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A NEW DYNAMIC FOR MEDITERRANEAN FORESTS

CASE STUDY

Promoting sustainable management of cork oak landscapes through payments for ecosystem services: the WWF Green Heart of Cork project

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Financial incentives for landowners may be a viable means of promoting the sustainable management of cork oak landscapes, as shown by this project in southern Portugal.

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Cork oak (*Quercus suber* L.), is an endemic species to the western Mediterranean Basin. Due to its conservation and socioeconomic value, cork oak is a priority species for WWF, a non-governmental global conservation organization. Well-managed cork oak landscapes provide valuable ecosystem services and hold important biodiversity values. In November 2011, WWF launched the Green Heart of Cork (GHoC) project in Portugal. The project aims to promote the sustainable management of cork oak landscapes through financial incentives to cork oak landowners for adhering to Forest Certification.

1. CHARACTERIZATION OF PILOT AREA

Site name: Rivers Tagus and Sado watersheds

The study area (Table 1) is located in southern Portugal, in the provinces of Ribatejo and Alentejo, comprising the watersheds of

Cork oak, near Vila Viçosa, Alentejo, Southern Portugal

TABLE 1. Site description

Site name	Tagus and Sado watersheds
Landscape area (ha)	500 000
Population	1 000 000
Forest area (%)	60
Agricultural area (%)	30
Main forest tree species	Primary: *Quercus suber*; other: *Pinus pinea*, *Pinus pinaster*, *Eucalyptus* spp.
Main forest functions and uses	Cork and livestock production, hunting
Main risks and threats	Overgrazing and consequent lack of oak regeneration in localized areas; generalized oak mortality, lack of management and abandonment in other areas
Private forest (%)	85
Public forest (%)	15
Management focus	Cork production and multiple use
Project thematic focus	Payments for ecosystem services

Rivers Tagus and Sado. The largest continuous area of cork oak landscape in Portugal is situated in this region, covering more than 0.5 million hectares. The area is mostly flat to moderately hilly and characterized by low fertility sandy soils. The climate is Mediterranean, with hot and dry summers and moist and mild winters. Average annual temperatures vary between 15°C and 18°C, and can reach over 40°C in summer; average rainfall varies between 600 and 800 mm/year. Cork oak is the dominant forest tree species in the area. Cork oak occurs together with maritime pine (*Pinus pinaster* Aiton), used for wood, and stone pine (*Pinus pinea* L.), used for edible seed production. Plantations of *Eucalyptus* spp., used for pulp production, are also found in the area.

Cork oak is primarily exploited for cork. Other activities relating to cork oak landscapes in the region include cattle grazing, hunting and agriculture (Bugalho *et al.*, 2009). Approximately 85 percent of the land in this region is privately owned and the main economic incentive driving the management of cork oak landscapes has been cork production. Lack of oak regeneration, associated with overgrazing by cattle, affects localized areas in the region (Bugalho *et al.*, 2011). Oak mortality has been increasing and has been attributed to several causes. These include: cohorts of trees reaching their age limit; a history of inadequate management practices such as the use of heavy machinery to control shrub encroachment that compacts soil and damages surface tree roots; and pests and diseases (e.g. the fungal disease caused by *Phytophthora cinnamomi*), the effects of which may be exacerbated by climate changes such as an increased frequency of seasonal droughts.

2. FOREST STEWARDSHIP COUNCIL (FSC) CERTIFICATION OF CORK OAK IN PORTUGAL

Cork oak occurs in southwestern Europe (France, Italy, Portugal and Spain) and northern Africa (Algeria, Morocco and Tunisia).[1] Well-managed cork oak areas have high biodiversity, including endemic and endangered vertebrate species. They also provide important ecosystem services, such as long-term carbon storage, and generate cork, the sixth most significant non-timber forest product globally (Berrahmouni *et al.*, 2009). Portugal is the country with the largest area of cork oak, representing 50 percent of the world´s cork production (Barreira *et al.*, 2010).

[1] See EUFORGEN distribution maps (http://www.euforgen.org/fileadmin/bioversity/publications/pdfs/1323.Cork_oak__Quercus_suber_.pdf).

In December 2006, WWF launched Forest Stewardship Council (FSC) certification in Portugal which subsequently expanded rapidly across the country. By December 2013, there were 339 000 ha of FSC-certified areas and, among these, 100 000 ha of cork oak landscapes certified for cork production (Table 2).

3. HIGH CONSERVATION VALUE AREAS

FSC management standards include the need to identify high conservation value areas (HCVA) in certified forests (Auld *et al.*, 2008). HCVA is a global standard tool, based on a set of six different attributes, used to identify areas of outstanding conservation value (see the High Conservation Value Resource Network website: www.hcvnetwork.org). An area can be classified as HCVA on the basis of its importance for the conservation of biodiversity (e.g. if it is located within a protected area, or harbours endemic or critically endangered species) or because it provides ecosystem services of significance for that particular area (e.g. carbon storage, watershed conservation or soil protection). The concept also includes conservation attributes relating to basic needs (e.g. subsistence or health) and traditional and cultural values of local communities (e.g. sites of religious importance).

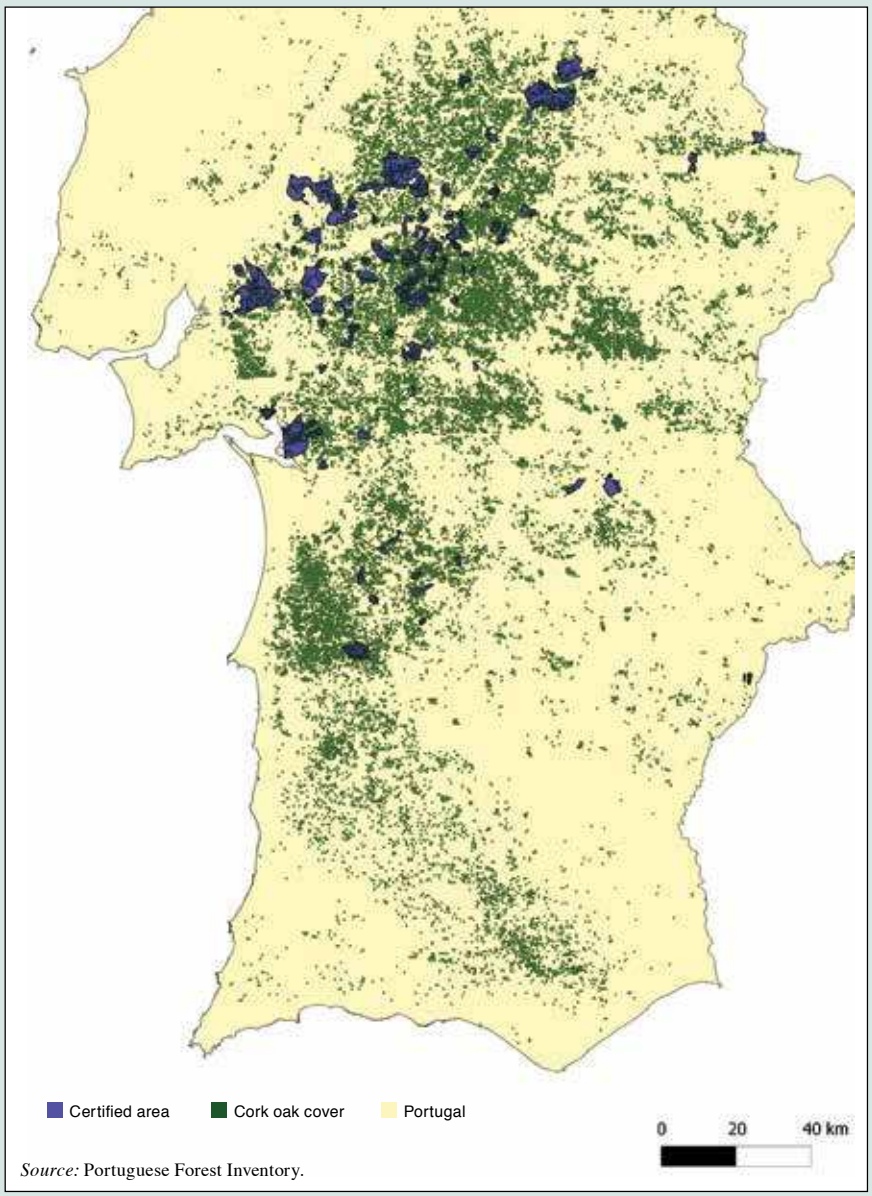
The HCVA concept is adapted to national contexts through the public participation of stakeholders. In Portugal, the national interpretation of the HCVA concept, led by WWF, involved representatives of

TABLE 2. Certified oak cover in relation to overall forest cover in Portugal as of December 2013

Site	Area (ha)
Continental Portugal	8 896 847
Forest cover	3 000 000
Cork oak cover	736 700
FSC-certified forest cover	339 000
FSC-certified cork oak cover	100 000

Source: Forest Stewardship Council, Portugal.

1
Map of southern Portugal (yellow) showing cork oak distribution (green) ***and cork oak certified areas (blue)***



Source: Portuguese Forest Inventory.

landowner associations, national authorities for forest and nature conservation, research organizations, and national environmental NGOs, among other entities.

In 2010, WWF and the University of Lisbon (School of Agriculture, Centre for Applied Ecology "Baeta Neves"), under the European Union-funded project "QUALIGOUV: Public Participation for Better Management of Forests in Protected Areas" (http://www.aifm.org/en/qualigouv), produced regional maps identifying potential HCVAs occurring within the main area of distribution of cork oak in Portugal, the region of the Tagus and Sado watersheds (Figure 1). Regional mapping of HCVAs for this area involved the identification of attributes related to biodiversity and ecosystem services by analysing all publicly available information on the distribution of endemic and threatened birds, reptiles and amphibians, and on the location of the main aquifers and carbon storage in the region (Branco *et al.*, 2010).

4. HABEaS: PROVIDING DATA TO FACILITATE PAYMENTS FOR ECOSYSTEM SERVICES FOR CORK OAK

Geographical and digital information on biodiversity, forest cover and location of main aquifers was integrated into a Web-GIS platform (Figure 2) denominated HABEaS: Hotspot Areas for Biodiversity and Ecosystem Services (www.habeas-med.org). The information on biodiversity was drawn from sources such as the *Portuguese Atlas for the Distribution of Birds* (Equipa Atlas, 2008), the *Portuguese Atlas for the Distribution of Reptiles and Amphibians* (Loureiro *et al.*, 2008), and the *Red Book for Portuguese Vertebrates* (Cabral *et al.*, 2006); information on forest cover and above-ground forest carbon storage was taken from the Portuguese Forest Inventory (http://forestportal.efi.int/view.php?id=502&c=PT) and on the location of main aquifers and aquifer water recharge rates from the Portuguese Institute for Water Resources (http://portaldaagua.inag.pt/PT/SectorAgua/Portugal/Pages/ADPNacionaisINAG.aspx). The WebGIS Platform was made available to the public in September 2010 and has been updated with more recent information since that date. As HABEaS generates maps identifying potential HCVAs, it has been used extensively by landowners and cork oak producers involved in FSC certification for identifying potential HCVAs within their estates.

The information generated by HABEaS was also used to set up the WWF Green Heart of Cork project (GHoC). This project relies on a Payment for Ecosystem Services (PES)-like scheme and on voluntary market approaches to promote the sustainable management of cork oak landscapes within the region of the Tagus and Sado watersheds.

The main aquifer in Portugal, the Tagus aquifer, spans 764 000 ha, 40 percent of which is covered by cork oak. This aquifer provides water to 1 million people living south of Lisbon, to more than 100 000 ha of agricultural areas and to several industries. HABEaS was used to identify those areas of cork oak located within the area of the River Tagus, with above average water aquifer recharge rates, and that also had high biodiversity value (e.g. concentration of endemic and threatened species) and could thus be considered as "hotspot areas for water and biodiversity conservation".

5. INVOLVING ALL KEY STAKEHOLDERS TO PROMOTE THE CONSERVATION OF CORK OAK

In November 2011, based on the information provided by HABEaS, WWF mediated a pilot PES-like case in the cork oak region of the Tagus and Sado watersheds between the main Association of Landholders and Cork Oak Producers in Portugal (APFC) and Coca-Cola, a global industrial bottling corporation which also operates in Portugal.

2
Printscreen of HABEaS WebGIS showing (in blue) areas of interest for the protection of birds in southwestern Portugal

WWF has been collaborating with APFC since 2008, providing technical assistance for the management and conservation of biodiversity in cork oak landscapes, and has had an international partnership since 2007 with the Coca-Cola Company, for which water is a strategic resource. This partnership aims to conserve priority river basins around the world (including the Mekong, Yangtze, Danube and Rio Grande/Bravo river basins, as well as the Guadiana river basin, in Portugal) and to integrate sustainability initiatives into the company's operations worldwide.

The PES initiative for the conservation of cork oak in Portugal was one of the results of the partnership in Portugal, as water from the Tagus aquifer is used by Coca-Cola for its bottling industry. Sustainable management practices in cork oak stands, validated through forest certification, include maintenance of adequate forest cover, reduction or exclusion of grazing to protect oak regeneration, and long-term rotational clearance of understory shrubs. When located in areas sensitive for aquifer water recharge, the stands have the potential to contribute to the quality of the water recharging the Tagus aquifer. Based on this premise, and through its corporate and social responsibility policy, Coca-Cola committed to paying a fixed amount to APFC, which is then distributed to landowner associates who are FSC-certified and located in "hotspot areas for water and biodiversity conservation". This commitment is mediated by WWF which identifies the hotspot areas for payments through the WebGIS HABEaS. After identification of eligible APFC associates, the fee to be paid was established at 17 euro/ha. In this PES-like scheme, FSC certification is used as a proxy to validate sustainable management practices in hotspot areas. The financial incentive aims to promote adherence of cork oak landowners to FSC certification, and thereby good forest management practices. The first payments were made in November 2011 and have been maintained until the present date.

The impacts of the GHoC project have been positive, both for the ecosystem service providers and for potential buyers. Indeed, the project is helping to increase the awareness of cork oak landholders about the importance of sustainable management practices and certification for the conservation of the cork oak landscape, the products it generates and the biodiversity it harbours. Concerning potential donors and ecosystem service buyers, other companies have been contacted and are also becoming engaged in the project. There is untapped potential

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to involve yet others that are seeking to mitigate their carbon footprint. This could contribute to the further promotion of good management practices in cork oak "hotspot areas for carbon and biodiversity conservation" in the region of the Tagus and Sado watersheds or similar regions elsewhere.

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