virtual Laboratory; number of accessions delivered; number of plans and participants; number of in situ conservation units, etc. This will provide an indication of the degree of implementation reached by the Strategy, and will allow new priorities to be identified as well as the modifications needed to adapt the Strategy to normative or administrative changes. A regular update every 10 years is proposed.

## Conclusions

The concepts of conservation and sustainable use of genetic resources have recently been incorporated into national and international forest policies. However, if these concepts are to be applied effectively, the elaboration of strategic documents is highly recommended. Tools for coordination and integration are required when different agents are involved in the elaboration and implementation of strategic plans. The aim of the Spanish forest genetic resources Strategy is to facilitate the activities concerned with use and conservation whilst at the same time establishing mechanisms which guarantee an effective coordination between the different programmes. It should provide a starting point for the future development of plans conducted by several administrations, resulting in increased efficacy of the actions.

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