

THE FRENCH REPUBLIC

**French report on the Convention  
on Biological Diversity**

**Implementation of Decision II/17  
taken at the second Conference of the Parties  
to the Convention on Biological Diversity**

December 1997

This report was compiled by the French government in compliance with Decision **II/17** of the second Conference of the Parties to the Convention on Biological Diversity.

It will be presented to the Conference of the Parties to be held in Bratislava (Slovak Republic) in May 1998.

This report was prepared in conjunction with the relevant Ministerial departments and public bodies and coordinated by the French Ministry of Foreign Affairs and the Ministry for Spatial Planning and Environment.

The report is supplemented by the following two publications in english :

- The French Republic, Ministry of the Environment, 1996. *Biodiversity in France : action programme for fauna and flora*, Paris, 3 18 p.
- Bureau des ressources **génétiques**, 1996. *Conservation of plant genetic resources, report to the FAO*, BRG, Paris, 166 p.

This report is also available on the website of the *Ministère de l'Aménagement du Territoire et de l'Environnement*, on Internet :

[environnement.gouv.fr](http://environnement.gouv.fr)

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The names of the French Ministries mentioned in this report are given either in full as per their exact name at the time of writing this report, or for simplification purposes, they may also be shortened to e.g. Ministry of Agriculture, Ministry of Environment and Ministry of Research, etc.

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## SUMMARY

### THE FRENCH APPROACH TO THE CONSERVATION OF BIOLOGICAL DIVERSITY

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#### MEETING THE REQUIREMENTS AGREED TO IN RIO : THE MAJOR THRUST OF FRENCH POLICY

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France signed the Framework Convention on Biological Diversity in June 1992 and ratified it on July 1 1994 (Act no. 94-477 of June 10 1994). Resources have been provided for its implementation.

The French Commission for Sustainable Development (*Commission française du développement durable*) was established in order to implement the commitments agreed to at the Conference on Environment and Development in Rio de Janeiro. In addition, France has set up a National Monitoring Committee (*Comité national de suivi*) for the Biodiversity Convention under the authority of the Ministry of Spatial Planning and Environment. The Committee brings together representatives from the administrations, NGOs and scientists involved in the issue.

France has above all taken action for the conservation of biodiversity by adapting, reinforcing and extending policies and measures that had already been implemented for several years in this field. France was one of the first countries to establish a Ministry of Environment (in 1971) and to adopt a Nature Conservation Act (in 1976).

The aforementioned Act no. 76-629 of July 10 1976<sup>1</sup> was a decisive step in the field of the conservation of biological diversity. It supplemented the previous legislative provisions and, in particular, laid down the principles of a coherent policy for the protection of wild flora and fauna and a requirement to take into account the conservation of biological diversity in France's economic and social activities as a whole.

Today, the Act still constitutes the cornerstone of legislation and measures adopted by the government in this field.

Today, there are four major thrusts to France's biological diversity conservation policy :

- integration into socio-economic and cultural practices :
  - generally, in spatial planning and plans,
  - specifically, in economic activities as a whole and most notably in agriculture and forest management,
- conservation of wild flora and fauna and conservation of outstanding areas and sites,
- conservation of genetic resources,
- research, education and training policies.

Furthermore, France integrates biological diversity into her overseas co-operation and knowledge transfer programmes.

#### TAKING BIOLOGICAL DIVERSITY INTO ACCOUNT IN SOCIO-ECONOMIC PRACTICES

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Taking the environment into account in all the activities that contribute to the development and transformation of the country is an essential aspect of French policy.

Biodiversity conservation is taken into account when the guidelines of national spatial planning policy and local development policy are defined. This is particularly the case for the National Plan (*Plan*

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<sup>1</sup> Amended by the Reinforcement of Environmental Protection Act no. 95-101 of February 2 1995.

*national*), State-Region Planning Contracts (*Contrats de plan État-Région*), Land Use Master Plans (*Schémas directeurs d'aménagement et d'urbanisme*), Infrastructure and Transport Master Plans (*Schémas directeurs d'infrastructures de transport*) and Water Development and Management Master Plans (*Schémas directeurs d'aménagement et de gestion des eaux*). It is also the case for policies based on partnerships such as *département* or Local Environment Plans (*Plans départementaux ou municipaux d'environnement*) and Environment Charters (*Chartes pour l'environnement*) established in association with local authorities.

Lastly, some 6 000 environmental impact assessments (EIAs) are carried out each year on road and infrastructure development schemes, of which around 300 focus on infrastructure schemes. The EIAs include an analysis of the effects of the projects on flora and fauna.

In addition, specific policies are pursued in two areas of activity – agriculture and forest management – which are vital for the conservation of biological diversity. The area of land concerned covers over 80 % of the total land area in mainland France.

### **Agri-environmental measures**

France has become resolutely involved in integrating the environment into agricultural activities as a response to the wider awareness of environmental issues in this area and to the reform of the Common Agricultural Policy (CAP) adopted by the European Community on May 21 1992.

Implementation of this reform (under the EC agri-environmental Regulation no 2078/92/EEC) in France is based on two mechanisms : a national programme (which, in particular, is aimed at maintaining natural grasslands) and regional agri-environmental programmes. The latter are devised according to local conditions. In particular, they encourage the development of organic farming and local operations to promote biodiversity and to restrict fallow land. These programmes are based on five-year contracts concluded between the State and farmers with a view to meeting specific locally set objectives.

### **Biological diversity and forest management**

Woodlands cover 29 % of the total land area in mainland France. Conservation of biological diversity in woodlands cannot - except in special cases - be considered without taking into account the presence of man. This presence goes back centuries. Conservation of biodiversity in woodland areas is part of the principle of multipurpose management of these areas.

The policy of integrating biodiversity conservation into forest management is based on the different levels for analysing its diversity and aims to protect representative or threatened individual forests, ecotypes, species, ecosystems, outstanding ecosystem patchworks or landscapes. This is achieved by global management that intends to ensure long-term continuity and by the development of policies specifically focusing on each of these levels.

In particular, in 1993, the Ministry of Agriculture and Fisheries - responsible for forests - defined national policy for the integration of biodiversity into forest management covering all French forests (both public and private). In 1991, the same Ministry also defined the outlines of its policy for the conservation of genetic resources.

## **CONSERVATION OF WILD FLORA AND FAUNA AND PROTECTION OF OUTSTANDING AREAS**

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### **Understanding and monitoring natural heritage**

For several years, France has been implementing a global strategy to acquire knowledge on and monitor certain species belonging to the natural heritage.

Firstly, the institutions were strengthened - in 1979, the Fauna and Flora Secretariat (*Secrétariat de la Faune et de la Flore*) was established within the National Natural History Museum (*Muséum National d'Histoire Naturelle* or MNHN). It has since become the Natural Heritage Department (*Service du*

*Patrimoine Naturel*) within the Institute for Ecology and Biodiversity Management (*Institut d'écologie et de gestion de la biodiversité* or IEGB).

With the assistance of the National Fauna and Flora Network (*Réseau Faune-Flore national*) bringing together more than 4 000 scientists, specialists, site managers or representatives from NGOs, the MNHN conducts and coordinates a series of national, regional and local surveys and atlases on species of wild flora and fauna. The work focuses particularly on identifying Natural Areas of Ecological and Wildlife Interest (*Zones naturelles d'intérêt écologique, faunistique et floristique* or ZNIEFF) and Areas of Community Importance for the Conservation of Wild Birds (*Zones d'intérêt communautaire pour la protection des oiseaux* or ZICO).

### **The Natura 2000 Network**

The aim of the Natura 2000 Network made up of sites meeting the criteria laid down in the EC “Birds” and “Habitats” Directives is to contribute to ensuring the conservation of biodiversity through the conservation of natural habitats and species of European interest. In France, the principles on which it is based will influence and direct public policies that support biodiversity and contribute to making the network sites special areas of sustainable development, particularly in rural areas.

### **Conservation and restoration of populations of the most threatened species**

*In situ* conservation of wild animal and plant species is a priority in France. Legislative measures have been adopted - in some cases this occurred many years ago - to ensure both habitat conservation (see below) and to restrict or ban the exploitation of species or to implement management measures for the most threatened species.

The legislation includes a system of full protection for rare, threatened and endangered species of wild flora (402 species altogether) consistent with the EC “Birds” and “Habitats” Directives. In addition to this legislative protection, France has established action plans - depending on the species concerned - for biodiversity conservation and conservation and/or restoration plans.

Lastly, today in France, *ex situ* conservation, a vital complementary measure for threatened species, is considered to be an integral part of any conservation strategy of rare or threatened species. In this respect, the six regional botanical conservation agencies in mainland France and Reunion Island play a significant role in the conservation of wild flora.

### **Protection of outstanding areas**

In France, protection of outstanding areas is primarily based on strict protection. The main aim of this type of protection is to protect outstanding sites - and the species associated with them - from human disturbance. The following belong to this category : core areas of national parks, nature reserves, national game reserves, State biological reserves, land acquired by the National Coast and Lakeshore Conservation Agency (*Conservatoire de l'espace littoral et des rivages lacustres*) and protected forests.

In addition to this mechanism, other types of “softer” protection and management exist. They focus on natural areas that may be less rich (sites designated for protection under a 1930 Act, natural coastal areas), large woodland areas and abandoned farmlands or extensively farmed areas.

## **MANAGEMENT AND CONSERVATION OF GENETIC RESOURCES**

Many years ago, France became aware of the need to preserve genetic resources in order to meet future requirements of the agri-food and industrial sectors and to take into account the social and cultural dimensions of these resources.

### **International commitments**

France has adopted or signed several international conventions or agreements that aim to ensure the long-term conservation of genetic resources.

In 1984, France adopted the UN Food and Agricultural Organization (FAO)'s International Undertaking on Plant Genetic Resources on the condition that, amongst other things, the rights of obtainers be

recognised. Today, France is actively involved in revising this instrument in order to make it comply with the Convention on Biological Diversity.

In 1995, France undertook to participate in the World Programme for the Conservation of Genetic Diversity of Farm Animals coordinated by FAO. France has been temporarily assigned the task of being regional focal point for Europe. Lastly, in 1996, France adopted the FAO World Action Plan on Plant Genetic Resources.

### **Action undertaken in France**

In 1983, France set up a national coordinating body for the conservation of genetic resources, the Genetic Resources Office (*Bureau des Ressources Génétiques* or BRG). This body was transformed into a Scientific Interest Group (*Groupement d'intérêt scientifique*) in 1993 and its partners to date include six Ministries and six public institutes.

A genetic resource conservation policy has been implemented for the following three sectors : animal species, plant species and microorganisms. Depending on the specific needs of each of the three sectors and in association with all her public or private partners involved, France carries out surveys, undertakes action to characterise, conserve and manage (ex situ and *in situ*) these resources. This policy also focuses on the resources in France's overseas *départements* and territories (DOM-TOMs).

## **RESEARCH, EDUCATION AND TRAINING POLICIES**

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### **How research is organised and the institutes involved**

Highly important research is conducted on biological diversity in the different universities and in the major public research institutes such as the National Natural History Museum (MNHN), the National Centre for Scientific Research (CNRS), National Institute for Agronomic Research (INRA), French Institute for Research on Marine Resource Use (IFREMER), the French Research Institute for Agricultural and Environmental Engineering (CEMAGREF), the French Institute for Scientific Research in Overseas Development and Co-operation (ORSTOM), the International Centre for Co-operation on Agronomic Research for Overseas Development (CIRAD) and the National Institute for Health and Medical Research (INSERM).

These bodies have also chosen to work together on a number of major subjects under the National Programme on Biodiversity Dynamics and Environment (*Dynamique de la Biodiversité et Environnement* or DBE) or through Public Interest Groups (GIPs) i.e. legal entities set up to coordinate research on a given theme e.g. water systems (*GIP Hydrosystèmes*), forest ecosystems (*GIP ECOFOR*).

Furthermore, public bodies involved in management such as the National Hunting Office (*Office national de la chasse* or ONC), the National Forestry Office (*Office national des for&s* or ONF) and the National Fisheries Council (*Conseil national de la p&he* or CSP) carry out applied research which helps to encourage biodiversity to be maintained.

### **Education and training for the conservation of biological diversity**

Education, awareness-raising and training are the three vital prerequisites for the long-term conservation of biological diversity. In France, they mainly take the form of integration of environmental concerns into the education system for children, young people and teachers, by setting up specific university training courses and by awareness-raising action and information aimed at the general public.

The Ministry of Education formally established the integration of environmental concerns into school curricula over 20 years ago (Circular issued on August 29 1977 entitled "General Guidelines on the Environmental Education of Pupils").

Today, the National List of Environmental Training Courses indicates more than 800 courses for all levels excluding primary education (i.e. secondary, professional schools and universities). They include 224 university level basic training courses (i.e. three to five years' study).

The Decentralisation Acts adopted in the early 1980s provided strong incentives for local authorities to take action at local level.



## INTERNATIONAL ACTION

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### **French initiatives for an international nature conservation policy**

In the last 10 years, France has been actively involved in developing an international nature conservation policy and has been a catalyst in several major areas or issues.

In 1989, France contributed to the adoption of a Protocol on Environmental Protection in Antarctica (a ban on all mining activities for 50 years). She was also heavily involved in establishing a Protocol concerning Specially Protected Areas and Wildlife in the Wider Caribbean Region (adopted in 1990).

France helped persuade the World Heritage Committee to recognise the concept of cultural landscapes (in 1992). She was involved in the adoption of a moratorium banning the hunting of all whale species under the International Whaling Convention. Furthermore, under this instrument, she instigated the creation of a whale sanctuary in the Southern hemisphere. Along with her African partners, France is also working to help save the populations of African elephants.

### **Conserving biological diversity in France's overseas co-operation activities**

France attaches particular importance to the conservation of biological diversity in the action she undertakes in the field of overseas co-operation. She has integrated the concept of sustainable development, particularly the conservation of biological diversity, in the analysis of programmes underway

Moreover, France took part in establishing the Global Environment Facility (GEF) and set up the French Global Environment Facility (*Fonds français pour l'environnement mondial* or FFEM), one of whose objectives is to contribute to conserving biological diversity in overseas development projects.

By means of France's research institutes, overseas development and co-operation bodies (particularly ORSTOM and CIRAD) and technical, theme-based bodies working on a specific topic (International Water Office or OIE, Water Agencies, etc.), she contributes to the conservation of natural resources and biological diversity in several countries, especially in Africa, Eastern Europe and in other developing countries.

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## INTRODUCTION

The Earth Summit, held in June 1992 in Rio de Janeiro, brought together almost all the countries on the planet. It was following this event that the general public discovered the new term of biological diversity. The concept - in various forms - had, however, been the subject of studies and debates among scientists for many years beforehand.

A number of guidelines for public action on biodiversity conservation and instruments with commitments for the participating States were adopted at the Rio summit :

- the Rio Declaration on "Environment and Development" laid down the principles that should guide long-term action taken by States ;
- Agenda 21, a sort of "work programme" for the 21st century in the field of environment and development, includes objectives for the conservation of biological diversity (Chapter 15).

In addition, the Convention on Biological Diversity was signed on June 13 1992 in Rio. Today, it has been ratified by more than 160 countries. (The exact number was 169 on June 1 1997).

Right from the start, France was one of the major players in this awareness-raising effort. Along with other countries, France played a vital role in founding the International Union for the Conservation of Nature and Natural Resources (UICN, today renamed the World Conservation Union) in 1948 in Fontainebleau. France was one of the first countries to launch the UNESCO-led "Man and Biosphere" Programme. France also was actively involved in developing the two major components of EC nature conservation policy - the Directive for the Conservation of Wild Birds (1979) and the Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (1992). Lastly, she has ratified almost all the international conventions aimed at conserving biological diversity in one way or another, including, of course, the Convention on Biological Diversity signed in 1992 in Rio. France ratified the Convention in 1994.

### THE THREE DIMENSIONS OF BIOLOGICAL DIVERSITY

Under Article 2 of the Convention, the concept of biological diversity is defined as follows :

« The variability among living organisms from all sources including, *inter alia*, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part ; this includes diversity within species, between species and of ecosystems ».

The concept of biological diversity therefore refers to all the variations that exist in the living world i.e. the number, the variety, variability of organisms and components that they form through being associated with one another. Scientists usually describe or approach these variations according to three levels of organisation :

- genes : this corresponds to genetic diversity (or genetic resources for agriculture, food and medicine). For example, this can be seen in the many different forms and features within one and the same species,
- species : this constitutes the level of species diversity,
- ecosystems, ecosystem complexes and landscapes : these are components of ecological diversity.

The originality of the approach through the concept of biological diversity is thus not confined merely to a list of the different components. It highlights the essential concept of "interaction" between the three different levels of organisation of biological diversity with the result that the latter should be approached globally.

Consequently, national strategies must be geared towards these three dimensions and their interaction.

## THE REQUIREMENT OF THE CONTRACTING PARTIES TO ADOPT NATIONAL STRATEGIES, PLANS AND PROGRAMMES

Article 6 of the Convention lays down the requirements of the Contracting Parties regarding “general measures regarding conservation and sustainable use” of biological diversity :

*“Each Contracting Party shall, in accordance with its particular conditions and capabilities :*

- a) *develop national strategies, plans or programmes for the conservation and sustainable use of biological diversity or adapt for this purpose existing strategies, plans or programmes... ” ;*
- b) *integrate, as far as possible, and as appropriate, the conservation and sustainable use of biological diversity into relevant sectoral or cross-sectoral plans, programmes and policies .”*

Articles 7 to 14 provide details on the contents of this general strategy regarding identification and monitoring (Art. 7), *in situ* conservation (Art. 8) and *ex situ* conservation (Art. 9), sustainable use of components of biological diversity (Art. 10), incentive measures (Art. 11), research and training (Art. 12), education and awareness of the public (Art. 13), impact assessment and minimising adverse impacts (Art. 14).

## THE FRENCH STRATEGY FOR THE CONSERVATION OF BIOLOGICAL DIVERSITY

This report presents the French national strategy implemented under Article 6 of the Convention and describes the various components thereof :

- Chapter 1 describes the richness of this biological diversity and refers to certain components and their fragile character ;
- Chapter 2 presents the way in which France has introduced the conservation of biological diversity globally in spatial planning policies and plans ;
- Chapter 3 gives details on the policies pursued for the conservation of wild fauna and flora ;
- Chapter 4 gives details on how the conservation of biological diversity is taken into account in agricultural and forestry activities ;
- Chapter 5 focuses on the policy pursued and action undertaken to preserve genetic resources ;
- Chapter 6 specifies the institutions and research programmes focusing on biological diversity in French research efforts ;
- Chapters 7 and 8 look at the fields of overseas co-operation and the transfer of knowledge as well as those of education and training.

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### **Initiatives taken by France to develop an international nature conservation policy**

France is heavily involved in developing an international nature conservation policy. She has been particularly active in this area over the last ten years.

France is party to a number of international commitments :

- the Convention concerning the Protection of the World Cultural and Natural Heritage (1975),
- the Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention) (1986),
- the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention) (1990),
- the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) (1990),
- the Convention on the Protection of the Alps (Alpine Convention) (1994),
- different conventions for the protection of Regional Seas (Mediterranean, Caribbean Sea, West Africa, etc.).

In addition to the aforementioned international instruments, France played a major role in developing several EC Directives particularly the Directive on the Conservation of Wild Birds (1979), the Directive on the Importation into Member States of Skins of certain Seal Pups and Products derived therefrom (1983) and the Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (1992).

In 1989, along with numerous Consultative Parties to the Antarctic Treaty, France contributed to the adoption of a Protocol on Environmental Protection in this region. Under the Protocol all mining activities have been banned since 1991 for a period of 50 years, and any proposed human activities are subject to an environmental impact assessment before being authorised. Following France's initiative, a recommendation laying down a Code of Conduct for tourist activities was adopted.

France is aware of the major economic stakes (mainly in terms of tourism, fisheries and subsistence farming) that the environment and the endemic species in the Caribbean region constitute. She was actively involved in establishing the Protocol for Specially Protected Areas and Wildlife in the Caribbean (adopted in 1990) under the Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region (Cartagena Convention).

France also helped persuade the World Heritage Committee to recognise the concept of cultural landscapes in 1992. This enabled the Canal du Midi to be recognised as a World Heritage Site under the 1972 UNESCO Convention. It also enabled a joint France-Spanish case to be compiled on the Mont Perdu in the Pyrenees with a view to applying for designation as a World Heritage Site.

Under the International Convention for the Regulation of Whaling (ICRW), France played an active role in the adoption of a moratorium banning the hunting of all whale species until new rules for assessing population stocks and management have been defined. Under this Convention, France instigated the creation of a whale sanctuary in the Southern hemisphere. Furthermore, alongside her African partners, France is also working to help save the populations of African elephants under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES Convention).

Finally, with the assistance of the public bodies under the authority of the Ministry of Environment, France is co-operating with several countries, particularly in Africa, Eastern Europe and other developing countries with a view to protecting the environment.

In 1948, France showed her commitment to the cause of the lasting conservation of world natural heritage by helping to establish the International Union for the Conservation of Nature and Natural Resources (IUCN, today renamed the World Conservation Union). France hopes to continue and intensify her action in this field. This is why she has accepted to host the 50th anniversary of the IUCN in November 1998 in Fontainebleau, the French town where the body was first established in 1948.

# CHAPTER I :

## HIGH, BUT FRAGILE BIOLOGICAL DIVERSITY

Today, in France there are practically no ecosystems or even biocenoses - including major wetlands, alpine pastures and forests - that have not been altered by man. The conservation of biological diversity in these types of area thus often depends directly on the management methods used and the control of human activities.

Given man's past and current presence in France and given man's activities on the land, an analysis of the richness of the country's biological diversity and the threats brought to bear thereon must focus on four interconnected areas :

- habitat diversity and recent trends,
- fauna and flora diversity and their trends,
- the diversity of farmland and forests,
- the diversity and fragile character of genetic resources.

### **I.1 HABITAT DIVERSITY AND RECENT TRENDS**

In France, habitat richness is closely linked to the great variety of environment types and living communities that occur therein : aquatic ecosystems - wetlands, freshwater, coastal habitats - heath and scrubland, grasslands and pastures, forests, rocks and scree as well as farmland.

#### **Over 14 700 natural areas of ecological and wildlife interest**

Habitat richness can be seen in the extensive inventory of Natural Areas of Ecological and Wildlife Interest (Zones *naturelles d'intérêt écologique, faunistique et floristique* or ZNIEFF). There were a total of 14 755 ZNIEFFs (at February 1996), covering over 13.5 million hectares.

Type I ZNIEFFs are sites of outstanding biological interest. There are a total of 12 820 covering around 4.5 million hectares i.e. 8 % of the total land area of mainland France. Type II ZNIEFFs are large, natural, rich areas having been subject to minimal alteration and with significant biological potentialities. The inventory has identified 1 935 Type II ZNIEFFs covering 11.7 million hectares i.e. 21 % of the total land area. It should be borne in mind that some Type II ZNIEFFs incorporate some Type I ZNIEFFs.

#### **Over 75 % of the habitats listed in the EC "Habitats" Directive occur in France**

172 natural habitat types of Community interest belonging to all the major types of environment (dunes, heathland, forests, etc.) occur in mainland France. The number of habitats varies, however, depending on the biogeographical areas under consideration. Woodlands and grasslands are the most dominant habitat types, accounting for one in two habitats.

This assessment indicates the diversity of the natural heritage found in France compared to other Member States of the European Union. For example, almost 600 species of continental vertebrates have been identified, putting France in second place in terms of diversity of the species in question.

## Loss of natural habitats

The situation in France is varied but overall there has been a loss of natural habitats as a result of urbanisation and its associated phenomena (building of infrastructure, etc.), changes in farm structure (land consolidation). In the remaining parts of the land area: some types of natural environment such as wetlands or permanent grasslands are declining. Conversely, others such as forests (covering 29 % of the total land area) are showing a tendency to increase in area as a result of the abandonment of farmland. However, there has been some localised decline due to expanding urbanisation and infrastructure (see below).

**Types of land use in 1990 and between 1982 and 1990  
(mainland France: 542 403 km<sup>2</sup>)**

Types of land use	Area 1990 (in %)	Variation 1982-1990 (in %)
• Rocks and water	3.4	2.1
• Heaths, rough grazing lands and alpine pastures	7.4	-1.6
• Forests	15.7	0.6
- broadleaved species	10.0	2.5
- others		
• Perennial crops	2.6	-5.7
• Grasslands	22.4	-12.5
• Annual crops	27.9	10.1
• Hedgerows, isolated trees, and poplar groves	3.1	-9.6
• Developed land	2	23.5
• Undeveloped land	1.9	17
• Roads and car parks	2.6	9.7
• Total	100	

Source : Agreste - TERUTI.

## Wetland trends

In France, excluding lakes, rivers and coastal mud flats, wetlands cover between 1.5 and 1.7 million hectares, i.e. slightly less than 3 % of the country's total area. A third of the ZNIEFF sites identified are wetlands. The most important ones have been designated as Ramsar sites under the Convention of the same name.

Major wetlands such as the Marais Poitevin - 8 1 000 hectares - or the Camargue - 145 000 ha - have been significantly altered over the last 20 years : construction of embankments and polders, drainage and crop growing on former grasslands, land consolidation, resulting in a reduction in the river networks. Over the last 50 years, the area of these wetlands has receded by tens of thousands of hectares and several animal species such as the otter have also disappeared from them.

Improving and restoring rivers can, however, help create wetlands of significant interest such as in the Champagne region. Here, in the space of 25 years, building large dams and reservoirs has brought about a genuine explosion in migratory and wintering waterfowl populations. This has warranted these sites being designated as Ramsar sites under the Convention of the same name.

## I.2 FLORA AND FAUNA DIVERSITY AND THEIR TRENDS

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Mainland France is the second most important Member State of the European Union in terms of diversity of its amphibians, birds and mammals. Depending on the various classes. 30 to 70 % of European vertebrate species occur in France. Similarly, 1 to 3 % of vertebrates in the world occur in France. 43 % of the vertebrate species of Community interest listed in Annex II of the EC "Habitats" Directive occur in France.

While only a small number of species became extinct as of the mid 19th century, the number of threatened species has increased since the Second World War as a result of intensified human pressures on vertebrates and their habitats. However, although it is true that a negative trend has been observed for many years, efforts undertaken to halt this trend, particularly since 1970, have, in many cases, enabled the decline in species loss to be stabilised and, in some cases, even to reverse it.

### **The declining average flora diversity**

French flora is an indication of the diversity of biogeographical influences and the highly varied conditions of the natural environment that occur in the country.

40 % of European flora occurs in France on less than 12 % of the total surface area of Europe. The diversity of France's plant heritage is largely due to it being partly located in Mediterranean region.

With 4 700 species of vascular plants – angiosperms, gymnosperms and pteridophytes – (i.e. 1.5 % of terrestrial species), mainland French flora is the fourth most important in Europe in terms of species diversity. 13 % of plant species of Community interest listed in Annex II of the "Habitats" Directive occur in France. In addition, France has wild relatives for all cultivated species that originate in Europe and the North-West Mediterranean.

Less accurate estimates are available on species diversity of non vascular plants (lichen, algae, bryophytes, fungi).

### **The decline in flora**

Out of the 4 700 taxa (vascular plants) in French fauna, 34 are presumed to have been extinct since 1900. Nine endemic species are already totally extinct. Species thought to be extinct in France probably disappeared as a result of man's activities. The species in question are mainly Mediterranean species.

Since the extinction of endemic species affects biological diversity on a world scale, France has a major responsibility towards the conservation of natural heritage. According to the IUCN categories, endemic species are essentially of the "vulnerable" status. Almost a fifth are classified in the "endangered" category.

20 % of taxa are estimated to be threatened. Among them, 486 species or sub-species are considered as priority species (IUCN "endangered" and "vulnerable" categories) in the **Red Data Book of Threatened Flora in France** (volume 1) (*Livre rouge de la flore menacée de France*). Around 500 other species and sub-species require regular monitoring of their populations.

The threats to these species are a direct result of the destruction or alteration of the biotopes in which they occur, mainly open habitats being closed up following a decline in pastoral farming and agricultural abandonment, and rock habitats or screes.

Status of wild flora species in France according to the IUCN categories

IUCN Red Data Book Category	Extinct	Presumed extinct	Endangered	Vulnerable	Rare	Uncertain	Total
Strictly endemic within France	6 5.6 %	1 0.9 %	16 15 %	67 62.6 %	16 15.0 %	1 0.9 %	107 100 %
Subendemic (France and generally an adjoining country)	1 1.5 %	1 1.5 %	14 20.9 %	35 52.2 %	14 20.9 %	2 3.0 %	67 100 %
Rare and/or endangered subendemic in both countries concerned	0 0 %	0 0 %	2 33.3 %	2 33.3 %	2 33.3 %	0 0 %	6 100 %
Total endemic species	7 3.8 %	2 1.1 %	32 17.8 %	104 57.8 %	32 17.8 %	3 1.7 %	180 100 %
All categories	9 1.8 %	16 3.3 %	97 20.0 %	290 59.7 %	70 14.4 %	4 0.8 %	486 100 %

Source : Olivier et al, 1995.

Developments, human pressure and threats of biotic origin clearly stand out from the other categories of threats. The extent of biotic threats indicates that new types of problems are emerging which can only be addressed by implementing appropriate management practices.

Species whose numbers are increasing

Unlike certain animal species, there are probably no species belonging to the French flora whose numbers are increasing on a lasting basis. However, as a result of an increase in wooded areas, mainly through man's influence, certain tree species are expanding in numbers.

**A highly rich, but still threatened fauna**

France is the most important European country for vertebrates (excluding fish), with a large number of mammal species (100 excluding marine mammals). There are a total of 521 "breeding" species - 53 % of which are bird species, 19 % mammal species, 15 % fish species (freshwater only), 6 % reptiles (excluding marine turtles) and 7 % amphibians.

As in the case of flora, this heritage is much greater if France's overseas *départements* and territories (DOM-TOMs) are considered. A highly rich fauna and flora occurs in the DOM-TOMs. This is particularly true for endemic species, many of which still have not been described by scientists.

Since the mid-19th century, eight breeding vertebrate species have become totally extinct i.e. 1.3 % of vertebrates in France. Seven of the eight species were aquatic (marine or freshwater species). According to the present state of scientific knowledge, a total of 14 species are estimated to have become extinct (this knowledge is based on ancient literature). Three of these species, the white-headed duck, the white-tailed eagle and the monk seal have become extinct since 1970.

117 species i.e. 19 % of mainland France's vertebrates (excluding marine fish species) are extinct or strictly threatened vertebrates (bearing the "endangered or "vulnerable" status according to IUCN's former categories).

At the same time, 17 new vertebrate species (mainly birds) have become naturalised in France from neighbouring countries. Natural appearances of new species were observed most notably in the 1950s and 1960s.



In addition, efforts began in the 1980s to reintroduce species by restoring populations that had disappeared at regional or national levels.

Operations to introduce new species deserve special attention because they can be damaging to local fauna and man. No fewer than 35 species have been introduced by man and they have adapted themselves to living in mainland France, including 13 species since the mid-19th century (mainly fish and mammals).

## Fauna and flora diversity in the DOM-TOMs

### Diversity of the territories

Terrestrial and marine biomes in the French overseas *départements* (DOM) and territories (TOM) are among the planet's highly diverse biogeographical regions. Most of the DOM-TOMs are located in the intertropical zone. French Guiana belongs to the northern coastal fringe of the South American mainland while all the others are islands of varying size (ranging from small islets in the Indian Ocean to New Caledonia in the Pacific Ocean).

In addition, there are DOM-TOMs located in the northern part of the North American continent (Saint Pierre et Miquelon), in the southern part of the Indian Ocean (French Austral Territories) and in Antarctica.

Highly varied ecosystems occur in the **DOM-TOMs**. The following ecosystem types are well represented in these territories : tropical forests (especially in French Guiana), volcanic mountain areas and their forest ecosystems (Reunion Island), coastal ecosystems such as the barrier reef in New Caledonia, coral reefs in the Pacific: Islands, and lastly, the **Austral** and Antarctic Territories.

### High biological diversity

These factors have resulted in high biological diversity in the DOM-TOMs, both in absolute terms and compared to mainland France. Wild flora and fauna species diversity is exceptional in these areas, particularly in French Guiana, New Caledonia and French Polynesia.

In French Guiana, for example, 6 000 species have been identified, 4 800 of which are vascular plants, 186 mammal species (including 106 species of bats), 682 bird species, 159 species of terrestrial reptiles and 55 species of terrestrial molluscs. In New Caledonia, 3 322 plant species occur (77 % of which are endemic), 116 bird species (18 % of which are endemic), 48 species of terrestrial reptiles and over 400 species of terrestrial molluscs. The wild flora and fauna of French Polynesia are made up of around 1 500 plant species (63 % of which are endemic), 57 bird species and some 320 species of terrestrial molluscs.

There is also high diversity in terms of the number of species of vascular plants in Martinique and Guadeloupe, terrestrial molluscs on Reunion and Mayotte Islands as well as terrestrial reptiles in Guadeloupe.

### A very high level of endemism

The fact that most of the DOM-TOMs are islands explains why there is such a high level of endemism in their flora and fauna. For example, 77 % of the 3 322 vascular plant species and 85 % of the 48 species of terrestrial reptile species occurring in New Caledonia are endemic.

The importance of this exceptional biological heritage is recognised worldwide. Practically all the DOM-TOMs are or form part of an Endemic Bird Area.

Lastly, the considerable conservation efforts that have been undertaken over the last 20 years have enabled the populations of certain species (birds of prey, ducks, mountain and lowland ungulates and the beaver) to be restored. As a result of conservation policies and the protection system established for these species, their numbers have increased.

At first glance, if the changes in the number of vertebrate species since the 19th century are analysed, an increase in the number of species may be seen. This increase is merely apparent, however, since 122 vertebrate and invertebrate species are considered to be "strictly threatened".

### Historical trends in the number of vertebrate species in France

	Permanently extinct		Temporarily extinct		Total no. of reintroductions*	Natural appearances	Introduction by man	
	Before the mid-19th century	After the mid-19th century	Before the mid-19th century	Natural reappearance in 20th century			Before the mid-19th century	After the mid-19th century
Mammals	-4	-3	-5	+5	0	0	+4	+6
Birds	-2	-2	0	0	0	+15	+1	+5
Reptiles	0	-1	0	0	0	0	+1	0
Amphibians	0	0	0	0	0	0	0	+3
Freshwater fish	0	-2	0	0	0	+2	+2	+13
<i>Sub-total</i>	-6	-8	-5	+5	0	+17	+8	+27
Total number of species	<b>-14</b>		<b>0</b>		<b>0</b>	<b>+17</b>	<b>+35</b>	

NB : Excluding species whose breeding is unconfirmed, and occasional or highly localised species

\* Refers to species that became extinct from the French fauna, that did not re-appear naturally but that were reintroduced by man in the wild on a lasting basis.

Source : Maurin *et al*, 1994.

### I.3 DIVERSITY OF FARMLAND AND FORESTS

#### Changes in farmland

Farmland accounts for about 55 % of the total land area in France and agriculture thus shapes a large proportion of the country's landscape. The various climate and soil types and the different forms of farming (annual cash crops, intensive or extensive animal farming, tree crops, wine production and mixed farming, etc.) contribute to creating a great diversity in habitats for wild flora and fauna.

French farmland has a high heritage value. If land use is super-imposed on the ZNIEFF inventory (see above), it is possible to analyse the types of land use that occur within these areas. In 1996, farmland accounted for 24 % of Type I ZNIEFFs and 36 % of Type II ZNIEFFs. Although these figures are not proportional to the total agricultural land area in France (54 %), they are nevertheless significant. Certain types of farmland, such as grasslands or heterogeneous farmland (complex associations of strips of natural vegetation, permanent and seasonal crops) are represented more heavily than others.

However, in recent years, developments in agriculture have led to considerable changes in these types of environment. On the one hand, abandonment of farmland has caused closing up of some habitats and a loss of ecosystems and on the other, agricultural intensification has resulted in the fragmentation and alteration of certain types of landscape.

## The development of forests

Forests cover 29 % of the total land area in France. They are relatively rich in ecological terms. Forest ecosystems in France are highly diversified as a result of the diversity of tree species that occur and the different forestry management methods that have been practised for centuries. This diversity is also linked to the country's variety of climates, geographical zones, topography and soil types. Forests in France are made up of 2.3 million hectares of coppice, 1.3 million hectares of mixed coppice/high forest and 6.7 million hectares of high forests.

Compared to the forests of Europe as a whole, French forests are highly diverse in terms of the number of species that occur (see table below). Broadleaved species are the dominant type both in numbers and area covered. Although a large number of exotic or naturalised tree species occur in France, it should be pointed out that native species cover 94 % of forest land (in mainland France).

### Native and introduced trees species in the forests of mainland France

Trees occurring in forests

	Native species	Naturalised species	Exotic species	Total
Number of broadleaved species	57	3	16	76
Number of conifer species	16	6	38	60
<b>Total</b>	73	9	54	136
Proportion of the total forest area covered in 1994	94.03 %	5.97 %		100%

In addition, over 70 % of forests in France are made up of mixed stands. In the last 10 years, there has been a slight decline in single-species' stands, whereas there has been a considerable expansion in mixed species' stands (three or more species). Stands with four or more species make up a fifth of forest area in mainland France and three species' stands slightly over a fifth. This is a particularly exceptional feature in Western Europe. This situation appears to be stable on the timescale of the century.

During the last two centuries, the area covered by forest has almost doubled and it is still increasing today. Most of the forests (74 %) are privately owned and expansion of the forest area has mainly occurred on private property.

Lastly, there are large tracts of tropical forests to be found in France's overseas *départements* and territories : about 8.8 million hectares. Tropical forests in Guiana alone cover around 8.3 million hectares (i.e. a 93 % afforestation rate). Forests on Reunion Island, Guadeloupe and Martinique cover 200 600 hectares. In the overseas territories, dense evergreen forests cover 372 000 hectares in New Caledonia, not to mention the 393 000 hectares of various formations and *maquis* and 20 700 hectares of mangroves.

## I.4 DIVERSITY AND THE FRAGILE CHARACTER OF GENETIC RESOURCES

### Animal species

In France, there is high diversity of breeds of domestic animals : over 148 (excluding poultry and farmed fish), the majority of which are ruminants (see table below). Amongst these breeds, 57 % are considered by FAO (1996) not to constitute a threat in their genetic diversity because of the high number of available breeding females. However, it is important to emphasise the risks of the intensive use of certain males in the genetic management of a breed through artificial insemination : the most notable example is that of the Prim'Holstein breed for which only 140, out of a population of around two million heads, actually contribute to ensuring the next generation.

FAO considers that 43 % of French breeds are threatened in their genetic diversity, a third of which are in a critical state and half of which are the subject of conservation plans (see table below). Basically, FAO considers that breeds are threatened if the number of breeding females is below 1 000 or if the number of breeding males is 20 or below. The breed is deemed to be in a critical state if the numbers fall below 100 for females and five for males.

Status of breeds in France according to FAO (1996)

Species	Not endangered	Endangered	Critical	Total
Cattle	25	9 (7)	7 (6)	41
Sheep	42	10 (6)	2 (2)	54
Goats	3	2 (1)	0 (0)	5
Pigs	3	5 (1)	9 (5)	17
Horses	11	18 (2)	2 (0)	31
<b>Total</b>	<b>84</b>	<b>44 (17)</b>	<b>20 (13)</b>	<b>148</b>

The figures given in brackets are the number of breeds for which a conservation plan has been established.

In addition, a number of other species that still occur in the wild are bred for direct consumption or consumption of products derived therefrom (fish farming, bee-keeping), for restocking (hunting, fishing), for biological control and pollinisation. These populations that have been bred are often released in large numbers into the wild and will interact with naturally occurring populations of the same or similar species. Genetic diversity of the naturally occurring populations may thus be weakened, particularly if the populations bred by man have a selective advantage over the former with which they compete. Beyond quantitative changes in genetic diversity, the impact of such practices on the biological mechanisms that ensure these species' adaptive potential need to be determined. Very little is known by scientists about these questions.

### Plant species

France has always followed a policy of prospecting for, naturalising, domesticating and selecting plants of interest for botany, agriculture, horticulture, landscapes, forestry or industry. It is rich in genetic resources for all species grown both in mainland France and in the DOM-TOMs. This diversity was long underestimated, dispersed and sometimes threatened.

Agricultural developments resulted in highly productive varieties but along with them came a significant reduction in genetic diversity used both in terms of species and sub-species : a decline in the number of species grown, a decline in the range of varieties used, the creation of homogeneous and specialised varieties replacing local ecotypes with a wide genetic base. The latter began to disappear due to the fact that they were not competitive in the intensive farming system. At the same time, a decline in wild species related to cultivated species was observed (these wild species being a source of diversity for the latter) as a result of a considerable decline in non agricultural land. It should be noted, however, that very little is known about the genetic diversity within these species except in the case of certain "pilot" species. Thus the decline in genetic diversity used often led to a decline in the available variability.

In this context, many genetic resources have been brought together over several decades within public and private collections : over 150 000 acquisitions have been recorded in public institutes, 40 % of which concern forest genetic resources. Although part of these resources constitutes a significant asset for subsequent needs of the agri-food industry, their long-term conservation is by no means a foregone conclusion and is subject to no legislative provision.

As described above, there is great genetic and species diversity regarding forests in France.

Resolution 2 of the Strasbourg Conference (1990) lists the threats to the genetic diversity of European forests : only elms, especially *Ulmus campestris* and *Abies nebrodensis* in Sicily are recognised as being

endangered. However, several tree species or groups of tree species, many of which occur in France, are considered to be threatened in terms of genetic diversity :

- spruce due to acid deposition in Central Europe ;
- oaks due to forestry practices (increased productivity, geographical transplantations), particularly the holm oak in the areas where it occurs naturally ;
- the black poplar due to rapid changes in its habitat (riparian forests) and uncontrolled hybridisation with Euro-American hybrids ;
- fragile broadleaved species, particularly wild Rosaceae, as there is an increasing shift in forestry systems practised towards single-species cultivation.

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## CHAPTER II : TAKING BIOLOGICAL DIVERSITY INTO ACCOUNT IN SOCIO-ECONOMIC PRACTICES

Taking the environment into account within all the activities that change the shape and form of the land whether they be initiated by the State, local authorities or public or private developers constitutes an essential component of French environmental protection policy, and more generally of biodiversity conservation policy.

The environment and biodiversity conservation must be integrated both through other policy areas [see chapter IV] and when major spatial planning and land use guidelines are drawn up through, for example, national and regional development plans or through other policy areas.

Today, an increasing number of components of public policies and practices integrate the environment within their approach more explicitly : national plans, State-Region Planning Contracts, Land Use Master Plans, Infrastructure Master Plans (roads, motorways, high-speed train lines, navigable waterways, etc.), or policies based on partnerships between public authorities <sup>2</sup> such as *département* environment plans or Environment Charters concluded with local authorities.

In addition, as France is a partly decentralised State, today, instruments for policy consultation and a contract-based approach to policies as well as information and public participation play a major role. The Spatial Planning Act no. 95-115 of February 4 1995 contributed to strengthening these guidelines.

Lastly, planning policies focusing on specific types of environment - mountain or coastal areas - enable implementation of the biological diversity conservation policy to be adapted accordingly. The same is true for defining and implementing forest management which is also vital to protect the multipurpose character of forests.

### II.1 ENVIRONMENTAL PROTECTION IN PLANS AND MASTER PLANS

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Medium - or long - term national or regional planning instruments control the development of human activities on the land and influence changes in pressures brought to bear on biological diversity resources.

#### State-Region Planning Contracts (*Contrats de plan État-Région*)

The environment has become one of the priority thrusts of the new generation of State-Region Planning Contracts. They are concluded between the State and each of the 22 French regions and cover a five-year period (those currently in force cover the period 1994-1998). These instruments enable a decentralised approach to public policies centred on major planning and development objectives. Specific contract-based objectives concerning the environment are defined and active policies to protect the environment are encouraged. In many respects (protection of outstanding sites, management of sensitive areas, pollution control, etc.), these planning contracts contribute directly or indirectly to the conservation of wild flora and fauna.

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<sup>2</sup> France has 100 *départements* four of which are overseas. There are 22 regions in mainland France. France is also divided into 36 783 municipalities (*communes*) (90 % of which have fewer than 2 000 inhabitants). At the *département* and regional levels, there are both *département* and regional authorities as well as decentralised national government offices.

### Land Use Master Plans (*Schémas directeurs*)

Land Use Master Plans were introduced under Act no. 83-8 of January 7 1983, and replaced the former type of Land Use Master Plans (*schémas directeurs d'aménagement et d'urbanisme* or SDAU).

The Land Use Master Plans, drawn up by a group of municipalities (*communes*), lay down basic guidelines for development in the area concerned, taking into account the balance which must be struck between development of the area and the conservation of natural sites and resources.

As town planning documents, the Land Use Master Plans define overall land use, major infrastructure, location of the most important amenities and activities as well as land to be protected from urbanisation. The principles thus adopted must be transposed into specific regulations through the Land Use Plans (see below).

### Land Use Plans (*Plans d'occupation des sols* or POS)

Taking the environment (particularly the conservation of flora, fauna and sites) into account in land use plans is now a legal requirement under four major Acts adopted between 1976 and 1985 (Town and Country Planning Code - *Code de l'urbanisme*, Art. L 121-1 and those following). These town planning documents are drawn up at *commune* level<sup>3</sup>.

Through Land Use Plans, by means of the rules applicable to each type of area occurring within their boundaries, the *communes* can have considerable influence on the conservation of biological diversity. More specifically, under the Town and Country Planning Code, *communes* can ensure :

- that natural areas requiring protection are designated. They may be sites of outstanding aesthetic, biological or historic interest ;
- that woodland areas designated for strict protection purposes are protected. They may be woodlands or forests occurring in the *commune* or public parks in towns and cities that already exist or are to be established. This measure may be of interest for conserving specific specimens within urban areas.

The draft Land Use Plan is subject to public enquiry and once it has been approved, it remains applicable for an unlimited period of time.

### Environment Charters (*Chartes pour l'environnement*)

In 1990, France began a contractual policy encouraging local authorities (*communes* or groups of *communes*) to draw up municipal environment plans (*plans municipaux d'environnement*). These instruments became Environment Charters in 1992. The latter are contracts concluded between a local authority and the State in order to implement an overall environment strategy for a given area. Priority action areas include protection of natural and outstanding areas and maintaining biological diversity.

A large proportion of environment charters concluded to date cover rural areas where the biodiversity conservation objective is important : *survey* of natural areas, landscape quality charter etc. In addition, the charters covering urban areas also take biodiversity into account. In Mulhouse, for example, the charter's action programme includes the creation of a National Botanical Conservation Agency as well as studying and monitoring wild fauna. Similarly, in Strasbourg, there are plans to set up a conservation agency for endangered plants and to draw up an urban tree charter.

### Département quarry plans (*Schémas départementaux des carrières*)

Since quarries were often located in alluvial areas, this has resulted in considerable pressure being brought to bear on natural areas that are particularly rich in wild fauna and flora species. Today, protection of these areas is ensured far more effectively (especially through a ban on extraction in the low water channel of rivers) and since quarry sites are restored once operations have finished, natural areas suitable for wild fauna and flora are recreated.

Département quarry plans, introduced under Act no. 93-3 of January 4 1993, must take into account « the national economic interest, resources and the demand for materials (...), protection of sensitive landscapes,

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<sup>3</sup> Mainland France is divided into some 36 000 *communes* , 13 000 of which have adopted a POS.

natural sites and environment, the need for integrated land management” and the “restoration and improvement of sites ».

## **II.2 COMPULSORY ENVIRONMENTAL IMPACT ASSESSMENTS FOR DEVELOPMENT SCHEMES**

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In France, under the 1976 Nature Conservation Act, there is a legal requirement to take the environment into account when a public or private development scheme may have an impact on the environment. In particular, an environmental impact assessment (EIA) of the scheme must be conducted. Some 6 000 EIAs are conducted each year, 300 of which focus on infrastructure schemes.

This procedure was reinforced by Decree no. 93-245 of February 25 1993, which transposes into national law EC Directive of June 27 1985 on the assessment and effects of certain public and private projects on the environment (Directive 85/337/EEC).

Thresholds and selection criteria, particularly for schemes which often have a major potential impact on wild flora and fauna and their habitats, have been modified and adjusted : e.g. power lines and hydroelectric dams. This is also applicable when renewing authorisations, land consolidation operations, tourism infrastructure and leisure activity developments.

## **II.3 AREAS SUBJECT TO SPECIFIC POLICIES : MOUNTAINS, THE COAST AND FORESTS**

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### **Mountain policy**

By definition, mountains are a fragile environment, given their ecological diversity and the extent of economic activities occurring in these areas. The situation in France’s mountains - rich in fauna and flora and where considerable economic and tourism activities are located - intensifies this fragility.

France has developed a policy to protect natural mountain areas. Six out of the seven national parks (created under a 1960 Act) are located in mountain areas and a large proportion of the 30 regional nature parks (PNR) are located in upland areas. Lastly, many nature reserves (created under the 1976 Nature Conservation Act) are also in mountain areas.

As of 1977, when the national mountain guidelines were adopted, the concept of taking the environment into account in land use planning was added to that of environmental protection. The subsequent 1985 Mountain Act provided a general framework for balanced protection and development in mountain areas.

All these policies and programmes now apply to the French Alps under the Alpine Convention that entered into force on March 5 1996 and ratified by France on January 4 1996. This Convention aims to reconcile the economic interests at stake in the Alps with the requirement to protect a threatened heritage.

### **Coastal protection**

As an interface between land and sea, the 5 500 km of coastline in mainland France are a fragile area with high biological diversity. For many years, France has been taking action aimed at controlling the development of coastal areas more effectively with a view to maintaining natural balances.

Following on from the former national planning guidelines of August 25 1979, the Act of January 3 1986 on the Development Protection and Enhancement of the Coast lays down the principles and rules for reconciling economic development with protection of the coast. In particular, it helps to control town planning in coastal zones. Building is not authorised in natural areas of high value.

The Coast Act helps to protect coastal areas and the coastal environment (including marine areas) within *communes* located along the coast. It provides for the protection of outstanding or typical features of the area concerned, particularly those of great biological importance such as deltas, dunes, nesting sites, feeding or roosting grounds for birds protected under the EC Directive on the Conservation of Wild Birds (no. 79/409/EEC), caves, coastal forests, artificial lakes of over 1 000 hectares in area, Posidonia beds or mangroves in the overseas *départements*.



This Act, along with the National Coast and Lakeside Conservation Agency (*Conservatoire de l'espace littoral et des rivages lacustres*), is an essential tool for maintaining biological diversity in coastal areas.

**The National Coast and Lakeshore Conservation Agency**  
(*Conservatoire de l'espace littoral et des rivages lacustres* or CELRL)

The National Coast and Lakeshore Conservation Agency is a public body responsible for ensuring, in mainland France and the DOM-TOMs, permanent protection of natural coastal areas, lakeshores and the shores of inland artificial lakes with an area of more than 1 000 ha, through a land acquisition programme. The Agency is anxious to balance its acquisitions depending on the various types of environment and landscape, to follow a priority protection policy for major national sites and to protect farmland that contributes to maintaining open land on the coast. Since it was set up in 1975, the Agency has acquired almost 45 000 hectares, i.e. 8 % of the French coastline.

This land rights acquisition policy complements the strictly statutory protection of the coast :

- when land is subject to pressure for urban development,
- when land is subject to damage and needs restoring and managing,
- when land is inaccessible and opening it up to the public is necessary.

The *communes*, *départements*, groups of these territorial entities and the National Forestry Office (ONF) - if the area concerned is woodlands -, are fully involved in managing the land acquired by the Agency. However, the latter remains responsible for drawing up the management regulations and methods.

### Forest management

In France, the concept of forest management was developed in the 14th century in order not to do anything that would run counter to ensuring permanent forest resources, essential to human activities in society. This concept has evolved and inspired the organisation of several sectors in which it is useful, if not vital, to control various human activities in space and in time.

In France, since 1963, each forest of 25 unbroken ha in area (sometimes smaller) has been subject to a Simplified Management Plan (*plan simple de gestion*) which includes overall guidelines suitable for the forest areas concerned. The aim of the plans is to conserve biodiversity, the potential for future harvesting and the multipurpose character of forests on a lasting basis. These guidelines are subject to ministerial approval following consultations with the Regional Forestry and Forest Products Commission (*Commission régionale de la forêt et des produits forestiers*).

Planning and the Simplified Forest Management Plan increasingly encourage their authors to define the scope for human activities focusing on : maintaining biodiversity, regular income through forestry, hunting or sylvo-pastoral potentialities, public access, landscape, protection of the environment from natural risks or fire in order to help the manager to make decisions as and when they are necessary with full knowledge of the facts and the situation specific to each forest.

Currently, 90 % of the area of State forests are subject to management, 71 % of the area of forests owned by local authorities are subject to the forestry regulations (*régime forestier*) as are 75 % of private forests over 25 unbroken ha i.e. a total of more than 6 million ha. Felling in unmanaged private forests of over 25 unbroken ha is subject to prior authorisation in general, accompanied by guidelines or forest conservation/reconstitution measures previously approved by the competent authorities.

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## CHAPTER III : POLICIES FOR THE CONSERVATION OF WILD FAUNA AND FLORA

### III.1 ACQUIRING KNOWLEDGE ON AND MONITORING THE NATURAL HERITAGE

Acquiring knowledge on and monitoring natural heritage began a long time ago in France. The early 19th century was a time of great scientific explorations all over the world. All through the 19th and 20th centuries, the list of living species and their distribution range was extended and may be considered as the major achievement of naturalists and their work up until the **Second** World War.

Drawing on this historic basis, France's strategy to acquire knowledge on and monitor the country's fauna and flora heritage was launched and has been regularly strengthened over the last 25 years.

Three main objectives were set within the strategy :

- to make full use of available knowledge in all its forms while, at the same time, gradually adding to this ;
- to acquire **knowledge** covering the entire area of France, focusing on efforts to produce reference reports ;
- to update these reference reports, making it possible to quantitatively highlight the various dynamic phenomena having an impact on the natural heritage.

Today, closely involving natural resource managers and users in compiling the surveys and lists and in monitoring work is an integral part of this strategy. This helps to raise their awareness and make them understand the necessary changes in legislation more effectively.

#### III.1.1 REINFORCING INSTITUTIONS SINCE 1970

A central role is played by the National **Natural** History Museum (*Muséum National d'Histoire Naturelle* or MNHN) and its Institute of Ecology and Biodiversity Management (*Institut d'Écologie et de Gestion de la Biodiversité* or IEGB)

The establishment of a French Ministry of Environment (in 1971) gradually led to discussions, research and policy being applied to nature conservation. In 1979, a Fauna and Flora Secretariat (*Secrétariat de la faune et de la flore* or SFF) - today renamed the Natural Heritage Department (*Service du patrimoine naturel* or SPN) - was set up within the MNHN in order to act as a "spearhead" for observing and monitoring natural heritage.

A series of national, regional and local surveys and atlases were compiled, firstly focusing on vertebrates and higher flora with priority given to rare and threatened species. The data is gathered through a network of researchers, nature conservationists, various NGOs and other bodies coordinated by the SPN (see above) within the MNHN's Institute for Ecology and Biodiversity Management.

By combining this data with information included in the significant body of specialised scientific literature and in museum collections and herbaria, the end result is not only censuses or "reference reports" but also **comprehensive** historic accounts of species distribution. Using computer technology, trends are thus highlighted, quantified and mapped.

**The National Natural History Museum (MNHN)  
and the Institute for Ecology and Biodiversity Management (IEGB)**

The “Garden of Medicinal Plants” (*Jardin des plantes médicinales*) was founded in 1626 by an edict issued by King Louis XIII. It gradually expanded under the authority of the French naturalist Buffon until it acquired its current status, in 1793, of National Natural History Museum (MNHN).

The MNHN has a threefold task : to conserve the national heritage of natural and social sciences, to conduct research and disseminate knowledge as well as to manage the institution.

In order to help the Ministry of Environment formulate its natural heritage and biodiversity conservation and restoration policy, the MNHN established the Institute for Ecology and Biodiversity Management (IEGB) in 1995, replacing the Permanent Environment Delegation (*Délégation permanente de l'environnement*), set up in 1992.

The IEGB groups together the internal skills on these topics and coordinates relations with national and international partners. The Department of Natural Heritage (SPN) was established within the IEGB, replacing the former Fauna and Flora Secretariat.

**IEGB's objectives**

The IEGB has set itself two priorities :

- to form a sound basic and applied research centre for ecology and conservation biology,
- to act as the special representative of the Ministry of Environment for its national policy for sustainable management of the natural heritage and biological diversity as well as for implementing EC legislation and international conventions on environmental protection.

**Knowledge is based on natural heritage data**

The general structure of knowledge of natural heritage and biodiversity is based primarily on cooperation and joint efforts between all the different national public or private partners. Approved knowledge reference systems are gradually being set up within the Natural Heritage Global Information System (*Système d'information global sur le patrimoine naturel*). ~~These~~ data bases form essential tools for the IEGB to develop and disseminate a range of computer products and maps that are standard or devised at the request of users.

**Scientific know-how for conservation measures**

Drawing upon a network of experts, the IEGB provides scientific and technical advice to the Ministry of Environment for issues of topical interest in the field of natural heritage assessment, management and conservation as well as for man-nature relations. In its expert capacity, the MNHN also provides advice to international bodies and organisations. It has been appointed “scientific authority” for CITES and the “focal point for information exchange” under the Convention on Biological Diversity.

### **The European Topic Centre for Nature Conservation (ETUNC)**

France is closely involved - at several levels - in the activities of the European Environment Agency (EEA) which began operating on October 30 1993. EEA, based in Copenhagen (DK), has been entrusted with the task of gathering, assessing, checking and validating environmental data in Europe. One of the nine so-called European Topic Centres (ETCs) established by EEA since 1994 is based in France : the European Topic Centre for Nature Conservation (ETCMC). The Ministry of Environment provides further funding for the Centre in addition to that provided by EEA.

By choosing to entrust the National Natural History Museum (MNHN) with this task, EEA recognises the privileged position that France occupies in terms of biodiversity, located between Northern and Southern Europe. It is also a sign of the MNHN's potential as an institution for conducting research on ecology and managing collections, data bases and systems. The ETC/NC is a consortium of 15 institutions from 12 European countries, associated with the MNHN. The latter has ultimate responsibility and is the legal contracting party vis-a-vis EEA. By contributing - each one in its respective field of expertise - to the work programme defined by EEA, these institutions significantly reinforce ETC/NC's expert capacity.

#### **ETC/NC's structure**

The ETC/NC is headed by Juan-Manuel de Benito (who is Spanish) and assisted by a central team of seven experts. It is located within the National Natural History Museum (MNHN) which coordinates the consortium's various tasks and also directly carries some of them out.

The MNHN's partner institutions within the **ETC/NC** consortium are :

- National Environmental Research Institute (**NERI**), **Rønde**, Denmark,
- Finnish Environment Institute (**FEI**), Helsinki, Finland,
- Bundesamt für Naturschutz (**BfN**), Bonn, Germany,
- Greek Biotope/Wetland Centre (EKBY) Goulandris Natural History Museum, Themi, Greece,
- Agenzia Nazionale per l'Ambiente (ANPA), Roma, Italy,
- European Centre for Nature Conservation (ECNC), Tilburg, Netherlands,
- Norwegian Institute for Nature Research (NINA), Trondheim, Norway,
- Instituto de Conservação da Natureza (ICN), Lisboa, Portugal,
- Higher Institute for Statistics and Information Management (ISEGI), Lisboa, Portugal,
- Direction General de Conservación de la Naturaleza, Madrid, Spain,
- Museo Nacional de Ciencias Naturales (MNCN), Madrid, Spain,
- Swedish Environmental Protection Agency (SEPA), Solna, Sweden,
- Institute of Terrestrial Ecology (ITE), Huntingdon, United Kingdom,
- Joint Nature Conservation Committee (JNCC), Peterborough, United Kingdom.

In addition, the World Conservation Monitoring Centre (WCWC), based in Cambridge (UK) is associated with the **ETC/NC** Consortium through the European Centre for Nature Conservation (ECNC). All these bodies are represented on the Board. The latter's chairman is Claus Stuffmann, former head of the Nature and Soil Conservation Division in DG XI (European Commission). The Board meets twice a year.

#### **The ETC/NC work programme**

The ETC/NC work programme is threefold :

- to contribute to developing EEA's nature information strategy, particularly by gradually setting up a European Nature Information System (EUNIS) ;
- to analyse the state and trends of biodiversity in Europe (periodical reports on the state of the environment and the EC environmental action programmes, developments in methodologies, etc.) ;
- to support implementation of the EC Natura 2000 network, especially by helping to produce software designed for keying in and processing the inventories of Sites of Community Interest and by conducting scientific analyses of the data with a view to establishing the Community list of the future Natura 2000 sites.

The ETC/NC was initially set up for a three-year period (1994- 1997). Its assignment has been renewed for a further three years until the year **2000**. Its geographical scope will be extended to all Eastern European countries that are in the process of joining the EU.

## A Fauna-Flora network involving all the bodies concerned

From the outset, the Fauna and Flora Secretariat (SFF), then the Natural Heritage Department (SPN) set up a National Fauna-Flora Network (*réseau national Faune-Flore*), made up of over 4 000 experts in association with other specialised national or regional networks that were established in the 1970s (networks of ornithologists, mammalogists, herpetologists, entomologists and botanists).

The SPN has also set up the necessary cooperations and links with national or regional bodies or authorities that, through their own respective networks, gather natural heritage data on fauna and flora species : universities, museums and also the National Hunting Office (*Office national de la chasse* or ONC), National Fisheries Council (*Conseil supérieur de la pêche* or CSP), National Forestry Office (*Office national des forêts* or ONF) and nature protection and management bodies (national parks, nature reserves, regional nature parks, Regional Natural Area Conservation Agencies (*conservatoires régionaux d'espaces naturels*), as well as regional or *département* environmental administrations, particularly the Regional Offices of the Environment (*Directions régionales de l'Environnement* or DIREN).

The same is true for international level where organising specialised networks is considered as a priority action, especially on a European scale, with the EIONET network for which the French Institute for the Environment (*Institut français de l'environnement* or IFEN) is the national focal point. EIONET was set up upon the initiative of EEA and its European Topic Centre for Nature Conservation (see above).

### III.1.2 COMPILING SURVEYS

Improving knowledge on wild fauna and flora species and on natural habitats has been one of the primary concerns of the Ministry of Environment from its inception.

The diversity of the components of the natural heritage, the varying geographical scales suitable for monitoring, the required knowledge of historical trends have all led several types of surveys and inventories to be compiled. These are also intended to meet the needs of the different actors involved in implementing policies to protect, manage and restore natural areas and wild fauna and flora.

**The Inventory of Natural Areas of Ecological and Wildlife Interest (*Zones naturelles d'intérêt écologique faunistique et floristique* or ZNIEFF), established on the basis of wide consultation**

What prompted the Ministry of Environment to launch the national Inventory of Natural Areas of Ecological and Wildlife Interest (ZNIEFF) was primarily the need to hold reliable and homogeneous information on the country's areas of greatest biological or ecological interest.

This inventory is coordinated, at national level, by the SPN and validated by regional scientific committees set up especially for this programme. It has involved large numbers of scientists and nature conservationists in all the regions of France working in close cooperation with the Regional Offices of the Environment (DIREN - decentralised regional offices of the Ministry of Environment). France's territorial entities, particularly the regions, have been heavily involved in this operation.

Two types of area were identified in the inventory :

- Type I areas : characterised by their outstanding biological interest (occurrence of protected species, associations of species or rare or threatened species or species characteristic of the regional heritage) ;
- Type II areas : large natural areas that are rich and have been subject to few alterations and that provide significant biological potentialities (by definition, these areas may include several Type I areas).

Today, this inventory covers the overseas *départements* (DOM) of Reunion Island, Martinique and Guadeloupe. Work has begun in French Guiana. The ZNIEFF inventory is also being extended to include the marine environment. The inventory of land areas is currently being improved. This is the modernisation phase of the ZNIEFF, begun in 1995.

## The inventory of Important Areas for the Conservation of Birds (*zones importantes pour la conservation des oiseaux* or ZICO)

France has conducted a scientific inventory of the Important Areas for the Conservation of Birds throughout the country. The work was undertaken by the French Society for the Protection of birds (*Ligue pour la protection des oiseaux* or LPO) and the MNHN's Natural Heritage Department on behalf of the Ministry of Environment. The inventory includes all the sites warranting special ornithological interest under EC Directive no. 79/409/EEC of April 2 1979.

### Species surveys : reference reports vital for fauna and flora management

Since it was set up, the Nature Conservation Directorate (*Direction de la protection de la nature* or DPN) within the Ministry of Environment adopted the principle of compiling a series of national species surveys giving priority to vertebrate groups. These national surveys, which act as reference reports, are regularly updated in order to :

- produce statistical data vital for the regular assessment and monitoring of natural heritage ;
- enable reports to be written for the purpose of providing input to France's management and conservation policy ;
- provide scientists with data sheets that may be used as a basis for different applied research.

The data in the surveys is compatible as a result of basic common methodologies. It is stored in SPN/MNHN's data bases.

### Local surveys (at *commune* level)

*Commune* 4 type surveys on species or groups of ungulate species (for which in-depth knowledge is needed on their protection and management requirements) have significantly increased in number. Data gathering relies on technical and local administration networks.

As the data thus gathered is complementary to that included in surveys carried out by scientists and nature conservationists, it helps to provide rapid and concise knowledge of France as a whole. It may also easily be updated. This data, compiled on a *commune-by-commune* basis, may easily be combined with data from other programmes located by geographical features (ZNIEFFs, deer ranges, etc.).

### Historical accounts : a desire to integrate all available knowledge

Trends are identified and historical accounts are compiled using the extensive scientific heritage contained in specialised literature and in museum collections and herbaria. Combining this information with data from the inventories makes it possible to produce the most comprehensive historical accounts of species distribution.

### The Natura 2000 network

The aim of EC Directive no. 92/43/EEC of May 21 1992, known as the "Habitats" Directive, is to conserve Community biodiversity, mainly by establishing a network of sites, in which natural habitats habitats of wild fauna and flora species of Community interest occur, in order to maintain or restore these habitats in a favourable conservation status.

The network entitled "Natura 2000" is the backbone of the mechanism. It must contribute to achieving the objectives set in the Convention on Biological Diversity. It is to be implemented in three stages, the first of which involves compiling national scientific inventories of the sites concerned.

A total of 1 306 sites covering around 13 % of the total land areas in mainland France were identified by the National Nature Conservation Council (*Conseil national de protection de la nature*) as candidate sites to be included in the Natura 2000 network.

75 % of the types of habitats of Community interest listed in Annex I of the Directive occur in France (i.e. around 170 habitats including 43 out of the 66 priority habitats). 83 animal and 57 plant species listed in

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4 Mainland France is divided into 36 783 *communes* of roughly equal size. This administrative unit constitutes a useful link in the chain for collecting information and disseminating results.

Annex II of the Directive occur in France (including, respectively, 8 out of 23 and 10 out of 165 priority animal and plant species).

France forms a vital link in the Community network due to its biogeographical situation that includes land with ocean, continental, alpine and Mediterranean features.

In autumn 1997, France forwarded a list of proposed sites (535 in number, covering 890 000 hectares of terrestrial sites and 170 000 ha of marine sites) to the European Commission. Further consultation of local actors is currently underway to add to the preliminary proposals and to seek agreement on management methods for these sites.

#### **Monitoring the natural environment : the EC CORINE Land Cover programme**

A biophysical land use survey by remote sensing has been conducted under the aegis of the French Institute for the Environment (IFEN). Its aim was to compile a complete land cover of mainland France by applying the system introduced in the EC CORINE Land Cover programme. This tool focuses, among other things, on biodiversity in the whole of France and helps to incorporate environmental knowledge more effectively in the overall spatial planning framework. Total coverage of France was completed in 1996.

The CORINE Land Cover programme has enabled computer management of the theme maps using the Geographical Information System (GTS). There are several applications for natural heritage monitoring :

- identifying land use changes,
- analysing France's ecological diversity, by combining these maps with other theme-based maps (natural areas, protected areas, forest surveys, species' distribution ranges),
- simulating global impacts of major development schemes.

### **111.13 METHODS USED TO DISSEMINATE INFORMATION**

The knowledge acquired is passed on through the wide dissemination of the findings of survey work, particularly in the form of atlases and red data books.

#### **Atlases**

National atlases (in the form of maps with a standardised presentation) constitute a sound basis for assessing natural heritage. These maps provide a relevant account of the space-time distribution of species and, in some cases, an approach to quantifying them. They serve as reference reports and are also one of the best ways of disseminating information among a large number of nature conservation experts and the general public. Some 15 atlases have been produced to date.

Since 1970, when the national atlas programme was launched, a strong momentum has been created among NGOs. An increasing number of nature conservation NGOs are becoming involved in the preparation of regional and *département* atlases.

Data from the national atlases is also used to compile European atlases. On behalf of the *Societas europae herpetologica*, the Natural Heritage Department (SPN) produced an atlas of European reptiles and amphibians which was published in 1997.

#### **Red data books**

The concept of red data books was devised by the World Conservation Union (IUCN). In France, for the past ten years, the Ministry of Environment has been supporting the production and publication of red data books on major groups of threatened wild species occurring in the country. Since then, the SPN has been conducting an active policy of publishing red data books on specific themes, thus helping to set up species' protection and management programmes.

In 1983, with backing from the Ministry and financial support from the World Wide Fund for Nature-France, the Fauna and Flora Secretariat (SFF) published the first volume on vertebrates. The second volume on marine and coastal species was published in 1987. In 1992, the National Fisheries Council (CSP) – with its network of 700 fish wardens –, the Ministry of Environment, the French Research Institute for Agricultural and Environmental Engineering (CEMAGREF) and the SFF pooled their

resources to update and significantly expand the chapter on freshwater fish in the 1983 assessment. As part of the same programme, a complete update on threatened fauna in France was published by the SFF in 1994. Lastly, a red data book on the most threatened species was published in 1995, bringing the total number of national red data books produced to date to six.

Red data books or lists have also been published in some French *départements* and regions. A number of others are currently in preparation. Some focus on the DOM-TOMs. The *Red Data Book on Birds of French Overseas Regions (Livre rouge des oiseaux des régions françaises d'outre-mer)* was published in 1988 by the International Council for the Preservation of Birds.

## III.2 CONSERVATION AND RESTORATION OF POPULATIONS OF THE MOST THREATENED SPECIES

### 111.2.1 PRIORITY FOR *IN SITU* CONSERVATION

#### Three levels of statutory protection

*In situ* conservation of wild fauna and flora species is a priority issue in France. It implies conservation of their habitats, the adoption and implementation of measures controlling or banning the use of these species as well as management policies and measures for the most threatened species. In France, there are three possible legal instruments for the conservation of wild species. Each one meets different protection requirements.

#### Full protection

Species of wild flora that are rare, threatened or endangered are afforded what is known as full protection. This means activities that threaten the species (felling, uprooting, gathering, use, sale, purchase, destruction, transport, peddling or offering for sale) are banned.

For fauna, as a result of the EC Birds and Habitats Directives, vertebrates are almost totally covered (except for species considered as pest species with regard to agriculture and fish farming - they may be hunted) by full protection orders (*arrêtés*), whether these species are threatened or not.

The list of nationally protected flora species (i.e. in mainland France) was laid down by the Order of January 20 1982, as amended by the Order of August 3 1995. It lists 402 fully protected species.

Two species of marine flora are also protected. Lastly, lists of regionally protected species have been established in most regions of mainland France in addition to the measures adopted nationally.

#### Number of protected flora species in mainland France

Nationally protected species	Number
Full protection	400
Partial protection	27
Protected marine species	2
Species protected at regional level	1 478
<b>Species protected at <i>département</i> level</b>	<b>26</b>

*Source* : IEGB/MNHN



Number of fauna species listed as protected fauna species in mainland France

Nationally protected species	Nombre
Molluscs	62
Crustaceans	4
Echinoderms	1
Insects	115
<b>Total number of vertebrates</b>	<b>182</b>
Cyclostomes and fish	24
Amphibians	32 (33)*
Reptiles	37 (40)*
Birds	251 (317)*
Mammals	71 (87)*
<b>Total number of vertebrates</b>	<b>415 (501)*</b>
Species protected at regional level	Number
Insects	104
<b>Total number of invertebrates</b>	<b>104</b>

\* The figures not in brackets refer to the total number of species excluding accidental species ; the figures in brackets include accidental species.

Source : IEGB/MNHN, May 1996.

#### Partial protection

Partial protection (under Article L. 212-1 of the Rural Code) entails submitting certain activities affecting the species requiring protection to prior authorisation by the administration, e.g. production, keeping and use. This system applies to 27 species.

#### Other partial protection systems

Some non-threatened fauna and game species that may be hunted are nevertheless protected by a ban on the sale thereof. This applies to species of birds, for which hunting is and will remain authorised, but which are protected from large-scale taking through this ban.

Lastly, certain species have a special status under which sale thereof is banned but the destruction and capture of individual specimens is authorised.

#### Prefectural regulations

In this case, the ban only concerns gathering and transfer (sale) of certain species included in a list established by Ministerial Order. The *département* Prefect (representative of the government in each of the 96 *départements* of mainland France) may thus prohibit or regulate, either on a permanent or temporary basis, the gathering and sale of these plants to ensure sustainable use thereof.

#### Penalties

Penalties are applied in the event of violation of the statutory protection described above.

Failure to comply with the provisions of the interministerial Orders establishing the list of fully or partially protected species (national or regional lists) constitutes a punishable offence under Article L. 215- 1 of the Rural Code. The offender may face a fine of up to FF 60 000 (this figure is double for a second offence) or be sentenced to up to six months in prison.

Violating a Prefectural Order that regulates the gathering of species makes the offender liable to penalties set for fourth degree **offences** i.e. a maximum fine of FF 5 000.

**European Community (EC) and international law on the  
conservation of natural areas and wild species of flora and fauna**

Two EC Directives and one Regulation (applicable in France) focus on the conservation of wild species :

**Directive no. 79/409/EEC** of April 2 1979 on the Conservation of Wild Birds, as last amended by Directive **94/24/EEC** of June 8 1994. It provides for the protection of habitats necessary for the reproduction and survival of bird species considered to be rare or threatened on a European scale. These birds are listed in Annex I of the Directive.

**Directive no. 92/43/EEC** of May 21 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora. This is a highly comprehensive legal instrument that aims to protect natural habitats, wildlife species and their habitats. The natural habitats and species whose habitats are threatened are listed in Annexes I and II of the Directive. In addition to species whose habitats must be protected, certain flora and fauna species listed in Annex IV are to be subject to strict protection.

**Regulation no. 338.97** of December 9 1996 aims to ensure the protection of wild fauna and flora species by regulating trade therein.

Several international conventions ratified by France focus on the protection of wild fauna and flora species and natural areas :

The **Bern Convention** of September 19 1979 on the Conservation of European Wildlife and Natural Habitats, ratified by France in 1989.

The **Bonn** Convention of June 23 1979 on the Conservation of Migratory Species of Wild Animals, ratified by France in 1989.

The **Washington Convention** of March 3 1973 on International Trade in Endangered Species (CITES), ratified by France in 1978. EC Regulation no. **338/97** ensures the implementation of the Convention in the European Community.

The **Ramsar Convention** of February 2 1971 on Wetlands of International Importance especially as Waterfowl Habitat, ratified by France in 1986. This requires Contracting Parties to designate at least one wetland of international importance in accordance with the criteria adopted by the Conference of the Parties in order to ensure conservation thereof.

## **11.2.2 MANAGEMENT AND RESTORATION AS ADDITIONAL TOOLS TO LEGISLATION**

Statutory protection is a vital tool in any fauna and flora conservation policy. However, on its own, it cannot reverse the decline of certain species or restore the populations thereof. It must go hand in hand with management and restoration action undertaken in the field. Strong emphasis must be placed on this in the future because, today, France has an almost complete set of legislation and regulations. Management and restoration are specified - depending on the species concerned - in two types of documents: action plans and conservation and/or restoration plans.

### **Action plans**

Action plans have been implemented by the Ministry of Environment since 1988. Since 1991 they have been renamed "biodiversity conservation action plans". They are defined by groups of species and are aimed primarily at ensuring general monitoring of the state (the concept of ecological monitoring) of certain protected or sensitive animal populations. They are also aimed at conducting a critical assessment of information and management measures already implemented.

Action plans have already been drawn up for each of the following groups of species : insects, reptiles amphibians, marine turtles, marine mammals, water birds and bats.

### **Restoration plans**

Based on the action plans and the findings that they show, it has been necessary to implement restoration or conservation plans on a species-by-species basis. The aim of these plans is, in the medium - or long - term, to maintain or even increase populations of particularly threatened animal species or populations for which a new rapid population growth poses threats to certain human activities. These plans set a target in terms of desired population levels with a view to achieving sustainable and balanced conservation of species and their immediate environment.

These plans lead to different types of concrete short-term action. This may focus directly on the species : operations to strengthen numbers, reintroduction operations, feeding operations, monitoring of breeding grounds (e.g. for all birds of prey), regulating authorised taking, adapting authorised hunting periods, hunting and trapping methods. For totally protected species, the action may focus on scare tactics, transfer operations and, as a last resort, the removal of individuals or the intentional reduction of their offspring.

The action may also focus on habitats through full or partial protection of the areas vital to a given species, reformulating or totally revising management methods for areas that have lost their initial carrying capacity, highly **localised** operations to avoid problems posed by linear infrastructure.

Technical specifications are written into each action plan and each conservation and/or restoration plan. These make it possible to determine the state of knowledge of species' populations and to ensure that the most vulnerable populations of each species or group of species are regularly monitored.

The Ministry of Environment has drawn up the technical specifications for existing action plans. Implementation is then immediate without any further regional or local consultation as these are national plans. Most of the conservation and/or restoration plans are drawn up by the specific Regional Office of the Environment (DIREN) concerned. In some cases, this heavily involves other local actors (regional, *département* and local authorities and NGOs).

### **The reintroduction of species**

For several years, the Ministry of Environment has been pursuing an active policy for the reintroduction of species.

The long-term objective is to restore the wildlife heritage of France, both in qualitative and, if possible, in quantitative terms, and to enable certain species to increase in number to a level suitable on a European scale, by reintroducing them into habitats from which they disappeared.

### **III.2.3 PLANT SPECIES MANAGEMENT : THE NETWORK OF NATIONAL BOTANICAL CONSERVATION AGENCIES (CBN)**

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The first national botanical conservation agencies (*conservatoires botaniques nationaux* or CBN) were set up in 1970 and formally established by Decree in 1988. The CBNs are scientific bodies - unique in the world -, approved by the Ministry of Environment, and specialised in the conservation of wild plants. Their task is threefold :

- to find out which plants are threatened and accurately locate them ;
- to ensure the conservation of these species in their natural habitat, protect them from becoming extinct by cultivating them and building up seed stocks ;
- to raise public awareness and education with a view to encouraging citizens to protect the flora heritage.

The current CBN network - five in mainland France and one on Reunion Island - covers half of France's land area. The objective is eventually to have 10 CBNs to cover the whole of mainland France and two for the overseas *départements*. Three new agencies are currently being set up (in the Paris basin, the Massif Central and the Pyrenees).

In addition, the CBN are responsible for the transfer of knowledge to actors involved in the management of the natural environment : *communes*, private landowners, *département* or regional administrative authorities, land management bodies, etc.

### **IJL2.4 EX SITU CONSERVATION : THE VITAL COMPLEMENTARY TOOL FOR THREATENED SPECIES**

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*Ex situ* conservation is today considered to be an integral part of any rare or threatened species conservation strategy. Its prime objective is to safeguard and constitute "spare copies" of the different naturally occurring populations of rare and threatened species. The gathering of living material from the wild which is intended for *ex situ* conservation must thus be carefully conducted and result in a sample whose biodiversity must be representative of that of the original population.

#### **The example of flora**

The aim of this type of conservation for flora is to safeguard enough significant "(potential) numbers" (in the form of seeds or pollen from complete individual *specimens* or meristems) i.e. a genuine stock of (genetic) variability.

This method of conservation thus requires painstaking and often sophisticated techniques for sorting out batches, packing the samples in sealed containers, for long-term storage, assessing biological diversity, studying *breeding* mechanisms and developing propagation methods.

One of the major advantages of *ex situ* conservation is the availability of the plant material it provides for carrying out action to strengthen populations, to reintroduce or introduce species. These operations are aimed at maintaining biological diversity in general and the variability of rare or threatened species in the wild.

The CBNs are the main actors involved in *ex situ* conservation of the flora heritage. (See also the genetic resources conservation strategy, chapter 5).

### III.3 ESTABLISHING A NETWORK OF PROTECTED AREAS THAT ARE REPRESENTATIVE OF BIODIVERSITY

#### 1113.1 PROTECTING AND MANAGING NATURAL AREAS : THE SPECIFIC CHARACTER OF THE FRENCH APPROACH

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For 150 years, France has been conducting a natural area conservation policy (Forest Code of 1827, 1930 Act on the Protection of Natural Monuments and Sites). However, only the “scientific, historic or legendary” aspects were taken into account. It was not until the early 1960s that the ecological aspect of protecting wild species and their habitats was acknowledged by law. There has thus been a gradual shift from a species-based policy to a policy giving priority to biotope protection.

Since 1960, when the National Parks Act was passed, France has developed an original policy based on an undertaking agreed jointly by landowners, local authorities and the State. In fact, unlike in other countries (particularly North America) where there are vast areas of publicly owned land, in France it has only been possible to introduce nature conservation into mainly privately owned land. Nature conservation thus requires consultation of the various public and private actors involved and minimum consensus among partners, even if it means providing tax breaks or special funding.

This approach can be seen in the regulations laid down on a case-by-case basis. It includes the introduction of strict protection which, because it runs counter to the free use of areas thus protected, can only be imposed after an in-depth public enquiry. It entails delegating the management of protected natural areas to local bodies (public bodies, local authorities or NGOs, etc.) and adopting contract-based measures (voluntary nature reserves, regional nature parks, agri-environmental measures, charters, etc.).

In addition, since 1976, the natural area conservation agencies have established land acquisition and land use rights programmes with support from the government, local authorities and the general public.

Outside areas afforded strict protection, while protecting the environment, it is also important to consider the natural heritage as a positive component that can encourage economic development of the area concerned. This is particularly true for regional nature parks but also wherever a similar approach seems possible.

#### III.3.2 STATUTORY PROTECTION OF VARYING DEGREES

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In general, protection measures are adapted to the objectives and threats to the areas concerned.

Firstly, it is necessary to identify and list State-owned land that is managed with a view to biodiversity conservation. This includes all the land owned by the National Coast and Lakeshore Conservation Agency (CELRL), State biological reserves and forest reserves within forests managed by the National Forestry Office (ONF). It also includes land owned by the Regional Natural Area Conservation Agencies (*Conservatoires régionaux des espaces naturels* or CREN) generally purchased with government or EC support.

Secondly, it is necessary to identify and list areas that are subject to regulations which restrict human activities in order to safeguard biological diversity. There are mainly the core areas of national parks, nature reserves, protected forests (*forêts de protection*), voluntary nature reserves and national game reserves.

It is then possible to take into account the areas of land where building is not permitted except with ministerial authorisation (sites designated for strict protection - sites *classés*) and land where restrictions on alteration thereof are imposed (biotope protection orders - *arrêté de biotopes*).

The first two categories cover 1.2 % of the total land area in mainland France. The three categories taken together cover 2.3 %.

Other areas are subject to a more flexible form of protection as long as current management methods used thereon pose little threat to biological diversity. These are areas within regional nature parks, peripheral

areas of national parks and a large proportion of the forests managed by the ONF. All these areas taken together cover around 15 % of the total land area.

Site managers accompany their biodiversity conservation measures with an active public awareness-raising and education policy. Areas under strict protection (the first and second categories) constitute reference areas where management methods and information campaigns are tested for subsequent application in the whole of France.

#### The main types of protected areas in mainland France\*

	Number	Area (ha)	% of total land area
National parks	6	353 865	0.65
Core area	6	905 022	1.66
peripheral area			
Nature reserves	122	131418	0.24
Voluntary nature reserves	98	10 842	0.02
State <b>biological</b> reserves	139	15 000	0.03
Regional <b>nature</b> parks	31	5 015 302	9.22
Sites designated for strict protection	2 583	/	/
Biotope protection orders	430	107 120	0.19
Land acquired by the CELRL	322	44 142	0.08
Sites managed by the CREN **	651	17 167	0.03

(\*) Categories covering more than 10 000 ha.

(\*\*) Source : *Espaces naturels* de France (1995).  
Data. at July 1 1996

Source : -SPN-IEGB/MNHN and Ministry of Environment (DNP).

#### The main international commitments concerning the conservation of natural areas (mainland France)

	Number	Area (ha)	% of total land area
<b>SPAs</b> (EC Birds Directive)	103	730 502	1.34
<b>Ramsar</b> sites	14	662 035	1.22
Biosphere Reserves (MAB programme)	6	507 650	0.93
Biogenetic reserves (Council of Europe)	34	42 438	0.08

Data at July1 1996

Source : -SPN-IEGB/MNHN and Ministry of Environment (DNP).

### 111.3.3 THE LEGISLATIVE FRAMEWORK AND THE ROLE OF THE AUTHORITIES

The legislative framework which covers the conservation of natural areas lays down both the degree of recognition of natural heritage diversity and the responsibilities of the authorities that are in charge of implementing the legislation. As France is a Member State of the European Union (EU), protected areas may be identified and designated at three levels (EU, national and local levels). Furthermore, France places the action it undertakes within a broader international context i.e. as part of the policies of the Council of Europe, the United Nations and UNESCO (Paris Convention : World Heritage Sites, MAB Programme : biosphere reserves).

#### **European Community (EC) legislation**

EC Directive no. 79/409/EEC of April 2 1979 on the Conservation of Wild Birds was the first EC piece of nature conservation legislation to be adopted. All the Important Areas for the Conservation of Birds (ZICO) were identified and listed. It is the State's responsibility to transform these guidelines into long-term protection measures, either through legal or contractual measures, particularly by designating certain areas as Special Protection Areas (SPAs).

The same is true for Directive no. 92/43 of May 21 1992, which aims to « contribute to ensuring biodiversity through the conservation of natural habitats and of wild fauna and flora... ».

The Directive aims to conserve natural habitats and habitats of species of Community importance so that they may form a coherent European environmental network of Special Areas of Conservation (SACs) known as "NATURA 2000".

Developments in Community policy, especially agricultural policy (agri-environmental measures, reform of the Common Agricultural Policy (CAP), reform of the Structural Funds), also have a decisive effect. For example, agri-environmental measures designed to reconcile agricultural production with environmental protection are implemented on around six million hectares of grasslands.

#### **Legislation concerning areas of national interest and State responsibilities**

Under French legislation, for many years, the State has had special responsibilities and has been able to make use of instruments for the conservation of natural areas that go beyond common law.

Under the Act of May 2 1930 on the Protection of Natural Monuments and Sites and legislation on State-owned forests, several nature conservation measures have been adopted.

Today, legislation on the conservation of natural areas of national interest focuses on :

- national parks (Act of July 22 1960) ;
- the National Coast and Lakeshore Conservation Agency (CELRL, Act of July 10 1975) ;
- nature reserves ;
- biotope protection orders adopted by Prefects.

These measures are grouped together in the new Part II of the Rural Code (*Code Rural*).

The Mountain and Coast Acts (respectively no. 85-30 of January 9 1985 and no. 86-2 of January 3 1986) also set targets and establish specific procedures that affect certain aspects of the natural environment.

Areas mainly protected by the State for the purpose of nature conservation thus cover a small surface area (all the strict protection measures managed by the State cover less than 1% of the total land area of France), because considerable precautions are taken so as not to arbitrarily infringe ownership rights (various forms of consultation, public enquiries, etc.).

Two items of legislation have since been added to the aforementioned legislation : the Landscape Protection and Enhancement Act no. 93-24 of January 8 1993 and Act no. 95-101 of February 2 1995 on the Reinforcement of Environmental Protection.

## Instruments for the acquisition of land rights

The acquisition of land rights, via public ownership of the land concerned, is justified for areas of great biological value requiring a high level of protection and very specific management. Outside publicly-owned forests, these land rights have been made use of most notably by the CELRL in coastal areas. Over the last 20 years, this body has acquired almost 45 000 ha (5.50 km) of coastline in mainland France. Once this land is acquired, it is considered as the CELRL's own specific land and the rights are practically inalienable. Land has also been acquired in the overseas *départements* (DOMs).

Elsewhere, the acquisition of land rights is guaranteed by means of the Regional Natural Area Conservation Agencies (*conservatoires régionaux d'espaces naturels*). These are non profit-making bodies responsible for monitoring the land use rights of 17 000 ha, particularly in northeastern France. All these approaches are increasingly coordinated between the *départements* which, through the Sensitive Natural Area Tax (*taxe d'espaces naturels sensibles*), now have considerable funding at their disposal.

## The role of regional, *département* and local authorities

Subnational authorities have considerable possibilities to take action for the conservation of natural areas : town planning documents for *communes*, sensitive area policy for *départements*, etc. Certain regions have introduced financial or technical incentives for environmental protection through Regional Environment Agencies. In most regions, these agencies already exist or are currently being set up.

One of the main instruments that may be used by subnational authorities for the protection of natural areas remains the regional nature park (*parc naturel régional* or PNR). They were formally established by a Decree of March 1 1967 and they were given a legal and regulatory basis under the Landscape Protection and Enhancement Act of January 8 1993 and the Act of February 2 1995 on the Reinforcement of Environmental Protection.

The original feature of these parks lies in the fact that land on which areas of national interest are thus designated by the State, following a proposal by local authorities. The arrangement is formalised on the basis of a contract (the charter). There are currently 32 regional nature parks (including one in the DOM) covering a total of 50 150 km<sup>2</sup> in mainland France and 700 km<sup>2</sup> in the DOMs.

\* \* \*



## **CHAPTER IV : BIODIVERSITY CONSERVATION IN FARMING AND FORESTRY ACTIVITIES AND IN THE AQUATIC ENVIRONMENT**

In France, one of the main reasons for agriculture and forests being important factors for the conservation of biological diversity in France is that these two land use types cover over 80 % of the total land area. Agriculture covers 30 million hectares and forests 15 million out of a total surface area of 55 million hectares in mainland France. Farmland breaks down into two-thirds arable land and one third permanent grassland.

There is high biological diversity in the aquatic environment and it plays a vital role in the balance of water systems. This diversity is due to the different types of aquatic environment occurring in France. The total river network is 270 000 km long in mainland France. This network has highly diversified hydrogeological characteristics both in time and in space. The aquatic environment also includes numerous types of wetlands (river valleys, deep natural lakes, deep artificial lakes, natural and artificial ponds, coastal ponds, peatbogs and wet heathlands, estuaries and deltas, etc.).

For a long time, agricultural activities were carried out in relative harmony with the natural environment. The accelerated intensification of farming practices, the ever greater use of machinery and chemicals, particularly since the Second World War, the upheavals due to the transformation of land for cash crop growing and land consolidation operations have all put significant pressures on the environment and on biological diversity.

Conversely, human pressures (large-scale and selective felling) were considerable until the early 19th century. As a result of intensification of farming (as mentioned above) and the spectacular increase in farm yields, land has been “freed” from agricultural use. This has led to an expansion of forests. Moreover, the use of new energy sources (coal, oil and nuclear power) resulted in a decline of felling activities in many forests. This enabled them to regenerate themselves to a level close to their natural dynamics while meeting the new demands of industry (timber for producing frames, furniture and fittings, timber for producing industrial wood products). Although some species are managed intensively, management of French forests has always been carried out with long-term conservation of the resource in mind.

Recent developments, both in agriculture and forest management, today attest to a greater concern for reconciling these activities with protection of the environment and conservation of biological diversity, including the conservation of genetic resources [see chapter V].

In addition, under the 1992 Water Act, conservation of biological diversity has been strengthened in recent years to form an integral part of management policies for the aquatic environment.

### **IV.1 BIOLOGICAL DIVERSITY AND AGRICULTURE**

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Neither the quality of natural areas and landscapes nor the conservation of biological diversity can be envisaged without taking into account current agronomic and farming practices.

## The relationship between agriculture and environment

Agriculture and environment are largely interdependent. Like other human activities, agriculture has an influence on the environment but the environment has a much greater influence on agriculture than on other economic activities.

Consequently, for centuries, agriculture has traditionally contributed to shaping the landscape, the environment and its biological diversity in France. As a result, in many cases, rural landscapes and the habitats of certain species can today only be protected by maintaining and managing farming activities. Similarly, animal and arable farming have created numerous breeds and crop varieties that should be maintained as they are now also part of our natural heritage.

Agriculture is largely dependent on the availability of natural resources and the quality thereof. It is thus in the interest of agriculture that the natural resources be maintained.

However, agriculture has altered the natural environment, sometimes with adverse effects. Intensive agriculture has had a considerable impact thereon through pollution of the aquatic environment and soil or through the loss of ecosystems – hedgerows, copses, etc. as a result of land consolidation operations.

The role of agriculture in the conservation and management of biological diversity must also be placed in the context of the world challenge to feed the planet in the 21st century. Farmers are thus at the heart of an issue which has contradictory dimensions in technical, economic, sociological and political terms. This makes agricultural management an increasingly complex matter.

## Agriculture, land use and conservation of natural resources

Over 50% of the land area of France is devoted to agriculture and the **agri-food** business. A number of trends can be seen from land use changes over the last 100 years :

- there has been a 50 % reduction in the area of non cultivated farmland between 1840 and 1960. Since 1980, it has **levelled** off at around three million ha ;
- there was a constant decline in arable land from the early 19th century until 1940. Since 1960, this has **levelled** off at around 18.3 million ha.

France has vast seaboard (Atlantic Ocean, North Sea and Mediterranean Sea). This results in a temperate climate which is highly suitable for agriculture : ocean climate in the West and North. a semi-continental climate in the East and a Mediterranean climate in the South.

There is a great variety of soils in France mainly as a result of the country's geological and climate diversity. The physical and chemical quality of soil is partly the reason for the differing natural regions that can be found in the country today. In the course of history, this soil quality determined the land use type specific to each region. However, land use has constantly evolved through man's action.

During the second half of the 20th century, considerable changes to the land such as drainage and land consolidation occurred as a result of developments in agriculture. Since the early 19th century, the area covered by forests has increased because marginal areas were reforested. On cultivated land, fertilisation has generally helped to ease the problem of natural impoverishment of soils.

Land use in France (1950-1995)

unit: thousand hectares

	1950	1980	1995
<b>Agricultural land</b>	33 465	31 744	30 075
- arable land	18 573	17 169	18 341
- land under permanent grass	12 279	12 850	10 551
- vineyards, orchards	2 049	1 422	1 183
<b>Non cultivated agricultural land</b>	5 687	2 757	3 018
<b>Forests</b>	11 301	14 615	15 043
<b>Non agricultural land</b>	4 466	5 803	6 647
<b>Total</b>	54 919	54 919	54 919

Source : SCEES.

Beyond its function to produce food, agriculture plays a social and ecological role in land use. In less favoured mountain and rural areas, the presence of farming helps to maintain landscapes that are open and shaped by man. In Mediterranean areas, the presence of farming is vital to help control forest fires. Lastly, farming as a land use type is a highly decisive factor for maintaining certain bird and animal species.

Agriculture is thus no longer only perceived as a provider of market goods. It increasingly appears as an integral part of the natural heritage and therefore must contribute to conserving the components of this heritage.

The development of sustainable agriculture will thus come about as a result of agricultural and environmental policies converging. On this point, the beginnings of a change can be seen in the reform of the Common Agricultural Policy, particularly with national agri-environmental programmes that began in 1993.

**The reform of the EC Common Agricultural Policy (CAP) and agri-environmental measures**

The relationship between agriculture and environment has changed considerably in recent years as a result of both a broader awareness of environmental issues and the CAP reform adopted on May 2 1 1992. The reason for the CAP reform was not merely to protect the environment. It may even be a cause for concern if controlling production goes hand in hand with making it more concentrated on the land. Consequently, measures on the joint organisation of markets have been supplemented by EC Regulation no. 2078/92/EEC on agri-environmental measures.

This Regulation focuses on agricultural production methods that are compatible with environmental protection requirements, conservation of biodiversity and maintaining natural areas. To this end, it establishes a Community aid scheme with up to 75 % EC funding in regions whose development is lagging behind and 50% in other regions.

The Regulation has three aims : to accompany the changes to be introduced under the rules governing the joint organisation of markets, to comply with the agricultural and environmental policies and to provide an appropriate income for farmers.

Under the **scheme**, seven types of commitments by farmers are supported :

- encouraging local endangered domestic breeds to be maintained ;
- reducing the use and impact of pollutants ;
- encouraging extensification of animal and arable farming ;
- protecting and enhancing landscapes, natural resources, soils and genetic diversity ;
- maintaining abandoned farmland or forest lands to prevent risks ;
- taking farmland out of production in the long term i.e. for over 20 years with a view to protecting the natural environment ;
- helping farmers to convert to organic farming.

Implementation of this EC Regulation is based on two mechanisms :

- a national programme concerning the premium to maintain extensive livestock farming (grassland premium) ;
- regional agri-environmental programmes.

### **The grassland premium and protection of endangered breeds**

The grassland premium is primarily a support system for a relatively disadvantaged sector, particularly after the fall in grain prices which has been beneficial to intensive livestock farming. It is designed to provide financial compensation for farmers to maintain the landscape by carrying out extensive livestock farming on a permanent basis on around 50 % of land permanently under grass.

The grassland premium was introduced in 1993 and was maintained in 1995 for farmers who comply with an undertaking to maintain their extensive livestock farming system and the area covered by the grassland premium. Recently established livestock farmers have also been eligible for payments. Almost 110 000 livestock farmers receive this support and almost six million hectares of grassland – mainly located in eastern, central and southern France – are maintained through the premium.

Protection of threatened species has been implemented for beef cattle, sheep and goats. This was extended to include horses in 1996. Applications accepted at June 30 1996 covered 364 500 ha. This programme will continue depending on available budgetary resources.

### **Regional agrisvIRONMENTAL programmes**

Regional programmes are implemented using nine sets of national terms of reference for measures that are drawn up within the general regulatory framework and through local operations.

#### Prevention and reduction of pollution from agricultural sources

This strand of the policy includes several measures or programmes.

The aim of the two measures to reduce inputs (nitrates, pesticides) is to protect groundwater boreholes and covered 3 1 000 ha at June 30 1996. There are significant regional variations.

The Wise Fertilisation programme (*programme Fertimieux*) is based on a voluntary, joint and preventive approach by farmers to alter fertilisation methods in order to limit water pollution by nitrates. 52 operations have been approved under this scheme and they cover 1.2 million hectares. 22 000 farmers in 46 *départements* are involved.

The programme to control pollution from agricultural sources (PMPOA) is a mechanism to upgrade animal housing to make it comply with legal requirements. It is also designed to manage animal slurry with a view to reducing water pollution. The programme primarily concerns the major livestock farms. The Chambers of Agriculture conduct half of the assessments on animal housing and slurry spreading methods.

Managing the use of sewage sludge and other waste in agriculture is becoming an increasingly important issue since half of the quantity of sludge from waste water treatment plants and part of the waste from the agri-food business is used in agriculture (spread on crops). At local and national level, work has begun to revise the regulations and methods in order to ensure soil protection and guarantee the quality of farm produce as well as to tighten food safety standards.

#### Management of the natural environment

This area of action covers various types of programmes.

5 000 ha of arable land and, since July 1996, intensive pasturelands have been reconverted into extensive grasslands. This has contributed to protecting groundwater boreholes and rivers and controlling erosion, similarly to one of the two measures adopted for taking farmland out of production on a long-term basis (20 years). The aim of the latter measure is to protect and manage flora and fauna.

26 000 ha of farmland have been converted to organic farming.

The stocking density of cattle and sheep is reduced for the purpose of extensification by enlarging farms and controlling the effects of abandoned farmland (13 000 units at June 30 1996). Protection of these breeds helped 9 000 units.

The aim of sustainable development plans (PDD), introduced in 1992, is to promote the development of integrated farming systems. To date, some 60 experimental sites have been set up nationwide. More than 1 200 farmers are involved in 300 operations focusing on managing land, farm tourism, supply of rented accommodation in rural areas and changing production methods by taking environmental protection into account.

#### Local operations

Alongside the aforementioned general measures, 217 local and regional operations have been implemented. They cover 303 000 ha (at June 30 1996). Following on from Article 19 of EC Regulation no 797/85 and the environmental joint land management operations (*OGAF environnement*) implemented in France as of 1989, local operations concern specifically defined areas with considerable environmental assets and include a set of measures adapted to the priority objectives for action. The measures are aimed at conserving or enhancing landscape or water quality, protecting species or biotopes and controlling natural risks.

#### **Other provisions for farmland management**

Under the Nature Conservation Act of July 10 1976, its implementing decree of October 10 1977 and the Decree of February 25 1993, an in-depth environmental impact assessment is required before any operation to consolidate farmland may be carried out. This provision was strengthened between 1992 and 1996 to make it into a management tool for environmental protection.

Legislation on the protected areas around groundwater boreholes and the 1976 Act on Installations Classified for Environmental Protection Purposes are also tools for preventing localised, point sources of pollution. The EC Directive on the Protection of Waters against Pollution caused by Nitrates was transposed into French law by the Decree of August 27 1993 under the Water Act of January 3 1992.

Lastly, economic accompanying measures are implemented to facilitate the upgrading of farming methods. The required investments are financed by farmers (one third of the total amount), the State and local authorities (one third) under the State-Region Planning Contracts and by the Water Agencies (the remaining third).

## **IV.2 BIOLOGICAL DIVERSITY AND FOREST MANAGEMENT**

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Forests play a key role in biological diversity because of the vast area they cover (over 1.5 million ha in Europe), because of species and ecosystem diversity, but especially since there is very little man-made land in forested areas. France can also be considered as one of the regions in the world where very old forest management methods are practised so that today no forest in the country can be qualified as totally virgin.

The complementary character of the various functions of the forest can thus be seen through centuries-old practices. This balance has become the best way of ensuring that forests continue to occur. Vast areas of forest are of economic and social interest and this has kept them from destruction whereas management practices were inspired by natural processes. This approach remains topical since renewed attention has focused on conservation of biological diversity.

French policy includes measures aimed at protecting representative or endangered individual forests, ecotypes, species, ecosystems, ecosystem patchworks or outstanding landscapes by means of management that will ensure their long term survival.

The aim is to ensure both conservation of ecological diversity at the present time and forest capacity to adapt to new constraints. This is why a coherent approach was developed at infra-species, species, ecosystem and landscape levels.

### **Infra-species level**

Following on from discussions begun in the **1980s** in France and the international commitments resulting from the S2 Resolution adopted at the Strasbourg Conference (1990), the Ministry of Agriculture formally outlined the policy for conservation of forest genetic resources in a Circular issued on September 9 1991. In 1992, the aforementioned Ministry established a national technical committee for the conservation of forest genetic resources.

In addition to the species covered by the European working groups from the Strasbourg Conference (spruce, holm oak, black poplar and valuable broadleaved species), national priority in France was first given to the silver fir, beech and the common elm.

The silver fir (*Abies alba*) and the common beech (*Fagus sylvatica*) are included in a network of in situ genetic reserves in publicly-owned forests. A static ex situ genetic resources conservation agency for the elm (mainly for the common elm, *Ulmus campestris*) has been set up. For the wild cherry tree, in addition to static ex situ conservation, two strips of land for dynamic in situ conservation purposes have been established in the regions of Brittany and Midi-Pyrénées.

Other conservation networks will soon be set up for the great European oaks (*Quercus robur*, *Quercus petraea*, and to a lesser extent, *Quercus pubescens*), the common spruce (*Picea abies*), the black poplar (*Populus nigra*), the maritime pine (*Pinus pinaster*) and the service tree (*Sorbus spp.*).

The next set of priorities will focus on the great social species i.e. those that are the subject of large-scale improvement programmes as well as rare and threatened species. The conservation of genetic resources of lower species that are not included on the endangered species list will have to be considered through the conservation policy of certain outstanding ecosystems that are representative or threatened.

Alongside this, an exhaustive survey of ex situ conserved forest genetic resources in French collections is well underway. The first volume focusing on conifers was published in 1987 and the second volume dealing with broadleaved species is currently in preparation. In total, 70 species will have been identified and listed, with around 32 000 genetic entities for conifers and almost 20 000 for the broadleaved species.

### **Species level**

Conservation of species diversity is a central component of the general framework of biodiversity conservation. Moreover, historically speaking, it is the first component of biodiversity to have been the subject of legislative measures, firstly as a result of legislation on hunting, and subsequently through implementation of the 1976 Nature Conservation Act. Under the latter, measures for protecting the areas concerned were adopted as were mechanisms to protect flora and fauna [see chapter III]. The “protected species” status has been given to numerous forest species whether they be fauna or flora, except for woody species (white elm, Fontainebleau service tree).

Under the 1976 Act, picking certain forest plants (fungi, berries and flowers) is subject to prior authorisation in a number of *départements*. Breeding specimens of wild animal species is also regulated with a view to controlling the breeding of animals intended for subsequent release into the wild. In addition, special forest guidelines (directives) have been adopted for publicly-owned forests that constitute habitat for the bear and the capercaillie.

Integrating the conservation of species diversity into forest management has begun and will be developed in the future on the basis of the surveys carried out as part of the implementation process of the 1992 EC Habitats Directive.

Lastly, certain forest species that are today considered as exotic belong to botanical genera that occurred in France up until the last great ice age (i.e. some 18 000 years ago). If they are of a specific economic interest, introducing them in a wise way may increase biological diversity as long as it is carried out cautiously and methodically without causing damage to ecosystems or endangered native species.

## Ecosystem level

Under the Convention on Biological Diversity, the Ministry of Agriculture has endeavoured to build on the previous approaches to biological diversity at infra-species and species levels by addressing the ecosystem level. To this end, the Circular of January 28 1993 was issued. It lays down national policy for integrating biodiversity in forest management.

This Circular issues a reminder that responsibilities of the forest policy-maker include (i) the size of strips of forest that must take into account the range of variation of the site, (ii) maintaining species naturally associated with the main tree species and (iii) the choice of management methods that interact with habitat diversity and the heterogenous structure of forest stands. The Circular also sets out the framework in which action undertaken by the State that may have an impact on biological diversity in forests must be implemented at the different administrative echelons concerned. To this end, it reinforces the role of the Regional Forest and Forest Products Commissions (**Commissions régionales de la forêt et des produits forestiers**), in charge of conducting the necessary studies and organising the necessary discussions. Under this approach, the major challenges of conservation and management of biological diversity in forests fall within the remit of local authorities and national responsibility is generally confined to laying down principles for subsequent implementation by local actors.

In 1993, the National Forestry Office (ONF) published guidelines for integrating biological diversity into the development and management of publicly-owned forests. These guidelines refer to the definition of basic management units, mixing the tree species, not removing ageing or dead trees, hollow trees, maintaining clearings, how to deal with forest edges, etc. The ONF has begun to draw up a scientific assessment of its policy of voluntary designation of State biological reserves (**réserves biologiques domaniales**), emphasising the quality of the management specifications for these reserves. Continual progress in understanding how forest ecosystems function and research on methods for assessing biological diversity in space and time should enable forestry practices to be gradually adapted to the objectives for conservation of the natural diversity of forests.

## Landscape level

France is a major biogeographical crossroads with a wide variety of landscapes. Woodlands cover 29 % of the total land area and as a result, they play a vital role, particularly in certain regions or upland areas.

Several forests are designated as outstanding and particularly sensitive landscapes and thus are afforded protection under the Act of May 2 1930 on the Protection of Natural Monuments and Sites. The aim is therefore to protect the environment and the landscapes in sites of artistic, historic, scientific, legendary or aesthetic interest by placing restrictions on activities that may alter or destroy the state or the appearance of the site or, if necessary by placing a total ban thereon.

In most cases, however, legislation or regulations that aim to protect the aesthetic quality of landscapes are directed mainly at controlling procedures for land use planning and development. This is the aim of the afforestation regulations that seek to establish a balance between agricultural and forest land, as well as the land use plans (POS). Beyond the potential ways of urbanising the land, the POS define the natural areas subject to specific management provisions. The Landscape Protection and Enhancement Directives (**directives de protection et de mise en valeur des paysages**) provided for under the Landscape Protection and Enhancement Act of January 8 1993, lay down basic guidelines and principles for protecting landscape “structures”. Town planning documents are now required to follow these guidelines and principles.

At the Ministry of Agriculture’s request, two manuals containing recommendations for taking the landscape into account in reforestation operations and forest management were published by the French Research Institute for Agricultural and Environmental Engineering (CEMAGREF) during the 1980s. In addition, following a period in which hedgerows and coppices were removed excessively as part of private or joint land consolidation operations, renewed attention is focusing on hedgerows and other linear wooded formations amounting to a total length of almost 850 000 km. These plant formations of human origin play a significant ecological role in conserving biological diversity by acting as “corridors” between larger wooded formations.

Today, in publicly-owned forests, forest planning documents increasingly take into account landscape concerns. On the basis of regional forest guidelines integrating the landscape dimension and an accurate analysis of the assets of the forests in question, they lay down mid- to long-term methods for coherent land management, reconciling production with natural environment and landscape conservation objectives.

### **IV.3 BIOLOGICAL DIVERSITY AND MANAGEMENT OF THE AQUATIC ENVIRONMENT**

#### **The Water Act of January 3 1992**

The 1992 Water Act (Act no 92-3 of January 3 1992) considerably strengthened the approach whereby biodiversity conservation is taken into account in managing the aquatic environment. This Act states that “water is part of the nation’s common heritage” and has a twofold objective : the qualitative and quantitative protection of water and the aquatic environment as well as its development as an economic resource.

The long-term aquatic environment conservation objective is vital for the biological resources of this type of environment. Under the Act, this objective is implemented through two instruments : Water Development and Management Master Plans (*schémas directeurs d'aménagement et de gestion des eaux* or SDAGE) and Water Development and Management Plans (*schémas d'aménagement et de gestion des eaux* or SAGE). These instruments are drawn up by representatives of all the actors concerned (State, authorities at regional, *département* and local levels, industry, users, environment NGOs, etc.).

These instruments are central to the overall approach to managing the aquatic environment. The SDAGE are adopted at the level of France’s six major river basins and the SAGE are adopted at the level of smaller river basins or homogeneous hydrographic units. These plans include an account of the state of the resource and the environment with regard to conservation of biological resources. They identify the use of the resources and the pressures brought to bear thereon. They also set priorities to be followed for the conservation of the environment and its biological diversity. In addition, the plans are tools for directly assisting decision-making in matters of water resource development or authorisation for use there of.

The 1992 Water Act has also resulted in renewed national efforts for water pollution control, following the guidelines set in EC policy and Directives. Other programmes contributing to the conservation of biological diversity in the aquatic environment should be mentioned : theme-based policies (the national wetlands action plan [see chapter VI]), localised contract-based action, particularly river contracts (*contrats de rivières*) or urban area contracts (*contrats d'agglomérations*) which involve local partners (mainly local authorities and the Water Agencies) in a concerted action programme.

This approach to managing the aquatic environment adopted in mainland France also applies to the overseas *départements*.

#### **The Wetlands Action Plan**

An assessment conducted between 1992 and 1994 of the impact of public policies on wetlands showed that there has been a continual, sharp decline in these areas for several decades.

On the basis of this account, the Cabinet Meeting (Council of Ministers) of March 22 1995 decided to launch a wetlands action plan. The aim of the plan is to reverse the current trend in the decline in the area covered by wetlands and to encourage the restoration of a network of wetland sites of national interest.

There are four major thrusts to the plan, as follows :

- identify and list wetlands and reinforce monitoring tools,
- ensure that public policies affecting these areas are coherent,
- begin restoring wetlands,
- launch an awareness-raising, information and training programme.

Under the Action Plan, a monitoring centre (*observatoire*) and an interdisciplinary research centre on wetlands within the Water Systems Public Interest Group (*GZP Hydrosystèmes*) [see chapter VI] are to be set up.



## CHAPTER V :

### THE CONSERVATION OF GENETIC RESOURCES

For thousands of years, animal and plant species and their accompanying microorganisms have been dispersed **naturally** or through man's action well beyond the sites where they originally occurred. These species have undergone the effects of genetic mutation and selection and have adapted themselves to highly varied types of environment. This has led to great genetic diversity.

Genetic diversity has considerably evolved over the course of time as a result of the pressure exerted by natural selection and since the appearance of the human race. It is vital both for maintaining the adaptive capacity of the different species and for meeting the future (but hitherto unforeseeable) needs of agriculture, industry and medicine.

Today, the dangers of excessive genetic uniformity of production and the need for infra-species genetic diversity (the only way to maintain species' capacity to evolve) are clearly recognised. Using a greater diversity to create varieties appears a necessity and should enable man's future needs to be covered. Today, however, these needs are difficult to predict. It is important therefore to reason in terms of building up and sustainably managing a genetic pool based on current biological knowledge and on all the resource management technologies available today.

In addition to these considerations with regard to the future needs of the agri-food and industry sectors, it is important to bear in mind the socio-cultural dimension of genetic resources, the diversity of which is closely linked to that of our cultures, lifestyles and landscapes. However, it is difficult to quantify the heritage value of the latter,

#### **Genetic resources : a political and economic issue**

France has long been aware of the interest and the need to conserve genetic resources of interest to the agri-food industry. France has adopted or signed several international conventions or undertakings aimed at ensuring the long-term conservation of these resources.

In 1984, France adopted the International Undertaking on Plant Genetic Resources proposed by the United Nations Food and Agricultural Organization (**FAO**), subject to the rights of obtainers being recognised. This was achieved in 1991 with the recognition of farmers' rights. On July 1 1994, France ratified the Convention on Biological Diversity signed at the Rio Earth Summit in 1992. Since 1995, France has been actively involved in revising the FAO International Undertaking to bring it into compliance with the Convention. on Biological Diversity.

In 1995, France undertook to participate in the **FAO's** World Programme for the Conservation of the Genetic Diversity of Farm Animals and France has temporarily been assigned the task of being regional focal point for Europe (1997-1998).

Lastly, in **1996**, France adopted the FAO World Action Plan on Phylogenetic Resources. In doing, France has undertaken to encourage the development of concrete action to conserve, **characterise**, assess and use genetic resources but also to promote research, training and technology transfer in these fields at national and international levels and that of major world regions.

**The Genetic Resources Office**  
**(Bureau des ressources génétiques or BRG)**

The Genetic Resources Office (BRG) is France's national coordinating body for the conservation of genetic resources of animals, plants and microorganisms. It was established in 1983 by the Ministry of Research and became a Scientific Interest Group (GIS) in 1993. Today, the BRG brings together :

- the Ministry of Research,
- the Ministry of Agriculture,
- the Ministry of Environment,
- the Ministry of Industry,
- the Ministry of Overseas Co-operation,
- the Ministry for Overseas,
- the International Centre for Co-operation on Agronomic Research for Overseas Development (CIRAD),
- the National Centre for Scientific Research (CNRS),
- the Varieties and Seeds Study and Monitoring Group (GEVES).
- the National Institute for Agronomic Research (INRA),
- the National Natural History Museum (MNHN),
- the French Institute for Scientific Research in Overseas Development and Co-operation (ORSTOM),

The BRG has an interministerial Higher Steering Committee and a Board responsible for setting the main framework for action. In addition, a scientific committee is in charge of implementing this.

**Tasks**

The BRG focuses on animal, plant and plant species and microorganisms. Its tasks are to :

- organise dialogue, harmonise and coordinate national initiatives on the conservation of genetic resources,
- promote research and transfer of knowledge and results by information campaigns and training programmes,
- represent France in a scientific capacity in European and international institutions, bodies and organisations.

**Activities**

• At national level, the BRG is represented in many scientific and technical bodies. Within its sphere of activities, it is involved in their work projects. It is an important partner of all the actors who are involved in the conservation and enhancement of genetic resources : selectors, NGOs, protected areas, conservation agencies. With these actors, it has drawn up a National Charter for the Conservation of Genetic Resources.

• The BRG supports research on genetic resources, organises symposia and produces specialised publications. It takes part in and contributes to preparing training sessions. It produces and distributes a quarterly newsletter.

• The BRG represents France at the International Plant Genetic Resources Institute (IPRGI) within European programmes on farm and forest species. It is France's appointed representative at :

- the European Union for action on genetic resources,
- the FAO within the Plant Genetic Commission for Agriculture and Food and action programmes on animal and plant resources.

It participates in national and international meetings on biological diversity.

## The National Charter for the Conservation of Genetic Animal, Plant and Microorganism Resources, drawn up by France in 1997

For some 20 years, measures have been implemented at national and international levels in order to conserve genetic diversity of domesticated species or species in the process of being domesticated. These measures must be continued, strengthened and extended. Furthermore, coherence in different action undertaken must be improved.

In 1994, the BRG decided to begin raising the awareness of those in the agricultural sector and, more widely, the different actors in France involved in the management of genetic animal, plant and microorganism resources - whether they be in the private or public sector or NGOs. It has called upon several actors to draft the framework for a National Charter for the conservation of genetic resources drawing on existing initiatives. As a result, it was possible to compile an assessment of current activities, to draw attention to possible weaknesses and missing information but also to specify the additional strategies to be implemented. The work was carried out bearing in mind France's international commitments in this field both in political and technical co-operation terms.

The Charter leads to an assessment and identifies the prospects that are needed to implement a genuine genetic resources management strategy, including the demand for research. There will also be an analysis of the demand for academic and professional training with a view to ensuring sustained national momentum in the field of genetic resources.

Under the National Charter, the areas covered are species of agricultural, industrial, economic, scientific and social interest that are managed and used by man. The Charter is concerned with genetic diversity of domesticated species or species in the process of being domesticated, with that of their pathogens and symbionts as well as that of their wild relatives.

The National Charter has ensured sound links between some of the aspects of the conservation of genetic resources and the various national programmes aimed at improving knowledge and the conservation of biodiversity. The boundaries are actually not easy to identify, particularly since the genetic dimension is a vital component of biological diversity. This is particularly true for all the approaches linked to the conservation of genetic resources in the natural environment (in situ management of forest species, management of naturally occurring populations of wild animal species partially used by man and above all an *in situ* survey and characteristic description of microorganism diversity).

## V.1 ANIMAL GENETIC RESOURCES

Animals can be grouped into three broad categories within which action is based on the same principles :

- domesticated species that man selects and that are bred in an enclosed environment ; the available variability is essentially in the hands of man ;
- species bred in captivity and released into the wild. There is regular contact between the stocks of these species bred by man and the naturally occurring populations thereof ;
- wild species and protected species bred for reintroduction or to support populations as part of action programmes.

## V.1.1 DOMESTICATED SPECIES OR SPECIES BRED IN A CLOSED ENVIRONMENT

France has a large number of breeds within each animal species bred for agriculture or food. In addition to their high cultural value, they constitute a considerable potential for diversifying farm production, for improving the quality of produce and, for some species, for helping to manage the environment.

Today, there is a tendency for the Common Agricultural Policy (CAP) to gear European production systems towards more diversified and more extensive agriculture. In the 1970s, the Ministry of Agriculture was anxious to protect animal genetic resources. Since then, 0.4 % of the budget earmarked for genetic improvement has been allocated to conservation programmes adopted by the National Commission for Genetic Improvement (*Commission nationale d'amélioration génétique* or CNAG).

Similarly, technical institutes have begun various types of action in this field. The National Institute for Agronomic Research (INRA) has initiated an active research programme that may contribute to more effective management of genetic variability. Gathering data on surveys and characterised descriptions of populations was centralised in 1985 by the National Union of Breed Books (*Union nationale des livres généalogiques* or UNLG), in association with all the experts in the technical institutes and the public sector (research, education).

### **Compiling surveys, management and conservation of genetic diversity**

Breed and population surveys have been carried out on most domesticated species. These are regularly updated by the professional and technical bodies, NGOs and research laboratories. However, surveys on genetic diversity of most species that have only been bred by man for a short time still need to be carried out : freshwater and sea fish, game birds and animals.

These surveys determine the strategies to be drawn up to conserve genetic resources, but additional information is required and they need to be refocused in order to meet the expectations of resource users more effectively. The BRG is currently working towards this aim and is planning to help widely disseminate information considered to be freely accessible (in raw and summary form), via a national information service on line.

Genetic variability of domestic animal populations (mammals, birds) is mainly carried out *in situ* or in ordinary living conditions since these animals are generally used for production. This type of management enables acquired social behaviour that is transmitted by learning between individuals of the same species to be passed on. It is conducted differently depending on whether large number breeds (intensive selection towards specialised types) or low number breeds (to restrict inbreeding) are concerned.

Intensive selection maximises short-term genetic progress. As yet, however, little is known about its effects on the genetic variability of a population with large numbers. It should be borne in mind that the real number of founders of the "Prim' Holstein" breed (those that contribute to the following generation) is below 0.01 % ! More systematic monitoring of the genetic variability within breeds with large numbers is being considered with a view to identifying the real risks of genetic erosion.

Long term management of low number breeds is part of a global approach to agricultural systems. It goes beyond breeding a given species and constitutes a major challenge to sustainably manage agricultural biodiversity on land. One of the conditions for adding value to these low number breeds is to more systematically integrate the quantitative and qualitative aspects of production including man and his lifestyle. This is how groups of animal farmers have succeeded in promoting breeds resulting in quality products that can be identified by the consumer : quality cooked pork meat from the Gascon pig ; high value produce derived from milk (butter, cheese and yoghurt) from the *Bretonne Pie-Noir* breed of cattle.

Cryoconservation of seeds and embryos is a complementary, but not an alternative tool to management measures for livestock in ordinary living conditions. Today, in France, freezing seeds and embryos is mainly used to manage cross-breeds within low to very low number breeds with a view to maintaining a minimum of inbreeding or to manage cross-breeding within large number breeds with a view to selecting the best genotypes. In the latter case, it contributes to reducing the genetic base used.

In addition, a national cryobank is currently being established for heritage purposes. This is the result of discussions developed within the National Commission for Genetic Improvement (CNAG) led by the Genetic Resources Office (BRG) for many years. This operation is being conducted in close co-operation with the breed operators concerned : technical institutes, insemination centres, etc. Priority for providing material for the cryobank will be given to resources from the most threatened available breeds for which

some stocks already exist. The cryobank should also eventually integrate a gene pool for large number breeds. The national collections thus formed will be managed on two sites independently of the stocks used for mating.

These different activities (be they surveying, in situ management or *ex situ* conservation) are monitored and coordinated by consultation groups bringing together the various actors involved in breeding : public and private selectors, technical institutes, breed associations, regional conservation agencies, etc.

### **Managing pathogens and symbionts of domesticated species**

Some collections of pathogens (viral or bacterial) and symbionts associated with these different species have already been constituted and are more or less dispersed. There are plans to organise these collections within a network, according to **microorganism** types and functions.

## **V.1.2 SPECIES BRED IN CAPTIVITY AND RELEASED INTO THE WILD**

Man breeds a number of species that are of direct interest for consumption (fish farming, bee-keeping), for restocking purposes (hunting and fishing), biological control and pollinisation. The situations encountered in the aquatic environment (fisheries, fish farming) or on land (hunting, biological control, pollinisation, bee-keeping) are comparable and the risks are identical.

In hunting, movements of wild species – introduction and reintroduction operations, operations to strengthen populations using non native species or breeds – are common practices. The pathological and biological aspects have often been analysed but this is less true for the genetic aspects which has led to management methods that may threaten small, local and well-adapted populations. However, a massive influx of animals carries the same types of risks for genetic diversity of the local fauna and on population structure as in the case of fisheries.

The vital problem that arises is the coexistence, in the same environment, of naturally occurring populations and populations introduced often through the release of large numbers into the wild. This carries the possibility of cross-breeding or competition among these populations. The health risks and the risks of diseases developing from animals coming from populations that are not adapted to the environment should also be emphasised.

Under Article L. 21 1-3 of the Rural Code, there is a ban on « *deliberately or carelessly introducing into the wild any specimen of **non** domestic animal species that is non native to the area in which it is being introduced* ». Implementing this Article should, in the future, help to control the risks of introducing species but, as yet, does not affect the infra-species level.

### **Freshwater fish**

Freshwater fish pose acute problems for several reasons :

- their genetic structure is more complex. This is due in particular to the fragmentation of their habitats in separate catchment areas ;
- their structure is more vulnerable as a result of restocking operations that are large-scale in some cases ;
- they are also more vulnerable to local environmental damage.

In France, specific regulations apply to freshwater fish (Rural Code, Art. L. 230-1 and those following). Management of stocks is entrusted to approved fishing associations that are grouped into federations at *département* and national levels. They are supported by the National Fisheries Council (*Conseil supérieur de la pêche* or CSP) and by fish wardens whose task is to enforce the legislation and carry out certain management operations (conducting and monitoring restocking operations, fish surveys, etc.).

The Ministry of the Environment, the Ministry of Agriculture, the National Fisheries Council, fishing associations and fish farmers are currently giving thought to the management objectives of the genetic fish resources occurring naturally, as well as to the choice of strategies and resources to be implemented in order to protect naturally occurring populations most effectively. This has already resulted in the adoption of the first “Salmonidae Restocking Charter” on April 4 1995, drawn up on the initiative of the Federation

for National Fisheries in France and Protection of the Aquatic Environment (*Union nationale pour la pêche en France et la protection du milieu aquatique*), the French Fish Farming Federation (*Fédération française d'aquaculture*), with support from the Ministries of Agriculture and Environment.

In addition, the aim of the Water Systems Public Interest Group (*GIP Hydrosystèmes*), established in 1993, is to coordinate the aquatic environment resources management programmes. It brings together the Geological and Mining Research Office (*Bureau de recherches géologiques et minières* or BRGM), the French Research Institute for Agricultural and Environmental Engineering (CEMAGREF), the National Centre for Scientific Research (CNRS), the French Institute for Research on Marine Resource Use (*Institut français de recherche pour l'exploitation de la mer* or IFREMER), the National Institute for Agronomic Research (INRA), the International Water Office (*Office internationale de l'eau* or OIE) and the French Institute for Scientific Research in Overseas Development and Co-operation (ORSTOM).

### **Game species**

In association with geneticists, the National Hunting Office (*Office national de la chasse* or ONC) has conducted research work on a number of game species : pheasants, wild boar, stags, partridge, red-legged partridge and rock partridge. Other projects are being planned for the capercaillie, red-crested pochard and other migratory bird species. The important thing is to assess and gauge the risks that these restocking operations carry and to inform the actors involved, particularly hunting associations and breeders. The ultimate objective is to jointly define the conditions for rational (wise) management of hunted species on a species-by-species basis and especially in terms of genetic resources.

### **Molluscs and crustaceans**

Extensive open-air fish farming gradually replaced fishing when direct fishing was no longer possible due to dwindling stocks. It is particularly developed in France given the vast coastal areas and national eating habits.

Shellfish farming (production of bivalve molluscs) focuses on several species : oysters (flat oyster, cupped oyster), mussels, carpet shells, clams and scallops. With regard to marine crustaceans, only the Japanese sand shrimp is farmed in France.

Owing to the fact that almost all the stocks of crayfish ran out last century, restocking operations using American crayfish were carried out. This has seriously disturbed the few surviving local populations.

In addition to the risks of disturbing the genetic structures of the naturally occurring populations, there are the epizootic risks of genetically standardising the cultivated populations.

### **Insects**

Several species of insects and acarids (parasites, predators or pollinators) are farmed and released as part of biological control programmes (e.g. minute egg parasites used against the corn borer), to pollinate certain crops (e.g. bumble bees used in cultivating tomatoes in glasshouses) and to produce honey (bees).

The use of auxiliary species in biological control operations poses two types of problems :

- introducing exotic species may lead to native auxiliary species moving elsewhere ;
- large-scale release of auxiliary species carries the risk of "genetically polluting" naturally occurring populations of the auxiliary species.

The adverse effects of such practices and the numerous failures encountered have led experts to refocus their research in order to increase the success rate of biological control operations and to reduce the risks of disturbing the non-targeted local fauna.

This research work has been accompanied by regulatory measures : Under Act no. 95101 of February 2 1995 on the Reinforcement of Environmental Protection, importers of exotic auxiliary species are required to obtain authorisation from the Plant Protection Department (*Service de la protection des végétaux*) within the Ministry of Agriculture.

The development of biological control research programmes has led to a new centre being set up in Montpellier : the Agropolis International Biological Control Centre (*Complexe international de lutte biologique Agropolis* or CILBA). The Centre is entrusted with the scientific task of studying and managing populations of organisms that cause damage to crops be they animals (invertebrates) or plants (weeds). The Biology and Population Management Centre (*Centre de biologie et de gestion des populations* or CBGP), a new laboratory jointly set up by the French Institute for Agronomic Research (INRA), the French Institute for Scientific Research in Overseas Development and Co-operation (ORSTOM) and the International Centre for Co-operation on Agronomic Research for Overseas Development (CIRAD), will become part of the CILBA in 1998.

### V.1.3 WILD SPECIES

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Although all the wild species occurring in France have potential resources, an infra-species genetic approach can only be implemented for some of them i.e. four types of species :

- threatened species (Red Data Books and statutory protection),
- species subject to intensive, and in some cases, unwise taking,
- species facing competition with exotic species that have been introduced (European pond turtle, European mink),
- species reintroduced into the natural environment from which they had become totally extinct (large carnivores, protected ungulates and large birds of prey).

The numbers of many existing species - at least vertebrates - and their distribution ranges are well known. Conversely, little progress has been made on identifying infra-species genetic variability and describing and characterising the genetic make-up of these resources.

Protecting wild species is already widely taken into consideration by the Ministry of Environment but it would be desirable to strengthen the existing programmes by integrating, if warranted, a section on genetic characterisation and analysis of genetic variability of priority species. This would lead to genetic management programmes for endangered species or populations.

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## V.2 PLANT GENETIC RESOURCES

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France has always pursued a policy of prospecting for, naturalising, domesticating and selecting plants of interest for botany, agriculture, horticulture, landscapes, forestry or industry. In France, there is high genetic resource diversity regarding all species cultivated both in mainland France and in the DOM-TOMs but, for a long time, this diversity was underestimated, dispersed and, in some cases, threatened.

Several measures have already been implemented for the conservation of the genetic resources of many plant species in natural and artificial conditions. It is now important to coordinate them, formally adopt them and extend them to all species, particularly those of interest to agriculture and food production including forest, ornamental and fruit species.

### V.2.1 *EX SITU* CONSERVATION

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Given the extent of the country's agricultural activities and research conducted on a permanent basis to improve them, France has numerous collections of genetic resources. This diversity, which makes up the basic material for any selection programme, is divided among the many public and private bodies and institutes involved in the work, and also among several local and regional conservation agencies for heritage and identity purposes.

## Species from temperate regions

France has chosen to set up a decentralised system for managing genetic resources since the system of large gene banks seemed unwieldy and inconsistent with the current distribution of French collections. France has opted to clearly identify the collections of genetic resources regarding material holders working collections and to distribute the conservation responsibilities between the different parties involved in maintaining a genetic pool in the long term.

With this in mind, the Genetic Resources Office (BRG) has been closely involved in setting up the networks to manage and assess the national collections of genetic resources since 1995, along the lines of what had been developed for soft wheat for many years.

Today, over 20 networks have been set up in France in association with public and private partners and NGOs. They focus on the following species :

- cash crop species (beet, cereals, large-seed pulse crops, maize, forage crops, sward plants, sunflower) ;
- fruit species (citrus fruit, fruit with pips, dried fruit, fruit with shells, Moraceae, olive trees, *Prunus*, vines) ;
- vegetable and fruit species (artichokes and cardoons, endives, edible crucifers, strawberry plants, beans, lentils, melon, cultivated Solanaceae) ;
- ornamental and perfumed species (lavender and hybrid lavender, pelargoniums, rosebushes).

These partners agree to jointly manage (conserve, assess and distribute) a national collection of genetic resources that they make available to the municipality subject to mutual conditions. They agree to share management costs. The organisation of the network is specified in a Charter that sets the objectives, names the partners and also lays down the rights and duties of each of the members and how the network is to function. In addition to the Charter, there are in-house rules (*règlement intérieur*) which are more technical.

The advantage of this system is that a close link is established between those who conserve and those who use genetic resources. There is a definite will to improve information on the collections with a view to taking into account genetic progress more effectively.

Eventually, all the national collections maintained within the networks should constitute the “French Bank of Genetic Resources”, placed under the responsibility of the BRG. These collections attest to France’s significant contribution to joint European genetic resource management programmes coordinated by the IPGRI.

In the coming years, this system should be strengthened through the establishment of a legal status for the national collections (consistent with international law) and permanent funding for their long-term management is being sought. This will ensure that free access to all this material is maintained, particularly under a multilateral system of exchanges of and access to genetic resources, such as that encouraged by FAO.

## Species from tropical regions

Given its long-established tradition of overseas co-operation, France is a member of several international networks through CIRAD and ORSTOM. In particular, the research centre located in Montpellier maintains duplicates of several collections of tropical species :

- in cold storage (cotton plant, fonio, gombo, bean, maize, millet, *Panicum*, rice, soya, sorghum, tomato and various forest species) ;
- in glasshouses (cacao tree, coffee tree, *Panicum*) ;
- *in vitro* (pineapple, banana tree, coffee tree, sugar cane, yams, manioc, African oil palm tree).  
These activities are accompanied by a plant health index of the resources.

France also maintains *in situ* collections in her overseas *départements*: banana tree, sugar cane, pineapple, hevea, cacao tree and eucalyptus). The Forest Department within CIRAD (CIRAD-For&) maintains seed banks and *in situ* collections of very many forest species, particularly of the genera *Terminalia*, *Tectona*,



*Pinus* and *Eucalyptus*. Today, there are plans to bring together the responsibilities of the different research institutes located in Montpellier (CIRAD, INRA, ORSTOM) within a special centre dedicated to genetic resources of tropical and Mediterranean species. This centre would bring together the activities focusing on resource conservation, plant health indexing for international transit and trading in these areas.

### Management of pathogens and symbionts of cultivated species

Certain collections of pathogens or symbionts associated with these different species have already been constituted. There are plans to organise the collections of microorganisms in networks by broad categories and functions.

## V.2.2 IN SITU MANAGEMENT

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*In situ* conservation refers to maintaining breeding organisms in their natural environment where there is still high genetic variability between populations and also within the different populations. In France, it focuses on forest species, wild breeding species of cultivated plants and grassland species. In the latter case, however, little has been carried out at national level.

This management goes hand in hand with an additional strategy for *in situ* conservation with a view to characterising, analysing and using the variability of the species under consideration in a more effective way.

### Forest species

In 1991, the Directorate for Rural Areas and Forest (*Direction de l'Espace Rural et de la For.* or DERF) within the Ministry of Agriculture began to develop national policy on the conservation of forest genetic resources (Circular DERF/SDF/N9 I/no. 3011). Within this framework, several measures have been devised and implemented for maintaining species *in situ* (common beech and silver fir), *ex situ* conservation (elm) and management simultaneously integrating *in situ* sites and pseudo dynamic *in situ* conservation (wild cherry tree). There are plans to implement measures, by the year 2000, for *in situ* and *ex situ* protection of some ten major forest species (large oaks, black poplar, common spruce, maritime pine, etc.).

A more extensive programme is currently being drawn up under the National Genetic Resources Charter with five main aims :

- dynamic *in situ* management of forest resources and *ex situ* conservation of national collections ;
- permanent survey of genetic resources managed under the programme ;
- monitoring dynamic trends in genetic diversity of forest species in France ;
- gathering or acquiring the necessary scientific knowledge to define methods and indicators for managing diversity, within the conservation schemes and in forests managed for production purposes.

This national programme for the conservation of forest genetic resources will involve :

- the National Technical Commission for the Conservation of Forest Genetic Resources (*Commission technique nationale de conservation des ressources génétiques forest&-es*), set up by the Ministry of Agriculture ;
- a methodological support unit appointed by the aforementioned Commission ;
- a management and conservation network, organised by species and combining *in situ* and *ex situ* methods for the following species : *Fagus sylvatica*, *Abies alba*, *Ulmus spp*, *Prunus avium*, *Quercus petraea*, *Populus nigra*, *Picea abies*, *Pinus pinaster*.

This programme supplements the one that has been established to protect habitats in compliance with France's commitments following ratification of the Convention on Biological Diversity : EC Directive 92/43 of May 21 1992, on the Conservation of Natural Habitats and of Wild Fauna and Flora (Natura 2000 network).

In addition, at a later stage, the activities of the National Technical Commission for the Conservation of Forest Genetic Resources could be extended to cover the overseas *départements* in order to take into account tropical species. In this case, it will be necessary to fully incorporate the ecological dimension.

#### **Wild relatives of cultivated species**

Little is yet known about the genetic diversity that occurs within these species. Surveying this constitutes a pre-requisite for devising long-term management plans. So far, only a few pilot operations have been set up for this purpose focusing on the following species : *Brassica oleracea*, *Beta maritima*, *Prunus brigantina*, *Agropyron* and *Tulipa*.

### **V.2.3 DYNAMIC MANAGEMENT OF VARIABILITY**

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Dynamic management of genetic variability is a strategy that complements that of gene banks. Strictly speaking, it does not come under *in situ* or *ex situ* conservation. It aims to artificially recreate the conditions for the continual development of populations of cultivated plants in modern agriculture where these processes have been lost : populations in which there is high genetic diversity are subject to low selective pressure in several types of environment. This method encourages the emergence of gene combinations in response to new environmental constraints that may be used more rapidly than the original resources to meet the future needs of agriculture.

This type of management is still at the experimental stage and therefore practised only on a limited basis. The species concerned are soft wheat, ryegrass and the wild cherry tree.

The original nature of the method and its strategic advantage to prepare more directly usable material could result in it being extended to cover a number of other species, using simple management methods. The aim would be to ensure improved transition between the raw resources and material that has been developed. A programme is about to begin on beet, incorporating wild species in the scheme. A similar programme to that implemented on the wild cherry tree is also being considered in the short term for the black poplar and the maritime pine.

### **V.2.4 CONSERVATION ON FARMS**

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Conservation on farms has aroused great interest at international level but its real role in the long term management of genetic resources needs clarifying. It is based on the principle that, each year, the farmer uses seeds from his own fields or from those of his neighbours. While that remains true for certain species and in certain regions in the world, including France's overseas *départements* such as French Guiana, economic developments resulted long ago in the division of labour so that seed production is now a specialised activity.

In mainland France where organisation of the seed production sector followed developments in the farming sector, conservation on farms, such as that mentioned at international level, does not seem to play any significant role. It is being considered to maintain minor species that support local produce. A national network for managing old local varieties and populations could be established in consultation with NGOs.

## V.3 MICROORGANISM GENETIC RESOURCES

The term microorganisms refers to all microscopic organisms including viruses, bacteria, single-cell algae, protozoa and filamentous or yeast-forming fungi i.e. an extremely heterogeneous group.

Microorganisms play a vital role in the biosphere : they carry out, often exclusively, essential functions, thus occupying key positions in the major biological, geological and chemical cycles (e.g. carbon and nitrogen cycles). Generally speaking, microorganisms play a vital role because of their capacity to reorganise "material" by transforming, detoxifying and breaking down dead organisms (leaves, soil). They also play an important role through their interactions with living organisms.

Furthermore, microorganisms also play a significant economic role in food production. They are used to make several foodstuffs (dairy industry, wine production, breadmaking, brewing beer, curing herring and salting fish) and in the pharmaceutical and chemical industries.

It is difficult today to assess the threats to naturally occurring microorganisms. However, there is a considerable threat to non-industrial flora empirically selected by man for his food needs over the ages (yeast for dairy products, for baking bread, brewing beer and making wine). There is an increasing tendency to replace them by industrial yeast, the quality of which is stable and the consistency even, thus meeting the needs of industrial production more effectively.

### V.3.1 POPULATION DYNAMICS AND *IN SITU* MANAGEMENT

Microorganisms build a bridge between the two issues of biodiversity and genetic resources. Very little is yet known about species and populations of microorganisms which occur in huge numbers compared to animal and plant species. The reasons for this partly because of the difficulty to isolate and cultivate them.

There are enormous gaps in the knowledge acquired on the diversity of their adaptive response, their diversity between and within species, their biogeographical diversity, and the diversity of their possible genetic exchanges with other kingdoms. This makes it difficult to assess the risks of genetic disturbance or erosion of microorganism populations in the environment.

"Host/microorganism" interactions are the subject of numerous research programmes in association with the biologists concerned with the host's variability. The problems of lasting interactions and mutualism are largely taken into account in the national Biodiversity and Environment Dynamics Programme (*Dynamique de la biodiversité et environnement* or DBE) [see chapter on research].

Under the aforementioned programme, the Microorganism and Ecology Biodiversity network is conducting research on the causes and mechanisms that generate diversity within ecosystems as well as on the impact of microorganism biodiversity on ecosystems.

### V.3.2 *EX SITU* CONSERVATION

The microorganisms that it has been possible to isolate and cultivate are generally kept in freeze-dried form and subject to cryoconservation in special "strain banks" (*souchothèques*).

There are two major types of strain banks in France : service strain banks and laboratory strain banks. The former are open structures providing a number of services : they may be used to identify strains, characterise specific properties, for confidential storage, for maintaining and disseminating referenced strains. There are only a few of these strain banks and they are located within research institutes (National Natural History Museum, National Institute for Agronomic Research or INRA, Institut Pasteur, etc.). There are, however, many laboratory strain banks of varying sizes. The report *INRA's Microorganism Collections (Les collections de micro-organismes de l'INRA*, by S.D. Ehrlich, 1993), lists over 69 laboratory collections merely within INRA itself. These two types of strain banks were identified in the *List of French Microorganism Collections (Répertoire des collections françaises de micro-organismes)*, which lists 168 collections in its 1993 edition.

Some of the strain banks have been grouped into networks in order to exchange informations and strains : either within one and the same body : INRA's French Computerised Microorganism Collection (*Collection française informatisée de micro-organismes* or CFISM), by sector (human health, animal health, etc.), or for political reasons (Microbial Information Network in Europe or MINE). Several networks dealing with (animal and human) health problems are closed.

As a result of France joining the MINE in 1988, it has been possible to :

- organise the management of national open collections within a European co-operative network ;
- to establish new collections in some sectors (yeasts, microorganisms of interest for biotechnology).

This action has been widely supported by the Ministry of Research.

Alongside these collections, there are several industrial strain banks which are totally closed.

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## CHAPTER VI :

### BIOLOGICAL DIVERSITY IN RESEARCH ACTIVITIES

In France, research on biological diversity is conducted in the various universities and the major public research institutes.

Within these universities and institutes, research on biological diversity has been organised in a more systematic way over the last few years : for example, the Joint Institute for Basic and Applied Ecology (*Znstitut fédératif d'écologie fondamentale et appliquée*) has been established within the University of Paris (Paris IV) and the Institute of Ecology and Biodiversity Management (*Znstitut d'écologie et de gestion de la biodiversité* or IEGB) has been set up within the National Natural History Museum (MNHN).

At national level, the Ministry of Spatial Planning and the Environment, the Ministry of Agriculture and Fisheries, the Ministry of Education, Research and Technology, the "Environment, Life and Societies" programme run by the National Centre for Scientific Research (CNRS) call upon and coordinate the French scientific community for research in this field. In addition, a national research programme entitled "Biodiversity Dynamics and Environment" has been launched.

A number of Public Interest Groups (*Groupements d'intérêt publics*) i.e. legal entities to coordinate research on a given theme, have been established in order to improve the coordination of research that often involves many different disciplines and bodies. For example, the Water Systems Public Interest Group (*GIP Hydrosystèmes*) focuses on inland waters, the ECOFOR Public Interest Group deals with forests and the Public Interest Group BRG concentrates on maintaining genetic resources. Lastly, environment NGOs have also periodically initiated programmes on conservation issues.

Theme-based research programmes have been launched, such as the National Wetlands Research Programme (*Programme national de recherche sur les zones humides* or PNRZH). Furthermore, applied research is conducted or piloted by public bodies that are in charge of managing some of these biodiversity resources : the National Forestry Office (*Office national des forêts* or ONF), the National Hunting Office (*Office national de la chasse* or ONC) and the National Fisheries Council (*Conseil supérieur de la pêche* or CSP).

#### **VI.1 RESEARCH ACTIVITIES UNDERTAKEN BY THE MAJOR PUBLIC RESEARCH INSTITUTES**

In France, research on biological diversity is mainly undertaken by the major public research institutes, particularly the National Natural History Museum (*Museum national d'histoire naturelle* or MNHN), the National Centre for Scientific Research (*Centre national de la recherche scientifique* or CNRS), the National Institute for Agronomic Research (*Znstitut national de la recherche agronomique* or INRA), the French Institute for Research on Marine Resource Use (*Institut français de recherche pour l'exploitation de la mer* or IFREMER), the French Research Institute for Agricultural and Scientific Engineering (*Centre d'études du machinisme agricole, du génie rural et des eaux et forêts* or CEMAGREF), the French Institute for Scientific Research in Overseas Development and Co-operation (*Znstitut français de recherche scientifique pour le développement en coopération* or ORSTOM) and the International Centre for Co-operation on Agronomic Research for Overseas Development (*Centre de coopération internationale en recherche agronomique pour le développement* or CIRAD).

For some of these bodies (the MNHN and some of the CNRS laboratories), biological diversity (at genetic, species and ecosystem levels) is the sole or one of the major fields of their research activities.

For others (IFREMER and ORSTOM), it is a major part of their research activities. Finally, for others still, while biological diversity is not a major field of research, it is nevertheless part of the themes they cover to pursue their objectives (e.g. agricultural research at INRA or CEMAGREF).

## VI.2 THE NATIONAL BIODIVERSITY DYNAMICS AND ENVIRONMENT RESEARCH PROGRAMME

The research programme entitled Biodiversity Dynamics and Environment (*Dynamique de la biodiversité et environnement* or DBE) organises French public research in this field. It constitutes the coordinated contribution made by the French scientific community to international research efforts on biodiversity under the DIVERSITAS programme run by the International Union of Biological Sciences and UNESCO.

The DBE programme takes into account the priorities of the major public research bodies, characteristics specific to France (in terms of scientific skills, “geographical or ecological” opportunities, and even strategic priorities) and the international programmes underway.

The national scientific objectives identified and selected are as follows :

- to highlight the factors that determine biological diversity and changes therein ;
- to assess, produce models and predict the direct or indirect role of man’s action on biological diversity and its consequences on ecosystem functioning, from local to regional levels ;
- to understand and take advantage of the economic, ethical or cultural effects that biological diversity may have on human societies.

The research themes are : origins and conservation of biodiversity ; effects of changes in the environment and population dynamics on biological diversity ; the role of biological diversity in the functioning of ecosystems ; perception, assessment and uses of biological diversity.

The partners involved in this national research programme on biological diversity are INRA, ORSTOM, CIRAD, IFREMER, CEMAGREF and the MNHN. Certain universities (in particular Montpellier II, Lyon I, Rennes II, Paris VI and Paris XI), along with other bodies, are also involved through their research teams that are working in association with the CNRS. A national programme office has been set up in association with the Ministry of Environment in order to coordinate the assessment, efforts and resources more effectively. The bodies specialising in applied research are considering launching additional research programmes. This will ensure that the national programme produces practical results.

## VI.3 THE NATIONAL BIODIVERSITY PROGRAMME

Based on the national research programme “Biodiversity Dynamics and Environment”, the main French research bodies are keen to actively participate in international debates and defend national interests more effectively. To this end, they drew up a joint programme - the National Biodiversity Programme (*Programme national biodiversité*). The aim of this programme is to identify the issues and areas of joint interest in the field of biodiversity and to assess the coordination already underway. This programme should act as a basis for setting up further activities involving several bodies whether they be in the form of incentives or whether they have a more formal structure.

The aim of the programme is not to cover the whole field of biodiversity and the various activities undertaken by the research institutes, but to identify the fields or activities that would be dealt with more effectively through coordination between the different institutes. Three types of approach have been chosen on the basis of the work undertaken :

- an approach by broad themes,
- an approach by biological model,
- an approach by experimental sites.

Four main areas have been identified in the field of biodiversity. These four areas are and must be interactive : origin, distribution and dynamics of biodiversity ; protection and restoration of biodiversity ; biodiversity and sustainable development ; adding economic value to biological diversity.

To avoid the risk of the research work being scattered, the emphasis should be placed on biological models that enable a cross-sectoral approach, taking into account the heritage and conservation aspects as well as the aspects pertaining to biological resources, with co-viability with social systems in mind.

The research could focus on priority experimental sites : on standard types of environment (extensive grasslands, forests, wetlands, coastal zones, etc.), or geographical areas identified for the problems that they pose with regard to biodiversity conservation.

#### VI.4 SCHEDULING RESEARCH PROGRAMMES WITHIN THE MINISTRY OF SPATIAL PLANNING AND ENVIRONMENT

##### **Developments in research issues over the last 25 years**

Given its strategic position between researchers and practitioners, the Ministry of Environment has been involved in setting and funding research programmes on biological diversity since its inception in 1971. In 1975, following a demand for applied research on flora and fauna species management (threatened species, or conversely, species posing problems because of their proliferation), the Ministry responded by setting up the Fauna and Flore Committee (*Comité faune et flore*) within the Studies and Research Department (*Mission des études et de la recherche*). During the first stage of its existence, the Committee provided funding for methodological research focused on species surveys and mapping their distribution ranges. That led to the creation of the Fauna and Flora Secretariat (*Secrétariat de la faune et de la flore*), today renamed the Natural Heritage Department (*Service du patrimoine naturel*) within the Institute for Ecology and Biodiversity Management (IEGB), in turn within the National Natural History Museum [see chapter III].

Subsequently, defending the idea that species can only be protected properly if habitats are also protected, the Committee drew up one of the first applied ecology programmes. In 1979, the Committee was replaced by the Ecology and Natural Heritage Management Committee (*Comité écologie et gestion du patrimoine naturel* or EGPN) which, today, is still in charge of establishing most biodiversity programmes. The driving force behind this Committee is the concern to make ecological research an integral part of natural heritage management. It aims to ensure that ecological analysis is taken into account in the decision-making process, along with technical and economic analyses. It seeks to help reconcile economic development and human activities with protection of the natural environment.

In addition to the work that the Committee undertakes, the Soils and Tropical Forests Scientific Committee (*Comité scientifique sols et forêts tropicaux* or SOFT) has been carrying out work since 1990. The Inland and Marine Waters Group, the Social Sciences Group and the Economic Affairs Group also undertake work from time to time.

##### **Research leading to management**

Almost all the calls for tender and research programmes initiated by the EGPN and SOFT Committees thus provide valuable tools to acquire knowledge on, use, maintain and manage biological diversity in mainland France, its overseas *départements* and territories and, occasionally, other countries. They act as a complement to the calls for tender put out by the EU in which the aforementioned Committees are sometimes Involved.

The two Committees have been constantly concerned with acquiring knowledge which will encourage more effective management and make a greater contribution to the conservation of biological diversity that is often under threat. The following issues have been closely examined : influences of the intensification of agriculture or consequences of abandoned farmland; impact of the different types of pollution; impacts of changes in fish farming or forestry practices, climate and landscape change; effects of the fragmentation of populations caused by building major road or rail infrastructure.

On a larger scale, the EGPN Committee is interested in new methods of managing land or broad ecosystem types. Similarly, studies on phenomena such as parasitism or predation, studies on fish-eating birds focused on practical management of the species concerned and assessing their functional role.

## The latest research programmes

The latest research programmes initiated by the Ministry of Environment refer specifically to assessing and managing ecological diversity, particularly on the following subjects :

- Biological diversity and fragmentation in intensive farmland.
- Biodiversity dynamics and land management, analysed from a historical perspective.
- Restoring the natural environment. A national research programme entitled Recreating Nature (*Recréer la nature*) was launched in 1995 to support and strengthen France's scientific and technical potential (environmental engineering).
- National Wetlands Research Programme (see below).
- Biodiversity and forest management (Ministries of Environment and Agriculture, through the ECOFOR Public Interest Group).
- Tropical forests : the SOFT Programme (Soils and Tropical Forests - see above) focuses on widespread damage and loss at a rapid rate of tropical forests, their sustainable management and the conservation of their extraordinary biological diversity. Under this programme, research was begun in 1990 in various countries in Latin America, Africa and Tropical Asia, primarily in the French DOM-TOMs (most notably French Guiana, with a view to establishing the National Park of French Guiana and assessing the impact of traditional human activities).

### The national research programme Recreating Nature (*Recréer la nature*) initiated by the Ministry of Spatial Planning and Environment

In addition to the concept of nature conservation, the idea of "restoring nature" became a requirement, given the damage caused to ecosystems and the need to maintain biodiversity.

In order to build on this new approach and to bring together the existing approaches (both fundamental and applied), with the help of WWF France, the Ministry of Environment and MAB France organised a symposium in May 1994 on the subject "Recreating Nature : restoring and creating ecosystems".

On the basis of the results of this symposium, a call for research proposals was distributed (2 000 copies) in August 1995, as part of the action to launch the national programme Recreating Nature. The research proposals were to focus on four major thrusts : (1) what determines the choices and motivations of the actors involved ? (2) How are the reference systems chosen ? (3) What are the relevant scales of time and space for action ? (4) What are the methods for monitoring and assessing this action?

In total, 69 proposals were received by the National Natural History Museum, the body in charge of managing and organising the programme. They were then examined by a Scientific Committee and approved by a Steering Committee bringing together representatives of 28 different bodies, Ministries and NGOs as well as the Chairman of the Scientific Committee. In May 1996, 20 projects were selected amounting to a total budget of FF 5.4 over a three-year period.

The programmes are presented by mixed teams, each one made up of a scientific and an operational element. They are spread geographically over the whole of France (mainland and the DOM-TOMs) and cover a diversity of natural environment types in line with the diversity of the French landscape : wetlands, peat bogs, grasslands, quarries, *garrigue*, forests, coral reefs, coastal environment, sub-Antarctic islands and the various plant corridors on the edges of the rail and motorway networks.

With these programmes, it will be possible to test and improve models and theories resulting from basic research on the structure and functioning of ecosystems. Through their objectives and the results they are expected to achieve, the selected programmes will act as a basis for future restoration measures. Lastly, these restoration projects will encourage protection measures to be taken (designation of sites, acquisition of land) or sustainable management to be implemented (agri-environmental measures). This in turn will give the action undertaken a more permanent character.

Today, restoring damaged ecosystems constitutes a new asset to enhance France's natural heritage. The Ministry of Spatial Planning and Environment wishes to carry this forward through this research programme.



## **VI.5 TWO EXAMPLES OF PUBLIC INTEREST GROUPS TO COORDINATE RESEARCH**

### **The Public Interest Group Water Systems (*GIP Hydrosystèmes*)**

Six public research institutes - the Geological Mining Research Office (BRGM), the French Research Institute for Agricultural and Environmental Engineering (CEMAGREF), the National Centre for Scientific Research (CNRS), the French Institute for Research on Marine Resource Use (IFREMER), the National Institute for Agronomic Research (INRA) and the French Institute for Scientific Research in Overseas Development and Co-operation (ORSTOM) and the International Water Office (Office *international de l'eau* or OIE) have pooled their resources within a Public Interest Group entitled "Understanding and Managing Water Systems" or *GIP Hydrosystèmes*. Its aim is to promote an integrated approach to water systems, taking into account the requirements of socio-economic development and the protection of natural systems and to get the scientific community involved in this objective.

The Group's scope covers inland water systems and their interfaces including estuaries, lagoons and the coastal environment. This scope ranges from temperate to tropical zones and focuses on both surface and underground water.

The Group has set itself five basic tasks : to facilitate joint action by the founding members ; to dialogue with users, facilitate and improve the transfer of knowledge with managers ; to make the most of and disseminate research results ; to strengthen relationships between research institutes and training centres, particularly in higher education, and lastly, to represent the French scientific community at national, European and international levels.

It became vital to focus the Group's activities on six particularly important specific themes, with an integrated approach to water systems in mind. They are :

- the transfer of water and dissolved substances or suspended matter ;
- biological systems, emphasising the factors that influence the structure of aquatic populations and the consequences of human activities ;
- societies and water systems, particularly an analysis of management methods ;
- developing the concept of "experimental site" that is aimed at integrating the research on a number of selected areas ;
- establishing a National Wetlands Research Programme [see below] ;
- research on methods and tools used in producing models and developing knowledge.

### **The ECOFOR Public Interest Group**

The Forest Ecosystems Public Interest Group (*GZP ECOFOR*) has been established by French research institutes to develop cooperative research programmes on how forest ecosystems function in mainland France and in the DOM-TOMs. The following institutes are partners : the French Research Institute for Agricultural and Environmental Engineering (CEMAGREF), the International Centre for Co-operation on Agronomic Research for Overseas Development (CIRAD), the National Centre for Scientific Research (CNRS), the National School of Rural Engineering, Water and Forests (ENGREF), the National Institute for Agronomic Research (INRA), the National Forestry Office (ONF) and the French Institute for Scientific Research in Overseas Development and Co-operation (ORSTOM).

Biodiversity is studied in the ECOFOR programmes primarily for its role in the functioning of ecosystems and for the possible use in forestry practices. With this in mind, a project on upland forests is seeking to identify the role of diversity in the functioning of subnatural forests in order to more clearly define forestry management methods for managed forests. A further project is focusing on introducing small diversity islands in artificial stands of maritime pine on heathlands as a means of controlling pests that destroy pines.

Another call for proposals was put out in 1997 by the Ministries of Environment and Agriculture, and a scientific study is currently being conducted (in summary form) on the relationships between biodiversity and forest management. It is scheduled to be published in late 1998.

## **VI.6 COORDINATING RESEARCH ON GENETIC DIVERSITY**

For many years, the Ministries and research institutes that are partners within the Genetic Resources Office (BRG) have been pooling their resources in this field through the activities coordinated by the BRG. Two national calls for tender put out in 1994 and 1997 have resulted in projects being supported on the biological (24 projects) and socio-economic aspects (34 projects) of these themes on the basis of a cross-sectoral approach for animals, plants and microorganisms.

Priority criteria for this call for tender were :

- the methodologies **used** for identifying and characterising genetic diversity of naturally occurring populations,
- studying the structure of genetic diversity in space and time and the associated sampling strategies,
- the physiological, physical and chemical effects of lowering the temperature and of desiccation, with a view to cryoconservation of gametes, embryos or organs,
- dynamic management of genetic diversity including acquiring knowledge of the mechanisms (a) for maintaining and developing the diversity of naturally occurring and artificial populations, and (b) of the co-evolution between animal and plant species with their parasites or their symbionts,
- the socio-economic and regulatory aspects of permanent management of genetic resources.

## **VI.7 THE NATIONAL WETLANDS RESEARCH PROGRAMME**

### **The aims of the research programme**

The approach is part of the Wetlands Action Plan adopted on March 22 1995 at the Ministerial Cabinet Meeting [see chapter IV]. It resulted in the adoption of a three-year National Wetlands Research Programme (**Programme national de recherche sur les zones humides** or PNRZH). This research should lead to a better understanding of how wetlands function, what their functions are, but it must also make it possible to devise and validate conservation, management and restoration methods. The programme must also encourage wetlands to be taken into account adequately in the instruments provided for under the 1992 Water Act : the Water Development and Management Master Plans (SDAGE) and the Water Development and Management Plans (SAGE) [see chapter II].

A Steering Committee, a Scientific Committee and a Permanent Office are the bodies directly involved in implementing the Plan. The Steering Committee is made up of members from the Water Agencies, the Ministries of Environment, Agriculture, and Infrastructure, the chairwoman of the Scientific Committee and of the Public Interest Group Water Systems (**GZP Hydrosystèmes**). The latter acts as the delegate in charge of carrying out the practical tasks, particularly the secretarial duties of the Steering Committee and the Scientific Committee, provides scientific input for the programme and produces the annual report (in summary form).

### **The themes covered by the research programme**

The research programme focuses on three areas :

- acquiring knowledge of how wetlands function,
- identifying, selecting and approving (functional, morphological and biotic) criteria enabling a description of wetlands to be drawn up in order to obtain the reference reports,
- determining the conditions for obtaining public support for a wetlands conservation and restoration policy.

The call for research projects was put out in late 1995. 19 projects have been selected and divided into four categories : (i) coastal wetlands (4 projects), (ii) river valley wetlands (8), (iii) low-lying inland wetlands (3) and (iv) cross-sectoral themes (4). A 20th project is being set up on the Kaw marshes (French Guiana).

A local committee is established for each project. Its task is to ensure that the project is carried out properly and that there is adequate coordination with other projects being conducted on the site in

question. It brings together the teams of researchers, local administration - Water Agencies, Regional Office for the Environment (DIREN) - and other local partners involved.

## **VI.8 RESEARCH UNDERTAKEN BY BODIES IN CHARGE OF MANAGING FORESTS, HUNTING AND FISHERIES**

As part of their respective applied research programmes on managing game species' populations and public forests, the National Hunting Office (*Office national de la chasse* or ONC) and the National Forestry Office (*Office national des forêts* or ONF) have conducted studies and continue to fund several studies on the ecology, monitoring and sustainable management of species, of groups of species or different types of natural environment at local, regional and national levels. The stated aim of all these studies is to maintain biological diversity through hunting or forestry plans and to take greater account of conservation in long-term management concerns.

The National Fisheries Council (*Conseil supérieur de la pêche* or CSP) encourages scientific research along the same lines in order to guide managers towards taking action to restore aquatic ecosystems and to conserve the natural fish heritage. By providing financial support for basic and applied scientific research (in genetics, population dynamics, ecology, etc.), the CSP is seeking to establish management rules incorporating the long neglected concept of taking into account biological diversity between and within species.

### **Research conducted by the ONF**

The National Forestry Office (ONF) undertakes numerous research and development programmes in order to take into account biodiversity conservation in forestry practices. These programmes are run in particular by the Technical Research Department (*Département des recherches techniques*), and overseen by the ONF's scientific board (*Conseil scientifique*). The aforementioned Department analyses and monitors long-term trends of the forest environment from a physical, chemical and biological perspective through the RENECOFOR network that is made up of 102 sites subject to permanent monitoring that are located all over France.

The ONF has recently set up a Forest Tree Genetic Conservation Agency (*Conservatoire génétique des arbres forestiers*) to study and conserve genetic diversity of woody forest species. It is currently conducting field experiments aimed at developing management techniques specifically adapted to certain animal species (capercaillie in upland areas, Cervidae in lowland areas) and plant species (restoring broadleaved species on the Atlantic coasts of the Aquitaine and Poitou-Charente regions). In addition, a National Scientific Committee for Birds (Commission *scientifique nationale sur l'avifaune*) has recently been established to coordinate study and population management programmes on bird (woodpeckers, birds of prey, black stork). This approach will subsequently be extended to all fauna species.

### **Research conducted by the CSP**

Within its various departments, the National Fisheries Council (CSP) has undertaken considerable efforts to harmonise the procedures for gathering information on fish populations. A national hydrobiological and fish monitoring network has been set up (*Réseau hydrobiologique et piscicole* or RHP). The CSP manages a data bank specifically on fish within the National Water Data Network (*Réseau national de données sur l'eau* or RNDE). In this capacity, the CSP may be called upon to provide information to the regional and national authorities as and when it is needed. A study is currently being conducted on the analysis of fish biodiversity as a factor to assess the state of health of rivers. In the longer term, the system set up will enable time-series to be compiled on natural or artificial developments of fish stocks.

### **Research conducted by the ONC**

Applied research and studies are undertaken by around 100 researchers and technicians within the National Hunting Office (ONC). It focuses mainly on acquiring knowledge and managing-game species and their habitats. Research is also undertaken on certain threatened mammals, on predator species and on the restoration of fragile habitats.

The main issues addressed in the research are the biology of species, devising management tools, acquiring knowledge about numbers taken through hunting activities, the impact of human activities,

trends in population numbers and habitat management methods. Research focuses above all on five species groups : small lowland game, large game, mountain fauna, migratory birds and predators.

The ONC is also involved in managing protected areas (5 500 hectares of game reserves, national game reserves and nature reserves), in analysing the impact of agro-chemicals on wild fauna and monitoring species' health.

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## CHAPTER VII :

### OVERSEAS CO-OPERATION AND TRANSFER OF KNOWLEDGE

#### VII.1 BIOLOGICAL DIVERSITY IN FRANCE'S OVERSEAS CO-OPERATION

Biodiversity conservation and restoration in France are part of a wider concern to contribute to maintaining global biological diversity, to work together with other countries, to co-operate on technical issues and exchange knowledge with Southern hemisphere countries, particularly French-speaking ones.

Today, France integrates the environment and biodiversity conservation in her overseas development aid programmes. France has set up a French Global Environment Facility (*Fonds français pour l'environnement mondial* or FFEM). The proportion of funding under this instrument allocated to biodiversity conservation is steadily increasing for projects on wetlands, coastal zones, tropical forests, steppes, dry forests, protection of threatened species etc.

France conducts an active policy on overseas co-operation in the field of management and conservation of water and aquatic ecosystem resources i.e. types of environment that are particularly suitable for biodiversity in all regions of the world, especially in tropical regions. In this field, France was one of the founding countries of the International Coral Reef Initiative (ICRI) set up for protection and management of this natural environment.

Lastly, through its public research institutes - particularly the International Centre for Co-operation on Agronomic: Research for Overseas Development (CIRAD) and French Institute for Scientific Research in Overseas Development and Co-operation (ORSTOM), France provides international assistance (overseas development aid) aimed at conserving and managing biological diversity in developing countries (development of agriculture, sustainable management of forests, conservation of wild fauna and flora and genetic resources, protection of soils and water resources).

Transferring knowledge increasingly tends to occur with new actors, whose skills are internationally recognised, becoming involved in the French system of overseas co-operation. These skills need to be formalised in terms of co-operation tools.

In this specific field, the following bodies are concerned : the National Coast and Lakeshore Conservation Agency (CELRL), the national parks, regional nature parks, the National Forestry Office (ONF), the Water Agencies, the French Institute for Environment (IFEN), the French Agency for Environment and Energy Management (ADEME). A framework agreement is currently being drawn up between the Secretary of State for Overseas Co-operation and the Ministry of Spatial Planning and Environment. Some experience has already been acquired or is being developed e.g. twinning parks (France-Ivory Coast, France-Senegal – cf. study undertaken by the French Committee to the IUCN/International Agency for French-speaking Countries or ACCT), ONF's operations in the Ivory Coast, CELRL's operations in Tunisia, the Indian Ocean and the Ivory Coast.

This chapter illustrates French overseas co-operation aimed at conserving biological diversity. Three strands of French overseas co-operation activities are presented in details :

- a financial tool for the conservation of biodiversity : the French Global Environment Facility (FFEM) ;
- a technical area in which France provides assistance : the protection and management of the aquatic environment ;
- French research on biological diversity conducted by two of the countries main public research institutes (CIRAD and ORSTOM) for the purpose of co-operation with developing countries.

### The French Committee to IUCN and its overseas co-operation activities

The French Committee to IUCN (World Conservation Union) was established in November 1992. This body is one of IUCN's 40 national committees and the fourth largest in terms of the number of members.

It currently has 45 members that come from NGOs, public institutions (the National Natural History Museum, the National Forestry Office, the National Coast and Lakeshore Conservation Agency, etc.) and Ministries (Foreign Affairs, Overseas Co-operation and Environment). It is also made up of some 150 experts who are members of the various committees depending on their skills (species survival, national parks and protected areas, environmental strategies and planning, environmental law and legislation, education and information) and in theme-based working groups (Mediterranean, mountains, overseas *départements* and territories, forests, etc.) set up by the Committee.

In the five years since it has been set up, the French Committee has defined its operating rules and become structured on a permanent basis ; it has also begun its first strategic discussions and devising action programmes in conjunction with IUCN-International. The committees and working groups have produced studies and research work on sensitive regional ecosystems (Mediterranean, mountains, forests and especially tropical forests).

The French Committee to IUCN has particularly become involved in operations for overseas co-operation with and transferring knowledge to a certain number of regions. Under the statutes of the association, priority is given to French-speaking countries. The operations have been conducted in the following areas :

- organising conferences (helping the French-speaking Parties to the CITES Convention prepare for conferences, round tables, etc.) ;
- organising training sessions ;
- conducting studies, in particular, on protected areas (Gabon, Guinea, Mauritania, Niger, twinning protected areas in France with French-speaking Africa) ;
- drawing up partnership agreements (French Committee to IUCN, CMS – Bonn Convention) ;
- translating and adapting IUCN-International's publications into French.

### Overseas co-operation activities undertaken by the French MAB Committee in the area of biodiversity conservation

The French Man and Biosphere (MAB) Committee carries out various activities in overseas co-operation that contribute to implementing the Convention on Biological Diversity. These activities are aimed at (i) devising and developing methods and guides to be disseminated, (ii) setting up co-operation between France and developing countries and specifically between managers of protected areas (iii) developing projects and (iv) improving training. The following activities are examples of this :

- developing a method to produce guides as a tool to help manage MAB reserves and applying this method in developing countries ;
- co-operation between the Man and Biosphere reserve of the Northern Vosges and that of Berezinsky (Belarus) ;
- drawing up an EC development project for conservation of the Mata Atlantica in the region of Iguape Jureia (Brazil) ;
- co-operation between the Man and Biosphere reserve of the Iroise (Brittany) and that of the Bijagos archipelago (Guinea-Bissau) ;
- organising an international seminar to discuss the future of protected areas in association with the French Committee to IUCN ;
- initiating biennial meetings of Man and Biosphere site managers at European and North American levels ;
- supporting the wetlands network.

The French MAB Committee grants its label to various research operations for overseas co-operation on restoring damaged sites and on establishing systems for sustainable use of natural resources, particularly in the Sahelian region.

## VII.2 THE FRENCH GLOBAL ENVIRONMENT FACILITY

Alongside the multilateral Global Environment Facility (GEF), France has established the French Global Environment Facility (*Fonds français pour l'environnement mondial* or FFEM). The latter's purpose is similar to that of the GEF but it is implemented on a bilateral basis. The amount of funding earmarked for the period 1994-1997 is FF 440 million (US\$ 75 million). 40 % of this sum is taken up by "biodiversity" projects. FFEM's resources, as those of the GEF, are additional resources to those allocated through the budget via French overseas development aid. The general criteria for a project to qualify for funding by the FFEM are identical to those adopted for the GEF.

With the support of this new tool, France is making great efforts to fund exemplary projects that are part of wider sustainable development programmes. The emphasis is placed on strengthening national capacities and the process of learning new techniques and technologies plays a major role in this.

### **Criteria for selecting projects on biodiversity**

Projects submitted for funding by the FFEM must :

- meet the general criteria and be in line with the priorities under international conventions (ozone, climate change and biodiversity) and also meet the conditions for funding by the GEF ;
- **primarily** be part of development projects in order to ensure more effective integration of global environmental issues within the sectors of development.

Funding through the FFEM should act as a lever and have the effect of **internationalising** the integration of biodiversity into overseas development projects. It must ultimately be capable of bringing about changes in development strategies in the countries concerned. The projects must focus on areas with major environmental characteristics in terms of biodiversity and/or areas under threat.

### **Broad types of operations funded by the FFEM**

Three broad categories of operations may benefit from funding from the FFEM regarding biodiversity :

- operations with direct effects on the conservation of biodiversity and management of protected areas : funding mechanisms, integrated conservation and development projects, management of natural resources involving local communities, surveys, rapid assessments, environmental impact assessments and defining biodiversity indicators, training management staff ;
- **operations** having an effect on direct or indirect factors ; these operations must help to identify and bring about the technical, economic, social and sociological conditions of sustainable management of the natural environment by influencing policies and practices ;
- operations encouraging adding sustainable economic value to biodiversity.

#### **Projects funded through the FFEM (at June 1 1997)**

By late May 1997, FFEM's Steering Committee had accepted 22 proposals for projects on biodiversity, 16 of which had already resulted in project assessment reports being compiled and in funding agreements being signed. The geographical distribution of funding is as follows : Africa (54%), Asia/Pacific (9 %), Mediterranean (9 %), Latin America/Caribbean (23 %), Eastern Europe (5 %).

The types of ecosystems covered by the funding are : wetlands (14 %), coastal zones (18 %), wet tropical forests (36 %), steppes/dry forests (32 %).

Research work and studies are incorporated in components of the projects and the objective must always be to support and guide an operational component. The distribution of funding for the projects submitted is as follows : research/study (25 %), training/capacity building (35 %), investment (40 %).

### VII.3 OVERSEAS CO-OPERATION REGARDING THE AQUATIC ENVIRONMENT

Faced with the expected rise in demand for water in the coming years, particularly in developing countries, France is applying its experience and skills to the protection of water resources, the aquatic environment and population needs. This is based on a highly active policy that France is pursuing at home on the protection of the aquatic environment and water resource management.

#### **Priority areas for aquatic resource management**

France wishes to promote an international action programme on freshwater, combining three major thrusts : applying recognised principles of water resource management at international level, developing decentralised co-operation and strengthening or extending existing legal instruments following the UN/ECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes. Similarly, France actively implements the Conventions on environmental protection in regional seas (e.g. the Mediterranean).

France supports water resource management by major river basins and she actively participates in the international commissions for the protection of rivers and lakes, the responsibility of which she shares with neighbouring countries (Rhine, Moselle, Lake Geneva, etc.), including the conservation of biodiversity resources.

#### **Sector-based technical co-operation to help set up Water Agencies**

Alongside the traditional subjects of technical co-operation in water matters (resource use and management, pollution control, hydraulics in agriculture), France provides assistance to set up Water Agencies (i.e. public agencies for water management established at the level of the major river basins). With France's support, several countries have initiated action in this field, particularly Indonesia, Brazil and Poland. The latter country wished to benefit from France's experience acquired in this field and is in the process of setting up several water agencies. Through global management of water resources and the aquatic environment and funding operations specifically at river basin level, the approach advocated by the Water Agencies contributes to conserving biological diversity, especially in the aquatic environment.

#### **Management of the major river basins and rivers**

France has acquired sound experience and practices in this field that she can pass on to developing countries : a unique institutional model in which the responsibilities are shared between the State, local authorities and private groups (the Water Agencies, the private companies that distribute drinking water and treat waste water and companies that carry out planning, development and management of waterways), international economic actors, experienced consultancies, research institutes (CEMAGREF, ORSTOM, CIRAD, INRA, etc.) training institutes, involvement in international research activities (IMI, IPTRID, IBSRAM). In addition, France has set up a body to bring together French skills in water matters within the International Water Office (*Office international de l'eau* or OIE).

#### **The International Water Office : a major player in overseas co-operation**

The International Water Office (OIE) was set up on January 24 1991 on the initiative of the Ministries of Environment, Agriculture, Foreign Affairs, Overseas Co-operation, Industry and Health. The OIE has six main tasks :

- to disseminate general, specialised and institutional information on all the areas concerning water ;
- to manage data bases that enable the quality of the aquatic environment and water resources to be monitored ;
- to organise study programmes, assessments and evaluations ;
- to provide access to scientific, technical, economic and institutional documents ;
- to provide training for professions in the area of water.



#### VII.4 BIOLOGICAL DIVERSITY IN PUBLIC RESEARCH FOR OVERSEAS DEVELOPMENT AID

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France encourages the integration of the environment and biological diversity in her overseas co-operation programmes. France also ensures that biodiversity conservation is an integral part of research for development of the countries with which she co-operates. This is particularly the case through the work undertaken by the country's public research institutes : CIRAD and ORSTOM.

##### **The International Centre for Co-operation on Agronomic Research for Overseas Development (Centre de coopération internationale en recherche agronomique pour le développement or CIRAD)**

CIRAD is a public scientific body specialised in agriculture in the tropical and subtropical regions. It was established in 1984 following a merger of a number of research institutes specialising in agronomical, veterinary, forest and agri-food sciences in the tropical regions.

CIRAD's task is to contribute to the development of these regions by undertaking research, experiments and providing training and scientific and technical information. It conducts its work in its own research centres within national agronomic research institutes of partner countries or by supporting overseas development through co-operation activities. It employs 1 800 staff (including 900 executives) who are stationed in some 50 countries.

Within CIRAD, biodiversity is incorporated in the objectives summarised by the terms "sustainability" and "double green revolution". In addition to the objectives of fighting against poverty and food shortages, today there is an environmental perspective to maintain the potential of the environment and biodiversity for future generations.

CIRAD is actively involved in devising and setting up several major "ecoregional" projects in Africa and Asia, drawing on partnerships with the different types of economic operators and by joining forces with experts from national research bodies of the partner countries, other scientific institutions from the Northern hemisphere and certain centres of the international agronomic research system.

With regard to biodiversity, CIRAD mainly undertakes action in the following fields : site restoration, site conservation, interaction between biodiversity and farming activities, socio-cultural practices, socio-economic research, genetic diversity and genetic resources management.

##### **French Institute for Scientific Research in Overseas Development and Co-operation (*Institut français de recherche scientifique pour le développement en coopération* or ORSTOM)**

ORSTOM is a public scientific and technological body under the authority of the Ministries of Research and Overseas Co-operation. It has a staff of 2 500 including 600 from Southern hemisphere countries and has 54 delegations in France, in her overseas *départements* and territories as well as in developing countries.

One of ORSTOM's major tasks is to promote and carry out any research work that may contribute to the economic, social and cultural progress of developing countries by studying the physical, biological and human environments of these countries through action undertaken on a partnership basis. It helps to build the scientific capacities of Southern hemisphere countries, provides training for research and for specific operations.

The dimension of biodiversity is taken into account in the following ORSTOM research stations :

- dynamics and uses of water resources and the tropical aquatic environment,
- dynamics and uses of the tropical terrestrial environment,
- dynamics and uses of marine and coastal ecosystems and their resources,
- the biological bases for enhancing biodiversity in agriculture and the agri-food business.

At a more detailed level of the research programmes, biodiversity is taken into account in the following aspects : acquiring knowledge about tropical biodiversity, sustainable management of species and resources and genetic resources.

### **French research undertaken on biological diversity in coral reefs**

France was one of the countries to set up the International Coral Reef Initiative (ICRI). France is particularly active in the fields of acquiring knowledge on, managing and protecting resources in the coral reefs. Through her overseas *départements* and territories (DOM-TOMs), France is present in three of the major regions or regional seas concerned : the Caribbean, the Indian Ocean and the Pacific Ocean.

France has set up a National Coral Reef Research Programme (**Programme national de recherche sur les récifs coralliens** or PNRCO) that currently focuses on three themes :

- past and present carbonates,
- how the reef and lagoon ecosystem functions,
- reef oceanography.

Several research institutes are involved in this programme : universities in the DOM-TOMs, ORSTOM, the National Natural History Museum (MNHN), School for Advanced Studies (EPHE), the National Centre for Scientific Research (CNRS). The research conducted on biological diversity in the coral reefs is as follows :

- flora and fauna surveys,
- species diversity,
- habitat and landscape diversity,
- origins and conservation of biodiversity,
- impacts of introduced species.

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## CHAPTER VIII :

### EDUCATION AND TRAINING FOR BIODIVERSITY CONSERVATION

Education, awareness-raising and training are three vital conditions for long-term biodiversity conservation. They are chiefly carried out by integrating environmental concerns into the education system for children, young people and teachers, by setting up specific higher education training courses and by carrying out action to inform and raise the awareness of the general public.

In France, environmental education is carried out by several partners : NGOs, Ministries, the National Natural History Museum (MNHN), local authorities, etc. In this field, action undertaken at local level has developed considerably as a result of the Decentralisation Acts adopted in the early 1980s and the significant role played by NGOs.

#### VIII.1 GRADUALLY INTEGRATING ENVIRONMENTAL CONCERNS INTO THE FRENCH EDUCATION SYSTEM

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Five years after the 1972 Stockholm Conference, the Ministry of Education officially integrated environmental concerns in school curricula through the Circular it issued on August 29 1977 entitled "General Guidelines on the Environmental Education of Pupils". This Circular today acts as a charter for environmental education in France. Subsequent protocols were signed with the Ministry of Environment (February 15 1983 and January 14 1993).

The 1993 protocol is designed to organise and strengthen the integration of environmental concerns - including nature and biodiversity conservation - in education. It focuses on four themes :

- improving basic and vocational training for teachers ;
- introducing the environment into school curricula, not on the basis of the environment being considered as a separate subject, but rather as a cross-sectoral concept ;
- improving and rationalising teaching resources by setting up data bases ;
- setting up a unit to monitor developments in environmental professions.

Environmental education with regard to the conservation of the natural environment and of wild fauna and flora can be introduced into the education system in two ways : as a discipline, for which every subject, without exception, can provide input as part of their respective curricula ; and in an inter-disciplinary way through primary school study topics, cross-sectoral subjects in secondary schools, educational field projects or discovery classes. The latter give priority to *in situ* understanding of the environment through field trips organised and run by experts and teachers.

The national list of environmental training courses currently indicates more than 800 courses for all levels except primary schools (secondary schools, vocational training institutes, universities, etc.). Among these, there are 224 basic training courses in higher education (i.e. three to five years' study at university). This advanced training in the field of environment is offered by several universities. In many cases, it is closely integrated into training for engineers and technicians, particularly in the sector of agricultural training (see box below).

### **Increasing integration of the environment in agricultural training**

In agricultural training (agricultural colleges, colleges of higher education), there has been considerable development in new training courses that combine the position of agriculture in the production system and the national economy with aspects regarding land use and biodiversity conservation.

Similarly, training courses are being set up at universities and vocational and technical training institutes. The training department of the Permanent Assembly of Chambers of Agriculture (*Assemblée permanente des chambres d'agriculture* or APCA) has also developed a series of training courses for technicians and farmers in the field of the environment (pollution control, landscapes, taking into account biodiversity conservation).

### **Educational field projects (*Projets d'action éducative* or PAE)**

Since 1979, educational field projects (PAEs) have been part of school curricula, based on the efforts of a team of teachers and students who choose to work together on a project with the help of outside partners. The environment is one of the major subjects covered by PAEs.

Some projects which focus heavily on local concerns or issues attest to the high value of this kind of partnership. Thus 2nd year pupils from a secondary school in Fleury-sur-Andelle (near Rouen) are discovering the natural environment in close association with the staff of the Brière Regional Park. In the Poitiers region, pupils from Les Salières secondary school in Saint-Martin de Ré (on Ré Island) are taking information classes on the techniques of shell-harvesting on foot in order to protect the intertidal zone from irreparable damage. The operation is being conducted with the French Institute for Research on Marine Resource Use (IFREMER) and the local Tourist Office.

In the Aspe Valley in the Pyrenees, French and Spanish bodies are involved in an interdisciplinary programme focusing on the protection of bears. The joint efforts provided by the national park and the local authorities have helped to produce outstanding teaching material.

## **VIII.2 ACTION UNDERTAKEN BY BODIES IN CHARGE OF WILD FAUNA AND FLORA CONSERVATION**

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Environmental education also takes place at local level through field trips and working with partners whether they be nature conservation NGOs or the regional offices of the Ministries concerned (Regional Office for the Environment, Regional Office for Culture, National Forestry Office) ; regional, *département* or local authorities or private companies, etc.

This partnership operates within many different bodies such as the Permanent Centres for Environmental Education (*Centres permanents d'initiation à l'environnement* or CPIE), national or regional parks, Architecture, Town Planning and Environment Councils (*Conseils d'architecture, d'urbanisme et de l'environnement* or CAUE) and national botanical conservation agencies, etc. The aim is to provide information and training for the public in urban or rural areas with regard to the realities of the natural and human environment. In particular, this involves understanding and protecting wild fauna and flora and the importance of their protection so that everyone may feel responsible for their living environment.

The functions of most of the bodies and partners involved in natural heritage conservation and management include educational aspects. In 1981, the educational activities run by the national parks and regional nature parks were formally established through projects such as trails, theme and information centres as well as initiation activities for schoolchildren. Informing the public about the threats to the plant kingdom, its diversity and its resources is an operation undertaken on a day-to-day basis by the national

botanical conservation agencies (*conservatoires botaniques nationaux* or CBN) based on collections of living plants.

Schools and colleges, NGOs, training centres and the general public thus have access to suitable awareness-raising tools (teaching services, workshops for schoolchildren, exhibitions, lectures, slide shows, theme tours and libraries, etc.).

At the same time, the development of “green” tourism based on the quality of natural heritage has also helped to raise public awareness by encouraging more environmentally friendly behaviour.

The following boxes provide details on the specific role and activities of three categories of players heavily involved in education activities for nature conservation purposes :

- the Permanent Centres for Environmental Education (CPIE),
- the National Natural History Museum (MNHN),
- nature conservation NGOs,

lastly, the educational programme Citizenship-Environment and Development (*Citoyenneté-Environnement et Développement*) is also presented.

**The Permanent Centres for Environmental Education**  
**(Centres permanents d'initiation à l'environnement or CPIE) :**  
“look, develop and pass the knowledge on”

The 43 Permanent Centres for Environmental Education (CPIE) are vital links in the chain for action at regional level. Since their creation in 1972, they have been contributing to biodiversity conservation through awareness-raising and training programmes, analysis of and involvement in local development projects. They bring together skills and operate in partnership with all the actors concerned in the geographical area they cover - both in urban and rural areas. The CPIEs have formed a national union and thus function as a network.

CPIEs act as mediators combining consultancy with action, handling disciplines as varied as biology, educational sciences, history, geography, economy etc. Based on this approach, the CPIEs have defined the three-pronged focus of their activities : *look*, providing a service to study the environment and natural heritage, *develop*, playing an active role with partners to enhance their area – in 1994, 250 studies or local development projects were conducted –, *pass the knowledge on*, in a scientific, sensitive and cultural approach adapted to each type of audience.

Each year, the CPIEs organise a total of 440 000 days of courses and 45 000 days of training sessions. They also organise environmental initiation trips for schoolchildren.

**The Citizenship-Environment and Development Programme**  
**(Citoyenneté-Environnement et Développement)**

In 1992, the Teaching and Vocational Training Federation (*Ligue de l'enseignement et de la formation permanente*) which introduced discovery and field trips, launched a specific programme for environmental education entitled Citizenship-Environment and Development (CED). This programme has been awarded a quality label valid for activities undertaken and operating methods used by organisers of educational trips and for leisure and holiday centres. In this context and with support from the WWF, the above-mentioned Federation launched an awareness-raising and education programme on the subject of biological diversity. Teaching documents and other aids have been produced. In each centre where the CED programme is run, display panels help young people to improve their knowledge.

In 1996, 24 centres in France were awarded the CED label. During the last school year, they were visited by 1 500 classes and their teachers i.e. some 55 000 people in all.

## Action undertaken by the National Natural History Museum (MNHN) in the field of education, training and awareness-raising

The MNHN is a public body for higher education, primarily under the authority of the Ministry of Education, Higher Education and Research and secondarily under the authority of the Ministry of Environment.

Under its statutes within the Ministry of Education, one of its task is to disseminate knowledge on the natural heritage to all sectors of society (schools, general public, experts). At the request of the Ministry of Environment, this task is directed at actors involved in biodiversity management in two highly different contexts : protected areas and spatial planning.

### Basic training

Basic training is that which is provided by the educational system until students obtain qualifications and they begin their working life.

As part of higher education and training for research, several members of the MNHN teach students following courses to obtain the Diploma of Advanced Studies (*diplôme d'études approfondies* or DEA) and the Diploma of Specialised Higher Studies (*diplôme d'études supérieures spécialisées* or DESS) and those students following courses at the MNHN's school (*École doctorale*) particularly in subjects such as : animal and plant systematics; DEA Environment : time, areas, societies (biodiversity management and sustainable development) ; DEA Biodiversity; DEA Museology (natural and social sciences).

General primary and secondary education focuses on biodiversity in the natural environment. It is organised by the Department of Educational Activities (*Service de l'animation pédagogique*) and takes various forms : MNHN classes, production of films and radio/television programmes.

Lastly, the MNHN is involved in higher technical education in the area of agriculture : in training for the Higher Technician Certificate (*Brevet de technicien supérieur* or BTS), specialising in land management. Experts from the MNHN teach subjects such as biodiversity and landscape ecology issues.

### Vocational training

Vocational training is provided in addition to basic training. People who have already received basic training and who are working follow proficiency courses or courses to improve and update their knowledge. The following professions are concerned by this type of training :

- managers of protected natural areas and regional administrative officials in charge of implementing environmental policy ;
- those in charge of enforcing the protection orders issued on threatened species ;
- managers and those involved in land management, particularly under an agreement concluded with the National School of Rural Engineering, Water and Forests (ENGREF) ;
- teachers in State secondary schools and agricultural colleges.

### Training and awareness-raising aimed at the general public

The MNHN has a statutory duty to disseminate knowledge on the natural heritage to all sectors of society, i.e. those who are interested in biodiversity through lectures, exhibitions and discussions fora, etc.

The MNHN provides two types of exhibition for the public :

- permanent exhibitions, such as the Hall of Evolution (*Galerie de l'Évolution*), entirely devoted to understanding biodiversity (diversity of the living world, evolution and life, man as a factor of evolution). This permanent exhibition designed for the general public is obviously a major teaching aid for schoolchildren of all levels.
- temporary exhibitions of varying size and duration, such as the following : Forest and Man, Sustainable Development (1996) and Sacred Nature, Managing Biodiversity (1997).

### The role of NGOs in nature education and training

While nature conservation can be justified for scientific and social reasons, it can only be effective if as many people as possible perceive a need for it. It can also be justified for ethical and utilitarian reasons linked to resource conservation.

In both cases, it implies awareness and knowledge that are vital to gain support for conservation policy and for the consequences of implementation thereof. Conservation measures are generally seen in a favourable light by the public contemplating the issue, but to a lesser extent if the population categories directly concerned are taken into account. During the relatively short history of nature conservation, it has already been possible to observe the extent to which raising the awareness of and educating the public are prerequisites for the success of conservation measures.

This duty is also part of the tasks carried out by nature conservation NGOs. The latter focus a considerable part of their activities on nature discovery, awareness-raising or education. Originally, these activities were carried out within the NGOs themselves, but gradually they gave rise to bodies specifically set up for this purpose : the Permanent Centres for Environmental Education (CPIE - see above) and Nature Initiation Centres (*Centres d'initiation à la nature*) and to networks that are today supported by public authorities. One of the objectives that could be assigned to the development of these bodies would be to form a nationwide network of nature centres distributed according to ecological entities and taking part in nature conservation measures with a view to contributing to local development.

However, these guidelines are not always effectively followed up despite the apparent increase in funds allocated to educational activities. The currently fashionable concept of environmental education tends to equate with the term environment a whole series of highly disparate and vague activities at the risk of overshadowing the real issue of nature education. Yet, it is precisely in the field of nature education that the needs are most strongly felt since it is a fact that the urban way of life and the damage caused to natural areas situated close by remove the public from their contact with nature and, in particular, unspoilt nature. Putting people in touch with nature in order to stimulate their awareness of the unspoilt beauty and spontaneous character of nature that is not controlled or dominated by man is an extremely useful way of encouraging nature conservation.

Here too, the role of NGOs is vital in that they are close to the public and that they have developed educational skills, drawing on a sound knowledge of nature. It is precisely through their sensitive and yet scientific approach to nature that NGOs are capable of passing on a strong message to support conservation.

This can be seen in the example of the Alsace region. Here, knowledge about the complex and dynamic functioning of the Rhine river system has been made accessible to the public and local riverside residents through awareness-raising campaigns conducted over a period of several years by nature conservation NGOs. As a result of these campaigns, the State was initially able to implement an overall conservation plan for this outstanding environment and can now envisage adopting measures to restore the river dynamics that will help both to maintain biodiversity and conserve water resources.

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## List of abbreviations and acronyms

ADEME	: French Agency for Environment and Energy Management
BRG	: Genetic Resources Office
BRGM	: Geological Mining and Research Office
CAP	: Common Agricultural Policy
CAUE	Architecture, Town Planning and Environment Councils
CBGP	Biology and Population Management Centre
CBN	National Botanical Conservation Agency
CELRL	National Coast and Lakeshore Conservation Agency
CEMAGREF	French Research Institute for Agricultural and Environmental Engineering
CFISM	French Computerised Microorganism Collection
CILBA	Agropolis International Biological Control Centre
CIRAD	International Centre for Co-operation on Agronomic Research for Overseas Development
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CNAG	National Commission for Genetic Improvement
CNES	National Centre for Space Exploration
CNRS	National Centre for Scientific Research
CPIE	Permanent Centre for Environmental Education
CRBPO	Research Centre for Bird Population Biology
CREN	Regional Natural Area Conservation Agency
CSP	National Fisheries Council
DATAR	Delegation for Spatial Planning and Regional Development
DBE	Biodiversity Dynamics and Environment
DDAF	<i>Département</i> Office for Agriculture and Forestry
DIREN	Regional Office for the Environment
DNP	Nature and Landscape Directorate (within the Ministry of Environment)
DOM	Overseas <i>Dkpartements</i>
DOM-TOM	Overseas <i>Départements</i> and Territories
EEA	European Environment Agency
EC	European Community
ECOFOR	Forest Ecosystems Public Interest Group
ETC/NC	European Topic Centre for Nature Conservation
EU	European Union
FAO	United Nations Food and Agriculture Organization
FFEM	French Global Environment Facility
FNE	<b>France Nature Environnement</b>
GEF	Global Environment Facility
GEVES	Varieties and Seeds Study and Monitoring Group
GIP	Public Interest Group
IEGB	Institute for Ecology and Biodiversity Management
IFEN	French Institute for the Environment
IFREMEF:	French Institute for Research on Marine Resource Use
INRA	National Institute for Agronomic Research
INSEE	National Institute for Statistics and Economic Studies
INSERM	National Institute for Health and Medical Research
IPGRI	International Plant Genetic Resources Institute
IUCN	World Conservation Union (formerly the International Union for the Conservation of Nature and Natural Resources)

LPO : French Society for the Protection of Birds  
 MAB : Man and Biosphere Programme  
 MINE : Microbial Information Network in Europe  
 MNHN : National Natural History Museum  
 NGO : Non-governmental organisation  
 OGAF : Joint Land Management Operation  
 ONC : National Hunting Office  
 ONF : National Forestry Office  
 ORSTOM : French Institute for Scientific Research in Overseas Development and Co-operation  
 PMPOA : Programme to control pollution from agricultural sources  
 PNBDE : National Biodiversity and Environmental Dynamics Programme  
 POS : Land Use Plan  
 PDD : Sustainable Development Plans  
 SAGE : Water Development and Management Plans  
 SCPN : Natural Heritage Accounting System  
 SDAGE : Water Development and Management Master Plans  
 SDAU : Land Use Master Plans  
 SFF : Fauna and Flora Secretariat (today SPN/IEGB)  
 SFM : French Microbiology Society  
 SOFT : Soils and Tropical Forests Scientific Committee  
 SPA : Special Protection Area (under EC Directive 79/409/EEC)  
 SPN : Natural Heritage Department  
 UN : United Nations (Organization)  
 UNESCO : United Nations Educational, Scientific and Cultural Organization  
 UNLG : National Union of Breed Books  
 WWF : World Wide Fund for Nature  
 ZICO : Important Areas for the Conservation of Birds  
 ZNIEFF : Natural Areas of Ecological and Wildlife Interest

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