

Introduction - Portugal

Portugal covers an area of 92.000km with a population of about 10 million. The mainland has, from a climatic point of view, a Mediterranean influence, with dry and hot summers and rainy winters, but it is also influenced by the temperate macroclimate. This situation leads to a notable climatic variation that is confirmed by gradients of basic climatic data (Pereira *et al.*, 2004)¹:

- Annual precipitation ranges from less than 400mm in the Guadiana valleys (South of Portugal) to more than 3000mm in the mountain range of Gerês (North of Portugal). The average number of rainy days goes from 15 to 90.
- Mean annual temperature ranges from 6-8°C in the mountains in the North and Center to 18-20°C in the valleys of Algarve (South). Minimum temperatures ranges from -2°C in the mountains in the North, to 8-10°C in Algarve.
- Mean number of frost days ranges from less than 2 to 100. The number of days with tropical nights (with more than 20°C) ranges from less than 2 to 20.

This diversity of ecosystems, confined to small spaces, resulted in many areas of ecosystem transition, which are associated with high biodiversity. On the other hand, Mediterranean agriculture, created habitats with high conservation value, upon which the conservation of several species depends. Examples of this are the “montado” and “lameiros” (Pereira *et al.*, 2004).

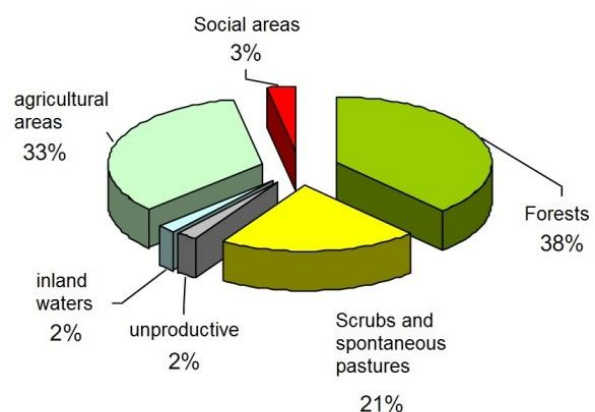
In conclusion, for its size Portugal is one of the European countries with highest diversity of organisms and farming systems, but at the same time is one of the countries more vulnerable to the loss of that diversity (Pereira *et al.*, 2004).

1. Forest characteristic and forest types - Portugal

Forests provide a diverse range of goods and services of economic, environmental, recreational and cultural importance in a world growing increasingly urbanized, artificial and affected by large environmental impacts.

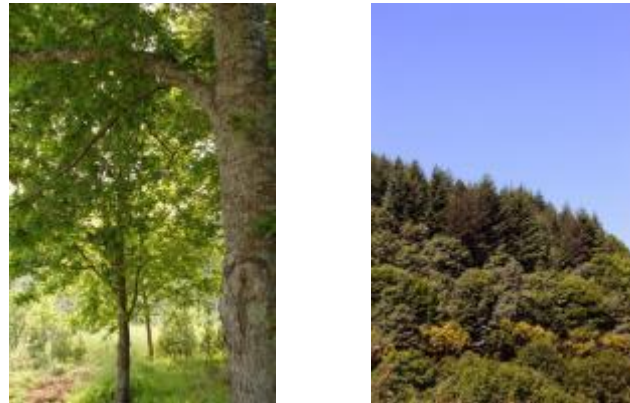
Portuguese forest occupies 3,541 million hectares, accounting for 38% of the country territory. Followed by 33% of agricultural and 21% of scrubs occupancy (IFN, 2005/06)². Nevertheless, forests still have growth potential, with the possible conversion of some scrubs and agriculture areas into forest areas.

The value of Portuguese forests - wood, cork, fruits and seeds, rosin, honey, wild fruits and mushrooms, game, fishery, carbon storage, biomass for energy and protection is estimated at 1.17 million Euros. And the total economic value of losses,



Source: 5º IFN, 2005/06

forests fires, pests and diseases, is estimated at 394 million Euros (Estratégia Nacional para as Florestas, 2006)³.



According to the latest National Forest Inventory (AFN, 2005/06), the Portuguese main forest species are: Maritime Pine (27%), Eucalyptus (23%), Cork Oak (23%), Holm Oak (13%), Stone Pine (4%), Oaks (5%), Sweet Chestnut (1%), other coniferous (1%) and broadleaved trees (3%)⁴.

2. Typical and exceptional fauna and flora species in forests

According to SIAM report⁵, Portugal has a number of very diverse fauna and flora in relation to its size, and is considered one of the 25 biodiversity hotspots of the world. In this country can be found 67 species of mammals, 207 breeding birds, 27 reptiles, 17 amphibians, a total of about 400 species of vertebrates, and about 3000 species of vascular plants, among which 86 are endemic, that is, that do not exist anywhere else in the world. The wide variety of substrates, also promotes the support of a large amount of biodiversity in soil.

2.1. Forest tree species used for afforestation in Portugal

Dominant or abundant native species⁶: Carob tree (*Ceratonia siliqua*), Common Alder (*Alnus glutinosa*), Holm Oak (*Quercus rotundifolia*) (protective measures by Law N^o. 155/2004), Kermes Oak (*Quercus coccifera*), Portuguese Oak (*Quercus faginea*), Pyrenean Oak (*Quercus pyrenaica*), English oak (*Quercus robur*), Sweet Chestnut (*Castanea sativa*), Wild cherry (*Prunus avium*), Narrow-leaved Ash (*Fraxinus angustifolia*), Strawberry Tree (*Arbutus unedo*), *Myrtus communis* (*Myrtus communis*), Maritime Pine (*Pinus pinaster*), Stone pine (*Pinus pinea*), Alder Buckthorn (*Frangula alnus*), Cork Oak (*Quercus suber*) (protective measures by Law N^o. 155/2004), Betula alba (*Betula pubescens*).

Non-native species (prevalent or abundant)⁷: European Black Pine (*Pinus nigra*), Douglas fir (*Pseudotsuga menziesii*), Eucalyptus (*Eucalyptus globulus*), hybrid black poplar (*Populus x canadensis*), Northern Red Oak (*Quercus rubra*).

Endangered species⁸: holly (*Ilex aquifolium*) (protected by Law Nº. 423/89 of 4 December), common yew (*Taxus baccata*), Scots pine (*Pinus sylvestris*), Portugal laurel (*Prunus lusitanica*), Algerian Oak (*Quercus canariensis*), Common Rhododendron (*Rhododendron ponticum*).



2.2. Characterization of the four main forest species

The Maritime Pine (*Pinus pinaster*)⁹, is a native species, has rounded crown and grows up to 40m. It is the predominant species in the national forest. It is scattered all over the regions of northern and central coast of the country. This has been the species chosen in the afforestation campaigns carried out during the nineteenth century, due to its ability to adapt to poor and rocky soil. In addition, it spreads easily and has a rapid growth. Its timber is widely used commercially.

Eucalyptus (*Eucalyptus globulus*)¹⁰, original from Tasmania, and for that it is an exotic species; it is presented all over the country. These trees can grow up to 55m and grow rapidly. Especially used by pulp and paper industry, became one of the most planted trees in Portugal. In the '80s, there was great controversy about the negative effects of these trees in soil, water and biodiversity, which resulted in the implementation of legislation (Law Nº. 175/88 of May 17 and Law Nº. 513/89, 6 July) that restricts the increase of monoculture plantation of this species, resulting in the improvement of techniques for optimizing the production that enabled the increase of productivity without the need to expand the forest area.

The Cork oak (*Quercus suber*)¹¹ is a tree with a rounded canopy up to 20m, which produces cork intensively. This is an evergreen indigenous species, typical of Mediterranean climate forests. Their presence can be found throughout the territory. Cork is a raw material with unique characteristics, because it floats in water, is elastic, compressible, waterproof, odorless, natural, renewable and recyclable, a very environmentally friendly material. The system called “montado de sobro” has a huge economic, social, environmental, landscape, history and culture value and cork oak is the national tree of Portugal. Portugal is the leading producer, processor and exporter of cork.

The Holm oak (*Quercus rotundifolia*)¹² grows to 15 to 20m. It is a indigenous evergreen specie, also typical from Mediterranean forest. This tree is very important in agricultural systems called

“montado de azinho”, as a producer of acorns to feed the black pig. It is also a good source of coal, timber and firewood.



2.3. Animal native species

Our forests are home to some of the following examples of typical and exceptional fauna, some existing only in our country¹³:

Endemic and resident mammals, not threatened: European Hedgehog (*Erinaceus europaeus*), mole (*Talpa occidentalis*), European Rabbit (*Oryctolagus cuniculus*), Iberian Hare (*Lepus granatensis*), Red Fox (*Vulpes vulpes*), least weasel (*Mustela nivalis*), Beech Marten (*Martes foina*), European Badger (*Meles meles*), wild boar (*Sus scrofa*), European Roe Deer (*Capreolus capreolus*), Red Deer (*Cervus elaphus*).

Endemic and residents mammals, that are in danger: the Iberian lynx (*Lynx pardinus*), Horseshoe bats (Rhinolophus), mouse-eared bat (Myotis), long-winged bat (Miniopterus), gray wolf (*Canis lupus*) and the Mountain Iberian wild goat (*Capra pyrenaica*) - this species has less than 50 individuals.

Residents and non-threatened birds: Egret (*Egretta garzetta*), Mallard (*Anas platyrhynchos*), Common Buzzard (*Buteo buteo*), Common Gallinule (*Gallinula chloropus*), Barn Owl (*Tyto alba*), Little Owl (*Athene noctua*), River Kingfisher (*Alcedo atthis*), Great Spotted Woodpecker (*Dendrocopos major*), Lark (*Alaudidae*), Eurasian Crag Martin (*Ptyonoprogne rupestris*), European Robin (*Erithacus rubecula*), Common Blackbird (*Turdus merula*), Cetti's Warbler (*Cettia Cetti*), Azure-winged Magpie (*Cyanopica cyanus*).

Resident birds and in danger of extinction: Great Bittern (*Botaurus stellaris*), Cinereous Vulture (*Aegypius monachus*), Adalbert's Eagle (*Aquila adalberti*), Golden eagle (*Aquila chrysaetos*), osprey (*Pandion haliaetus*), Purple Swamphen (*Porphyrio porphyrio*), Pin-tailed Sandgrouse (*Pterocles alchata*).

Endemic reptiles and amphibians that are not threatened: Gold-Striped Salamander (*Chioglossa lusitanica*), Bosca's newt (*Triturus boscai*), Iberian Midwife Toad (*Alytes cisternasii*), Frog-of-muzzle-sharp (*Discoglossus galganoi*) Iberian Painted Frog (*Rana iberica*), Iberian Emerald Lizard (*Lacerta schreiberi*), Bocage's Wall Lizard (*Podarcis bocagei*), Bedriaga's Skink (*Chalcides bedriagai*).

Resident reptiles and amphibians that are rare or vulnerable: Iberian Rock Lizard (*Lacerta monticola*), Portuguese viper (*Vipera seoane*).

Endemic fish, not threatened: Luciobarbus bocagei (*Barbus bocagei*), Iberian Nase (*Chondrostoma polylepis*), Squalius alburnoides (*Squalius alburnoides*), bordallo (*Squalius carolitertii*).

Endemic fish endangered: Saramugo (*Anaocypris Hispanic*), European Sturgeon (*Acipenser sturio*).

In Portugal, can be hunted several species of animals, such as, ducks, wild pigeons, quail, thrushes, rabbits, boars, deer, partridges, golden plovers, snipe, woodcock, pheasant, hare.

3. Forms of nature protection such as national parks and Nature 2000 sites

3.1. Nature and landscape protection

The forest is also a source of multiple environmental services essential to society: air renewal, supply of water of quality, fighting desertification and climate change - the Portuguese forest sequesters about 280 million tons of CO₂¹⁴.

According to the Institute for Nature Conservation and Biodiversity (ICNB), protected areas indicate areas where forest conservation is promoted in Portugal. These areas are divided in the following forms:

- **National Park:** "protected area that includes one or more ecosystems bearing little man changes. These areas integrate representative natural region and natural humanised landscape samples, geo-morphology sites, flora and fauna species or habitats of ecological, scientific and educational interest. The purpose is to protect the ecological integrity of the ecosystems and avoid intensive exploration of the natural resources. Peneda-Gerês is the only National Park in Portugal and is located in the Northwest part of the country. This Park belongs to the PAN Parks network.
 - **Natural Park:** "protected area that includes natural, semi-natural and humanised landscapes, of natural interest, representing harmonious integration of human activity with Nature. These Parks integrate samples of a biome or natural region, with the objective of allowing the features of natural and semi-natural landscapes and ecological diversity to be maintained and valued". There are currently 13 Natural Parks.
 - **Natural Reserve:** "Its purpose is to protect flora and fauna habitats, with the aim of ensuring the natural conditions needed for the stability or survival of the species, biotic communities or physical aspects of the environment, whenever these require human intervention to guarantee their survival". 11 natural reserves are classified.
 - **Natural Monument:** "natural site that, given its singular nature, rarity or ecological, aesthetic, scientific and cultural representability requires conservation". Currently there are 7 natural monuments.
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- **Protected Landscape:** "a natural, semi-natural or humanised area that represents harmonious integration of human activity with Nature with the purpose of maintaining and valuing the natural or semi-natural landscape and its ecological diversity. According to legislation currently in force, these protected areas are to be re-classified". There are 7 protected landscapes.



3.2. Natura 2000 sites

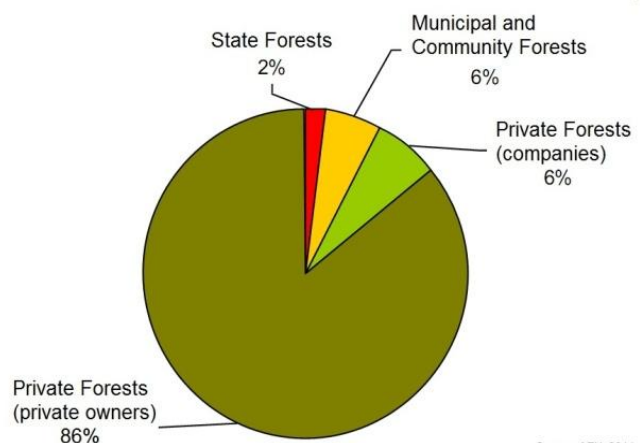
The Natura 2000 Network is a European ecological network created with the goal of preserving biodiversity by conserving natural habitats, wild flora and fauna in the European Union territory. "It is composed of areas of community importance for the conservation of habitats and species, in which human activities must be compatible with the preservation of the natural values, therefore their management has to take into account the ecological, economical and socially sustainable" (ICNB, 2011).

The Natura 2000 Network is composed of sites classified as Special Protected Areas (SPA), by the Council Directive 79/409/EEC of 2 April 1979 on the conservation of wild birds, including the migratory species and the habitats where they occur. Sites of Community Importance (SCI) classified according to the Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and wild fauna and flora which are considered threatened in the EU (ICNB, 2011).

In mainland are classified 39 SPA and 60 Sites of Community Importance. These classified areas cover a total land area of 1.979.519,40 ha, representing approximately 20,5% of the mainland¹⁵.

4. Organization of Forestry

The National Forestry Authority (AFN) manages 8% of forests, where 2% are state forest and 6% are municipal and community forests. In Portugal, 92% of forests are being managed by 400.000



Source: AFN, 2011

private forest owners (86%) and private companies (6%)¹⁶.

In Peneda-Gerês National Park, 5.275ha of them are public property (7,5%), 19.438ha (27,6%) are private property, and the remaining 45.577ha are community property (65%)¹⁷.

AFN is the state body responsible for protecting and managing the national forests. This agency's mission is¹⁸:

- Promoting the sustainable development of forest resources and of the associated spaces, of the hunting resources, apiculture and aquaculture, and other inland waters directly linked to forest and forestry activities, through the knowledge of its development and fruition, ensuring their protection, conservation and management.
- Promoting cross-sectoral balances, accountability of different actors and an appropriate organization of forest areas.
- Encourages the improvement in the competitiveness of industries that comprise the various ranks of the forestry sector, as well as structural prevention, acting in planning and seeking joint strategies in the defense of the forests.

AFN is part of the Ministry of Agriculture, Sea, Environment and Regional Planning (MAMAOT), and is endowed with administrative autonomy. It is divided into three directorates, which are responsible for supporting the formulation and implementation of policies that promote the forestry sector, coordinating the management of forest resources of the State, formulate and promote the implementation of policies for the management of communal areas, regular the management of private forest areas, promote and coordinate action plans aimed at reducing the impacts and effects of the elimination of biotic agents and implementation of policies for the defense against forest fires.



The Regional Directorates of Forests, also belongs to the AFN, this are decentralized agencies that are responsible for the implementation of forest policies and instructions established by the AFN, but also, for the implementation of programs and studies at local and regional level. They are

divided into five regional directorates, which incorporate 7 Flexible Units, 6 Multidisciplinary Teams and 16 Regional Forest Management Units.

Beyond the AFN there are other entities that contribute to the protection and development of forests, including Forest Federations and Organizations. There are four Federations:

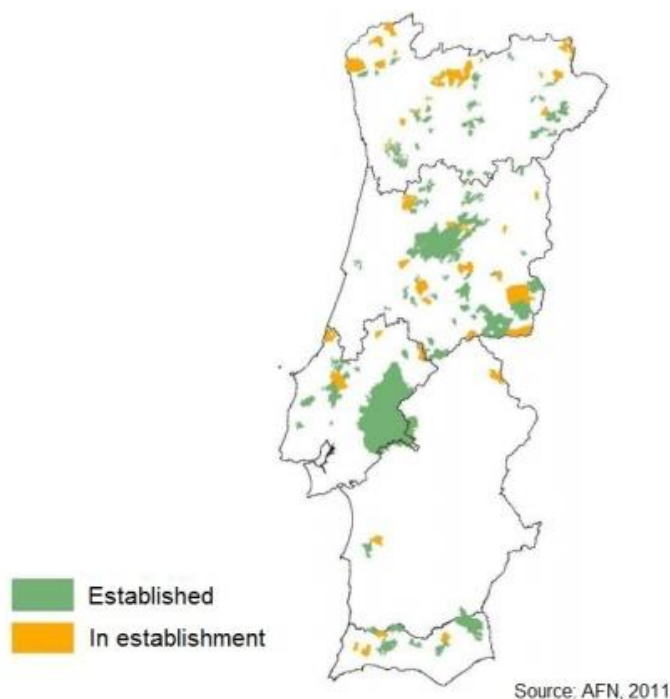
- Forestis – Associação Florestal de Portugal;
- FENAFLORESTA - Federação Nacional das Cooperativas de Produtores Florestais, FCRL;
- BALADI - Federação Nacional dos Baldios;
- UNAC - União da Floresta Mediterrânica;
- FNAPF - Federação Nacional das Associações de Proprietários Florestais;
- Fórum Florestal – Estrutura Federativa da Floresta Portuguesa;

These associations represent 164 Forest Landowners Organizations (OPF), distributed throughout the country. Currently there are 51 in the Northern Region, 87 in the Centre, 8 in Lisbon and Tejo Valley, 9 in the Alentejo Region and 9 in the Algarve region. Ouvir

According to AFN, as activities carried out by OPF are diverse, the main ones being the development of projects, technical and legal information, professional training, the promotion of dissemination actions, the cadastral survey with GPS, the preparation of Forest Management Plans, management of settlements and the assessment of woody material from its members. Concerning activities related to the Forest Fire Protection, we stress the fact that more than half of the OPF, have teams of forestry sapper teams who provide services in preventive forestry and first fire intervention.

Currently the OPF play an important role in the creation and operation of Forest Intervention Areas (ZIF), working manager's organizations of these areas. The ZIF perimeters are made of contiguous forest areas totaling 1000 ha or more, where the forest owners of at least 50% of the area are in agreement. When a ZIF is established, all forest landowners within its boundaries, whether they belong to the ZIF, or not, are bound to comply with the rules of forest management that will be adopted in place by the members of general assembly of this ZIF.

Forests are privately owned but are for public use, except those linked to universities or who have restrictions on use, such as for example, the National Park of Peneda Gerês. Some forest areas, where there is a high fire risk, have in the entrance panels with an indication of conditional access. These panels are placed when these areas are: critical by law, areas subject to forestry regime and forest lands under state



management, the areas where there is a corresponding limitation of signaling activities (AFN, 2009)¹⁹.



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