

# The network of Conservatoires Botaniques Nationaux in France and the implementation of the GSPC: results of fifteen years of activities

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## Abstract

*The Conservatoire Botanique National of the Bassin Parisien: a leading role in plant diversity conservation in the French Ministry of Ecology and Sustainable Development (Departement Ecologie et Gestion de la Biodiversite) In France, the Conservatoires Botaniques Nationaux are responsible for the conservation of plant diversity. The Conservatoire Botanique National of the Bassin Parisien, which comes under the National Museum of Natural History, has five main activities, which are in total accordance with the targets of the GSPC. The communication will present many advancements which have been obtained in these five domains:*

- 1. The ambitious programme of biodiversity inventory: it allows us today to provide a widely accessible list of two thousand known species, with more than three million data items (the seventh GBIF contributor). The database is useful to support public policies for territorial projects including biodiversity*
- 2. The research activity is carried out on very limited size populations and include demographic and genetic studies, the development of protocols and relevant tools for ecological engineering*
- 3. A large programme of ex situ conservation, with a seed bank, an in vitro micropropagation unit and a living collection as a back up for the in situ conservation projects*
- 4. Numerous in situ programmes are carried out: population reinforcement, reintroduction and transplantation. At the same time, an ecological management of habitats is established to protect the ecosystems*
- 5. Communication and education of the general public through the use of different medias*

## Introduction

Although France played a major role in the creation of the IUCN at Fontainebleau in 1948 (now called the World Conservation Union), this country has since had a low profile on the international scene. However, since 1990, the creation of the Conservatoires Botaniques Nationaux has enabled France to develop a strong programme in plant biodiversity and conservation. The Conservatoires Botaniques Nationaux, now regarded as the leaders of knowledge in the field of plant conservation, do not have an equivalent in Europe or anywhere in the world. Because its activities have been primarily within France, this country has not been a major contributor to the *Global Strategy for Plant Conservation* (GSPC). Similarly, the activities of the Conservatoires Botaniques Nationaux are seldom represented within Botanic Garden specialized networks (BGCI, ENSCONET...). Now, however, the expertise of the Conservatoires Botaniques Nationaux has progressed to such an advanced degree that they must take on the role of a world leader in this field.

The Conservatoires Botaniques Nationaux have four main objectives:

1. investigate the distribution and evolution of wild flora and natural or semi-natural habitats, using scientific methods
2. identify and conserve rare and endangered wild species and natural or semi-natural habitats
3. publish assessments for the Administration and all local communities
4. educate the public about plant biodiversity and protection

The results obtained within the framework of these missions are evaluated every five years, which leads to the renewal of the ministerial agreement for a new five-year period. At the same time, the scientific committee of each Conservatoire meets every year to assess the actions carried out during the previous year and to make any adjustments thought necessary.

Today, there are eight Conservatoires Botaniques Nationaux, and there will soon be ten with the creation of two new Conservatoires (East of France, French Guiana). With the completion of the ministerial agreement for three others (Franche-Comté, Sud-Atlantique and French West Indies), all the French territory will be covered (Figure 1).

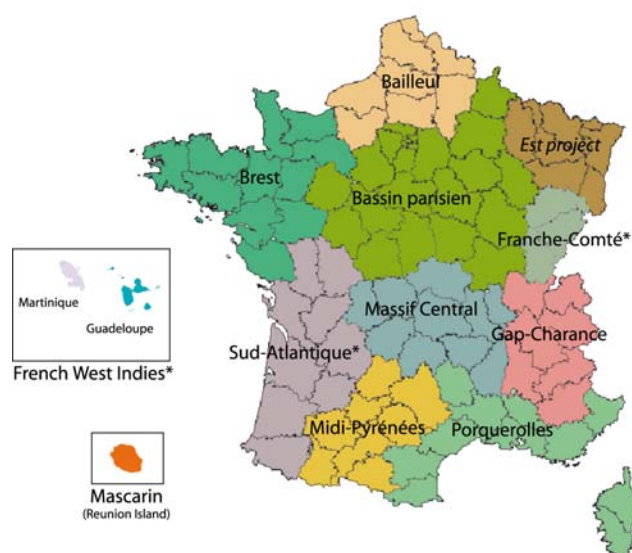


Figure 1. The network of Conservatoires Botaniques Nationaux in France. \*Conservatoires which are waiting for their “National” ministerial agreement

Since 2000, the Conservatoires Botaniques Nationaux have been gathered in a Federation that:

1. coordinates and standardizes working methods
2. implements and leads national programmes of knowledge of the conservation of flora and their habitats
3. supports new Conservatoires

Moreover, following the adoption of the *Global Strategy for Plant Conservation* in La Haye in 2002, the Federation of Conservatoires Botaniques Nationaux have been aiding the French Ministry of Ecology and Sustainable Development to formulate a French National Strategy for Plant Conservation which is based on the main targets of the GSPC.

Fifteen years after the creation of the network of the Conservatoires Botaniques Nationaux, the Federation is pleased to report significant progress in the knowledge of the distribution of wild flora, understanding of

plant conservation as well as in the success of the public education programmes. France is now making a significant contribution to the implementation of the GSPC.

## Understanding and documenting plant diversity

Concerning the flora, the first mission of the Conservatoires Botaniques Nationaux is an understanding of the spatial distribution for all species over the whole national territory. A thorough inventory is carried out which, in addition to data collected by plant fanciers and data from the literature, leads us to a very good knowledge of the plant biodiversity (Figure 2). With more than twelve million items of data, the Conservatoires Botaniques Nationaux have documented the French Flora in great detail. The network of Conservatoires Botaniques Nationaux is the sixth largest contributor in the world to the GBIF programme and provides the only contribution from the Conservatoire Botanique National of the Parisian Basin. The network of Conservatoires Botaniques Nationaux may soon be the third largest world contributor.

This knowledge permits publication of several floristic Atlases, at the local and regional levels, and it permits us to establish regional Red Lists of threatened species, using IUCN criteria.

Moreover, these lists are very useful for planning the programme of seed harvesting and defining the priorities for *in situ* conservation trials.

Finally, this thorough knowledge of plant distribution is very useful for territorial development. For example, the Conservatoire Botanique National of the Parisian Basin developed the “Parisian Hot Spots Map”, which is used for public policies. This map is made from the rare and protected species distribution map (Figure 3).

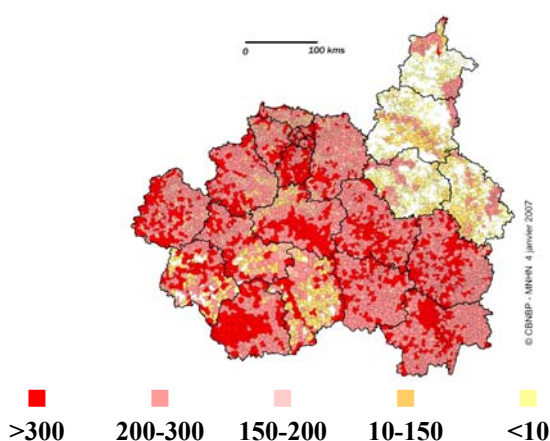


Figure 2. Number of species per commune (after 1990) for the study area of the Conservatoire Botanique National of the Parisian Basin

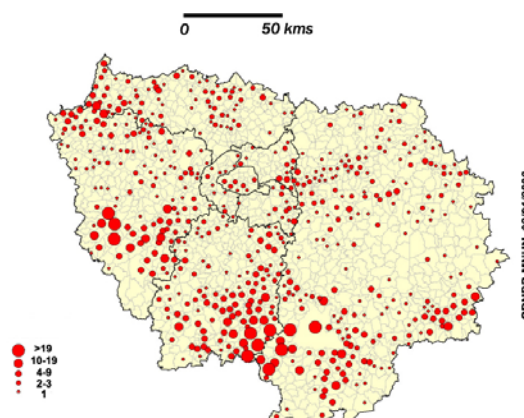


Figure 3. Number of protected species per commune (after 1990) for the Parisian region

Over the last few years the Conservatoires Botaniques Nationaux have improved the knowledge of natural and semi-natural habitats. After having set up a typological reference frame (which establishes common tools for cartography at the national level), a methodological cartography guide has been developed, as well as a guide for identifying natural and semi-natural habitats. Both guides provide a standard method of mapping the habitats. Thus, several hundreds of thousands of hectares were described and mapped, both at a regional level and a local level (Figures 4 & 5).

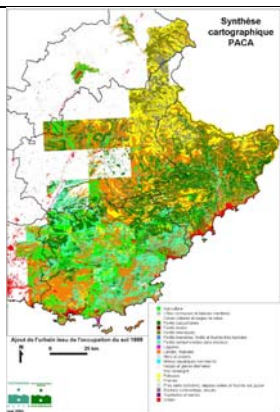


Figure 4. Cartography of natural habitats in the Provence-Alpes-Côte d'Azur region

Realization : Conservatoires Botaniques Nationaux de Porquerolles and Gap-Charance



Figure 5. Cartography of natural habitats of a Seine Valley loop (west of Paris)

Realization : O. JUPILLE, CBNBP-MNHN

The information is available for the public by consulting the different websites of each Conservatoire Botanique National. A website of the Federation is under construction and it will organize access to all French data on flora and habitats.

Thus, the work carried out for more than fifteen years helps achieve two of the prime targets of the *Global Strategy*, and this knowledge will be maintained at a high level, thanks to the installation of Regional flora Institutions.

## Development of models and protocols for plant conservation

Relevant programmes of *in situ* conservation require effective tools that are developed in the laboratory and field. This research in conservation biology is interested in population genetics and demography. It is centred on very limited size populations, in order to understand the threats weighing on these weakened populations (consanguinity, Allee effect...).

This research is conducted in partnership with the main French universities, and other institutions with a high degree of expertise (National Natural History Museum in particular).

## Conserving plant diversity

The Conservatoires Botaniques Nationaux have developed an integrated vision of plant conservation, whose main target is to ensure the preservation and the conservation of species in their natural habitats. For that, the Conservatoires use the following adapted tools: legal rules for species and spaces, scientific surveys, reinforcement, reintroduction and transplantation of populations in nature (that is often made through partnership with natural area managers), *ex situ* conservation if necessary, research activities on biology and species ecology.

A national assessment is being prepared, about the many actions conducted by the Conservatoires on the 486 species regarded as the most threatened on metropolitan territory, according to *The red book of the threatened flora of France (Livre rouge de la flore menacée de France)* edited in 1995 (<http://inpn.mnhn.fr/inpn/en/conservation/LR/index.htm>).

Today, the Conservatoires Botaniques Nationaux have conducted a lot of threatened species conservation programmes, in the field. Ecological management of habitats, reinforcement (Figures 6 & 7) and reintroduction of populations are the tools commonly used to reach this aim. If destruction of habitats is inescapable, transplantation of populations. Each one of these programmes must be authorized by the French Ministry of Ecology and Sustainable Development.

Some of these experiments help develop the conservation methods which must be used for *in situ* conservation trials such the importance of the source of the material in relation to increased genetic diversity, the number of ramets for a reintroduced population and the spatial organization of the ramets.

In addition to the development of relevant tools for *in situ* flora conservation, these experiments help the necessary evolution of laws as regards species reintroduction and origin of plant material used.



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Figure 6 & 7. A reinforcement trial for *Equisetum variegatum* (L.) Schleich, a mountain species on the brink of extinction in the French plain

*Ex situ* conservation is one of the main aims of the Conservatoires Botaniques Nationaux too. It is carried out both in the laboratory and in the garden.

In the laboratory, seeds which are collected from threatened plants are preserved according to three different modes (dry cold at +4°C, freezing at -20°C and freeze-drying). Various tests are usually carried out to verify if batches keep their capacities to germinate.

The seed harvest is based on legally protected species. Because the revision of the lists is not often done, the seed harvest is extended to species that are threatened according to local botanists.

Garden conservation is arranged around three themes: the supply of material that is absolutely necessary for activities of research in conservation, the precautionary conservation of threatened species, and the creation of plant collections, which after a phase of large scale multiplication, will be used for plans of reinforcement and reintroduction.

This is in fact a dynamic conservation: besides the seed banks of which the goal is to anticipate the changes in the French floristic landscape, the plant material collected *in natura*, after a phase of multiplication in the garden, is intended to maintain the threatened populations in nature.

Invasive species are a problem on which the Conservatoires Botaniques Nationaux have worked for a long time. They have taken an active part in the identification of species which can be regarded as invasive. They contributed to a publication dealing with the biological invasions caused by the exotic plants, including the study of the situation and some proposed solutions (Muller 2004). The Conservatoires Botaniques Nationaux currently contribute to designing tools that allow the French Government to establish rules and prohibit trade in invasive species. As announced in the *French Strategy for Biodiversity* ([http://www.ecologie.gouv.fr/IMG/pdf/FRENCH\\_STRATEGY\\_FOR\\_BIODIVERSITY-2.pdf](http://www.ecologie.gouv.fr/IMG/pdf/FRENCH_STRATEGY_FOR_BIODIVERSITY-2.pdf)), an institution for invasive species will be created very soon, on the initiative of the French Ministry of Ecology and Sustainable Development, thanks to the information provided by the Conservatoires Botaniques Nationaux.

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## Promoting education and awareness about plant diversity

The work done by the Conservatoires Botaniques Nationaux to promote education on plant biodiversity and to increase public awareness about the need for its protection is very important. Each Conservatoire uses its own methods but the targets are the same: to give each citizen the tools to take part in some aspect of plant biodiversity protection.

**Schools:** the Conservatoire Botanique National of the Parisian Basin wrote a handbook dealing with biodiversity and called “*La biodiversité à la portée de tous*” (*The biodiversity that anyone can understand*). This sixteen page handbook was distributed to all the classes in each primary school of the Parisian region (about forty thousands handbooks). Like the other Conservatoires Botaniques Nationaux which accommodate school classes, the Conservatoire Botanique National of Bailleul has a laboratory of three hundred square metres to organize botanic workshops for children

**Students:** the Conservatoires Botaniques Nationaux accommodate many trainees, from bachelor’s degree to post graduate theses. The staff of the Conservatoires teach courses at university on biodiversity conservation and they ensure professional sessions about natural heritage

**General public:** open days are regularly organized for the *ex situ* collections and the seed banks. Moreover, the scientists of the Conservatoires Botaniques Nationaux take part in many conferences about ecology and biodiversity, and they are often interviewed by the media. The partnership, initiated by the Conservatoire Botanique National of Brest with the foundation of a great industrial parapharmaceutic group, which is interested in conservation and the good use of the plants, has recently supported the publication (two hundred and fifty thousands units) and the free distribution of a handbook of fifty pages dealing with the threatened plant species. At the regional level, the Conservatoires Botaniques Nationaux publicized the problem of invasive species through conferences and publications

**Decision makers:** to inform public policies is a priority for species that are threatened by extinction. Thus, the Conservatoires Botaniques Nationaux inform the decision-makers of the presence of protected or threatened species. These data must be known before any decisions are made as regards town planning and important building sites. The Conservatoires Botaniques Nationaux accompany and advise local councillors for the setting up of actions for the protection of plants that are on the brink of extinction.

## Conclusion

Thus the Conservatoires Botaniques Nationaux are establishments that show a high relevance in the following contexts:

- Convention on Biological Diversity (<http://www.cbd.int/default.shtml>)
- Bern Convention (Convention on the Conservation of European Wildlife and Natural Habitats ([http://www.coe.int/t/e/Cultural\\_Co-operation/Environment/Nature\\_and\\_biological\\_diversity/Nature\\_protection/](http://www.coe.int/t/e/Cultural_Co-operation/Environment/Nature_and_biological_diversity/Nature_protection/)))
- *French Strategy for Biodiversity* ([http://www.ecologie.gouv.fr/IMG/pdf/FRENCH\\_STRATEGY\\_FOR\\_BIODIVERSITY-2.pdf](http://www.ecologie.gouv.fr/IMG/pdf/FRENCH_STRATEGY_FOR_BIODIVERSITY-2.pdf))
- *Global Strategy for Plant Conservation* (<http://www.cbd.int/programmes/cross-cutting/plant/default.asp>)
- *European Plant Conservation Strategy* (<http://www.plantlife.org.uk/international/plantlife-policies-strategies-eps.html>)

- Habitats Directive  
([http://ec.europa.eu/environment/nature/nature\\_conservation/eu\\_nature\\_legislation/habitats\\_directive/index\\_en.htm](http://ec.europa.eu/environment/nature/nature_conservation/eu_nature_legislation/habitats_directive/index_en.htm))

## Reference

Muller, S., 2004. *Plantes invasives en France*. (Patrimoines naturels, 62). Muséum national d'Histoire naturelle, Paris, France.