Portugal

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Facts and Figures

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Definitions

Coppice is a system where trees originate from vegetative or asexual reproduction. Most coppice forests have been converted into high-forest in the last decades. This has involved oaks (*Quercus faginea, Q. pyrenaica, Q. robur, Q. ilex*) and chestnut (*Castanea sativa*). The aim is to produce better timber quality and for conservation purposes. In the case of holm-oak (*Q. ilex*), many areas have been managed as a sylvo-pastoral system known as montado. The most common coppice forests in the country involves *Eucalyptus* plantations for pulpwood production. The most usual species is *E. globulus* which is grown in rotations of 10 – 12 years.

Coppice
= Talhadia

Coppice with standards
= Talhadia composta

Legal Framework

The Forest Inventory considers forests of over 0,5 ha, minimum cover of 10% and width larger than 20 m. In general, there are no restrictions on clearfellings or on harvesting age. However, some natural parks might put some restrictions for certain species. Restrictions consider size of clearcuttings for species that are relevant for conservation and protection purposes (mostly oak species). Some species are protected by law in respect to harvesting. Cork-oak (*Quercus suber*) and holm-oak (*Q. ilex*) cannot be pruned or harvested without permission from the official authority (Institute for Nature Conservation and Forestry). In relation to forest establishment densities, there are some minimal densities if the afforestation is supported by a financed project. It depends on species: Pine and other conifers 1000 trees/ha; *Pinus pinea* (fruit) 200 trees/ha; broadleaves 600 – 800 trees/ha; cork-oak and holm-oak (sylvo-pastoral system) 250 trees/ha. Forest areas affected by fire cannot be used for another purpose (e.g. construction) and must be forested.

Short rotation coppice is considered in those cases where the rotation is between 2 – 5 years. In Portugal, short rotation coppices are not common.

Statistics

The coppice area is estimated around 863,000 ha. The *Eucalyptus globulus* area tended for pulp production, with a rotation period of 12 years, occupies an area of a 812,000 ha or ~ 26 % of total forest area (3,154,800 ha). Other types of coppicing have much longer rotation periods, such as oaks, *Castanea sativa* (20-50 years; eventually converted to high forest on a significant scale), as well as ash and poplar (20 year rotation), which are produced for timber.

Reference

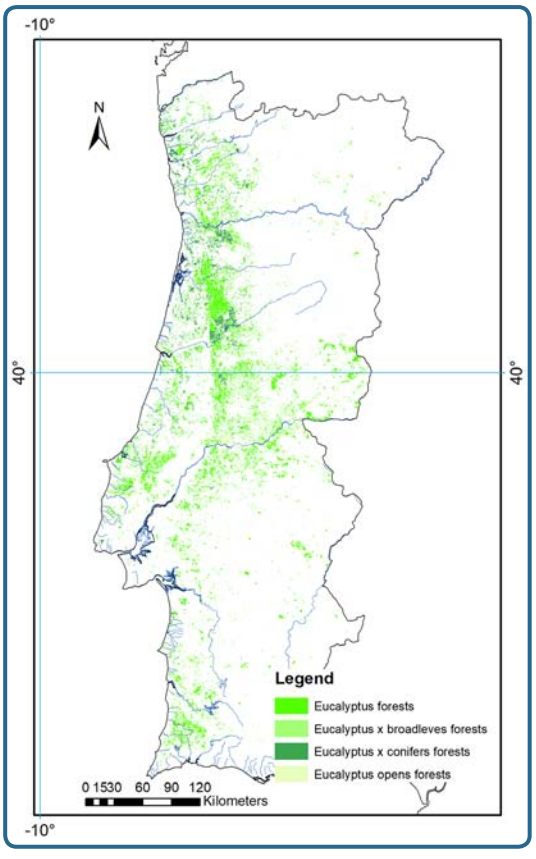
ICNF, 2013. *IFN6 - Áreas dos usos do solo e das espécies florestais de Portugal continental. Resultados preliminares*. Instituto da Conservação da Natureza e das Florestas, Lisboa 34 pp.

Typology

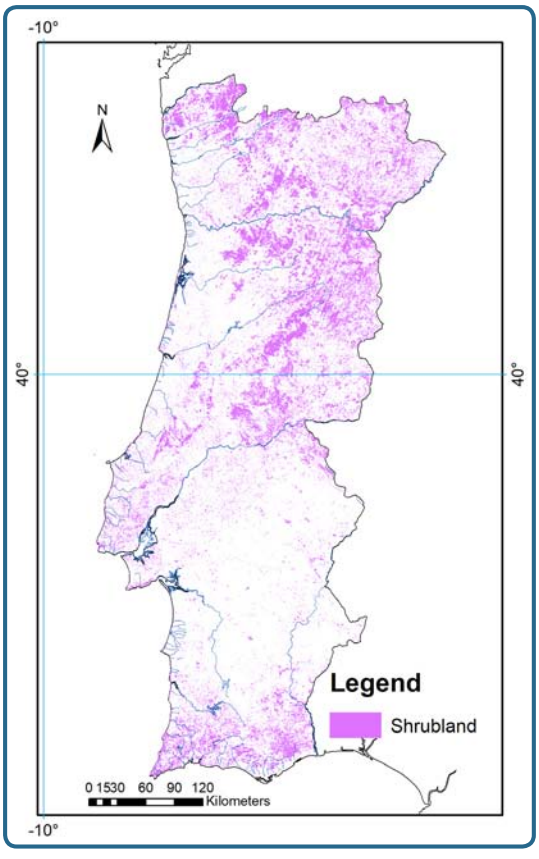
Simple coppice	*Eucalyptus* is the most common type of coppice forest in the country. The most usual species is *Eucalyptus globulus*, which is grown for pulpwood production. Areas with chestnut consist mostly of orchards for fruit production. Only small areas exist with coppice that was used in the past for the production of small sized wood. Some oak species are coppiced (*Quercus faginea, Q. pyrenaica, Q. robur, Q. rotundifolia*) for the production of firewood. Holm-oak (*Q. rotundifolia*) is the most common oak species used as coppice. Most coppice has been converted to high-forest for quality timber and conservation purposes.
Coppice with standards	*Castanea sativa, Quercus faginea, Q. pyrenaica, Q. ilex* subsp. *rotundifolia*
Pollarding	Pollarding may be found in some areas, mostly with ash (*Fraxinus angustifolia*) and poplar (*Populus nigra*)
Short rotation coppice	Hardly practised

Maps

Helder Viana and Abel Rodrigues



Map of the current extent of *Eucalyptus globulus* in Portugal; most of this species is coppiced



Map of shrubland in Portugal; this area has the potential to be converted to simple coppice

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Description

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Coppice is a silvicultural system that has been commonly used in Portugal for centuries. It produces a range of small and medium sized materials, such as firewood, poles, charcoal, raw material for basketry and cooperage, on short (10 to 30 year) rotations. It is one of the oldest forms of management in semi-natural forests.

Different types of coppicing, with regeneration by stool shoots, has been practiced for many species, such as common oak (*Quercus robur*), Pyrenean oak (*Quercus pyrenaica*), Portuguese oak (*Quercus faginea*), holm-oak (*Quercus rotundifolia*), chestnut (*Castanea sativa*), ash (*Fraxinus spp.*), poplar (*Populus spp.*), willow (*Salix spp.*) and eucalypt (mainly *Eucalyptus globulus*).

While coppicing of some species has declined over the years, eucalypt coppice, grown on 10 to 12 year rotations for pulpwood production, has expanded enormously in recent decades. *Eucalyptus globulus* (Fig. 1) is now dominant over approximately 812,000 ha (National Forest Inventory, 2013) and, as this is 26% of the total forested area of the country, it is currently the main Portuguese species. *Eucalyptus* makes up nearly 94 % of the total area in coppice management.

Most of the other formerly coppiced species have been converted into high forest. Most common oak (*Q. robur*) occurs as high-forest with coppice retained only in small patches. Pyrenean oak (*Q. pyrenaica*) forests have been improved to high-forest for quality timber production and conservation purposes (Carvalho and Loureiro, 1996). Oak forests are very rich ecosystems and in some regions are important for the survival of rare and threatened plants. Silvicultural practices have been used to improve tree growth and so the production of better quality, larger dimension wood. Portuguese oak (*Q. faginea*) was previously coppiced for firewood and charcoal, but nowadays coppicing this species is not common. There are residual patches of holm oak (*Q. rotundifolia*) in the north and center of Portugal, maintained to produce firewood and charcoal. The southernmost holm oak areas are now part of a silvo-pastoral system known as montado, where trees and livestock husbandry activities are combined. The majority of chestnut (*Castanea sativa*) is in orchards for nut production. Only small areas exist for wood production and there is little coppice.

The coppice rotation for oaks (*Q. faginea, Q. pyrenaica* and *Q. robur*) varies between 10 and 30 years, depending on the species, site quality and final tree diameter. Previously, coppice had many uses, but during recent decades much has been abandoned and converted into high-forest (Carvalho and Loureiro, 1996). Nowadays, only a few oak coppices are maintained for firewood production. In certain areas, it is common to find oaks as small groups and at the edges of fields. Generally they have a secondary production role, forming a reserve to meet occasional needs (e.g., firewood, poles). Some of these areas are also managed for biodiversity, conservation and soil protection.

Pollarding may be found in some areas. Traditionally oak (*Quercus spp.*) and ash (*Fraxinus angustifolia*) foliage was cut for cattle feed, in rotations of 2 to 4 years; this is not common nowadays.

As result of the strategy for climate change mitigation and for secure energy supply (European Commission, 2014), European Union members have been implementing projects for energy production from biomass (e.g. Viana et al.,

2010). The biomass needed by the power plants will generally be supplied from forest residual biomass, but this can be complemented by short rotation woody crops, specifically grown for their energy value. Coppice systems work well with short rotations to produce wood for energy from species such as willows, poplars and eucalypt, as well as lignocellulosic crops such as reed canary grass (*Miscanthus*) and switch grass. Currently, short-rotation coppice (SRC) to produce raw material for energy purposes is very scarce, but several studies are in progress. According to some evaluations there is a potential for these to be used in Portugal, primarily on abandoned, previously agricultural land, (Abel, 2012). These SRC plantations would involve eucalypt (mostly *E. globulus, E. maideni* and *E. camaldulensis*) and poplar (*Populus x euroamericana* clones) in rotations of 3 to 5 and 2 to 3 years, respectively. Yield may range between 8 and 40 tons dry weight ha^{-1} $year^{-1}$ for eucalypts (85% stands between 8 and 30) and 8 to 20 tons dry weight ha^{-1} $year^{-1}$ for poplar.

Figure 1. Eucalypt (*E. globulus*) coppice stands in Portugal

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Forestry Regulations

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The forest public service was first institutionalized in 1824, under the aegis of the Navy Ministry, with the creation of the **Royal Forest Administration**, which was subsequently transferred to the Ministry of Industry, Trade, and Public Infrastructures. In 1886, the first public institution was created, which aimed to reforest the Gerês and Estrela Mountains in Northern Portugal. In 1901, the forest regime code was implemented in a law that included the main legislation concerning the forest sector. In 1919, the **Forest Services** were put under the General Direction of Aquaculture and Forests (DGRFA), which developed forest engineering works such as torrent mitigation and the forestation of coastal dunes through the **Law of Forest Settlement** in 1938. Nowadays, the Forest Service's Extension is consolidated within the **Institute for Conservation of Nature and Forests** (ICNF), resulting from

the merger of the former Nature Conservation Institute, part of the Environment Ministry, with the General Direction of Forest Resources from the Agriculture Ministry.

In Portugal, the forest area occupies about 35% of the territory (3.2 Mha), with an additional 1.5 Mha occupied by shrubland. Historical circumstances have dictated that more than 90% of the forest area is in private ownership, a very high percentage compared with privately-owned forest areas in other countries, e.g. 70% in Spain, Finland and Sweden; an average of 60% in the EU 27 countries; 55% in the USA and 8% in Canada. The main forest species in Portugal are managed or are potentially manageable under the coppice regime. Indeed, nowadays, the main forest species is eucalypt (*Eucalyptus globulus*) with an area of 812,000 ha, managed intensively as coppice for pulp production. These coppices run for 4 or 5 rotation cycles, with 8-12 years per cycle. On burnt sites, the ability of eucalypts to re-sprout from stumps enables their partial recovery. After maritime pine (*Pinus pinaster*) high forest, grown only for wood production, the third species in terms of area occupied is cork oak (*Quercus suber*), with 730,000 ha, followed by holm oak (*Quercus rotundifolia*), occupying around 330,000 ha. Other oaks (*Quercus faginea; Quercus rotundifolia; Quercus robur; Quercus pyrenaica*), and chestnut (*Castanea sativa*) cover around 66,000 ha, and 40,000 ha, respectively. The latter species is mainly managed for fruit as high forest, but an area of around 3,000 ha of chestnut is managed as coppice for wood production.

The aforementioned forest regime code of 1901 was replaced by the **Forest Code** under a law of September 2009, but revoked in 2012. Nowadays, in addition to the 1901 regime, forestry legislation includes the following:

- 1996 law on the basis of national forest policy;
- legislation from 1999 and 2009 concerning regional forestry plans (PROF),
- plans of forest management (PGF)
- specific plans of forest intervention (PEIF), which can be adapted to county, district and national levels
- legislation from 2001 for the protection of cork oak and holm oak
- legislation from 2005 on forest intervention zones (ZIF)
- regulation from 2013 on the juridical regime of forestation and reforestation.

The **National Strategy for Forests** (ENF), approved in 2015, is a vast document emphasizing biotic and abiotic risks in forestry, the economic relevance of the main forestry clusters and forecast scenarios of resource allocation and forest diversification until 2030. In 2017, the urgent need for reform in the forest sector, stimulated by political pressure to control forest fires, resulted in 13 legislative acts, with three awaiting ratification.

These **new acts enhance and complement previous forest legislation** with regard to the following relevant topics:

(i) The ENF, reviewing estimates of scenarios for climate change in Portugal, suggested a **reduction of the area suitable for eucalypts** leading up to the end of the 21th century. Taking into account the versatility of this species for production of goods and services, the ENF came up with a proposal to stabilize the actual area of 812,000 ha until 2030. In this context, legislation in 2017 imposed a strict control of eucalypt forestation, limiting the expansion of eucalypt coppices and allowing new plantations only in compensation for former areas of eucalypt previously abandoned, on condition that these abandoned areas should be cleared and left in a suitable condition for either agricultural or forest use. Moreover, if the total eucalypt area surpasses the ENF's threshold, an intervention

for reducing the total area is made, prioritising projects or stands abridging existing eucalypt areas higher than 100 ha.

(ii) the establishment of the so-called **Entities of Forest Management** (EGF), i.e. corporations of forest owners or private agents operating within a specific juridical regime, aiming to manage forests larger than 100 ha, wherein 50% of land assets should consist of areas smaller than 5 ha. The main objective is to promote professional management in small forest properties, creating economies of scale under good practice codes, which allow for economic and sustainable feasibility of the available land assets to be achieved. In this context, the EGF is entitled to fiscal benefits and other forms of public support.

(iii) simplifying the process of establishing **forest intervention zones** (ZIF), defined in 2005 as continuous and delimited areas, subject to a plan of forest management approved by ICNF. Also, if necessary, ZIFs can define specific plans of forest intervention, regulated by ICNF, aimed to control biotic or abiotic risks such as soil erosion, biodiversity, phytosanitary conditions or fire protection. ZIFs are managed by a single private entity, with the necessary technical expertise and a commitment to follow the guidelines and objectives established for the ZIFs, scrutinized by the forest owners' council. Legislation in 2017 simplified the creation of ZIFs, establishing both maximum and minimum areas of 20,000 ha and 500 ha respectively, with no more than 25 necessary associates and 50 forest land properties within each intervention zone. There were provisions for consolidating forest properties from different counties. The ZIFs are covered by fiscal benefits that consider the specific kind of goods and services delivered by forests and agro-forest farms and the long-term returns from forest investment. The philosophy of the ZIFs and EGFs was to consider the prevalence of small private forests and to provide incentives for amalgamating forest and agro-forest farms and to promote professionalization in forestry and forest management.

(iv) the 2017 legislation changed the **juridical status of regional forestry plans** (PROFs), by delegating to municipal authorities the capacity to intervene on soil use, by transferring of some elements of the regional forestry plans to Municipal Directory Plans (PDMs). Municipalities will henceforward be able to include mandatory forestry components in their PDMs. Legislation of 1996 and 1999, actualized in 2009, allocated to ICNF the responsibility of forest planning. The objective was to establish a continuous process of decision-making over the use and conservation of forest areas and resources and to achieve medium and long term targets laid down in national strategies, particularly the National Strategy for Forests (ENF). Forest planning was designed to operate at three levels:

1) regional or supra-municipal, where the PROFs are elaborated in coordination with other public priorities of the regions

2) local, where plans for forest management (PGF) are coordinated with local practices of forest management

3) at a lower operational level, through specific plans for forest intervention (PEIF), dealing with local constraints such as biotic and abiotic risks, recovery of degraded soils, forest diseases, forest fires and improved water retention.

The preparation and execution of PGFs is obligatory in situations such as:

- public and community forests or agro-forestry farms,
- private forests or agro-forestry farms with areas equal or greater than those defined in the respective PROFs,

- candidate forest or agro-forestry farms for national or EU financial support, aimed to benefit forest production and commercially valorize the ZIF areas.

In the latter context, forest owners and economic agents who are committed to PGFs within ZIFs are exempt from the obligation of making their own PGF.

From 1996, national forest policy laws strictly regulate the cutting of trees, so that forest owners must communicate to ICNF the type and extent of scheduled tree cuttings. The **juridical regime of forestation and reforestation** of 2013 (RJAAR) requires forestation and reforestation operations with forest species be referred to ICNF. This legislation controls and evaluates forestation and reforestation operations that do not apply to urban or transport matters, which are regulated by other legislations. The RJAAR also exempts control operations in areas of less than 5000 m^2, with a width greater than 20 m.

Portugal is the premier cork producer in the world; the cork oak stands are traditionally managed as high forest, although the coppicing system operates in other Mediterranean countries. Indeed, as early as 1950, "Subericultura (Cork oak cultivation)", the *magnum opus* of Vieira de Natividade, promoted the environmental advantages of cork oak and holm oak coppice in protecting soil, using cycles of 10-15 years. This is no minor issue in the southern part of the country, where low fertility soils are prone to erosion; cork oak coppicing is then directed towards biomass production with a theoretical density of about 1000 stumps/ha.

The legislation concerning cork oak and oak dates from 2001; it allows for the conversion to coppice from high forest when thought necessary for technical and environmental reasons. Noteworthy additions to this legislation emphasize the need to protect these indigenous species, citing definitions of stand density (number trees/ha): 50 trees/ha for trees taller than 1m, with a perimeter at breast height (dbh) of less than 30 cm; 30 trees/ha, when the average dbh is between 30 cm and 79 cm; 20 trees/ha, when the average dbh of the trees is between 80 cm and 129 cm; and 10 trees/ha, when the average dbh is greater than 130cm. These trees can be rejuvenated when new poles grow from the stumps. An authorization from the ICNF is mandatory when cutting cork oak or holm oak trees, including thinning, which must be registered within a period of 30 days. Conversion from high forest to coppice, or phytosanitary pruning, also needs prior authorization. In cork and holm oak stands, deep soil cultivation is forbidden since it may affect tree root systems and natural regeneration. Soil cultivation is also prohibited on slopes between 10% and 25%, and also above 25% if not carried out along the contour lines. Among the remaining forest species (e.g. *Quercus pyrenaica* and chestnut) that are manageable as coppice, these are candidates for the necessary diversification of the Portuguese forest landscape. These species are subject to the common principles and objectives of the National Strategy for Forests, which aims to protect forest species with special ecological importance and vulnerability.

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