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242

A NEW DYNAMIC FOR MEDITERRANEAN FORESTS



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Cover: Pine tree (*Pinus pinaster*), near the beach of Corrubedo in Galicia, Spain.
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EDITORIAL

Mediterranean forests are interwoven with the lives of the people of the region. They provide wood, cork and other products, as well as being a source of income for many. They contribute to the conservation of biodiversity, capture and store carbon, protect soil and water, and offer areas for recreation.

Yet they are under increasing pressure. This includes pressures from humans, whose needs are growing and shifting, and stresses due to climatic changes including temperature increases, reduced rainfall and prolonged periods of drought. This makes it all the more important to look holistically at the goods and services that Mediterranean forests provide and define sustained and integrated solutions.

The positive message that emerges from this issue of *Unasylva* is that there is a strong technical basis and political will across the countries of the Mediterranean to find such solutions, and to tackle these issues collaboratively. A number of initiatives, born at different times and in different contexts, are coming together, in particular through the work of the Collaborative Partnership on Mediterranean Forests, to ensure that both research and policy are tying in with a regional approach and translating political will into action.

In the first article, V. Garavaglia and C. Besacier present an overview of the current situation of forests in the Mediterranean region, drawing upon FAO's ground-breaking 2013 publication, *State of Mediterranean Forests*. Requested by members of the Committee on Mediterranean Forestry Questions—*Silva Mediterranea* at a meeting held in Antalya, Turkey, in 2010, this body of knowledge sets a baseline for the gathering of relevant data over time in order to adequately monitor and manage forests in the Mediterranean. Both the article and publication highlight climate change as the major challenge affecting the region, and emphasize the importance of establishing regional strategies. The Strategic Framework on Mediterranean Forests, described in the second article, seeks to do exactly this. Besacier presents the main lines of the framework, which aims to provide a common policy direction across the region and serve as a tool to improve coordination.

Several case studies give insight into what different Mediterranean countries are doing today to meet the challenges they face. J. Suárez Torres and F. Navarro Baixauli describe measures being taken in the Valencia region, Spain, to deal with fires, over 75 percent of which are caused by human activities, from the burning of agricultural or gardening refuse to apiculture and recreational activities.

In the case study on Montpellier, F. Besse, M. Conigliaro, B. Fages, M. Gauthier, G. Mille, F. Salbitano and G. Sanesi look at another important area, i.e. forests and trees in the urban and peri-urban setting, describing the innovative “green vision” of the City of Montpellier and its improvements to quality of life thanks to efficient planning and full involvement of civil society.

M. Bugalho and L. Silva, in their article on the Green Heart of Cork project, highlight the specific problems affecting cork landscapes in Portugal, showing that the use of certification

and economic incentives may be a viable means of improving sustainable forest management in this region.

Three examples of Model Forest initiatives wrap up the case studies, each with a different perspective on the Model Forest approach, which combines the needs of local communities with the long-term sustainability of landscapes. In Tlemcen, Algeria, P. Valbuena, O. Aissaoui and M. Segur look at how the approach is being used to address changes in forest use and threats to cork oak. In the case of Ifrane, Morocco, M. Qarro, P. Valbuena and M. Segur describe how the Model Forest aims to safeguard the region's cedar forests while catering to the economic and subsistence needs of local people. M. Özdemir, P. Valbuena and M. Segur show that in Yalova, Turkey, the main focus of the Model Forest initiative is to sustainably develop income-generating activities including the production of non-wood forest products, recreation and tourism.

The final section in this edition presents the Collaborative Partnership on Mediterranean Forests and a series of related projects carried out by its partner organizations. The partnership, set up in 2010, brings together a range of regional actors concerned with improving forest management and enhancing forests' benefits.

F. Ducci, V. Garavaglia and M.C. Monteverdi showcase the work of the European Cooperation in Science and Technology (COST) framework in conserving and sharing knowledge on forest genetic resources and the adaptive traits of species populations that manage to survive in marginal environments – of potential for climate-change adaptation strategies. C. Besacier and C. Gallo Granizo describe a regional cooperation project, funded by the French Global Environment Facility, that explores REDD+ opportunities in the Mediterranean Region. R.A. Kastl and L. Liagre present a GIZ (Germany Agency for International Cooperation) project on adapting policy framework conditions to climate change in the Middle East–North Africa region through capacity building and intersectoral collaboration. EFIMED (the Regional Office for the Mediterranean of the European Forest Institute) is also shown to have an important role in coordinating research across the region, through for example the Mediterranean Forest Research Agenda 2010–2020, produced via an extensive consultation process. L. Amandier, A. Khaldi and S. Vallée present two initiatives of the International Association for Mediterranean Forests (AIFM), which focuses on the exchange of knowledge, covering climate change and integrated land management.

The issue closes with a report of the independent evaluation carried out on the Committee on Mediterranean Forestry Questions—*Silva Mediterranea*. The report highlights the history of this statutory body of FAO, created in 1948, and its potential to play an even stronger role if the recommendations of the evaluation are taken into account.

Many of the themes coming through in this issue of *Unasylva* will recall questions already raised in *Unasylva* No. 197, on Mediterranean Forests, published in 1999. Fifteen years later, it is timely to take a fresh look at these questions in light of the ongoing social and environmental transformations in the region, and the measures that are being taken to tackle them. ♦



© VALENTINA GARAVAGLIA

The state of Mediterranean forests in 2013

V. Garavaglia and C. Besacier

A new report examines the effects of climate change, shifting demographics and other social and environmental pressures on forests across the Mediterranean region. It highlights the need for better monitoring of Mediterranean forests and greater regional cooperation.

Valentina Garavaglia works in FAO's Forestry Department for the Secretariat of *Silva Mediterranea*. She is coauthor and one of the coordinators of *State of Mediterranean Forests 2013*. **Christophe Besacier** is in charge of the Secretariat of the Committee on Mediterranean Forestry Questions–*Silva Mediterranea* and of the Secretariat of the Collaborative Partnership on Mediterranean Forests. He is coauthor and one of the coordinators of *State of Mediterranean Forests 2013*.

The Mediterranean region encompasses 31 countries (Table 1) and a wide range of political, economic, social and environmental contexts. It has an extremely rich natural and cultural heritage, and human and economic development is largely dependent on sometimes scarce natural resources and a vulnerable environment. Today, human activities are creating substantial environmental pressure, with significant disparities between the northern, southern and eastern subregions.

The Mediterranean region has more than 25 million hectares (ha) of Mediterranean forests and about 50 million ha of other Mediterranean wooded lands (where forests and other wooded lands are defined according to FAO, 2010a), and these lands

are strongly interconnected with urban and agricultural/rural areas (Figure 1). Mediterranean forests and other wooded lands in the region make crucial contributions to rural development, poverty alleviation and food security, and the agricultural, water, tourism and energy sectors. Such contributions are difficult to quantify, however; moreover, changes in climate, societies and lifestyles in the Mediterranean region could have serious negative consequences for forests, with the potential to lead to the loss or diminution of those contributions and to a wide range of economic, social and environmental problems.

Above: Forests of Djelfa province, Algeria

A tool for monitoring and assessing changes and risks to Mediterranean forests and other wooded lands is needed, therefore, to help ensure the sustainable management of Mediterranean forest ecosystems. With this in mind, members of the Committee on Mediterranean Forestry Questions–*Silva Mediterranea* requested FAO, at a meeting held in April 2010 in Antalya, Turkey, to prepare a report on

TABLE 1. Mediterranean countries* grouped into eastern (EMC), northern (NMC) and southern (SMC) subregions

Classification	Country
EMC	Israel
	Jordan
	Lebanon
	Palestine
	Syrian Arab Republic
	Turkey
NMC	Albania
	Andorra
	Bosnia and Herzegovina
	Bulgaria
	Croatia
	Cyprus
	France
	Gibraltar
	Greece
	Holy See
	Italy
	Malta
	Monaco
	Montenegro
	Portugal
	San Marino
	Serbia
	Slovenia
	Spain
	The former Yugoslav Republic of Macedonia
SMC	Algeria
	Egypt
	Libya
	Morocco
	Tunisia

*Countries officially involved in the Barcelona Process in the context of the Euro-Mediterranean Agreement (Barcelona Declaration, 1995).

Source: EU, 1995.

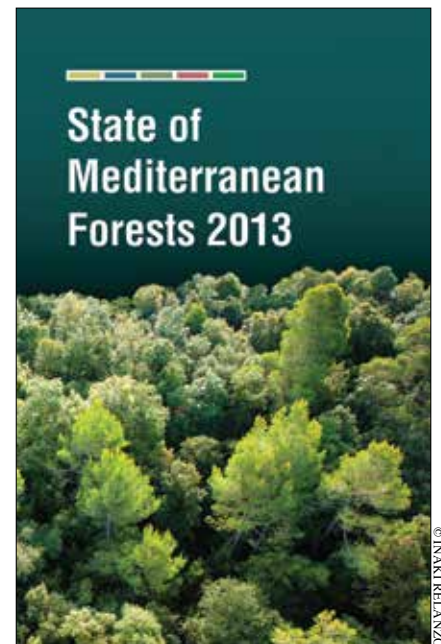
the state of Mediterranean forests, in collaboration with other institutions. It was agreed to use already available data collected by regional and international institutions in the context of other environmental assessment processes, such as the state of the environment and development in the Mediterranean process (Plan Bleu, 2009) and FAO's five-yearly global forest resources assessment (FAO, 2010a).

The proposed approach and structure of the first *State of Mediterranean Forests* report was presented and formally approved by member countries at the 21st session of the Committee on Mediterranean Forestry Questions–*Silva Mediterranea*, also held in Antalya, in February 2012, and the report was subsequently compiled under the coordination of Plan Bleu and FAO (see box on next page). This article presents some of the main findings of the report.

THE MEDITERRANEAN REGION

This article considers the Mediterranean region to comprise the countries surrounding the Mediterranean Sea (i.e. those shown in Table 1). A Mediterranean climate is one characterized by mild winters and hot and dry summers, with precipitation concentrated in autumn, winter and early spring. Total rainfall varies strongly from year to year and violent precipitation events and dry winds can occur. Winter temperatures occasionally fall below 0 °C at sea level, and snow and below-zero temperatures are common at high altitudes (e.g. the Alps, the Pyrenees and the Atlas mountains).

Typical Mediterranean forests are composed of broadleaved species (mainly oaks), both evergreen and deciduous, such as *Quercus ilex*, *Q. suber*, *Q. coccifera*, *Q. pubescens*, *Q. cerris*, *Q. pyrenaica*, *Q. toza*, *Q. calliprinos*, *Q. ithaburensis* and others, and conifers such as *Pinus halepensis*, *P. brutia*, *P. pinea*, *P. pinaster* and *Juniperus* species. Where water availability is not a limiting factor in plant growth (e.g. along rivers),



The first edition of the State of Mediterranean Forests report is a collaborative effort that will provide a basis for monitoring forests in the region

forests of *Q. robur*, *Q. petraea*, *Fraxinus* species, *Populus alba* and *Populus nigra* can prosper.

In some areas, human influence has modified Mediterranean forests, producing areas of sparse woody vegetation known as the *maquis* and the *garrigue*. A multifunctional agro-sylvopastoral system known as the *dehesa* found on the Iberian Peninsula is characterized by pastures with scattered oaks, both evergreen and deciduous, sometimes mixed with *Pinus pinea*.

Many Mediterranean countries also have areas that do not have a typically Mediterranean climate: for example, northern Mediterranean countries (NMCs) such as France, Italy and Spain have substantial temperate areas, while many southern and eastern Mediterranean countries (SEMCs) have large deserts. Many of the data used here were available only at the national level, making it difficult to distinguish between biogeographic zones. This article covers all forest areas in the Mediterranean region, focusing wherever possible on forests growing in a Mediterranean climate.



Note: Gradient of green = percent of Mediterranean forest cover; beige = other wooded lands (wooded areas with less than 10 percent canopy cover); brown = non-Mediterranean forests; grey = other land uses.

Source: FAO and Plan Bleu, 2013.

1

Distribution of Mediterranean-type forests in Mediterranean countries

Contributors to the first State of Mediterranean Forests 2013 report

Under the coordination of Plan Bleu and FAO, the following organizations contributed to *State of Mediterranean Forests 2013*:

- Association internationale forêts méditerranéennes – AIFM (International Association for Mediterranean Forests);
- Centre for Mediterranean Cooperation (IUCN-Med);
- Centre Tecnològic Forestal de Catalunya – CTFC (Forest Sciences Centre of Catalonia);
- Centro de Investigación Ecológica y Aplicaciones Forestales – CREAF (Centre for Ecological Research and Forestry Applications, Spain);
- Consiglio per la Ricerca e la Sperimentazione in Agricoltura – CRA (Agricultural Research Council, Italy);
- Corpo Forestale dello Stato (State Forestry Corps, Italy);
- Forestry Timber Section and Trade and Timber Division of the United Nations;
- Haut Commissariat aux eaux et forêts et à la lutte contre la désertification (High Commission for Water, Forests and Desertification Control, Morocco);
- Institut méditerranéen du liège (Mediterranean Institute of Cork, France);
- Institut national de la recherche agronomique – INRA (National Institute for Agricultural Research, France);
- Istituto di Genetica Vegetale, Consiglio Nazionale delle Ricerche – IGV-CNR (Institute of Plant Genetics of the National Research Council, Italy);
- Instituto Superior de Agronomia – ISA (Higher Institute of Agronomy, Portugal);
- International Union for Conservation of Nature – IUCN;
- Joint Research Centre/European Forest Fire Information System – JRC/EFFIS;
- Mediterranean Model Forest Network – MMFN;
- Mediterranean offices of the World Wildlife Fund;
- Mediterranean Regional Office of the European Forest Institute – EFIMED;
- Office national des forêts (National Forests Office, France);
- UNECE/FAO partnership; Forest Research Centre (CIFOR-INIA);
- Università degli Studi di Bari (University of Bari, Italy);
- Università degli Studi di Firenze (University of Florence, Italy).

THREATS TO FORESTS

The Mediterranean region had a population of 507 million people in 2010 across three continents (Europe, Africa and Asia). This population is expected to increase to 625 million inhabitants by 2050 (Plan Bleu, 2009; see also Figure 2), mainly in SEMCs and in urban and coastal areas. Human activities pose an increasing threat to natural resources, raising questions about the sustainability of current uses of Mediterranean landscapes.

Climate change

The effects of climate change can be seen in the Mediterranean and have begun to exacerbate already existing pressures and degradation phenomena, increasing the vulnerability of the ecosystems and populations that depend on them and leading to

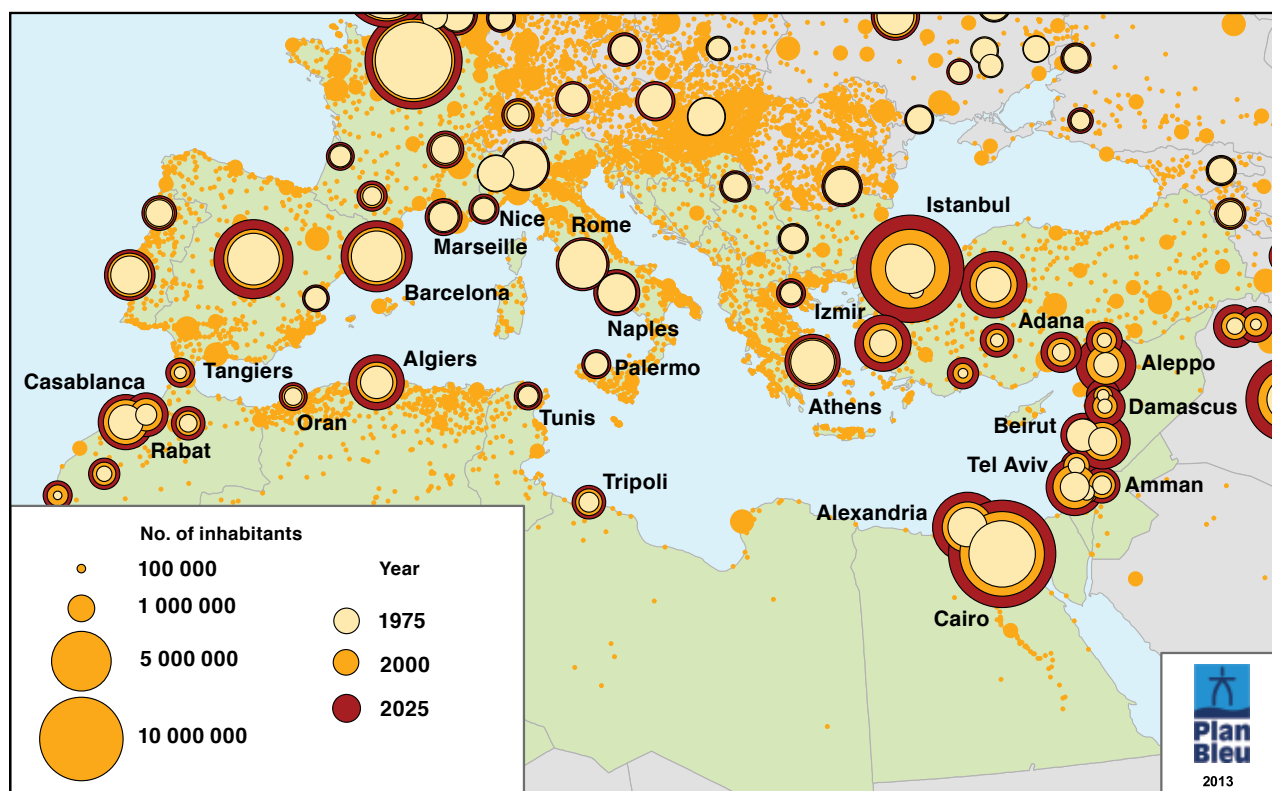
considerable changes in the environment that in some cases may be irreversible (such as desertification and soil erosion). Numerous essential economic activities (such as agricultural activities and grazing) in the region are and will increasingly be affected.

Climate change is thought to have affected the Mediterranean throughout the twentieth century and has clearly accelerated since 1970, with an average warming of nearly 2°C in southwestern Europe (specifically, the Iberian Peninsula and southern France). The exception is Greece, where, until the early 2000s, the average annual temperature declined. There may also have been warming in northern Africa, although this is difficult to quantify due to a lack of data. Rainfall decreased by up to 20 percent in the twentieth century in some parts of the SEMCs (IPCC, 2007). Based on Intergovernmental Panel on Climate Change (IPCC) scenarios published in

2007, projected climatic changes will strongly increase in the Mediterranean region by 2100.

Risks throughout the region, but SEMCs particularly affected. Table 2 shows the projected changes in temperature and precipitation in the Mediterranean region in 2100. The most significant temperature increases are projected to occur in Egypt, Jordan, Lebanon, Palestine and the Syrian Arab Republic. There will be changes in precipitation throughout the Mediterranean region, but the projected increase in water stress in most SEMCs is alarming. Models project more frequent and serious continental droughts (fewer days of precipitation and an increase in the length of the longest periods without rain) (IPCC, 2007). Average annual river flow is projected to decrease, despite possible seasonal redistribution (e.g. more water in winter and less in spring and summer). It is also

2
Urban population distribution and increase
in Mediterranean countries, 1975–2025



Source: FAO and Plan Bleu, 2013. Based on information from United Nations, Department of Economic and Social Affairs, Population Division, 2011.

projected that extreme events will become more frequent and intense.

Impacts on ecosystems and biodiversity. Climate change could affect ecosystems in multiple ways, such as by reducing or expanding their extent and distribution, changing the behaviour of species and their interactions, and changing the risk of fire, diseases and species invasions.

Rising temperatures may displace vegetation types and species in latitude and altitude. In the Mediterranean region, it is estimated that a 1 °C increase in temperature could cause certain plant species to migrate approximately 180 km to the north, or 150 m in altitude (Plan Bleu, 2009), as well as alter the distribution of pathogenic species and their vectors. Combined with periods of more severe drought, warming could lead to an increased frequency of fire, which may hinder the regeneration of species and, combined with overuse, lead to accelerated desertification. Such changes

TABLE 2. Projected changes in temperature and precipitation in the Mediterranean region in 2100

Season	Temperature variation (°C)		Precipitation variation (°C)		Occurrence of extreme events (% increase)		
	Min.	Max.	Min.	Max.	Hot	Humid	Dry
Winter	+1.7	+4.6	-16	+6	93	3	12
Spring	+2	+4.5	-24	-2	98	1	31
Summer	+2.7	+6.5	-53	-3	100	1	42
Autumn	+2.3	+5.2	-29	-2	100	1	21
Annual	+2.2	+5.1	-27	-4	100	0	46

Source: IPCC, 2007.

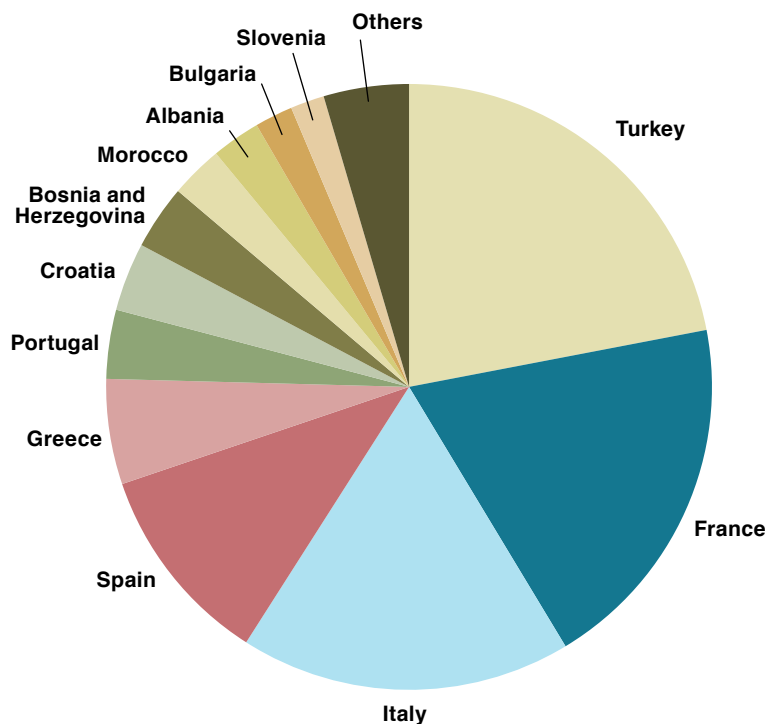
could increase the risk of extinction of a wide range of species and ecosystems.

A number of studies predict changes in certain environments. Safi (1999), for example, predicted changes in bioclimatic areas in Lebanon by 2080 and suggested that there would be an expansion of arid zones and a contraction of cooler and more humid zones. Forecasts made within the framework of the CARBOFOR project

(Badeau *et al.*, 2005) suggest that, in France, areas favourable to mountain forest and higher latitude species will be lost by 2100, while areas favourable to species adapted to hotter and drier conditions will expand.

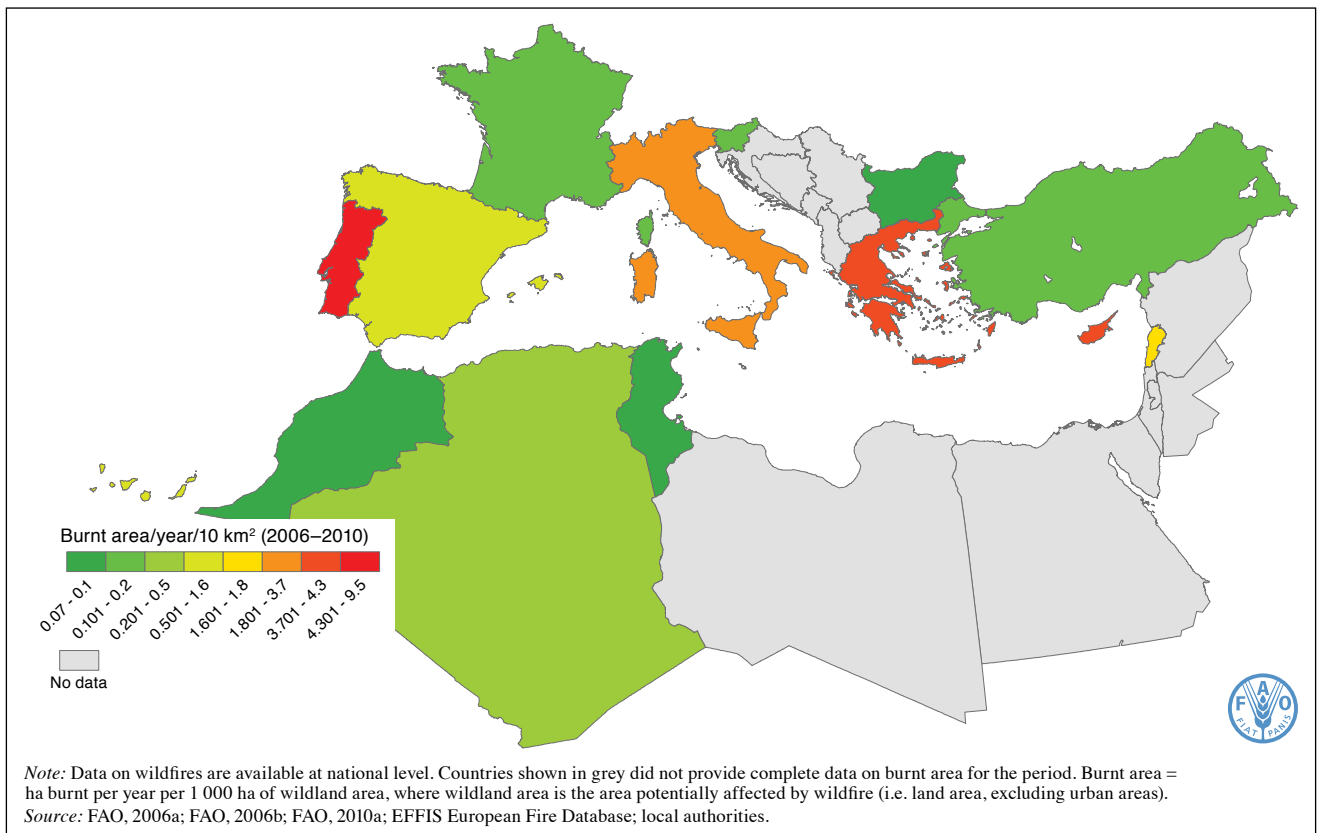
Water scarcity. Water resources are limited in the region and unequally distributed: in 2012, four countries (France, Italy, Spain and Turkey) accounted for 67 percent of the region's renewable fresh water resources (flows available within their own borders on an annual basis), while the SEMCs held only about one-quarter (27 percent) of the region's water resources between them (Figure 3) (FAO and Plan Bleu, 2013 from FAOSTAT and AQUASTAT databases). Forest management approaches are needed that increase the resilience of forests to water stress and help meet demand from the various economic sectors.

Wildfires. Over millennia, human activities in Mediterranean landscapes have modified natural forest fire dynamics and the capacity of vegetation to respond to disturbance (i.e. its resilience). The climate also plays a major role in fire dynamics and risk: for example, the moisture content of litter is reduced by the generally prolonged hot and dry season (generally between about June and October), when the average daytime temperature is often above 30 °C, there is little rain, and winds are characterized by high speeds and strong desiccating power.



Source: FAO, 2012.

3
Share of the total volume of Mediterranean water resources, by country, 2012



In the period 2006–2010, over 2 million ha of wildlands (not all forest) were burnt in the Mediterranean region, an average of more than 400 000 ha per year (Figure 4). In the same period, about 269 000 wildfires were reported in the region (an average of about 54 000 wildfires per year).

The limited information available about the causes of fires suggests that the Mediterranean region is characterized by a prevalence of human-induced wildfire. In the case of Algeria, Bulgaria, Italy, Portugal and Turkey, which reported statistics on fire causes (European Commission, 2011), “unknown” accounts for 51 percent of the total (ranging from 88 percent in Algeria to 14 percent in Bulgaria and 12 percent in Turkey). This confirms the need highlighted by the European Commission (2011) for improved knowledge and reporting on wildfire causes and for more post-fire investigation.

In the context of a European project led by Cemagref (France) and the European

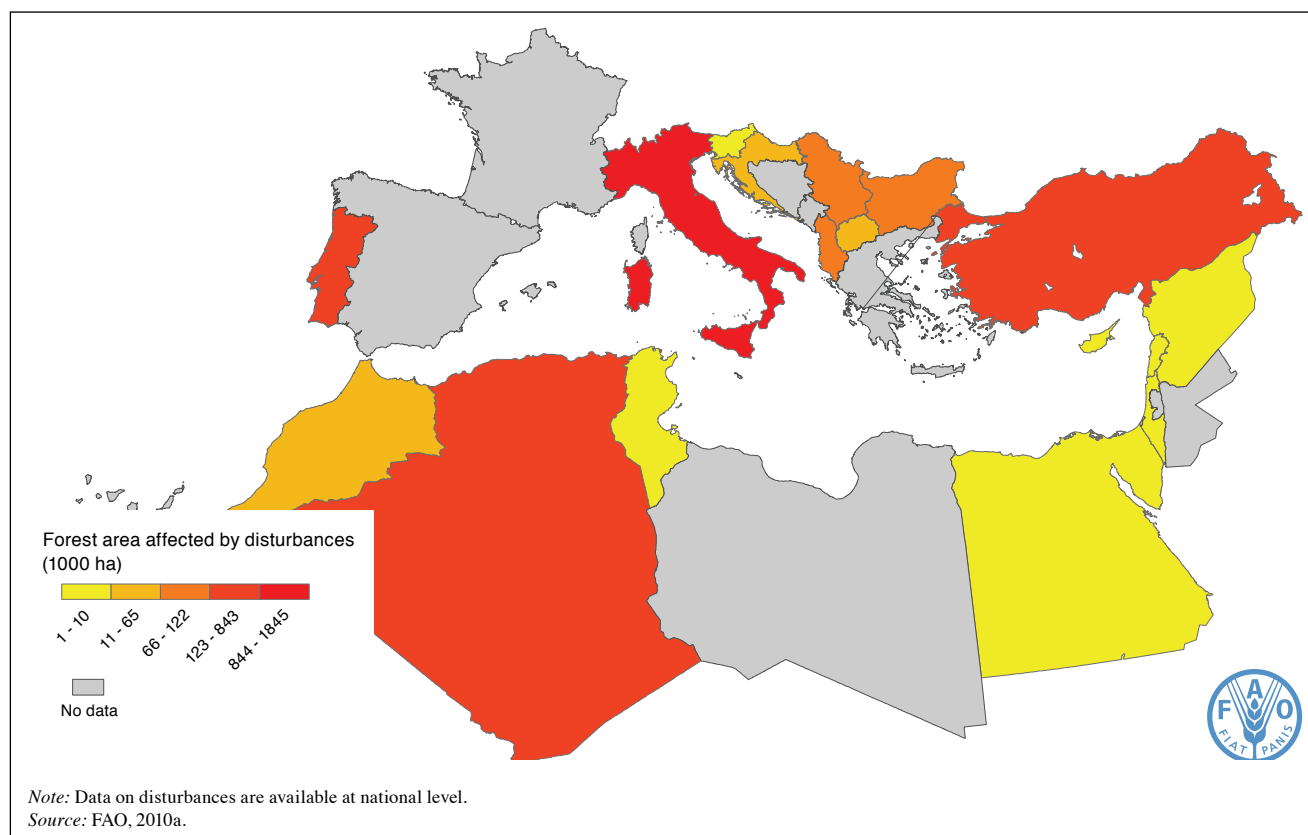
Forest Fire Information Systems, a new common classification scheme has been proposed. This project aims to harmonize data across countries, facilitate the identification of the main drivers of fire ignition and make it possible to improve reporting on forest fire causes.

The temporal and spatial distribution of wildfires in the Mediterranean region is influenced by several factors and there is considerable year-to-year variation. Nevertheless, Mediterranean forest ecosystems are particularly prone to wildfire, as demonstrated by the case of France. In the period 2000–2010, wildfires in the French Mediterranean¹ (which represents less than 20 percent of the total area of France) accounted for about 49 percent of the total number of wildfires nationally and 69 percent of the total burnt area. In most years, about 70–80 percent of the area burnt by wildfires each year in France is in the Mediterranean part of the country (FAO and Plan Bleu, 2013).

4 Area burnt by wildfire per year, Mediterranean region, by country, 2006–2010

Climate change may lead to greater weather extremes (e.g. droughts and heat waves), exacerbating the threat posed by fire (FAO, 2007). An overall increase in burnt areas and a rise in the frequency, intensity and severity of wildfires are expected in the next decades. In addition, human influences, such as land abandonment and a lack of land and forest management, can increase the incidence, spread and severity of wildfire. The consequences of such an increase in fire frequency and intensity are likely to be almost entirely negative, both

¹ The French Mediterranean zone as defined by the French forest fires database for the Mediterranean area (Prométhée) includes the following departments: Alpes-de-Haute-Provence, Alpes-Maritimes, Ardèche, Aude, Bouches-du-Rhône, Corse-du-Sud, Drome, Gard, Haute-Corse, Hautes-Alpes, Hérault, Lozère, Pyrénées-Orientales, Var and Vaucluse.



5 Total forest area affected by disturbances in Mediterranean countries, 2005

socioeconomically (e.g. increased damage to infrastructure, the loss of merchantable forest goods and ecosystem services, and deleterious effects on human health) and ecologically (e.g. increased forest degradation and biodiversity loss).

Forest health threats. The Mediterranean forests share many common features, including climate, soils and forest composition. As a result of these similarities, they also share many forest health problems, including those associated with insect pests, disease, other biotic factors (such as woody invasive species, wildlife browsing and grazing), and abiotic factors (such as air pollution and storms).

Although data are incomplete, outbreaks of forest insect pests were estimated to have damaged 35 million ha of the world's forests annually in the period 1988–2007 (FAO, 2010a). Of this global total, over

5 million ha of damage is estimated to have occurred in Mediterranean countries, which was almost 6 percent of the total forest area of the region. Figure 5 shows the countries in the region classified according to the reported extent of forest disturbances in 2005.

Woody invasive species are increasingly recognized as a major problem in the region, with a range of negative economic, social and environmental impacts. For example, *Ailanthus altissima*, a tree species native to China, is a significant invasive plant in the Mediterranean region. It is an aggressive, fast-growing tree and a prolific seeder that may overrun native vegetation; it also produces toxins that prevent the nearby establishment of other plant species.

Droughts occur when precipitation is lower than usual over an extended period of time (usually a season or more). Often associated with the arid regions of Africa, in recent years drought events have also

occurred in the Mediterranean countries of Europe (WMO, 2011). Drought can affect forests in various ways and can lead to increased mortality, declines in productivity, dieback, and increased susceptibility to insect pests and pathogens.

Biodiversity loss. The unusually high geographical and topographical variability (e.g. irregular coasts and many mountain ranges) and a pronounced climatic bi-seasonality have had a strong positive influence on species richness and distribution in the Mediterranean region, which is a biodiversity hotspot with high endemism (Myers *et al.*, 2000; Médail and Quézel, 1997). Twenty-five percent of the approximately 200 terrestrial animals found in the region are endemic to it, and 350 species of bird are also found in the region. There are more than 25 000 plant species in the Mediterranean region, compared with about 6 000 in central and northern Europe. Mediterranean forests have nearly twice the number of woody

species as central and northern European forests (247 vs. 135), and 158 of the woody species in Mediterranean forests are exclusive to those forests or largely preferential, compared with 46 in central and northern European forests. There is a similar difference in terms of genera: 34 are exclusive to Mediterranean forests and only 7 to central and northern European forests (Scarascia-Mugnozza *et al.*, 2000).

Nevertheless, the high biodiversity in the Mediterranean region is threatened by habitat loss (Myers *et al.*, 2000). According to the EU's 1992 Habitats Directive, 386 endangered species and 142 habitats in the Mediterranean are in need of protection. Anthropogenic pressures such as habitat loss, landscape degradation, fire, soil erosion and climate change are some of the drivers of forest biodiversity loss in the region. Implementing concrete measures for biodiversity and forest genetic conservation is a difficult challenge that requires an integrated approach to land and forest

management encompassing the environmental, economic and social dimensions of sustainable development.

GOODS PROVIDED BY MEDITERRANEAN FORESTS

Wood products

The socioeconomic importance of Mediterranean forests is less about the wood they provide than their non-wood forest products and ecosystem services (Merlo and Croitoru, 2005). Nevertheless, such forests do contribute to meeting regional demand for wood products. Because data on wood production, consumption (Figure 6) and trade in the Mediterranean are reported at the national level, they do not show the relative importance of Mediterranean forests compared with forests in other biogeographical regions of the same countries.

Non-wood forest products

The impressive diversity of species that characterizes the Mediterranean region

offers potential for the production of a wide variety of non-wood forest products (NWFPs). Some countries in the region have specific legislation governing the use of certain NWFPs, but generally the diversity of products and a lack of clear definitions of NWFPs hinder the regulation of their cultivation, extraction (Figures 7 and 8), marketing and export.

ECOSYSTEM SERVICES

The relationship between people and forests is continually evolving. The socioeconomic changes of recent decades triggered by urbanization and rises in living standards have increased the importance of the ecosystem services of Mediterranean forests (Palahi *et al.*, 2008). Some of these services are discussed below.

Erosion control and water supply

Vegetation plays a crucial role in preventing erosion by decreasing the effect of erosive forces and physically keeping the soil in place. The erosion of forest soils



Mediterranean stone pines are the source of pine nuts. The Mediterranean region produces approximately 6000–9000 tonnes of pine nuts per year, not including domestic or local consumption

6
**Average apparent per capita
 consumption of wood and wood products,
 by Mediterranean subregion, 2010**

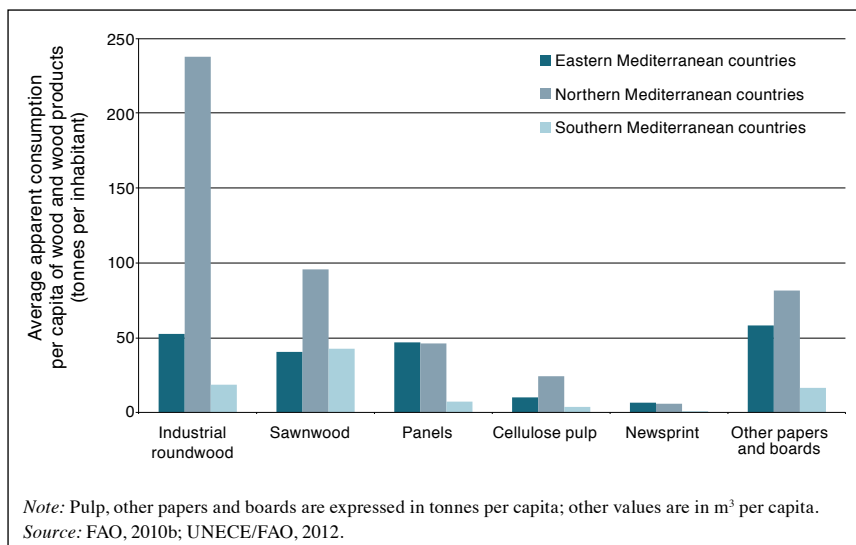
can be exacerbated by, for example, the loss of forest cover, wildfire and storms.

In the case of extreme rainfall events, trees, shrubs and herbs can significantly reduce the kinetic energy of raindrops (Albergel *et al.*, 2011) and therefore the risk of erosion.

The importance of forest cover in ensuring high water quality is increasingly recognized: for example, between 1990 and 2010, the area of protective forests (forests primarily designated for soil and water protection) increased from 15.2 million ha to 15.9 million ha in western Mediterranean Europe and from 2.1 million ha to 3.1 million ha in southeastern Europe, including Turkey (FOREST EUROPE, UNECE and FAO, 2011).

Carbon sequestration

Forest ecosystems play a key role in the global carbon cycle and climate regulation because carbon is exchanged naturally and continuously between vegetation, soils and the atmosphere through



photosynthesis, respiration, decomposition and combustion.

According to an evaluation made in 2005 (Ding, Nunes and Telucksingh, 2011), the economic value of carbon storage in Mediterranean forests ranges between US\$37 billion and US\$63 billion in the IPCC global emission scenarios A1 and B2,² respectively, with 2050 as the horizon. The economic value of carbon is smaller in Mediterranean forests than in forests in central–northern Europe, but higher than that of forests in northern Europe and Scandinavian Europe.

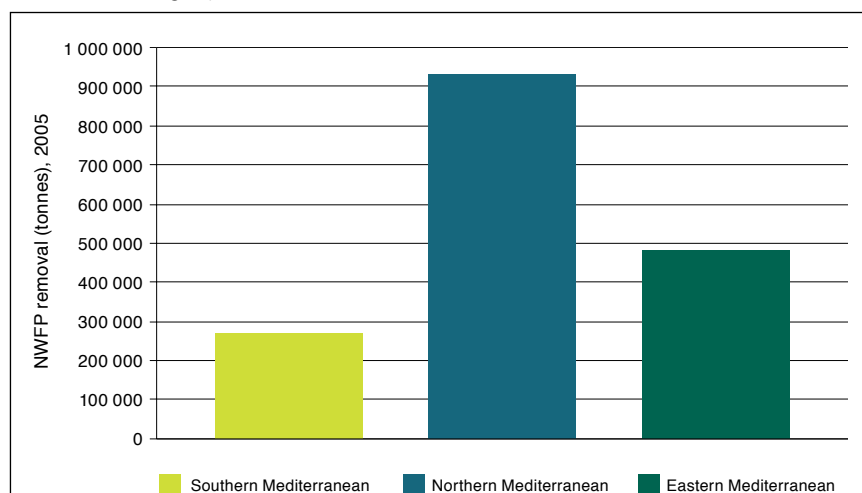
² IPCC scenarios: “The A1 storyline and scenario family describes a future world of very rapid economic growth, global population that peaks in mid-century and declines thereafter, and the rapid introduction of new and more efficient technologies. Major underlying themes are convergence among regions, capacity building and increased cultural and social interactions, with a substantial reduction in regional differences in per capita income ...

“The A2 storyline and scenario family describes a very heterogeneous world. The underlying theme is self-reliance and preservation of local identities. Fertility patterns across regions converge very slowly, which results in continuously increasing global population. Economic development is primarily regionally oriented and per capita economic growth and technological change are more fragmented and slower than in other storylines.

“The B1 storyline and scenario family describes a convergent world with the same global population that peaks in mid-century and declines thereafter, as in the A1 storyline, but with rapid changes in economic structures toward a service and information economy, with reductions in material intensity, and the introduction of clean and resource-efficient technologies. The emphasis is on global solutions to economic, social, and environmental sustainability, including improved equity, but without additional climate initiatives.

“The B2 storyline and scenario family describes a world in which the emphasis is on local solutions to economic, social and environmental sustainability. It is a world with continuously increasing global population, at a rate lower than A2, intermediate levels of economic development, and less rapid and more diverse technological change than in the A1 and B1 storylines ...” (IPCC, 2007)

7
**NWFP removals in the
 Mediterranean region, 2005**



Note: Pulp, other papers and boards are expressed in tonnes per capita; other values are in m³ per capita.
 Source: FAO, 2010b; UNECE/FAO, 2012.

Social services

Social and cultural services provided by forest ecosystems include recreation and ecotourism; the maintenance of cultural heritage values, cultural diversity, spiritual and religious values, aesthetic and educational values, and knowledge systems; inspiration; social relations; and a “sense of place” (Alcamo *et al.*, 2003). Overall, however, data on the social ecosystem services provided by forests is scarce in most countries.

CONCLUSION

The Mediterranean region is likely to be strongly affected by climate change, the effects of which will exacerbate existing pressures on Mediterranean forests and people. Water scarcity is likely to affect a

greater part of the Mediterranean region in coming decades, with potentially serious consequences for people, local economies and forest health. Unmanaged – or poorly managed – forest stands may be more vulnerable to natural hazards such as pests, disease, drought and forest fires.

Given the importance of Mediterranean forests for local people, their contribution to rural development and food security (in some countries more than others), and the wide range of goods and ecosystem services they provide, strategies for the management of Mediterranean forests are needed that increase resilience and equitably distribute their benefits and costs. To promote such strategies, ongoing monitoring is required. The *State of Mediterranean Forests*, if published every five years, could provide an overview of the situation of Mediterranean forests and assist in the development, monitoring

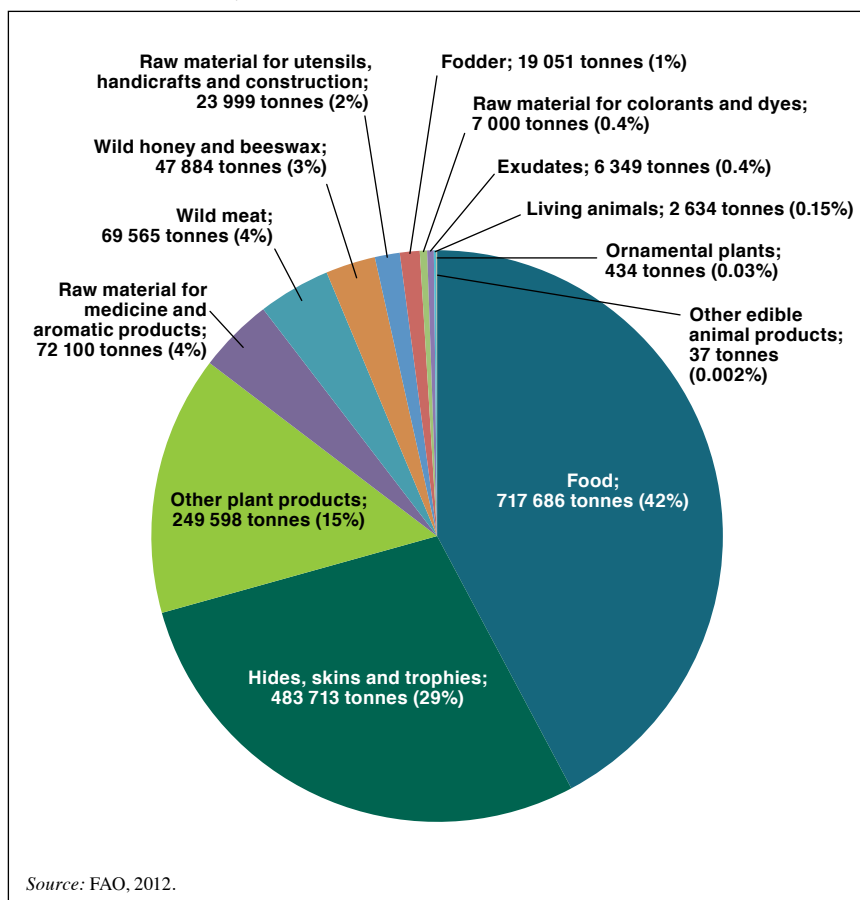
and assessment of regional strategies and coordination between national approaches. The improved sharing of information on forests in the Mediterranean region would help increase regional cooperation among the Mediterranean countries, mobilize financial resources to reduce the impacts of climate change on Mediterranean forest ecosystems and other wooded lands, and foster the development and implementation of a shared vision on Mediterranean forests. ♦



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8
NWFP removals in the
Mediterranean countries, 2010





**Reforestation near
a High Atlas village,
Morocco**

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The Strategic Framework on Mediterranean Forests and the Tlemcen Declaration

C. Besacier

This regional policy agenda, which was endorsed by Mediterranean countries in March 2013, will help align national policies to promote sustainable forest management in the region.

Christophe Besacier is in charge of the Secretariat of the Committee on Mediterranean Forestry Questions—*Silva Mediterranea* and of the Secretariat of the Collaborative Partnership on Mediterranean Forests.

The Strategic Framework on Mediterranean Forests aims to provide a common policy direction for the integrated management of Mediterranean forest ecosystems. On the basis of information drawn from the 2013 publication, *State of Mediterranean Forests*, it focuses on the need to develop goods and services, promote resilience, and strengthen both capacity and resources.

The framework is the result of a regional process initiated in April 2011 at the Second Mediterranean Forest Week in Avignon, France, with a first draft prepared by an expert workshop convened in Chania, Greece, in September 2012.

The main objectives and strategic lines of the Strategic Framework on Mediterranean Forests (SFMF) are as follows:

1. developing and promoting goods and services provided by forest ecosystems and other wooded lands in the Mediterranean region:
 - improve sustainable production of goods and services [by Mediterranean forests];
 - enhance the role of Mediterranean forests in rural development;
 - promote forest governance and land-tenure reform in Mediterranean landscapes;

*House of Tlemcen National Park,
Tlemcen, Algeria*



© FAO/MARCO PERRI



The Third Mediterranean Forest Week, held in Tlemcen from 17–21 March 2013, was attended by foresters from across the Mediterranean region

2. promoting the resilience of these forest ecosystems and other wooded lands in the Mediterranean to face global changes:
 - promote wildfire prevention by integrating the increasing risks associated with ongoing climate change in the Mediterranean;
 - manage forest genetic resources and biodiversity to enhance the adaptation of forest ecosystems and other wooded lands to climate change in the Mediterranean;
 - restore degraded Mediterranean forest landscapes;
3. enhancing the capacity of stakeholders and the resource mobilization necessary for the sustainable management of forest ecosystems and other wooded lands in the Mediterranean
 - develop knowledge, training and communication on Mediterranean forests;
 - reinforce international cooperation on Mediterranean forests;
 - adapt existing financing schemes and develop innovative mechanisms to support the implementation of forest policies and programmes on Mediterranean forests.

The SFMF was shared with foresters throughout the Mediterranean region

during the consultation process and endorsed by countries at the high-level segment during the Third Mediterranean Forest Week, organized in Tlemcen, Algeria, on 17–21 March 2013 by the Committee on Mediterranean Forestry Questions—*Silva Mediterranea*, with the support of the Algerian Ministry of Agriculture and Rural Development and several other members of the Collaborative Partnership on Mediterranean Forests.

The meeting, on the theme of “Mediterranean forests for sustainable development of landscapes: strategies of mitigation and adaptation to global change?”, was a landmark in regional cooperation on Mediterranean forests. In addition to the endorsement of the SFMF, the meeting included the launch of the first edition of *State of Mediterranean Forests* and the celebration of the first International Day of Forests on 21 March, which highlighted the importance of forest ecosystems and other wooded lands for Mediterranean landscapes. It also saw the adoption of the Tlemcen Declaration.

The Tlemcen Declaration calls on political and administrative authorities at the national, regional and local levels and all other stakeholders involved in the management of forests and other wooded lands in the Mediterranean to develop and,

if necessary, adapt their strategies and policies, including governance, for the sustainable development of Mediterranean landscapes. It exhorts forest managers, experts and the scientific community of the forest sector to develop and implement, in consultation with all relevant stakeholders, innovative and sustainable management of landscapes, and to disseminate related information in the Mediterranean region. It also requests the implementation of the main recommendations proposed in the SFMF, taking into account the characteristics and needs of each country.

The Strategic Framework on Mediterranean Forests¹ should become an efficient tool to:

- improve the visibility of the forest sector and promote the mobilization of financial and human resources;
- provide a consensual framework to improve intersectoral coordination and foster partnerships between the various stakeholders involved in the management of forest ecosystems and other wooded lands in countries of the region after its integration into national policies (public/private);
- contribute to better coordination in the development and implementation of subregional and intersectoral programmes and/or projects;
- facilitate the identification and promotion of common positions on Mediterranean forest ecosystems and other wooded lands in international fora; and
- provide the Committee on Mediterranean Forestry Questions—*Silva Mediterranea* with a common vision and roadmap. ♦

¹ To consult the text of the SFMF, see <http://www.fao.org/forestry/36306-08872a0d33e559c4f5c42304068d43763.pdf> (Rationale) and <http://www.fao.org/forestry/36307-074996ea9512c5ec524af72a22c0b0775.pdf> (Strategic Lines).



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CASE STUDY

Improving fire management in natural parks in the Valencia Region

J. Suárez Torres and F. Navarro Baixauli

A project funded by the European Union has helped improve fire prevention in natural parks in this Spanish region by boosting local participation.

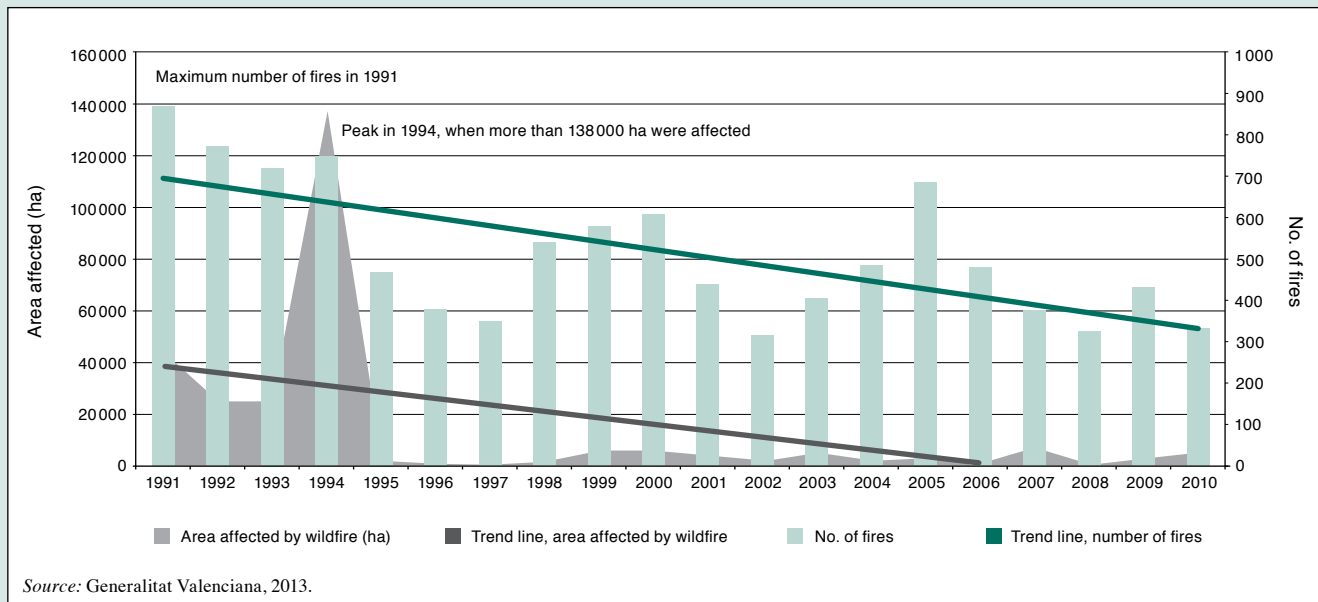
Jorge Suárez Torres is head of the Subdepartment of Prevention and Suppression of Forest Fires at the Regional Ministry for Governance, Valencia Regional Government, Spain. **Francisco Navarro Baixauli** is project manager, VAERSA (environmental services company), Valencia Regional Government, Spain.

In Spain's Valencia Region, forest fire is an important factor in landscape and vegetation dynamics (Figure 1) and strongly influences the services provided by forests and other wooded lands. The Valencia Regional Government (Generalitat Valenciana) participated in a QUALIGOUV project with the aim of improving forest-fire prevention in four of the region's natural parks: Turia, Chera-Sot de Chera, Puebla de San Miguel and Sierra Calderona (Table 1 and Figure 2). The QUALIGOUV project was funded by the

European Union between 2007 and 2013 and implemented in four countries to help improve the governance and management quality of natural protected areas.

This article describes these natural parks (also referred to here as "pilot areas") and their governance systems and examines the role of the project in improving fire management in them.

Above: Panoramic view of Puebla de San Miguel village and its surroundings, Puebla de San Miguel Natural Park, 2010



1 **Number of fires and affected area** **in the Valencia Region, 1991-2010**

THE NATURAL PARKS **Climate and geography**

Over one-third of the Puebla de San Miguel Natural Park is 1 400 m above sea level or higher. Its highest point (and the highest point in the Valencia Region) is 1 839 m, and it has a Mediterranean mountain climate (Figure 3). Located on a seismic fault, the Chera-Sot de Chera Natural Park has uneven and mountainous terrain; it was the first area in the Valencia Region to be declared a geological park. The Turia Natural Park is characterized by a less abrupt topography, proximity to the sea and the presence of riverine vegetation. The Sierra Calderona Natural Park is part of a mountain system that extends from the coastal zone to the interior of the Valencia Region, reaching a maximum altitude of 1 012 m.

Demography

The four natural parks have very different population dynamics. Puebla de San Miguel and Chera-Sot de Chera have very small and relatively isolated populations (66 and 1 000 inhabitants, respectively). Collectively, the rural and urban areas

in the vicinity of the Turia Natural Park have a population of about 200 000 inhabitants, and the park is also close to the Valencia metropolitan area (which has over 1.5 million inhabitants). Most of the

97 000 inhabitants of Sierra Calderona, which is also close to the Valencia metropolitan area, live near the coast.

There are differences in the types of settlement, from densely populated towns

TABLE 1. Description of the study area

	Puebla de San Miguel	Chera-Sot de Chera	Sierra Calderona	Turia
Landscape area, ha	6 390	6 451	18 019	4 692
Population	66	1 000	97 000	200 000
Forest area, ha (percentage of total landscape)	5 879 (92%)	5 806 (90%)	15 856 (88%)	2 768 (59%)
Agricultural area, ha (percentage of total landscape)	511 (8%)	645 (10%)	2 162 (12%)	1 924 (41%)
Main tree forest species	<i>Juniperus thurifera</i> , <i>Taxus baccata</i> , <i>Pinus nigra</i> , <i>P. sylvestris</i>	<i>P. halepensis</i> , <i>P. pinaster</i> , <i>Quercus rotundifolia</i> , <i>Q. faginea</i> , <i>T. baccata</i>	<i>P. pinaster</i> , <i>P. halepensis</i> , <i>Q. ilex</i> , <i>Q. suber</i>	<i>P. halepensis</i>
Main forest functions and uses	Recreation, amenity, scenic beauty, protection, biodiversity and production			
Main risks and threats	Wildfire			
Private forest, ha (percentage of total forest area)	765 (13%)	464 (8%)	10 148 (64%)	1 384 (50%)
Public forest, ha (percentage of total forest area)	5 114 (87%)	5 342 (92%)	5 708 (36 %)	1 384 (50%)
Management framework	Natural park			
Forest-fire prevention plan	Yes			
Number of forest fires, 10-year period	9	7	107	84
Area burnt in 10-year period, ha	0.18	2.5	5 303	363

Source: Adapted from Gasc *et al.*, 2012.

2 Location of pilot sites in the Valencia Region

to gardened residential areas and scattered settlements. Some inhabited areas are close to the forest, thus increasing fire risk in urban and peri-urban interfaces. The socio-economic situation also varies between pilot areas. On average, those natural parks with smaller populations (i.e. Puebla de San Miguel and Chera-Sot de Chera) have stronger economic links with the surrounding landscapes than those with larger populations (i.e. Turia and Sierra Calerona), whose economy is more closely tied to industry and to services unrelated to the forest.

Role of forest and different uses

Forest-based productive activities (e.g. hunting, fishing, mushroom-picking, and cane- and wood-cutting) are decreasing, while water regulation, recreation and

biodiversity conservation services are gaining in importance. However, the burning of agricultural and garden waste and certain beekeeping and recreational activities increase the risk of human-induced forest fire. In fact, only 23 percent of forest fires are of natural origin in the Valencia Region.



Governance

The Valencia Regional Government is responsible for the management of the natural parks. Each park has an executive director appointed by the Regional Ministry of the Environment, who makes the management decisions. In each park, a consultative committee (with advisory functions but no decision-making power) meets once or twice a year to discuss current and future projects and activities in the park. The consultative committee is composed of representatives of local and regional authorities, universities, and associations and organizations related to, for example, conservation, hiking, sports, culture and hunting (Figure 4).

The management structure is similar in all the four natural parks except for the composition of the consultative committees, which differs depending on the organizations present in each area.

Management problems are usually discussed and solved by the consultative committees or the park directors, and there is no other established structure for conflict resolution. Special working groups can be created (comprising representatives of the parties involved) to address specific conflicts. However, so far there have been no significant conflicts among stakeholders about forest-fire prevention.



Chera-Sot de Chera Natural Park, 2009

Responsibilities and obligations for the prevention of forest fire are shared among the various stakeholders – local institutions, the regional government, river authorities, private owners, local residents, visitors, sports promoters, farmers and agricultural cooperatives, researchers and hunters – and coordinated by the Regional Ministry for Governance. Each natural park has a fire-prevention plan, which is applied locally through local wildfire prevention plans. Actions set out in these plans include surveillance, the prevention of fire ignition, and the construction of infrastructure such as firebreaks, water tanks and forest roads. Once approved, and after a period of public consultation, fire-prevention plans form a framework for the implementation of prevention activities by all stakeholders.

3 Temperature and precipitation, four pilot sites

TABLE 2. Action on water tanks and forest roads

Type of work	Chera-Sot de Chera	Puebla de San Miguel	Turia	Sierra Calderona	Total
Road maintenance (m) (executed)	25 562	7 480	21 212	81 030	135 284
No. of new water storage tanks (planned)	6	2	0	4	12
No. of water tanks maintained (projected)	0	0	2	6	8

Source: Data compiled by authors.

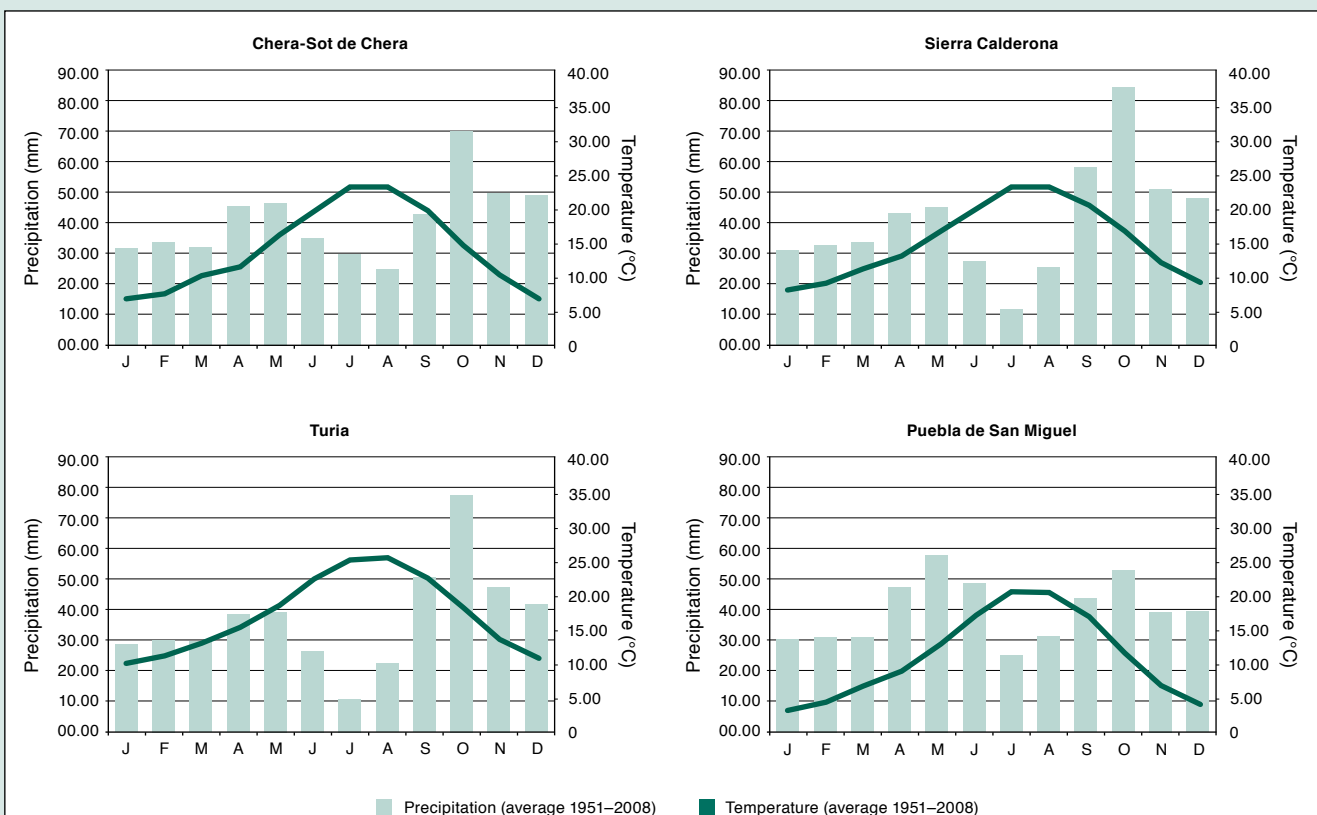
FIRE PREVENTION AT THE LOCAL LEVEL

Within the framework of the QUALIGOUV project, several activities have been undertaken with the aim of improving forest governance in the pilot areas. In particular, forest-fire prevention plans have been developed for each natural park, and planning, information, communication and participatory tools have been used to increase community empowerment. These activities have improved the governance of the natural parks and, in some cases, of the

entire Valencia Region. Their transfer to and implementation in other areas would, however, require a preliminary analysis and an adaptation of the approaches and tools used.

Fire-prevention plans for natural parks

Drawing up plans to prevent forest fires in each natural park is a way to establish a shared vision among stakeholders. In this way, a single document covers all the preventative actions to be carried out, such



Source: Generalitat Valenciana, 2013.

4
Governance system,
Valencia Region

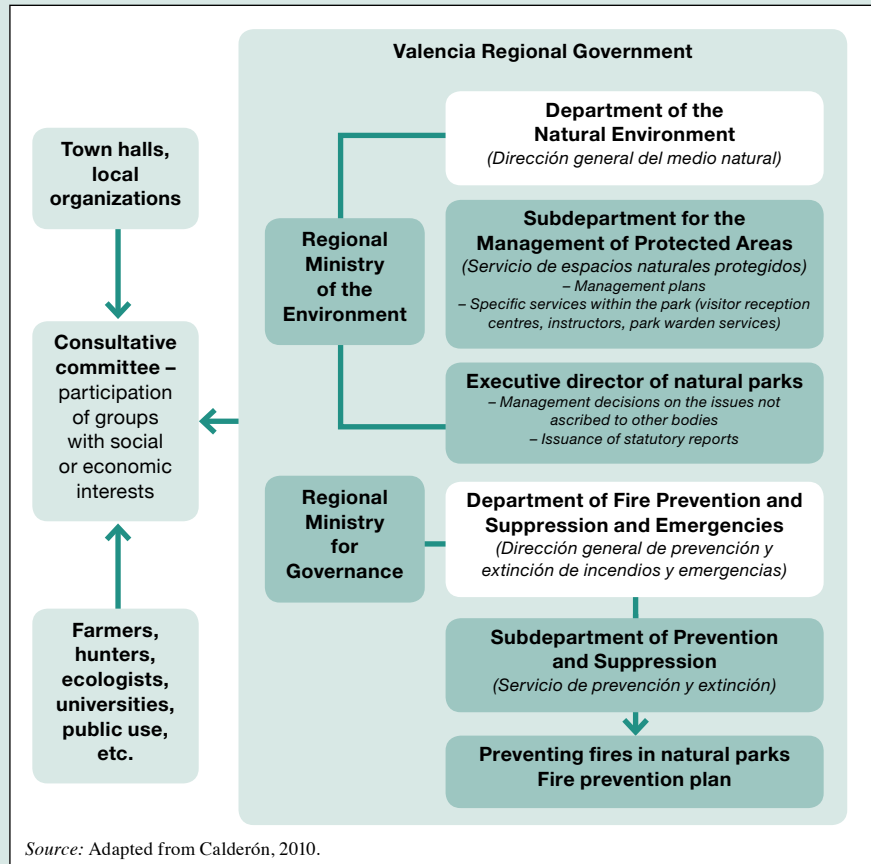
as vigilance, detection, information, ignition dissuasion measures (e.g. warnings and patrols) and the development of infrastructure. Once this planning structure is decided, municipal plans for the prevention of forest fires are developed locally, using a participatory approach (Figure 5). Awareness-raising is also needed at the local level to prevent forest fires.

Fire-prevention infrastructure

Action has been undertaken to improve and maintain fire-prevention infrastructure such as water storage tanks (for helicopters and fire engines) and forest roads (Table 2). The maintenance and improvement of forest roads is expensive; three projects have been developed to upgrade important roads, and stabilization trials using lime or cement have been conducted with the aim of obtaining maximum durability of the road surface. In total, in the four pilot areas, these projects include up to 135 km of forest roads as part of efforts to minimize the risk of forest fire. Actions have been planned for the installation of up to eight water tanks, including functional issue analysis and other environmental and security measures. For example, measures are needed to prevent animals from drowning in water tanks; escape ramps have been designed and adapted to the various tank diameters and can be fitted without the need to empty the tanks.

Promoting fire-prevention plans at the local level

Although the development and implementation of fire-prevention plans has been a legal obligation at the municipal or local level for almost a decade, they have started to be drawn up only recently thanks to the QUALIGOUV project, which provided



Source: Adapted from Calderón, 2010.

Phase	Actions	Participants/ parties involved
Development of the document	Meetings	Technical partners, executive director of natural parks, environmental rangers
	Presentation of the draft document	Consultative committee of the natural park
Review phase	Revision of the draft and production of the report	Department of Natural Parks of the Regional Ministry of the Environment (Valencia Regional Government)
Information to the public	Dissemination of the plan through the web	General public Stakeholders – affected councils, local and provincial associations, forest owners, cooperatives, etc. Consultative committee of the natural park
Approval phase	Meeting	Council of the natural park
	Final approval by law	Valencia Regional Government

Source: Adapted from Calderón and Suárez, 2010.

5
Stakeholders and actions in different
phases of the development of fire-
prevention plans for natural parks



River vegetation in the Turia Natural Park, 2008

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supportive funding of up to €6000 per plan to 15 municipalities. Five of these plans had been approved and 10 were being processed at the time of writing (Table 3). A methodological guide for the preparation of fire-prevention plans was also developed to assist in transferring knowledge and tools from the regional to the local level and to encourage greater coherence among local plans.

Manual of good practices for the prevention of forest fire

Most forest fires in the pilot sites are human-induced (caused mainly by negligence rather than arson). However, coercive preventative measures, limitations

and prohibitions are insufficient and may have negative side-effects, such as the disappearance of traditional activities carried out by local people in forest ecosystems. The *Manual of good practices for the prevention of forest fire*, which has been prepared to support the work, acknowledges the many legitimate activities that take place in forests and the presence of a wide range of legitimate forest users – such as farmers, foresters, residents and tourists. For each activity, the manual presents measures that can be taken to reduce the risk of starting forest fires, with the aim of raising awareness about safe forest practices and promoting shared responsibility for fire prevention.

Volunteer force for vigilance and prevention of forest fires

Involving local people in voluntary activities is a way of harnessing local concerns for active participation in forest-fire prevention, as well as of increasing the resources available for surveillance. Volunteering is supported by funding from the Valencia Regional Government within the framework of the QUALIGOUV project. It is being integrated into the region's preventive actions, thus facilitating coordination with other measures, creating an optimal use of resources and complementing the existing structure of surveillance.

CONCLUSION

The aim of the QUALIGOUV project was to help a range of stakeholders to develop governance processes, test tools for managing natural parks, and exchange experiences between the four pilot areas. Among other things, the project enabled the diagnosis of the wildfire situation in the pilot areas and the identification and roles of stakeholders and promoted a shared vision of the actions to be undertaken. Moreover, it promoted the development of common goals related to firefighting, fire prevention and sustainable development, and the collective identification of the actions required to achieve them. ♦

TABLE 3. No. of municipal fire-prevention plans in pilot sites (made and approved by the Valencia Regional Government before 2006 and in 2012)

Pilot site	No. of municipalities	Prior to 2006		2012	
		No. of plans made	No. of plans approved	No. of plans made	No. of plans approved
Turia	9	1	0	2	2
Puebla de San Miguel	1	0	0	0	0
Chera-Sot de Chera	2	0	0	0	0
Sierra Calderona	14	0	0	8	3
Total	26	1	0	10	5

Source: Data compiled by authors.

Wildland–urban interface, Sierra de Calderona Natural Park, 2013



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CASE STUDY

Montpellier, green city

F. Besse, M. Conigliaro, B. Fages, M. Gauthier, G. Mille, F. Salbitano and G. Sanesi



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Green governance and urban forests are improving the quality of life in a Mediterranean city.

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Cities investing in a “green vision” have made enormous gains in improving the quality of the environment and therefore the quality of life of their citizens. Montpellier has adopted such a vision, following the fundamental yet simple rule that eliminating or reducing the area of natural and agricultural land can no longer be regarded as the best path for urban development. The city administration has encouraged the improvement of urban forests, green spaces (i.e. parks, flower gardens, castle parks, private gardens open to the public, neighbourhood squares, etc.) and biodiversity conservation by establishing long-term partnerships with citizens and efficiently managing the city’s urban and peri-urban spaces. This article describes Montpellier’s approach.

THE MUNICIPALITY OF MONTPELLIER

With about 260 000 inhabitants (Table 1), Montpellier is the eighth-largest city in France. It lies on the southeast coast of France in the Department of Hérault and Languedoc Roussillon. Its average elevation above sea level is 64 m and the municipality covers 5 688 ha. Sixty per cent of municipal land is urbanized, and urban development is ongoing; the other 40 per cent consists of parks, protected areas, forests and rural areas.

Montpellier is situated between two rivers: the Lez to the east and the Mosson to the west. The city has been expanding

Above: View of the tower of the Maison Rimbaud in the forest on the river Lez, 2011

towards the coast (10 km from the city centre) through the development of new districts and the absorption of neighbouring municipalities (e.g. Lattes and Pérols) in the eastern and southern sectors. The city has a typical Mediterranean climate, with the highest frequency of rainy days in autumn and spring. Rainfall can be heavy, particularly in autumn when “*Cévenol*” events (violent storms that can last several days) may occur (on average, 2–3 times per year), frequently causing flooding in low-lying parts of the city. However, summer is very dry, with occasional thunderstorms in August. Montpellier is the least windy city in the Gulf of Lyon, thanks to the Cévennes mountain chain, which protects the city from the north–northwesterly Mistral and the northerly Tramontane winds, although sea breezes help mitigate extreme summer heat.

URBAN POLICY

Montpellier is a well-known historical city and unique cultural capital with a high standard of services. Its population grew by 22.5 percent between 1990 and 2012 and is projected to continue to grow, posing infrastructure challenges for the city. In response, the city has developed a sustainable urban strategy, including an action plan for the management and preservation of green spaces and biodiversity.

The French national strategy of land use and urban planning has led to the creation of metropolitan regions (*agglomérations*), which are conceived as the strategic level at which sustainable urban development activities are planned. This type of territorial organization is governed by a council, composed of representatives of its constituent municipalities, that has jurisdiction and responsibility over matters such as urban development, land use policies, environment, water management, economic development, etc. in the *agglomération*. *Montpellier Agglomération*, the overall metropolitan area of Montpellier, consists of 31 municipalities, with a total population of 419 000. Moreover, it has one of the highest rates of population growth

TABLE 1. Data on the city of Montpellier

Population 2009	258 366
Land area (ha)	5 688
Of which forest area (ha)	390.2 (6.9% of total land area)
Of which agricultural area (ha)	775.84 (13.6% of total land area)
Main urban tree species	<i>Platanus x acerifolia</i> , <i>Pinus pinea</i> , <i>Celtis australis</i> , <i>Quercus ilex</i> , <i>Melia azedarach</i> , <i>Sophora japonica</i>
Main urban forest functions and uses	Beautification, greening, recreation, social life, education, agri-park, biodiversity conservation
Main risks and threats	Changes in urban strategy (replacement of “green” infrastructure with “grey” infrastructure)

in France. To help meet the needs of its growing population, the government of the *agglomération* is implementing a “territorial coherence scheme” (*Schéma de Cohérence Territoriale* – SCOT), which aims to assist spatial and temporal planning for sustainable development by fostering the protection of natural and rural areas (Reygrobellet, 2007), the location of new urban development close to public transport, and the efficient management of space using the compact city approach – an urban planning and urban design concept which promotes relatively high residential density with mixed land uses. SCOT also provides a framework for urban plans at the municipal scale. As an example of urban development, the city started working in 2010 on a participatory design for the replacement of old military barracks. The project, entitled *Devenir du site de l'École d'Application d'Infanterie (EAI)*, aims to implement a new urban development approach involving a wide set of stakeholders and combining urban renewal, sustainable development and social cohesion.

Since the 1970s, the city of Montpellier has developed tools and actions to regulate the growth of the city and to ensure a high quality of life for its inhabitants. This has involved a policy of setting land aside with the ultimate aim of creating a publicly owned “pool” of land to promote urban development based on ecofriendly principles. This has enabled the city to acquire private green spaces, including properties and areas with forests and vineyards, that could be open to the public.

In 1994, the city adopted a charter for the environment consisting of five main elements: 1) conservation and improvement of the urban landscape; 2) ecomobility (prioritizing environmentally friendly and barrier-free mobility, including and combining walking and cycling, supported by integrated and adapted infrastructures); 3) conservation and better recognition of natural resources; 4) environmental education; and 5) development of tools and indicators for environmental management.

Since the 1990s, the city of Montpellier has developed tools to promote public participation in the governance of the city, taking advantage of communication technologies to promote dialogue. Nowadays local involvement and stakeholders’ engagement are supported by a number of initiatives carried out by the local municipal and metropolitan administrations (*Agglomération Montpellier*). Consultation and participation processes include surveys, interviews, events, interactive websites as well as the development of specific long- and short-term projects. For instance, since 1998, a toll-free telephone number and (subsequently) an online form (*Montpellier au quotidien*) has been available for citizens to ask questions, to inform local authorities about daily problems, and to provide suggestions and ideas for the development of further initiatives, etc. A range of communication tools to provide inhabitants with transparent and comprehensive information on the city’s facts and figures has also been put in place over the past years.

*Parc Rimbaud
in the morning,
2012*



MONTPELLIER, THE GREEN ECOCITY

Montpellier is building its future according to a green vision. By 2011, the city had won eight awards for its efforts to protect the environment, including the Ecocity label for its plan, “*De Montpellier à la mer*” (from Montpellier to the sea). According to the city’s land-use plan, Montpellier has 741 ha of public green space (including 412 ha of municipal space and 329 ha of protected woodland), which makes up 13 percent of the total area of the municipality. According to the tree inventory, which is updated annually, the city has over 80 000 trees. Species diversity is high: more than 205 species, subspecies and varieties are found among the 24 000 trees growing along roadsides and the 5 000 trees in city parks and school gardens. In 2012, Montpellier had a total

forest area of 500 ha and more than 37 m² of green space per inhabitant. The city’s aim is that, by 2042, no home will be more than 500 m from the closest green space.

Green governance and the management of green spaces

Many French cities have peri-urban woodlands that are managed either by the city or by the National Forests Office, a public institution responsible for the national forest estate and for providing advice on communal forest management. In Montpellier’s case, urban and peri-urban green spaces are managed directly by the city itself. Urban planning in Montpellier includes plans, actions, management tools and communication initiatives specifically for green spaces.

Although the term “green space” is widely used in French urban planning, “urban forest” is not, even though large

wooded spaces in French urban areas could be defined as such. As for Montpellier, however, the term “urban forest” is explicitly mentioned in the city’s planning documents as well as in those of the wider urban region, and the benefits of green spaces, including urban forests, are taken into account in the implementation of urban development projects. The Montpellier City Council even has a councillor for biodiversity, urban forests and the quality of public and green spaces to facilitate related policy decisions. The management and design of green spaces is the duty of a specific administrative unit, the Directorate of Landscape and Biodiversity. The development of green projects is initiated via meetings at the district level, and the participation of stakeholders is then organized through briefings and thematic meetings.



Historical centre of Montpellier. Urbanscape with olive trees for recreational activities, 2012

Regarding its green areas, Montpellier has adopted the principles of adaptive management, with management varying according to the nature, location and function of the area (Aggeri, 2004). All management approaches aim to minimize the use of chemical fertilizers and to replace them gradually with recycled compost. The use of pesticides and herbicides is banned.

A large number of actions taken by the city contribute to its “green vision”. For example, the city is promoting the reintroduction of native Mediterranean species that are suited to the climate and resistant to disease by producing about 160 000 plants per year in its plant nursery. Moreover, abandoned and neglected spaces are also included in the management of the city’s green spaces. Accordingly, a major project for the identification and evaluation of these areas was launched in 2009 following the precepts of the “Manifesto of the Third Landscape” (Clément, 2004). Furthermore, an observation network

has been set up to allow the population to upload data on their nature-related observations to an online database, thus contributing to the monitoring of environmental integrity. These networks also propose structured, semi-structured and informal activities to promote the sustainable management and design of urban spaces (Mairie de Montpellier, 2013a). Data on Montpellier’s green spaces and urban and peri-urban forests are also constantly updated and made publicly available (Mairie de Montpellier, 2013b).

AURA: a strategic tool for the implementation of a green, sustainable Montpellier

“The management reference to improve urban planning” (*Améliorer l’urbanisme par un référentiel d’aménagement – AURA*) is first and foremost a handbook providing guidelines for the sustainable development of Montpellier. It comprises a complete set of working tools for spatial-temporal

design and management, based on 30 indicators organized into 9 areas for action:

1. neighbourhood (*proximités sociales* – i.e. population density, social diversity, variability of urban structures and land uses, and type of housing);
2. functional proximity (*proximités fonctionnelles* – i.e. proximity of public transport, availability of public spaces for social activities, access to community-based services and facilities, proximity of and access to sociocultural and/or sports facilities, proximity of shops and markets, and land area devoted to economic activities);
3. citizen participation (*proximités citoyennes* – i.e. concrete opportunities for citizens to be directly involved in decision-making and implementation processes);
4. networks (*réseaux* – i.e. soft mobility, private parking, bicycle parking and street lighting);

5. blue infrastructure (*trame bleue* – i.e. rivers, lakes, ponds and associated vegetation);
6. green infrastructure (*trame verte* – i.e. gardens, parks, woodlands, farming systems, meadows, roadside trees, green corridors, “green” roofs and walls, etc.);
7. sustainability and design simplicity (*conception et sobriété* – i.e. bioclimatic design, plant integration, insulation and thermal inertia index, etc.);
8. energy efficiency (*efficacité énergétique* – i.e. water and energy consumption, greenhouse gas emissions);
9. renewable energy (*énergies renouvelables*).

The AURA approach, through a scoring system for a wide range of indicators, can help assess the sustainability of development projects, and it enables the community to choose interventions with the least negative impact on the environment. Ultimately, its objectives are to:

- preserve and promote the natural heritage of Montpellier;
- value “wastelands” as pools of biodiversity and connecting elements between green spaces;
- protect, promote and enhance green corridors along rivers, fostering biological connections and improving the habitat for fauna and flora;
- develop a sustainable green transport infrastructure, integrated at the scale of the greater city area and including bike paths and walkways in green spaces (Malhey-Dupart, 2006);
- promote sustainable urban development aimed at improving social equity, quality of life, biodiversity conservation, energy efficiency, the use of renewable natural resources and minimizing negative environmental and social impacts.

All 30 AURA indicators refer, directly or indirectly, to sustainability and to environmentally friendly urban development. For example, the indicators on “public open spaces supporting social uses” and “proximity to sociocultural and sporting

structures” are related indirectly to the presence of green and other open spaces. Other indicators specifically address trees, forests, nature and biodiversity:

- the coefficient of soil permeability – the ratio of areas with permeable soils to the total area;
- green spaces – the ratio of the area of green spaces to the total area;
- tree/forest canopy and summer climatic comfort – the ratio of the total canopy cover generated by medium-to-large trees to the open area in a given sector of the city;
- biodiversity – the number of plant species per hectare in green spaces;
- plant integration – the ratio of eco-managed area to the total area of private land.

In addition to indicators for scoring the environmental sustainability of a project, bonus points can be obtained by, for example:

- providing connectivity between green spaces within a district (if at least 80 percent of the green spaces are connected by habitat corridors with a minimum width of 5 m) and between neighbouring districts (if a district’s network of green spaces is connected

with at least one green space in an adjacent district);

- maintaining high-conservation-value ecosystems.

AURA considers the tree canopy not only as an ecosystem in itself, but also as a provider of ecosystem services for pedestrian routes, bike tracks and recreation areas. Tree canopy must also be designed so as to provide summer shade and to save energy on air conditioning, thus encouraging outdoor visits, even at the hottest time of the day.

The long-term biodiversity strategy

Following the recommendation of the national Grenelle Environment Forum in 2010, Montpellier adopted the Biodiversity Plan 2010–2014. The plan is organized into three key areas: observation and learning; conservation and restoration; and education and awareness. The plan was developed with the aim of building networks between local residents and the scientific and academic communities. Among the projects developed under the Biodiversity Plan, a series of inventories

View of the woodland in front of the new Town Hall, 2012



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and mapping exercises is being conducted that will provide an interactive map showing the city's significant trees. Activities within the framework of the Convention on Biological Diversity (CBD) tree-planting initiative, "Green Wave", were also included in the Biodiversity Plan and resulted in the planting of more than 1 500 trees in the city.

According to the Biodiversity Plan, and in line with the concept of green and blue infrastructure at the national level, the Montpellier City Council also initiated the "Green Network" project, aimed at connecting 210 ha of the city's green spaces while protecting and improving river banks. This ecological network approach is enabling the creation of new biological corridors and better interaction between land and rivers, woods, parks, squares, gardens and wetlands that host a large diversity of species. A 42 km network of pedestrian and cycle trails in natural settings called "the Marathon" is also being developed.

CONCLUSION

Investing in a "green vision" can pay dividends when there is a high commitment from all stakeholders concerned, and full involvement of civil society. Also, good planning and management of urban green spaces may require a considerable initial financial investment, while the benefits – whether income or ecosystem services and products – are reaped only after several years. Thus a viable urban development plan, based on sustainable development principles, should be part of an agreed long-term vision and financial commitment, in order to ensure efficient management of the green infrastructure over time. After all, investing in urban forestry and green initiatives means investing in the quality of life of present and future generations. Montpellier is one of the best examples of a Mediterranean city where effective social involvement in the governance process is part of a bottom-up problem-solving approach, and where the investment in, and commitment to, a long-term "green

vision" is truly improving the quality of life of its inhabitants. In line with its political commitment, Montpellier is currently engaged in developing a collaborative plan of development of the city towards 2040 ("Montpellier 2040"), on the premise that working for the city of tomorrow is everyone's business.

Tribute

Michela Conigliaro, Bertille Fages, Gilles Mille, François Besse, Fabio Salbitano and Giovanni Sanesi pay tribute to Michelle Gauthier, who passed away during the preparation of the study on which this article is based. Michelle was a respected professional who worked tirelessly to promote urban forestry and agroforestry. She was greatly appreciated and admired by her colleagues at FAO and by experts and practitioners globally for her experience, expert contributions, commitment, analytical skills and intersectoral vision. ♦



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CASE STUDY

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

M. Bugalho and L. Silva

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: <i>Quercus suber</i> ; other: <i>Pinus pinea</i> , <i>Pinus pinaster</i> , <i>Eucalyptus</i> 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/biodiversity/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).

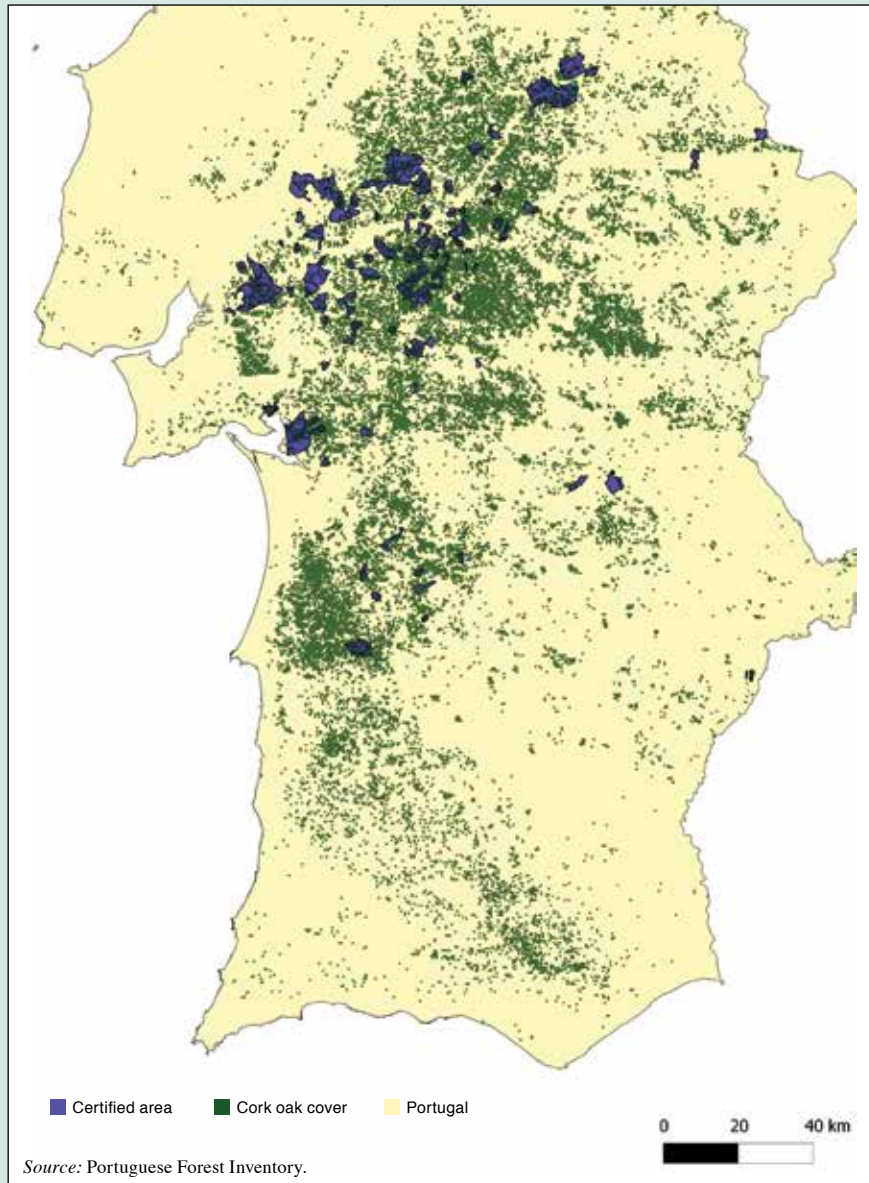
The HCVA concept is adapted to national contexts through the public participation of stakeholders. In Portugal, the national interpretation of the HCVA concept, led by WWF, involved representatives of

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)



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 WebGIS 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://portaldagua.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.

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

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





Serra de Grândola, Alentejo,
Southern Portugal

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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CASE STUDY

Establishing a Model Forest in the Tlemcen region, Algeria

P. Valbuena, O. Aissaoui and M. Segur



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The Tlemcen Model Forest should help improve the management of local cork oak forests, currently under threat.

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The establishment of the Tlemcen Model Forest process in Algeria is an important step towards sustainable development in the region. It is a means of raising awareness about sustainability within communities and encouraging responsible environmental behaviour.

TLEMEN

Climate and geography

The *wilaya* (or province) of Tlemcen is located in northwest Algeria (Figure 1). Its 900 000 ha can be divided into four geographical units, which are (from north to south):

1. the mountainous area formed by the Traras and Sebaa Chioukh mountains;

2. agricultural lands to the north of the town of Tlemcen, the capital of the province;
3. the Tlemcen mountains, which are part of the great chain of the Tell Atlas, crossing Algeria from east to west and separating the Mediterranean biome in the north from the Saharan biome to the south;
4. the steppe zone, which occupies the southern part of the region and represents the pre-Saharan transition or buffer zone between the Saharan and Mediterranean biomes.

Above: Tlemcen National Park

Rainfall in Tlemcen province ranges between 260 and 540 mm; the main bioclimatic zones are arid, semi-arid and subhumid. As in other Mediterranean areas, forests in Tlemcen province are subject to a range of pressures, such as clearing, overgrazing and climatic change, which have led to the substitution of the original mesophytic vegetation with xerophytic vegetation.

Demography

Tlemcen province has a total population of 969 000 people, of whom only about 7000 are rural. The largest towns are Sabra, Imama, Mansoura and Tlemcen.

Role and uses of forests

Estimates of forest area should be treated with caution because they include vegetation that is not necessarily forest. Nevertheless, it is estimated that Tlemcen province has a forest area of about 225 000 ha, comprising forests, scrub and degraded forest landscapes (ANDI, 2013; International Model Forest Network, 2010). The General Directorate of Forests, a national governmental body, is responsible for forest management and the fight against desertification.

Alfa steppes (*Stipa tenacissima*) occupy an area of 154 000 ha. The main forest stands are dominated by Aleppo pine (*Pinus halepensis*) (83 000 ha), holm oak (*Quercus ilex*) (82 000 ha), cedar (*Tetraclinis articulata*) (16 500 ha), juniper (*Juniperus oxycedrus*) (13 000 ha) and cork oak (*Quercus suber*) (4 800 ha). Other vegetation formations derive from degraded forest stands, especially oak forests, *Pistacia lentiscus maquis* and oleaster (*Olea europaea* subsp. *oleaster*), formations with *Chamaerops humilis* subsp. *argentea*, and garrigues¹ of

Ampelodesma mauritanica (International Model Forest Network, 2010).

Although forest accounts for 24 percent of the land area of Tlemcen province, it is unequally distributed: more than 80 percent of timber production potential is concentrated in the Tlemcen mountains (International Model Forest Network,

2010). In some municipalities, forests comprise up to two-thirds of the territory, while other municipalities are almost completely deforested (e.g. less than 2 percent forest cover).

1
Location of Tlemcen province,
Algeria



¹ UNEP-WCMC (2000) describes garrigues as discontinuous bushy associations of the Mediterranean calcareous plateaus, often composed of kermes oak, lavender, thyme and white cistus. There may be a few isolated trees. Garrigues are found on dry, filtering substrates (usually calcareous).

The Third Mediterranean Forest Week was held in Tlemcen in March 2013



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Agriculture and pastoralism are also significant activities in Tlemcen province. The gradual settling of nomads has increased overgrazing and led to degradation, which has been further amplified by wildfires and the general abandonment of rangelands. At the same time, increased demand for woodfuel has led to a reduction in the area of forest and scrublands. Major environmental issues in Tlemcen province are:

- climate change;
- overgrazing;
- deforestation;
- the use of fertilizers that remove species that do not tolerate high levels of nitrogen and promote the development of nitratophilous plants (Loisel and Olivier, 1987);
- the urbanization of garrigues, including those occupied by the palm species *Chamaerops humilis*;
- the overuse of these fragile ecosystems, with a potentially irreversible increase in *garrigue* shrub formations (Bouazza *et al.*, 2001).

Territorial governance and different uses

The relationship between the General Directorate of Forests and users (the owner of the forests in Algeria being the state) is subject to three types of regulation:

1. the right to use, which authorizes people to carry out certain forest uses under certain conditions, to be renewed each year;
2. authorization to use land managed by the General Directorate of Forests outside the actual forest area for

certain purposes for a specified period (20 years for livestock, 40 years for orchards and 90 years for forests) – this authorization is tacitly transferred to descendants unless the state decides to appropriate the land;

3. concessions for investment in recreation and leisure – this is an almost unique case of investment authorization and is limited to uses in recreational forest in suburban areas.

Cork oak under threat

In western Algeria it is estimated that cork oak forests originally covered an area of about 14 000 ha (Boudy, 1955), but they had declined to 9 400 ha by 1948 (Thintoin, 1948) and 6 500 ha by 2003 (Bouhraoua, 2003). In 2010, only relicts remained, and these were seriously threatened by pressures such as climate change, loss of soil permeability, fire, overexploitation, clearing, and pests and diseases (Varela, 2008). There has been a decrease in the health of cork oak trees and in regeneration of the species, and cork oak forests have been invaded by species such as *Quercus faginea*, *Arbutus unedo* and *Phillyrea angustifolia*.

The national production of cork (which takes place in about 50 percent of the total cork oak forest area in Algeria) has experienced strong annual fluctuations, and is not only an environmental issue but also an economic issue. An analysis of the value of Algerian cork products on the world market shows a low market value compared to that of other countries. Despite its potential, the local sector has fallen into a state of stagnation, making it difficult to meet the demands of global competition. In order to address this situation, a set of key actions have been suggested in order to stimulate the sector at the national level and ensure a place on the world market (Moussa and Chehat, 2011). Algerian cork oak forests are also used to produce woodfuel, including charcoal, as well as for livestock grazing, and improved management could increase their importance in local economies.

Several studies aimed at improving the management of cork oak forests in Algeria have been undertaken by universities and research institutes. These approaches include restoring and improving the management of degraded forests and ecosystems through forest landscape restoration actions that resemble gardening or agroforestry (Letreuch-Belarouci *et al.*, 2011).

The University of Tlemcen has studied the cork oak forests of the Hafir-Zariffet massif in the Tlemcen National Park with the objective of predicting future dynamics and proposing appropriate adaptive management approaches for a range of stand structures. Thus, managers can choose the type of intervention that best suits a given stand (Letreuch-Belarouci *et al.*, 2011). In the Hafir Zariffet massif, Ghalem (2011) studied the effects of fire on cork oak stands. Forest fire has become a major concern in Algeria, with an estimated 8 000 ha of cork oak burnt each year.

Although cork oak forests are the result of centuries of human management, today they are faced with substantial socio-economic changes as well as climate change. Innovative conservation and management approaches are important for conserving biodiversity and the multifunctionality of

these fragile, human-shaped ecosystems (FAO, 2013).

Tlemcen Model Forest Initiative

In the context of the Mediterranean Model Forest Network, the process to create and develop the Tlemcen Model Forest began in late 2010. The initiative is part of a new programme administered by the International Model Forest Network Secretariat that aims to improve the conservation and sustainable management of forest resources in francophone Africa, including the Congo Basin and the Mediterranean region (Algeria, Morocco and Tunisia).

This initiative is led by the General Directorate of Forests of Algeria, the Tlemcen National Park and the Institute of Wildlife Resources of Tlemcen. Other partners include the Moutas Deer Park, municipal assemblies, the University Abou Bekr Belkaïd of Tlemcen, the National Institute of Forestry Research, the IPADE Foundation (Instituto de Promoción y Apoyo al Desarrollo), the association for the conservation and protection of the environment of Tlemcen province (known as ASPEWIT), and the Tlemcen University Science Teachers' Association, with a total of over 30 partners.

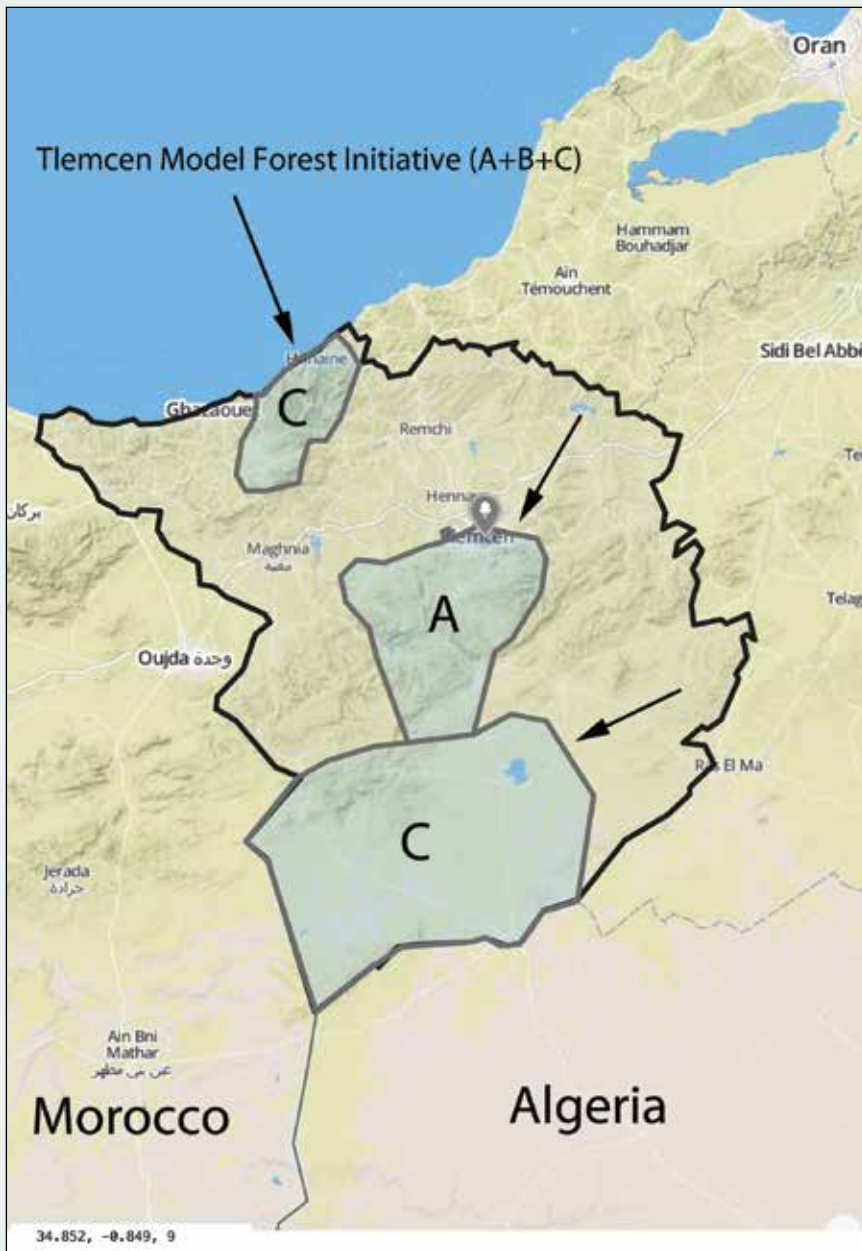
Model Forests in the Mediterranean

Model Forests are forest areas that are managed according to best management practices and serve as a model of exemplary forest management that can be emulated elsewhere.

The Model Forest concept is based on an approach that combines the social, cultural and economic needs of local communities with the long-term sustainability of large landscapes in which forests are important features. By design, Model Forests are broad-based initiatives linking a diverse mix of stakeholders and sectors and a range of values and interests (such as forestry, research, agriculture, mining and recreation) in a given landscape (International Model Forest Network, 2013).

A Model Forest is a voluntary association of people who live in a particular territory and are interested in discovering, defining, enhancing and guaranteeing its sustainability; and in sharing their experiences and their knowledge to contribute to global environmental goals (www.mmfn.info).

The Model Forests share their knowledge through the International Model Forest Network (www.imfn.net) and via several regional networks (Mediterranean, Canada, Iberoamerica, Africa, Northern Europe and Asia).



2
The Tlemcen Model Forest area

In 2011, the partners agreed on the institutional and geographical boundaries of the Tlemcen Model Forest, which consists of three major and very different ecosystems (Figure 2), including the Tlemcen National Park. The total area of the Tlemcen Model Forest Initiative is 156 000 ha.

The establishment of the Tlemcen Model Forest represents an important contribution towards sustainable development in the region, and should both raise awareness and encourage responsible environmental behaviour. The partners of the Model Forest have already defined the Strategic Plan, the governance structure and the lines of work of the initiative for the next 5 years, including: building the capacities of the population and

partners, enhancement of the value of natural resources (including timber and non-timber forest products, with a special focus on cork), education, communication, and networking.

This initiative has the objective of solving the problems in the territory through cooperation, networking and joint initiatives between partners, not only inside the territory itself but at a regional (Mediterranean) and international level. Learning from each other's mistakes and successes, and joint initiatives with other cork oak territories in the Mediterranean, will help ensure better use of resources and a bigger impact. ♦



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CASE STUDY

Managing cedar forests in Morocco's Middle Atlas mountains

M. Qarro, P. Valbuena and M. Segur

The Ifrane Model Forest aims to safeguard its cedar forests while catering to the economic and subsistence needs of local people.

Morocco's Ifrane province is located in the Middle Atlas mountains, ranging from low hills in the northwest to peaks in the south-east; the highest point in the province is Jbel Hyan, at 2409 m above sea level. The varied environment of the Middle Atlas has given rise to unique ecosystems, including Atlas cedar (*Cedrus atlantica*) forests, although these forests are now under threat.

Despite the ecological and economic importance of *Cedrus atlantica* in Morocco, little information exists on the structure and dynamics of both undisturbed and managed populations of this species. The largest stands of *C. atlantica* are located in two highly fragmented areas

of different sizes: the North Moroccan Rif mountains (160 km² of forest area) and the Middle and Eastern High Atlas (1160 km²) (Navarro-Cerrillo *et al.*, 2013; M'Hirit, 1999). The distribution of these forests in Morocco is strongly linked to climate (Navarro *et al.*, 2013).

The Ifrane Model Forest is an initiative to support the sustainable development and conservation of cedar forests. It was declared a candidate for the International Model Forest Network (IMFN) and the Mediterranean Model Forest Network (MMFN) at MedForum 2010 (following the creation of the Ifrane Forest

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View of Ifrane Model Forest



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Association and the approval of its statutes and Strategic Plan) and became a fully-fledged Model Forest at MedForum 2011.

CLIMATE AND GEOGRAPHY

The province comprises three distinct types of relief, depending on altitude: the central plateau, the tabular Middle Atlas, and the folded Middle Atlas. The central plateau has hills (commonly called *azaghar*) up to 1 300 m altitude, which are separated by wide valleys, often crossed by rivers. The *azaghar* are often stony and colonized by shrubs and grasses, which provide food and shelter for diverse animal species. Crops can be grown in the valleys' rich soils.

Ifrane province has a Mediterranean climate, but there are significant differences between the *azaghar* and the higher tabular and folded reliefs, due to altitude and other features. Moreover, the Middle Atlas is the first line of mountains facing the humid winds coming from the Atlantic. The bioclimatic environment varies from temperate and semi-arid on the central plateau to wet and cold or very cold at higher altitudes. The summer drought tends to last longer in lower-lying areas, and snow can occur on the higher peaks in winter.

HUMAN ACTIVITIES, DEMOGRAPHY AND ECONOMIC ACTIVITIES

Ifrane province has a total land area of 355 000 ha (Table 1) and is composed of eight rural communities (Tizguite, Dayet Aoua, Tigrigra, Ben Smim, Timahdite, Sidi El Makhfi, Oued Ifrane and Ain Leuh) and two urban centres (Azrou and Ifrane). The population of the province grew from 81 200 to 128 000 between 1971 and 1994, with an annual growth rate of 2 percent, which was relatively high for a province with a mainly forest–pastoral economy. Just over half of the population (51.4 percent) is urban. With a population density of 21 inhabitants per km² outside its towns, the province can be defined as sparsely populated compared with the overall Middle Atlas region (37 rural inhabitants per km², which itself is a low density

TABLE 1. Forest types, by area, Ifrane province

Stand type	Area (ha)
Pure cedar stands (<i>Cedrus atlantica</i> (Endl.) Carrière)	10 000
Mixed cedar (<i>Cedrus atlantica</i> (Endl.) Carrière) and holm oak (<i>Quercus ilex</i> L.) stands	38 000
Pure holm oak stands (<i>Quercus ilex</i> L.)	44 000
Pines stands (<i>Pinus</i> sp.)	3 500
Mixed holm oak (<i>Quercus ilex</i> L.) and Algerian oak (<i>Quercus canariensis</i> Willd.) stands	3 000
Spanish juniper (<i>Juniperus thurifera</i> L.) stands	2 000
Secondary and pastoral species	15 000
Total	115 500

Source: Ifrane Model Forest Strategic Plan (Association Forêt Modèle Ifrane, 2010).

compared with other rural mountain areas of the Rif and High Atlas).

The traditional pastoral system of the region is based on transient grazing, with people and herds moving seasonally between the *azaghar* and the higher mountains to exploit well-defined pastoral areas. Over the years, however, changes in the practice of transhumance and use of established paths, as well as in pastoral agreements, have led people to bypass these agreements, their traditional tribal arrangements, the laws governing the use of common land and forest tenure arrangements.

FORESTS AND THEIR USE AND MANAGEMENT

Forests cover one-third of the province. There are seven main forest types, composed mainly of cedars, oaks and junipers (Table 1). Pure and mixed cedar forests occupy a total area of about 48 700 ha (38 percent of total area of cedar forests in Morocco).

Forests in Ifrane province play an important economic role. Cedar wood is in high demand, and the province produces 30 percent of the national production of this wood (Allaoui, 2004). Average annual industrial wood production in Ifrane province (cedar, plus woodfuel from various species) amounts to 30 000 m³ (HCEFLCD, 2004). Income from wood production is returned to rural communities, who are legally compelled to reinvest 20 percent of

forest revenues in forests. The protective functions of forests are perhaps even more important than their economic and social roles. The Middle Atlas is considered the “water tower” of Morocco: rivers (which supply some of the country's largest dams) in the region include Sebou Moulouya, Oum Er-Rbia and Bouregreg.

There is a proposal to create what would be the Ifrane National Park in the region in order to protect the important ecosystem made up of the cedar forests, and to safeguard the Atlas cedar; to ensure that the region continues to perform its ecological roles (especially in regulating and protecting the country's water resources); to help combat degradation processes; and to ensure the region's continuing economic role, especially for the rural population.

About 71 500 agricultural holdings are situated close to forests in Ifrane province (Allaoui, 2004). Forests are a crucial component of rural livelihoods, for example as providers of forage. Local land management integrates forest with other land uses and enables the temporal and spatial organization of various rural activities.

Moroccan forests are by law owned by the state, but individuals have usufruct rights. Farming is not allowed inside forests, but nevertheless takes place (FAO, 1999).

The forests of Ifrane province are considered a national treasure because of the cedar stands and the biodiversity hotspot they represent, but are under serious threat from degradation (Allaoui, 2004).

Cedar stands are particularly threatened, not only by human pressures and pastoral activities but also by the Barbary macaque (*Macaca sylvanus*), a protected species that has proliferated in recent years (Maghnouj, 1999). In addition to its consumption of seedlings, which peaks in April, the Barbary macaque consumes the leaves and seeds, bark and branches of young trees or adult cedars (Ménard, 1995). Oak forests are threatened by overgrazing by sheep and goats and overharvesting for woodfuel.

Livestock grazing in rangelands (within and outside forests) plays a considerable socioeconomic role in the region. It is the main source of income for more than 8 245 households and extends over 79 per cent of the total land area of the province (364 358 ha) (HCP, 2009).

Traditionally, land has represented life, both materially and spiritually, in the region. However, the current pattern of exploitation is unsustainable and cannot meet the needs of local people. Increases in agricultural production are being obtained through the expansion of cultivated areas rather than by intensifying production methods and techniques.

Forests as a source of income for rural populations

Rural people in the region depend on forest products (lichen, mushrooms, woodfuel, herbs and medicinal plants, which are likely to generate significant revenue) (HCEFLCD, 2004), including for their food security. The contribution of forests to livelihoods in general is important and goes beyond timber production. For example, most rural people rely on woodfuel for their cooking and heating. An estimated 100 000 m³ of woodfuel is harvested in the region each year, with an average household consumption of about 7.2 tonnes of woodfuel per year at an estimated value of about 6 600 dirhams (about US\$800).

Overcutting for fuelwood is a threat to the region's forests (HCEFLCD, 2004).

Ifrane province has potential for the development of hunting-based tourism. Hunters and their organizations are working with the High Commission for Water, Forests and Combating Desertification as key partners in the management of game through the regulation of hunting rights and concessions. In Morocco, the involvement of hunting associations is essential for the management and preservation of the resource and to ensure sustainability. Ifrane province has three hunting areas with a total area of 9 665 ha and three

hunting associations with 20–70 members each.

Territorial governance

The population of the province is composed of three major tribes – Bni-Mguild, Bni-M'tir and Ait Seghrouche – divided into a total of 15 fractions (or clans). In Morocco, forests and rangelands are subject to forest law and, among other things, to pastoral rights. They are part of the national public domain, and are defined and managed by the Water and Forestry Service. In the forest, the rights to graze and gather to satisfy family needs



Men working at a sawmill with Cedrus atlantica timber from the forests of Ifrane Province

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*View of the landscape of the
Ifrane Model Forest*

are recognized, and use may not exceed sustainable levels. Beneficiaries of this right are tribal people living near the forest or who usually practice transhumance. The forest regulations set out the tribes and tribal fractions who may enjoy these rights, which are not transferable.

In practice, regulations pertaining to rangelands are not applied. Indeed, the rangelands in Ifrane province are experiencing problems related to changes in pastoral traditions and demography.

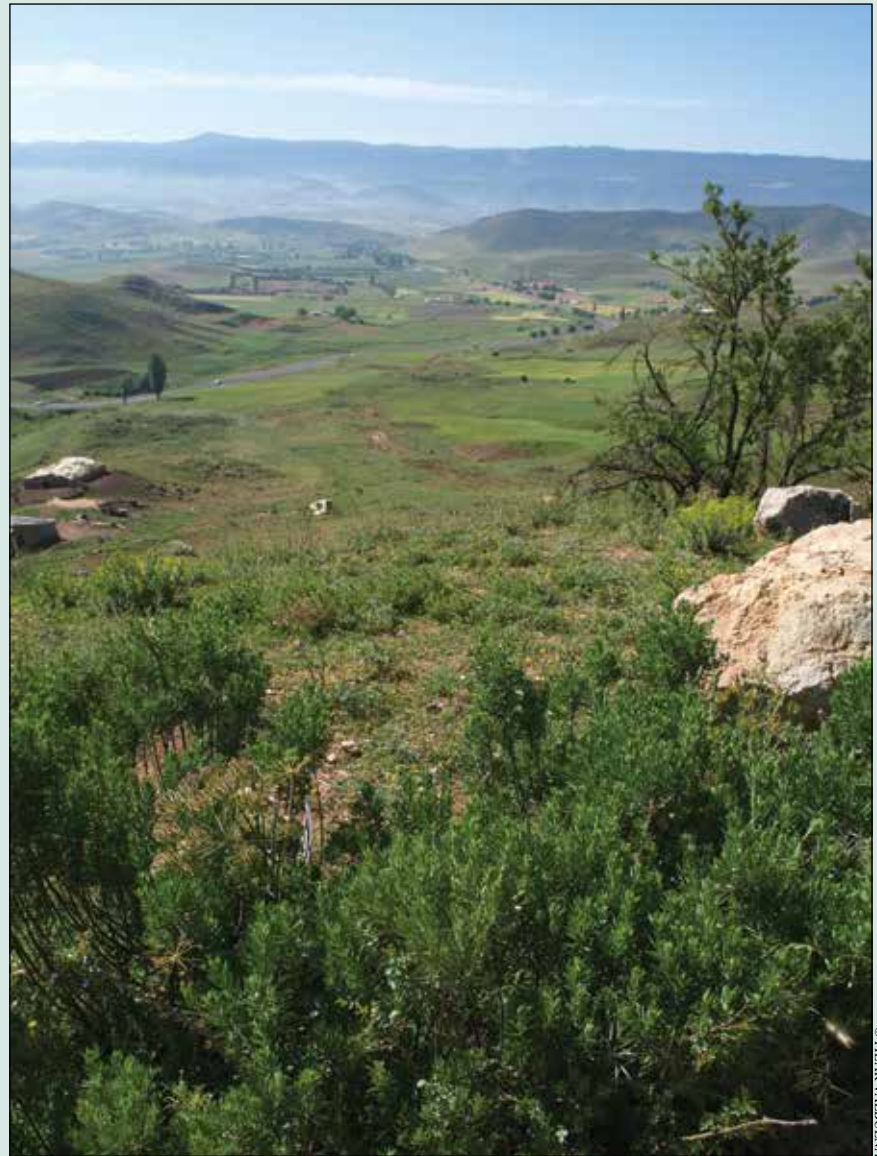
Management of the Atlas cedar forests

The Middle Atlas, located between 1 000 m and 3 200 m above sea level, contains some of the most beautiful cedar forests in Morocco and the Mediterranean region. This ecological heritage is of economic, social and cultural interest, including for tourism, and the need for its conservation and development is high.

A multidisciplinary study published in 2011 investigated the causes and symptoms of the decline of Atlas cedar in the Middle Atlas (Linares *et al.*, 2011). Thematic studies (e.g. in dendrochronology, entomology, ecophysiology, phytosanitary and dendrometric inventory and pedology) have also been undertaken to explore the decline, management and silviculture of cedar forests. An action plan has been prepared that calls for the establishment of a monitoring system and other measures to ensure sustainable forest management and protection.

Concurrently with the multidisciplinary study on the decline of Atlas cedars, in 2006 the High Commission for Water, Forests and Combating Desertification, with the support of FAO, initiated another larger study to develop a national phytosanitary monitoring system, using the Middle Atlas as a pilot area (TCP/MOR/3101).

The studies described here have improved knowledge of cedar dieback: its main causes are changes in climatic conditions and a lack of stand management that has led



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to the ageing of cedar forests (Allen *et al.*, 2010). Studies conducted by FAO have enabled the development of a management guide by the High Commission for Water, Forests and Combating Desertification. Changes in management practices (e.g. dynamic silviculture practices that avoid clearfelling) have begun to be implemented in the Middle Atlas, and regeneration and reforestation programmes are contributing to restoring the forests. Reversing the decline of Atlas cedar is a long-term goal that requires the establishment of forest stands adapted to the new conditions.

Ifrane Model Forest

The African Model Forest Initiative (AMFI) was established by the Canadian Government in 2009 as a follow-up to commitments made at the 2008 Francophonie Summit in Quebec City. With a budget of \$15 million over 3 years, the AMFI supports efforts by the IMFN Secretariat to develop Model Forests in francophone nations of the Congo Basin and parts of Mediterranean Africa (Morocco, Tunisia and Algeria). It also promotes rural sustainable development and good governance, encourages biodiversity conservation, and

helps these nations build effective networks with other Model Forests around the world (IMFN, 2010).

Within the framework of the AMFI programme, the IMFN and MMFN Secretariats visited the Ifrane Model Forest in Morocco, as a candidate Model Forest, in February 2010 in order to participate in the development of processes locally and to help draft the corresponding strategic plans. The work carried out during this period focused in particular on the creation of the Articles of Association of the Ifrane Model Forest, which led to the Incorporation Meeting held on 13 February 2010.

The objectives of the Ifrane Model Forest are:

- to contribute to establishing mechanisms and methods for sustainable management of natural resources and landscapes;
- to preserve and enhance biodiversity and natural ecosystems;
- to contribute to improving the living conditions of local people;
- to promote heritage values and local products; and
- to educate and raise awareness on environmental issues for sustainable development.

Several activities have been carried out since then, including a seminar on Amazigh poetry (forest conservation: culture and behaviour), forestry and pasture management activities (profit generation for the inhabitants of the mountain areas in the province of Ifrane), more efficient distribution of ovens, valuation of products such as medicinal plants and wool, and awareness-raising actions on the value of the environment. All these activities are aimed at improving the living conditions of the inhabitants of the area of the Ifrane Model Forest.

These activities are defined in the Strategic Plan (Association Forêt Modèle Ifrane, 2010), and are included in the following lines: capacity building for governance, communication, sustainable management of natural resources,

energy and housing, and diversification and improvement of incomes.

One of the activities being launched by the Ifrane Model Forest is the implementation of sub-programmes 22 and 23 of the Plan for National Parks Development and Management for the Ifrane National Park (HCEFLCD, 2007), in collaboration with the National Park. This activity is a “contribution to the sustainable management of the cedar forests of Ifrane National Park”, and aims towards an “improved economic value for the benefit of the local economy”, including an analysis of the situation, support mechanisms for strengthening the capacities of the population, and enhancement of the value and traceability of products. ♦



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CASE STUDY

Tourism and non-wood forest products in the Yalova Model Forest, Turkey

M. Özdemir, P. Valbuena and M. Segur

This example of sustainable forest management focuses on recreational activities and non-wood forest products such as nuts, mushrooms and honey.

Mehmet Özdemir is director of the Marmara Forestry Research Institute, Turkey, and **Pilar Valbuena** and **Miguel Segur** are at the Mediterranean Model Forest Network Secretariat and CeseFor Foundation, Valladolid, Spain.

The Yalova Model Forest (Figure 1) in Yalova, Turkey, covers a total area of 79 185 ha, of which 46 613 ha (59 percent) are forested (Figure 2). The forest is publicly owned and managed by the Forest District Directorate, and was accepted as a Model Forest by the International Model Forest Network in February 2011. The main aim of the Yalova Model Forest is to demonstrate a sustainable model of forest management, paying particular attention to the relationship between the environment and human activities.

Climate and geography in the Yalova region

The Yalova region (Figure 1) is characterized by plains, plateaus and mountain areas reaching an altitude of about 800 m above sea level. The climate is predominantly Mediterranean in character: the summer season is generally dry and hot,

Above: A paraglider launches from a hilltop in the Yalova Model Forest, which among other things is supporting the region's effort to develop sustainable tourism

whereas the winter is warm and rainy (Figure 3).

According to Turkey's State Meteorological Service, the mean annual temperature in Yalova is 14.6 °C, with a mean of 6.6 °C in February and 23.8 °C in July. Average annual precipitation is 726.5 mm, dry periods are common and, on average, there are 11 snowy days per year (Süheyla Balci Akova, 2011).

These distinctive conditions have produced a rich flora in the region. Forests have both Mediterranean and subtropical influences, and consist mainly of broadleaved species. The most common are *Fagus orientalis*, *Pinus nigra*, *Quercus robur*, *Q. petraea*, *Q. cerris* and *Q. frainetto*. *Castanea sativa*, *Carpinus betulus*, *Fraxinus excelsior*, *Acer pseudo-platanus*, *Platanus orientalis*, *Alnus glutinosa*, *Tilia tomentosa*, *T. platyphyllos*, *Taxus baccata*, *Prunus avium* and *P. domestica* also occur.

The region's limited areas of plains are used mainly for agriculture (horticulture, kiwifruit-growing, greenhouse production

and orcharding), and the coastal areas are important tourist destinations.

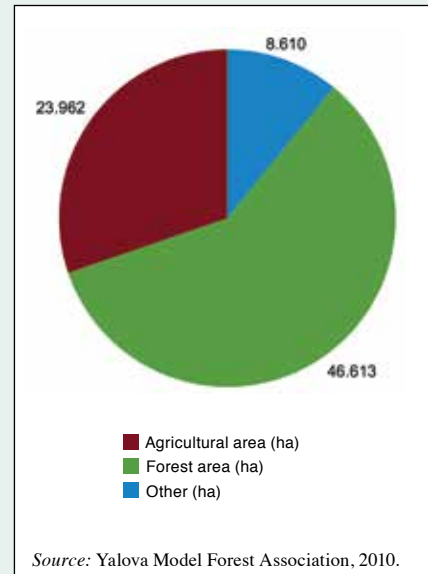
Demography and economic activities

The main economic activities in the Yalova region are tourism, agriculture and industry (the manufacture of textiles, chemicals and paper). The region has about 207 000 inhabitants, 66 percent of whom live in urban areas and the remainder in rural areas. There is a large seasonal increase in the size of the population in coastal areas in summer.

The Yalova forest is located near three large cities (Istanbul, Kocaeli and Bursa) and is therefore strategically placed for commerce and tourism. At the same time, these urban areas generate air pollution that could negatively affect forest health, and increasing population also represents a potential threat.

Role of forests and different uses in the Yalova Model Forest

In the Yalova region, 77 percent of the forest is set aside for production. It is available for the production of wood and non-wood forest products (NWFPs) as well as for tourism. Eighty-five percent of



1
Location of the Yalova Model Forest



Source: Yalova Model Forest Association, 2010.

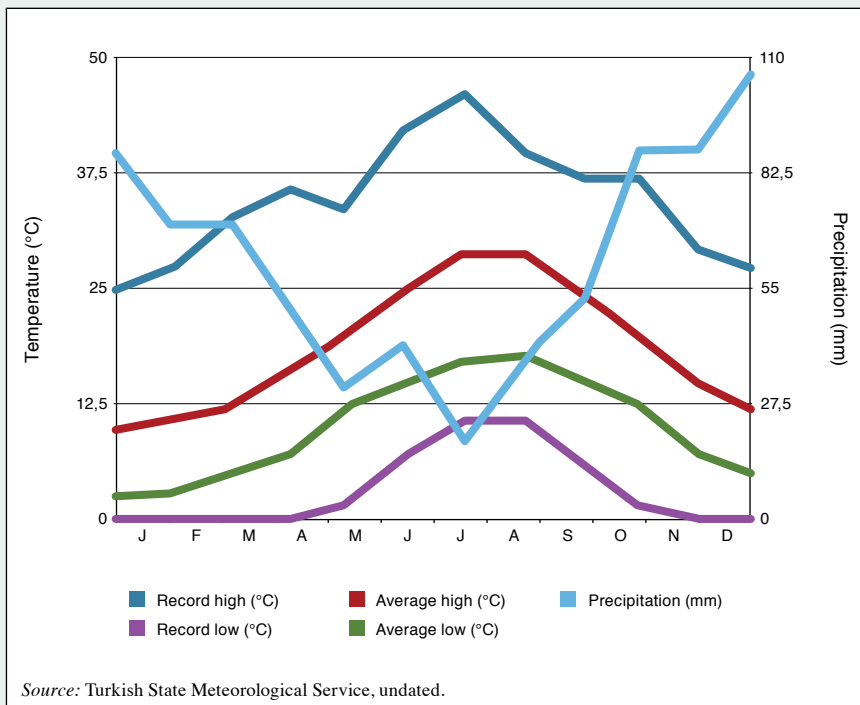
2
Land use in the Yalova Model Forest

the Yalova forest is natural and 15 percent consists of plantations of *Pinus pinaster* and *P. pinea*. *P. nigra*, *Fagus orientalis* and *Quercus* species are those used most commonly for wood production. Some mixed conifer–broadleaved forests in tourist areas are protected as recreational zones and are therefore not available for wood production.

Territorial governance of Yalova Model Forest

In Turkey, all forests belong to, and are administered by, the state. The General Directorate of Forestry (GDF) is the authority that applies the rules established by the country's Constitution and publishes statutes, codes and policy papers. The GDF is also responsible for the regulation of production and the sale of wood and non-wood forest products. Local forest users must obtain permission from the GDF for their activities.

The Yalova Model Forest Association (Figure 4) is a transparent and participatory non-governmental organization (NGO) formed with the participation of NGO representatives, organizations and institutions operating in the Yalova region. It is organized as an independent structure



3

Climatic data, Yalova region

(for the extraction of edible seeds), mushrooms, fruits of arbutus (*Arbutus unedo*), rosehip (*Rosa* spp.), chestnuts (*Castanea sativa*) and the flowers of linden (*Tilia cordata*) and daphne (*Daphne* spp.) are among the products gathered in forests. Apiculture, for the production of organic honey, is practised in the villages of Elmalık, Esenköy, Geyikdere, Güneyköy, Kocadere, Kadıköy, Sermayecik, Sugören and Teşvikiye. The collection of some NWFPs has contributed to the development of ecotourism, especially in off-peak times (seasonal mushroom-collecting, for example, is an important tourism activity).

Among the projects encouraged in the Yalova Model Forest is the cultivation of beech mushrooms (*Hypsizygus tessellatus*), supported by the East Marmara Development Agency. About 15 000 logs were inoculated in the forest to boost production. Plantations of stone pine for the production of pine nuts have also been established.

In the Yalova region, tourism is an important source of income. Attractions include its nature and coastal areas, as well as hunting and sports activities. The region's thermal springs are world-famous, attracting tourists from across Turkey and the Middle East in particular.

but, in accordance with national laws, collaborates closely with the Ministry of Forestry and Water Affairs and the GDF. Its executive committee consists of seven people, representing the management body of the forest, the Ministry of Forest and Water Affairs, the provincial administration, Yalova City Council, agricultural development cooperatives and producer unions. The Scientific and Technical Advisory Committee is structured so as to contribute to Model Forest activities and to research and development. Its membership is drawn from universities, agricultural and forest research, the East Marmara Development Agency and other stakeholders.

NWFPs and tourism in the Yalova Model Forest

Mushrooms, honey, medicinal and aromatic plants and fruit are among the NWFPs produced in the Yalova Model Forest. A 2010 inventory of NWFPs mapped the distribution of the main NWFPs and their main habitats (Table 1). The GDF is preparing to undertake more accurate inventories and is paying

increasing attention to biodiversity in management plans. It is expected that more accurate national information on NWFPs will be available in coming years to facilitate their sustainable use.

The economic potential of NWFPs is considerable: for example, Turkey exports 10 tonnes annually of essential oils (produced by 230 growers, representing a total area of 648 ha), flowers and dried plants, with a total revenue of US\$150 million.

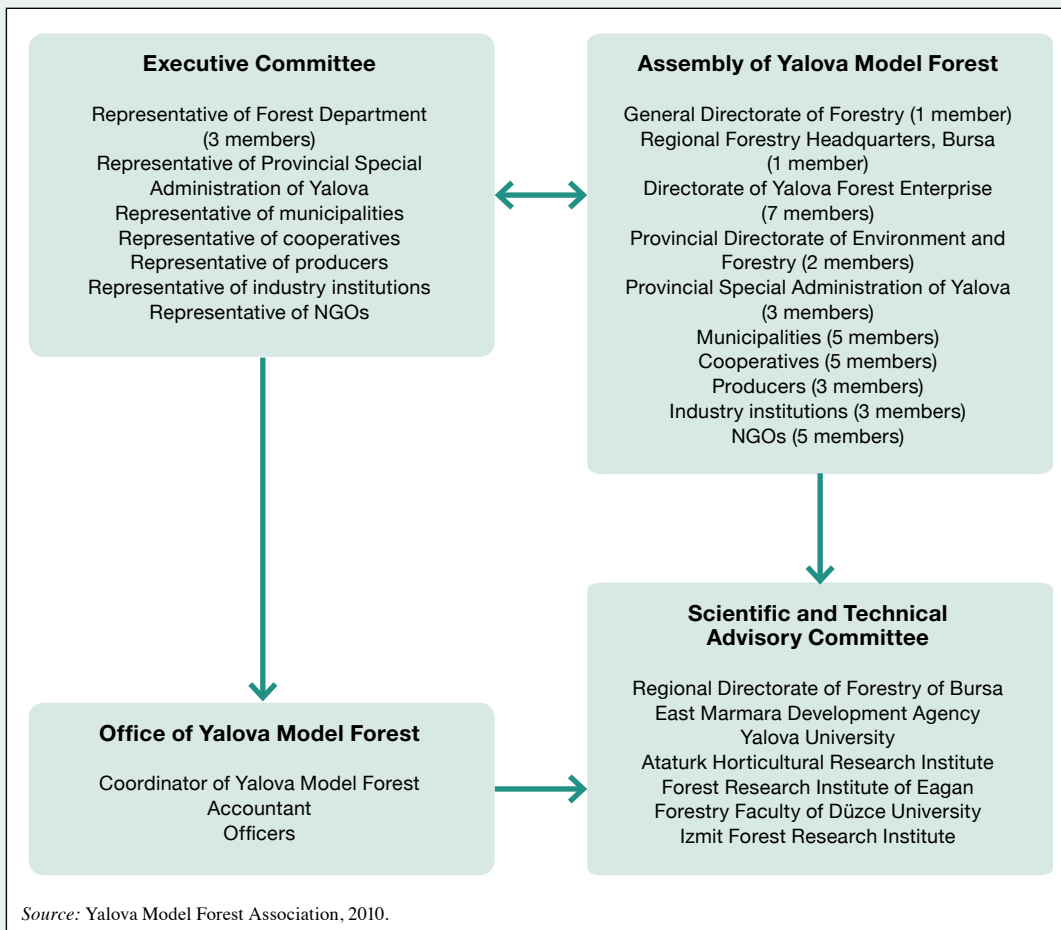
Collection in the wild is common in Armutlu and Çınarcık districts. Pine cones

TABLE 1. Wild collection of forest products in Yalova, 2009

District	Village	Product	Area (ha)
Armutlu	Mecidiye	Pine nuts, mushrooms, arbutus and rosehip fruit	23 679
	Hayriye	Pine nuts, mushrooms, arbutus and rosehip fruit	14 779
	Selimiye	Mushrooms	21 586
	Fistikli	Peanuts, mushrooms	25 057
Çınarcık	Esenköy	Chestnut, arbutus and rosehip fruit, daphne and linden flowers	14 910
	Kocadere	Chestnut, arbutus and rosehip fruit, daphne and linden fruit	14 960
	Teşvikiye	Chestnut, arbutus and rosehip fruit, daphne and linden flowers	24 440
	Ortaburun	Pine nuts, chestnut, arbutus and rosehip fruit, daphne and linden flowers	8 420

Source: Yalova Model Forest Association, 2010.

4 The Yalova Model Forest organizational structure



The Yalova Model Forest has begun to promote thermal tourism, rural tourism and ecotourism. The East Marmara Development Agency has supported the mapping of trekking trails and the creation of an urban forest in the thermal area, with various activities related to the forest ecosystem (e.g. forest adventure, food forest garden, educational forest, and botanic gardens). Educational projects have also been established to develop an awareness of the potential impact of tourism on the environment.

To achieve the goals of the Model Forest, networks of research institutions and universities – national, regional and international – have begun to be set up.

Working groups have been established to address specific topics (beekeeping, biomass and sustainable wood production, climate change and renewable energy,

medicinal plants, mushrooms, rural tourism and wild fruits) with the aim of increasing knowledge and sharing it with other Model Forests in the International Model Forest Network. ♦



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The Collaborative Partnership on Mediterranean Forests: a tool for improving technical cooperation in the forest sector in the southern and eastern Mediterranean

The Collaborative Partnership on Mediterranean Forests brings together institutions concerned with improving forest management and ensuring that forests also provide benefits for the people of the region.

Mediterranean forests and other wooded lands require special attention due to their unique natural heritage and the essential contribution they make to populations' welfare. They play a particularly important role in maintaining biodiversity and landscapes, regulating water cycles, protecting soils and storing carbon. The many services and products they provide to society support various economic activities (from grazing and farming to crafts and tourism) and generate substantial income in rural areas. However, forest ecosystems and related services are threatened by increasing climatic and anthropogenic pressures. Management strategies at the regional, national and local levels need to better integrate climate-change concerns with socioeconomic issues such as poverty, rural unemployment and demography, especially in the southern and eastern Mediterranean countries.

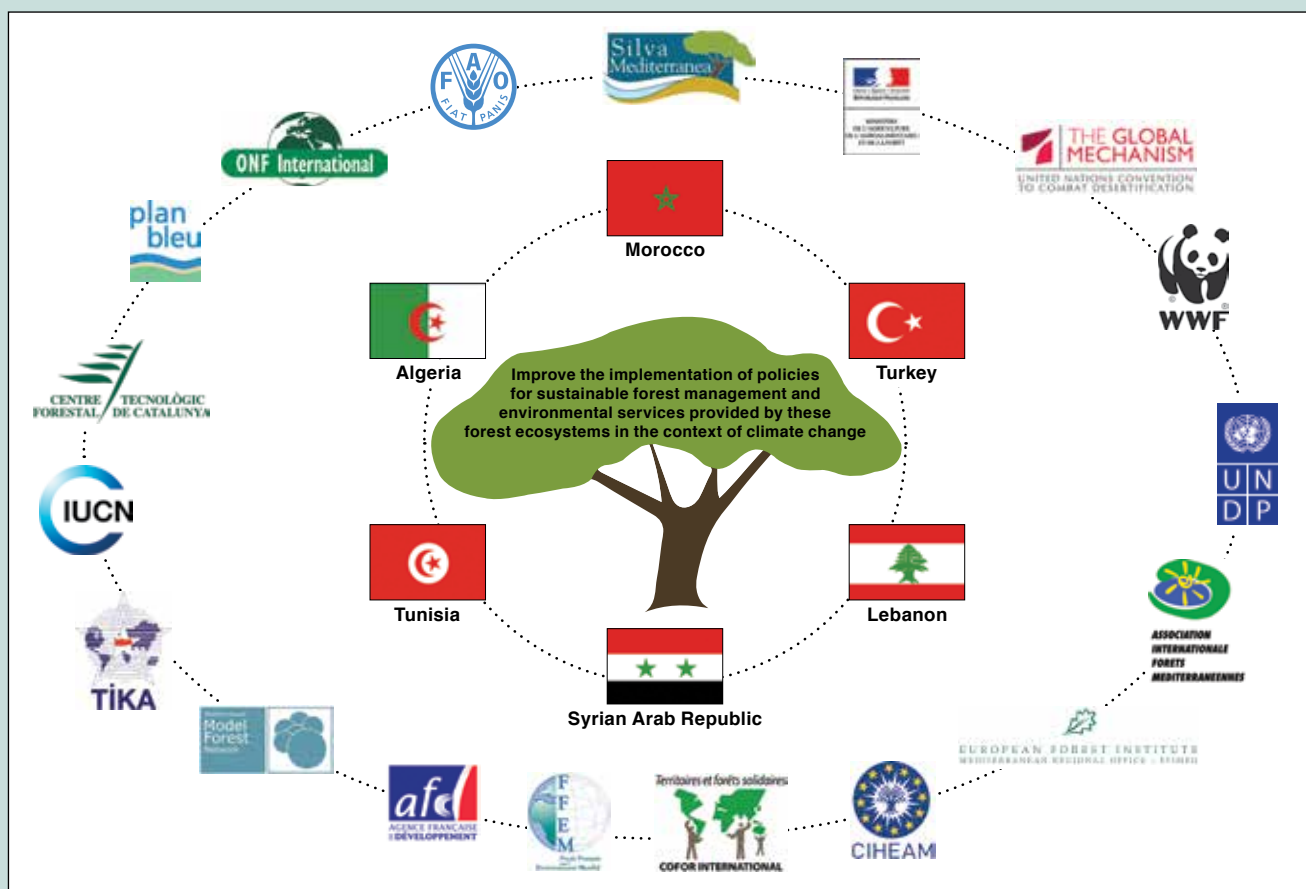
The Collaborative Partnership on Mediterranean Forests (CPMF), set up in September 2010, brings together various institutions (Figure 1) concerned with Mediterranean forests and involved in regional cooperation aimed at improving forest management and enhancing the benefits of forests for society. Through this voluntary partnership, members aim to coordinate their activities and seek synergies to strengthen countries' capacities and support their strategic orientations towards the sustainable and integrated management of forests.

The CPMF is particularly focused on technical cooperation in Algeria, Lebanon, Morocco, the Syrian Arab Republic, Tunisia and Turkey, and the governments of these partner countries are actively involved in CPMF activities. With a view to protecting Mediterranean forest ecosystems and enhancing the vital services that they provide,

Mediterranean landscape in Tunisia



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the partnership aims to address the following challenges in these countries:

- strengthen the capacities of forest administrations;
- intensify intersectoral cooperation with other relevant sectors of the economy (e.g. agriculture, tourism, water and energy);
- improve communication, knowledge and information on the importance of sustainable forest management, forest-based goods and services and the potential impacts of climate change;
- mobilize external support and partnerships.

The nature of members' contributions to the CPMF varies according to their missions and skills and can be achieved in different ways (e.g. through the provision of knowledge and expertise, networking and financial support).

The CPMF currently has the following members (see also Figure 1):

- Association of Forest Communities (COFOR International)
- Food and Agriculture Organization of the United Nations (FAO)
- Forest Sciences Centre of Catalonia (CTFC)
- French Ministry of Agriculture, Food and Forests (MAAF)
- French Development Agency and French Global Environment Facility (AFD/FFEM)
- German Agency for International Cooperation (GIZ)
- Global Mechanism of the United Nations Convention to Combat Desertification (UNCCD)
- International Association for Mediterranean Forests (AIFM)
- International Centre for Advanced Mediterranean Agronomic Studies (CIHEAM)
- International Union for Conservation of Nature (IUCN) – Centre for Mediterranean Cooperation

¹ Members and partner countries of the CPMF

- Mediterranean Model Forest Network (MMFN)
- Mediterranean Regional Office of the European Forest Institute (EFIMED)
- National Forests Office (France) – International (ONF-I)
- Plan Bleu, a regional centre established in the framework of the United Nations Environment Programme's Mediterranean Action Plan
- Turkish International Cooperation and Development Agency (TIKA)
- United Nations Development Programme (UNDP) Turkey
- WWF Mediterranean Programme (WWF MedPO).

The Secretariat of the Committee on Mediterranean Forestry Questions—*Silva Mediterranea* serves as a communication hub between CPMF members and partner countries. ♦



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Conserving marginal populations of forest trees in Europe

F. Ducci, V. Garavaglia and M.C. Monteverdi

A key area for understanding forest adaptation to climate change.

Fulvio Ducci is chair of COST Action FP1202 MaP-FGR/CRA-SEL Arezzo; **Valentina Garavaglia** is scientific secretary of COST Action FP1202 MaP-FGR at FAO *Silva Mediterranea*; and **Maria Cristina Monteverdi** is a researcher at CRA-SEL.

Conserving forest genetic resources (FGR) is crucial for forest ecosystems and people's well-being. Populations of species at the edges of their distributions, known as marginal/peripheral (MaP) populations, may contain unusual adaptive traits that make those populations able to survive in marginal environments. Such traits may be particularly important for adapting forests to climate change and for use in silvicultural activities to develop climate-change adaptation and mitigation strategies.

The Mediterranean region is subject to highly variable climatic regimes and is characterized by the presence of forest tree

populations with high levels of marginality and differentiation. Its forests, therefore, are likely to be highly vulnerable to climate change, and there is an urgent need to conserve its MaP tree populations as a part of adaptive forest management efforts.

COST (European Cooperation in Science and Technology) is an intergovernmental framework that facilitates the coordination of nationally funded research on a European level. Established in 1969, it

Above: A marginal population of *Abies alba* on Montagne de Lure in the south of France: recolonization on former grassland habitats (125–2506 m above sea level)

is one of the longest-running European frameworks supporting cooperation among scientists and researchers across Europe. This article reviews a COST project designed to conserve MaP populations in Mediterranean forests.

The ranges of many species worldwide are shifting to higher latitudes and elevations in response to climate change. The limits of species ranges have not been sufficiently studied, and the need for long-term conservation of the genetic diversity of MaP populations remains underestimated. Although it is known that MaP populations generally encounter more extreme conditions than those at the centre of the species' range and have adapted to them, there is no agreement on the crucial mechanisms that govern the resilience of MaP populations, including the role of local adaptation, demography, population dynamics and migration.

Current knowledge on MaP tree populations is, at best, fragmentary, and is rarely

taken into account in forest management and policymaking. The conservation of FGR has been insufficiently dealt with in national forest plans (NFPs), in national strategies for climate-change adaptation and mitigation, and even in practical aspects of forest management. Strategies for the use of "pre-adapted" southern MaP FGR for dealing with global change in northern forests remain controversial.

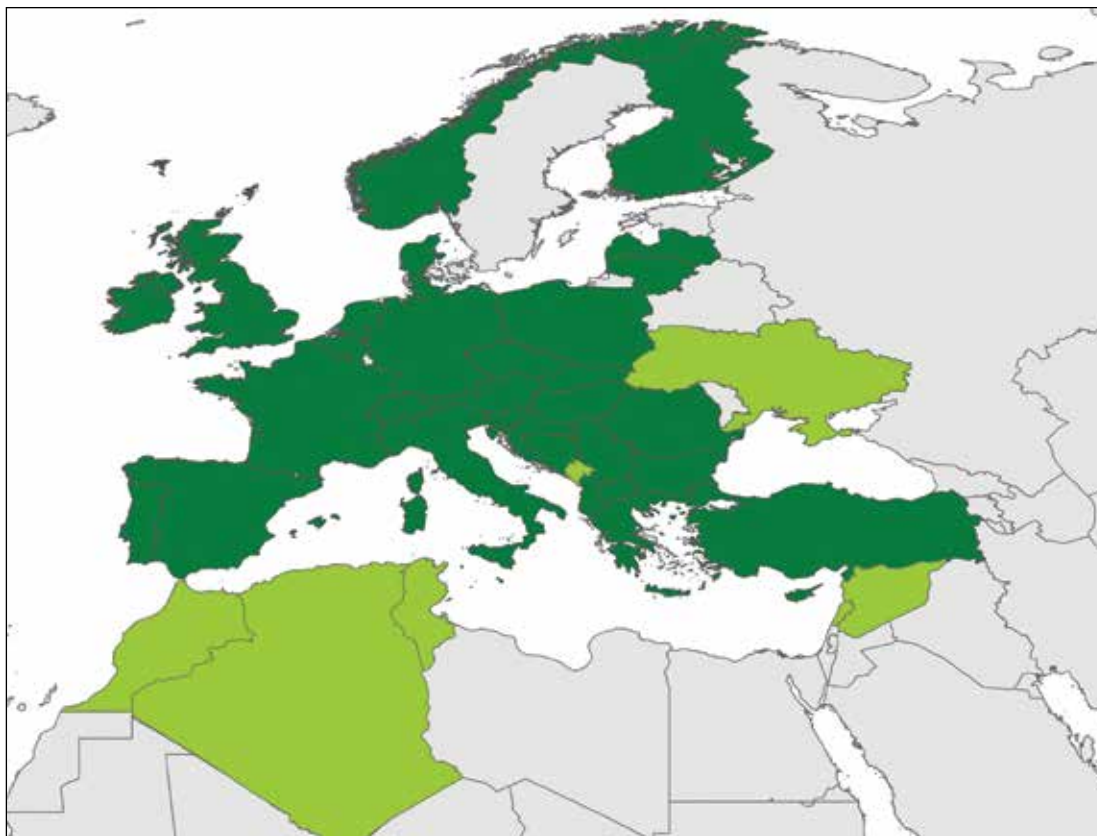
Information on FGR (and their adaptability to future conditions) is needed to prepare and implement conservation strategies at the national and regional levels. Projections of future distribution of species with relation to climate change (i.e. envelope models) need to be improved by integrating information on evolutionary processes based on knowledge of the species' genetic diversity.

A multidisciplinary approach

The issues outlined above highlighted the need for a multidisciplinary approach,

engaging a range of experts and stakeholders (e.g. geneticists, tree-breeders, sociologists, economists, ecologists, entomologists, climatologists, forest managers and policymakers), and incorporating new tools and methodologies. The COST Action FP1202 project was launched at the end of 2012 and will continue to 2016. It involves 30 COST member countries (Figure 1), as well as seven non-COST countries (Algeria, Lebanon, Montenegro, Morocco, the Syrian Arab Republic, Tunisia and Ukraine) and five international bodies: Bioversity International; FAO; the International Centre for Advanced Mediterranean Agronomic Studies – CIHEAM; Working Group 2.04.02 of the International Union of Forest Research Organizations – IUFRO; and the Mediterranean Regional Office of the European Forest Institute – EFIMED.

This project is: i) helping to reduce the fragmentation in European research around the key problems of conserving



1
COST (dark green)
and non-COST
(light green)
countries involved
in COST Action
FP1202 MaP-FGR

COST Action FP1202 MaP-FGR will combine outputs from several European Union projects

AGORA – Advancing Forest Research Capacities

COST ESSEMCLIVAGRI – Earth System Science and Environmental Management, Impacts of Climate Change and Variability on European Agriculture

COST FPS-ECHOES – Expected Climate Change and Options for European Silviculture

EUFGIS – European Information System on Forest Genetic Resources

EVOLTREE – EVOLution of TREES as drivers of terrestrial biodiversity

FORGER – Towards the sustainable management of forest genetic resources in Europe

LINKTREE – Linking genetic variability with ecological responses to environmental changes: forest trees as model systems

NOVELTREE – EC-funded project for better understanding of the biology of forest tree species

TREEBREEDEX – Database on forest genetic resources

TREES4FUTURE – Integrative European Research Infrastructure project to integrate, develop and improve major forest genetics and forestry research infrastructures

and using MaP-FGR; ii) generating new knowledge and identifying gaps to inform future research on the relationship between genetic diversity and adaptation to climate change; iii) highlighting the importance of MaP-FGR for countries further north with relation to climate change, given that these resources are often adapted to warmer and drier climates that are expected to extend further north; iv) providing researchers across Europe with the opportunity to observe forests undergoing climate-related stresses, with a view to understanding processes likely to affect forests more widely in the future; v) supporting European and non-European countries in establishing or improving their climate-change adaptation and mitigation strategies; vi) integrating skills, knowledge and tools in order to develop efficient and common strategies to preserve FGR; vii) developing clear and readily applicable guidelines and tools for forest managers and decision-makers (expert-based recommendation methods, decision-making tools, etc.); viii) enhancing collaboration among countries in the field of MaP FGR.

Fostering a dialogue among scientists from different disciplines and other stakeholders will provide new insights into the adaptation of MaP FGR to climate change. The results of this dialogue will provide

a basis for guidelines and recommendations at different levels (forest management plans, national forest plans and climate-change adaptation strategies, regional strategies or initiatives relevant to forests and climate-change adaptation).

Generating relevant knowledge on MaPs and climate change

The main objective of the Action is to generate relevant knowledge on the role and use of MaP populations to adapt forests to global change. Because they emerge from different processes, not all MaP tree populations may hold the same value for adapting forests to climate change (Lesica and Allendorf, 1995). Some may have little value for conservation and use if they are the result of maladaptive gene flow from central populations (Lenormand, 2002).

Other MaPs, particularly those in southern Europe, result from long-term evolutionary and adaptive processes (Hampe and Petit, 2005) and their FGR may contain original genetic combinations of high value for climate-change mitigation and adaptation.

The objective will be achieved by:

1. combining existing information from several sources on FGR and ecological conditions in MaP populations and making this information available

through existing databases. For this purpose, experience gained at the European level from the work of the European Forest Genetic Resources Programme (EUFORGEN), the TREEBREEDEX database on forest genetic resources, the European Information System on Forest Genetic Resources (EUFGIS) and the EVOLTREE (EVOLution of TREES as drivers of terrestrial biodiversity) network will be of major importance.

2. analysing this combined information to increase knowledge on the relationship between genetic diversity and adaptation to global change and particularly to climate change;
3. identifying gaps for future research and providing tools for forest managers and decision-makers (guidelines, recommendations, methods, decision-making tools, etc.);
4. training and networking researchers through the organization of annual training courses and the establishment of active and efficient exchanges among scientists (workshops, conferences, working groups, publications, etc.);
5. combining information on the current conservation status of FGR and identifying gaps related to tree species and, in particular, MaP populations.

The project will be implemented by four Working Groups (WG):

- WG1: Gathering of data already available and compilation of ecological, genetic and global change information – particularly climate effects – on FGR and distribution of MaP populations (e.g. climatic scenarios and models, forest decline maps, lists of endangered genetic resources). WG1 includes climatologists, soil scientists, ecologists and geneticists.
- WG2: Evaluation and analysis of WG1 information (e.g. genetic diversity maps per species/population, methodologies for evaluating FGR diversity, use of relevant databases, genetic material, trials and networks and information gaps). Standardization of

Pinus heldreichii,
Mount Pollino,
northern Calabria,
Italy: an isolated
population at
high altitude



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methods. Meta-analysis of the data to identify common and divergent trends of FGR response to global change. WG2 includes ecologists, geneticists and silviculturists.

- WG3: Mainstreaming genetic diversity into sustainable forest management in the context of global change, considering both conservation and use of FGR. WG3 includes breeders, geneticists, ecologists, silviculturists, forest managers and policymakers.
- WG4: Coordination and organization of networking, database management, training and communication activities through conferences, workshops, training schools, web toolboxes, open access databases, reports, publications and short-term scientific missions (STSMs). WG4 provides the Action's overall, integrative approach.

Liaison and interaction with other research programmes

At the European level, the COST Action will combine outputs from several EU projects, including AGORA, COST ESSEMCLIVAGRI, COST FPS-ECHOES, EUFGIS, EVOLTREE, FORGER, LINK-TREE, NOVELTREE, TREEBREEDER and TREES4FUTURE (see Box). Tools and methodologies provided by these projects and networks are used in this COST Action and serve the goal of strengthening cooperation and the exchange of information between countries.

Moreover, the Action is in line with the priorities included in the Mediterranean Forest Research Agenda 2010–2020 (EFIMED), agreed to by the European Forest-Based Sector Technology Platform (FTP). It is particularly complementary to the ERA (European Research Area)-net

project FORESTERRA (Enhancing Forest REsearch in the MediTERRanean through improved coordination and integration), currently under preparation. In addition the COST Action programme is operating in synergy with several initiatives such as:

- EUFORGEN in the implementation of Resolution S2 of the Ministerial Conference on the Protection of Forests in Europe (Strasbourg, 1990);
- the Work Plan of the working group on Forest Genetic Resources in the framework of the FAO Committee on Forestry Questions-*Silva Mediterranea*;
- training activities of CIHEAM;
- activities of IUFRO – Division 2 WP 2.02.13 “Breeding and genetic resources of Mediterranean conifers” and WP 2.04.01 “Population, ecologic and conservation genetics”.

At the global level, the COST Action FP1202 will contribute to several international initiatives:

- It is consistent with the needs identified by the United Nations Framework Convention on Climate Change (UNFCCC) for adaptation and mitigation to climate change (Intergovernmental Panel on Climate Change [IPCC] scenarios for the Mediterranean region will be applied to the COST Action).
- It contributed to the *State of the World's Forest Genetic Resources* report (FAO, 2014).
- It is in line with the International Union for Conservation of Nature (IUCN) priorities and IUFRO goals proposed during the last World Congress held in Seoul (2010).

Activities of the first year of the project

During the first year of the project, two general meetings were organized. The first kick-off meeting was held in Rome at FAO in January 2013, concomitantly with the meeting of the Intergovernmental Technical Working Group on Forest Genetic Resources (23–25 January 2013). A second meeting was hosted by Hungarian partners in Eger in September 2013.

During the year, two calls for STSMs were also launched. These missions (exchange visits) are aimed at strengthening existing networks by allowing scientists to go to an institution or laboratory in another COST country to foster collaboration, to learn a new technique, or to take measurements using instruments and/or methods not available in their own institution/laboratory. The main objective is to promote scientific collaboration and exchanges between the institutions participating in the MaP FGR Action. Fifteen applicants from eight COST and non-COST countries were selected and visited other institutions for a total number of over 365 days.

From 15 to 19 July 2013, a training programme focusing on “Genetic, ecological properties of marginal populations and their importance for conservation and use

under climate change” was organized at the Mediterranean Agronomic Institute of Chania (MAICh) (Crete, Greece). Twenty-one grant recipients were selected to participate and lectures were given by six European experts on FGR.

Each working group then began developing its tasks, objectives and workplan. In November and December 2013, respectively, WG1 participants met in Madrid to develop their activities and WG2 and WG3 organized a joint meeting in Aix-en-Provence (France) to discuss common steps and the exchange of information.

Next steps

In 2014, two plenary meetings are foreseen, in Portugal and Romania respectively, to present the activities and results of 2014.

Two new calls for STSMs will be launched and a training programme will be organized in Spain.

The first results produced by Working Groups 1, 2 and 3 will be shared with the support of Working Group 4 and new information will be made available on the COST Action FP1202 website (<http://map-fgr.entecra.it/>).

Given the increasing number of countries involved in the project (30 so far), it will be important to include these new partners in the ongoing activities of the four working groups; to further enhance the mobilization of young researchers; and to continue to promote collaboration among institutions. Key objectives are to share current knowledge about MaP-FGR, with a focus on the Mediterranean region as a hotspot for MaP-FGR, and to thereby encourage the implementation of evidence-based recommendations that incorporate genetic diversity into sustainable forest management. ♦



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Exploring REDD+ opportunities in the Mediterranean – a regional project funded by the French Global Environment Facility (FFEM)

C. Besacier and C. Gallo Granizo



An ambitious project examines whether REDD+ is a relevant mechanism for the Mediterranean.

Christophe Besacier is in charge of the Secretariat of the Committee on Mediterranean Forestry Questions–*Silva Mediterranea*. **Carolina Gallo Granizo** is also working with *Silva Mediterranea*.

In coming years, Mediterranean forests in Europe, North Africa and the Middle East will be increasingly subject to human pressures (such as overgrazing, fuelwood collection, wildfire and land conversions) and the effects of global changes (including rising temperatures, declining rainfall and pests). Deforestation and forest degradation will be especially significant in the MENA (Middle East and North Africa) countries.

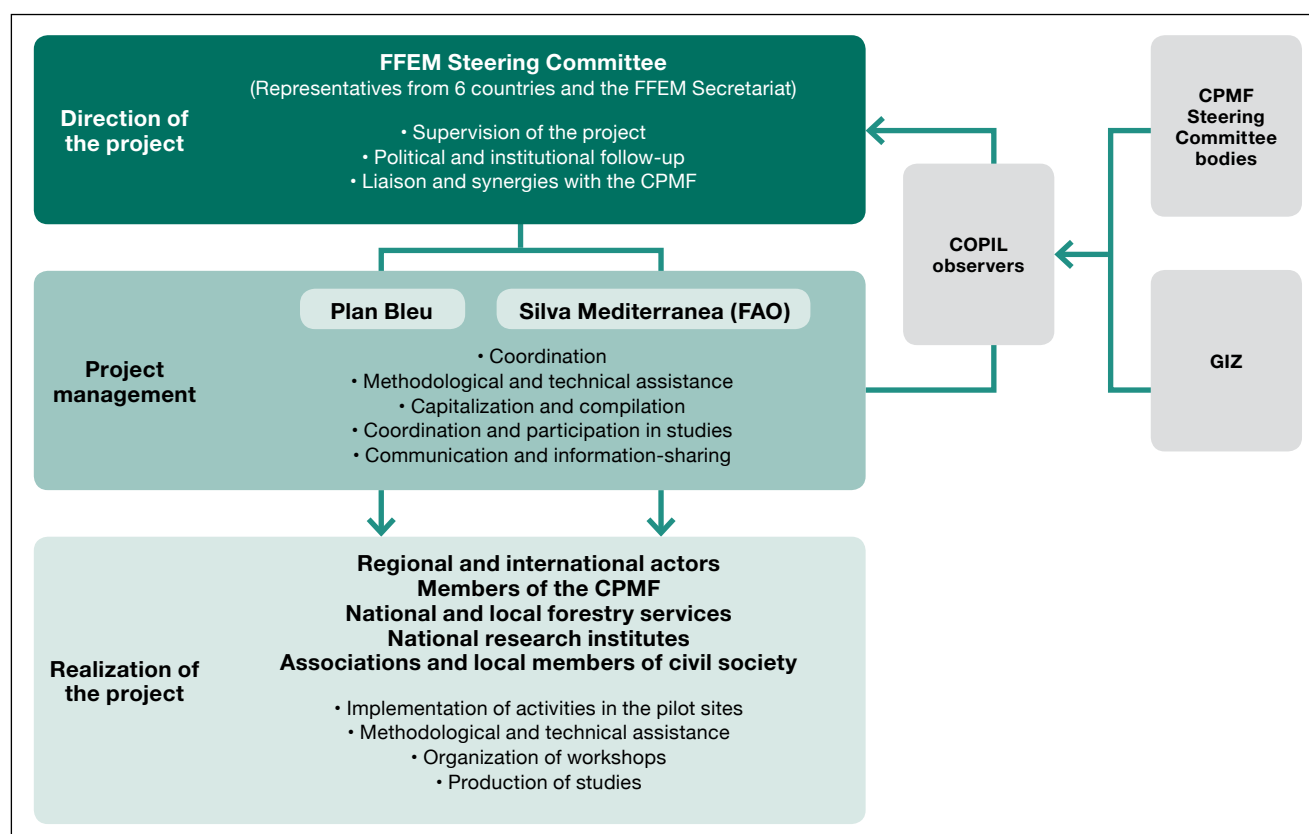
Such phenomena are all the more evident where human populations are strongly dependent on forest ecosystems.

Furthermore, in the Mediterranean region, forest administrations and managers also face significant technical and financial difficulties in sustainably managing forest ecosystems. In this context, a regional cooperation project, prepared by the FAO Committee on Mediterranean Forestry Questions–*Silva Mediterranea*, took shape at the end of 2010 as part of the new Collaborative Partnership on Mediterranean Forests (CPMF).

Above: Canyon with *Pinus brutia* at the pilot site of Düzlerçamı, Turkey

TABLE 1. Pilot sites and activities selected for each component by the Steering Committee (Beirut, 6 June 2013)

Countries	Algeria		Lebanon		Morocco	Tunisia		Turkey
Sites	Djelfa	Chrea	Jabal Moussa	National level	Maamoura	Barbara	Siliana	Düzlerçami
Component 1	1		1		1		1	1
Component 2		1	1		1			1
Component 3		1	1		1	1	1	1
Component 4	1			1	1	1	1	1



This project was presented by the French Ministry of Ecology, Sustainable Development, Transportation and Housing (MEDDTL) to the FFEM Steering Committee in November 2011. It aims to “maximize the production of goods and services provided by Mediterranean forest ecosystems in the context of global changes” in a total of five countries, situated in North Africa (Algeria, Morocco and Tunisia) and the Near East (Lebanon and Turkey). The forest cover (including both forests and other wooded lands) of these countries represents altogether nearly 19 million hectares.

This FFEM-funded project is co-financed by the German Agency for International Cooperation (GIZ), the European Union (EU) and the French Ministry of Agriculture, Food and Forests (MAAF), with an estimated total budget of 8.5 million euros for four years (2012-2015). The financial support provided by France (AFD¹/FFEM) represents 2.65 million euros. The project is managed by Plan Bleu and FAO under the guidance of a steering committee made up of members of both organizations, with the support of the *Silva Mediterranea* Secretariat, located within FAO (see Figure 1).

¹ Project structure

In general, the project aims to promote the sustainable management of forest ecosystems by maximizing the production of goods and services (including carbon sequestration). Its ambitious main goal is to explore REDD+ opportunities in the Mediterranean region. The project is made up of five major components:

Component 1: Production of data and development of tools to support decisions

¹ Agence Française de Développement, France’s national institution working for development.

Component 4: What are the REDD+ opportunities for the Mediterranean?

Mediterranean forests are recognized for their multifunctionality and especially for their provision of goods and services. Their beneficiaries range from local populations (non-wood forest products, fuelwood, etc.), to the country or the region (water systems, soil stabilization, etc.) and the world at large (biodiversity, carbon storage, etc.).

REDD+ is a mechanism that aims to reduce greenhouse gas emissions due to deforestation and forest degradation.* REDD+ projects aim to optimize carbon storage by reducing the drivers of deforestation and degradation. Originally designed for tropical regions, the REDD+ mechanism could also legitimately be applied in the Mediterranean region, particularly in the less developed countries of the region, in which wildfires, overgrazing, unmanaged firewood collection and conversion of forests to agricultural land or urban areas are sources of greenhouse gas emissions that contribute to climate change. Although REDD+ is primarily focused on reducing carbon emissions, the activities within REDD+ programmes will also indirectly help safeguard a wide range of goods and services which stand to benefit from activities designed to optimize forest carbon stocks.

However, the Mediterranean context is very distinctive, and current REDD+ methodologies are not necessarily directly applicable to it. Thus, the implementation of REDD+ projects in the Mediterranean needs to be carefully studied, in particular as regards their feasibility, methodologies and long-term sustainability. The development of pilot activities under Component 4 of the FFEM project described in this article will help assess the relevance of such a strategy at the local level and, if successful at that level, whether it could be replicated on a larger scale.

*See for example www.un-redd.org/AboutREDD/tabid/102614/Default.aspx.

on and management of vulnerable Mediterranean forest ecosystems affected by climate change and the ability of these forest ecosystems to adapt to global changes;

Component 2: Evaluation of the economic and social value of goods and services provided by Mediterranean forest ecosystems, in particular through the study of multiple issues related to environmental changes and their potential effects on the socioeconomic development of Mediterranean landscapes;

Component 3: Development of participatory and territorial approaches to forest governance in these Mediterranean forest ecosystems;

Component 4: Optimization of the environmental goods and services provided by Mediterranean forests and valorization of these efforts (including carbon sequestration);

Component 5: Support to the coordination and communication activities of the Collaborative Partnership on Mediterranean Forests (CPMF).

Several actions have been implemented within the different components in selected pilot sites in the five countries involved (see Table 1).

The actions currently implemented in these pilot sites are:

1. a regional study on the impact of climate change on the range limits of the main Mediterranean species present in the pilot sites (French National Institute for Agricultural Research (INRA), Avignon);
2. a state-of-the-art document on adaptation and mitigation research available in the Mediterranean region (Italian Agricultural Research Council (CRA) Arezzo, and FAO);
3. five climate change vulnerability assessments carried out in the pilot sites selected for implementation of Component 1 (Djelfa, Maamoura, Jabal Moussa, Düzlerçami and Siliana);



*Aleppo pines (Pinus halepensis Mill.)
at the pilot site of Siliana, Tunisia*



Panoramic view of the Jabal Moussa Biosphere Reserve, selected in Lebanon as pilot site for the project

4. a regional study on “Methods and tools for socioeconomic assessment of goods and services provided by Mediterranean forest ecosystems”, led by Plan Bleu with the support of the Mediterranean Office of the European Forest Institute (EFIMED) and the Forest Sciences Centre of Catalonia (CTFC);
5. a regional study on participatory governance for the multifunctional management of Mediterranean forested landscapes, led by Plan Bleu with the support of CTFC and COFOR International;
6. a regional study on the main drivers of deforestation and degradation of forest ecosystems in the pilot sites selected for the implementation of Component 4 (Djelfa, Maamoura, Düzlerçami and Siliana);
7. a regional study on “Cork oak landscapes, their products and climate change policies”, to better identify the potential of several carbon finance instruments in pilot sites with cork oak (Maamoura and Barbara);
8. a road map for the promotion of Mediterranean ecosystems in the context of international negotiations concerning the forest/agriculture sectors within the United Nations Framework Convention on Climate Change (UNFCCC);
9. a road map for the development and implementation of national mitigation strategies in the forest/agriculture sectors (including REDD+) in the five targeted countries;
10. a road map for the preparation of pilot projects to mobilize innovative financing mechanisms for Mediterranean forest ecosystems, based on a portfolio of project proposals in the pilot sites selected for the implementation of Component 4 (Djelfa, Maamoura, Düzlerçami, Siliana and the National Afforestation Programme in Lebanon).

This project should demonstrate the potential for regional cooperation between different forest stakeholders in the Mediterranean. It will strengthen the new Collaborative Partnership on Mediterranean Forests (CPMF) and the administrations of several key member states of the FAO Committee on Mediterranean Forestry Questions—*Silva Mediterranea*, by giving policymakers some eagerly-awaited answers on the opportunities for REDD+ in the Mediterranean. ♦



Panoramic view of the Djelfa forest, Algeria, consisting mainly of Aleppo pines (Pinus halepensis Mill.)

Adapting forest policy framework conditions to climate change in the Middle East–North Africa region: a GIZ regional project

R.A. Kastl and L. Liagre

This project focuses on the sustainability of forest goods and services in a region particularly affected by climate change.

Reinhard Alexander Kastl, forest expert, has been Chief Technical Adviser of the regional GIZ project on “Adapting forest policy framework conditions to climate change in the Middle East–North Africa region” since June 2010. **Ludwig Liagre**, economist, specialized in international and national forest financing mechanisms, has been collaborating on the regional GIZ project since 2010, and has been working as an independent consultant since June 2014.

The conservation and management of Mediterranean forests has an impact on the availability of soil and water, two resources of prime strategic importance for Mediterranean societies, particularly in the Middle East–North Africa (MENA) region. With the additional pressure of climate change and unsustainable use of forest resources, regional and national approaches must be developed to maintain and develop the socioeconomic benefits offered by forests.

This GIZ¹ project (see Table 1 for the project specifications), funded by the German Ministry for Economic Cooperation and

Development (BMZ), was launched in 2010 in conjunction with the establishment of the Collaborative Partnership on Mediterranean Forests (CPMF).

The six project partner countries – Algeria, Lebanon, Morocco, Syrian Arab Republic,² Tunisia and Turkey – agreed to develop joint solutions to sustainable forest management. Their common goal is to safeguard the numerous goods and services of Mediterranean forests, such as the supply of timber and non-timber

Degraded cedar forest bordering a lake in the Middle Atlas, Morocco



© CAROLIN WEINKOPF

products, protection against wind and water erosion, carbon sequestration, biodiversity conservation, and the availability of natural spaces for recreation.

PROJECT OBJECTIVES, STRATEGY AND KEY ACTIVITIES

The project aims to improve the framework conditions for the sustainable management of forest ecosystems in order to preserve the supply of goods and services in the face of climate change, and comprises six strategic components:

1. Capacity development of forest administrations with regard to climate change and enhancement of the value of goods and services provided by forests

Examples of activities:

- training on adaptation to climate change with relation to forests
- analysis of the integration of climate change into forest policies
- evaluation of the costs and benefits of REDD+.

2. Interinstitutional relations with partner sectors to increase the appreciation and acknowledgement by these sectors of the goods and services provided by forests

Examples of activities:

- training on intersectoral dialogue
- promoting and facilitating of intersectoral and interinstitutional communication and cooperation
- economic evaluation of goods and services provided by forests in Lebanon and Morocco.

3. Communication, information and awareness-raising, particularly on the expected impacts of climate change and the socioeconomic importance of the goods and services provided by forests

¹ The German Agency for International Cooperation (GIZ) operates in more than 130 countries, in the Mediterranean region, the Middle East, Africa, Asia, Latin America, Europe, the Caucasus and Central Asia. As a federal company, it supports the German government's international cooperation in the area of sustainable development.

² Cooperation temporarily suspended.

TABLE 1. Project specifications

Head office of the regional project	c/o High Commissariat for water, forests and combating desertification (HCEFLCD) in Rabat, Morocco
Sponsor and funder	BMZ – German Ministry for Economic Cooperation and Development
Implementation	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
Partner countries	Algeria, Lebanon, Morocco, Tunisia, Turkey (and Syrian Arab Republic ²)
Partner organizations	Forest administrations, ministries that are partners of the forest sector, member organizations of the CPMF, ONF International, MMFN, COFOR International, CIHEAM, the Global Mechanism, CTFC, UNDP, TIKA
Area concerned	Middle East–North Africa (MENA) region
Project duration	2010–2015

Source: Project website (<http://www.giz-cpmf.org>).

Examples of activities:

- assistance to communication units recently created in forest administrations of Tunisia and Algeria
- training of journalists from Algeria on the importance of forest goods and services
- support to the creation of the Forest Communicators Network for the Mediterranean and Middle East
- collaboration on the organization of the Mediterranean Forest Weeks.

4. Mobilization of external support and partnerships

Examples of activities:

- development of the CPMF
- capacity development on innovative financing mechanisms
- support to the creation of national funding schemes
- exchange on good practices with Costa Rica, a pioneer in terms of innovative financing mechanisms.

5. Development of value chains for non-wood forest products

Examples of activities:

- training on the development of value chains for non-wood forest products
- exchange of experiences between CPMF countries on the management of value chains such as the pine nut value chain
- studies of specific sectors and value chains.

6. Gender advocacy

Examples of activities:

- promoting gender balance as a cross cutting issue in all project events
- award of MedFor Master's scholarships to female students from CPMF countries
- organization of events for capacity development of women working in the forest sector of CPMF countries
- integration of gender concerns into the Moroccan forest administration.

DEVELOPING CAPACITIES FOR BETTER INTERSECTORAL POLICY DIALOGUE

By inviting key stakeholders to round-tables and workshops bringing together the political, scientific, and technical actors in charge of forest administrations and their partner sectors at the national and regional level, the project aims to contribute to intersectoral and transboundary communication mechanisms. In developing and implementing their forest policies, forest-related institutions of the MENA countries are drawing up methods which are adapted to the specific challenges that they face and based on the principles of civil society participation and a gender approach. In the words of a project partner, "This project goes beyond the simple dimension of forests."

In line with the strategy outlined above, the project activities focus on improving the capacities of governmental and non-governmental players (including the media) that can influence policy decisions related to forests.

Through training activities conducted at the national and regional level, the skills of forest administrations in delivering services are being strengthened; inter-institutional and intersectoral learning processes are promoted and other sectors partnering with the forest sector will become more aware of the importance of the goods and services provided by Mediterranean forests, taking into account the context of climate change. The contribution of forests to a green economy, to poverty alleviation and to food security is

given particular emphasis. Furthermore, support to partner countries will enable them to better position themselves in international negotiations related to forest–climate and forest–biodiversity themes, namely to mobilize additional external financial resources for the sustainable management of Mediterranean forests.

THE COLLABORATIVE PARTNERSHIP ON MEDITERRANEAN FORESTS

Beyond the circle of its main institutional partners, the project contributed, together with other organizations of the MENA region, to the creation of the CPMF. By mobilizing (to date) 16 stakeholders from different backgrounds (research institutes, non-governmental organizations, international cooperation agencies, etc.), all operating in the Mediterranean basin,

the CPMF supports an approach based on cooperation and convergence, and aims to give effective responses to the multiple pressures faced by Mediterranean forests today. ♦

*Shepherd in a green oak forest,
Morocco*



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EFIMED: Strengthening the research–cooperation and science–policy interface in the Mediterranean

I. Martínez de Arano

A reference in the Mediterranean forest research and policy landscape.

Inazio Martínez de Arano is Head of Office at the Mediterranean Regional Office of the European Forest Institute (EFIMED).

EFIMED was established in Barcelona in 2007 as the Regional Office for the Mediterranean of the European Forest Institute, building upon work carried out in the previous decade through other less structured cooperation efforts. Since its inception, it has focused on creating a smooth and balanced forest research area in the Mediterranean to help better inform management and policy decisions. It brings together a large network of forest researchers, practitioners and policy-makers, and promotes capacity building, mobility, higher education programmes and multilateral knowledge transfers.

EFIMED has become a reference in the Mediterranean forest research and policy landscape, having promoted relevant tools and initiatives covering a common forest research agenda, the coordination of research funding, successful developments in mobility and capacity building and the policy–science interface. Some of these highlights are summarized below.

Above: Cork oak landscape in Portugal. EFIMED works actively in areas such as entrepreneurship concerning non-wood forest products, including cork



Cover of A Mediterranean Forest Research Agenda – MFRA: 2010–2020, EFIMED

duplications, complementarities, gaps and synergies between the different research programmes and has analysed research capacities in order to eliminate duplication and address neglected or emerging topics. It has produced the first transnational call for forest research projects in the Mediterranean, pooling resources from 10 countries to address forest resilience through management of biodiversity at multiple scales. Future steps include the incorporation of more countries and areas, including those with similar climatic conditions outside the Mediterranean such as Australia, Chile, South Africa and California (United States of America).

EFIMED offers support for research visits and internships across the Mediterranean and this has been the focus of the recently completed **AGORA** (Advancing Capacities in Mediterranean Forestry Research) project. Funded by the European Commission, AGORA's objective was to advance forest research capacities in two southern Mediterranean countries by establishing dynamic and transnational research partnerships. For this, it implemented a twinning action plan, linking research organizations in Morocco and Tunisia with selected forest research centres of excellence in France, Italy, Portugal, Spain and Turkey. Over the project's lifetime, over 50 exchange visits took place, along with targeted capacity-building activities. Partner institutions included the National Research Institute on Rural Engineering, Water and Forests in Tunisia, the Karadeniz Technical University in Turkey, the University of Padova in Italy, the Portuguese Instituto Superior de Agronomia and the French National Institute for Agricultural Research.

EFIMED has developed its own **research capacities in the field of forest socio-economics** and works actively in areas such as the valuation, accounting and

payment of ecosystem services as well as innovation and entrepreneurship concerning non-wood forest products and environmental accounting. Currently, some of this work is being pursued within the framework of the Collaborative Partnership on Mediterranean Forests or as part of other arrangements involving multiple Mediterranean partners.

Facilitating the **policy–science interface** is the other key activity of EFIMED. EFIMED regularly produces policy briefs or more extensive knowledge syntheses such as *Water for forests and people in the Mediterranean Region – a challenging balance*,¹ published as the first volume of the EFI series “What Science Can Tell”. However, a fluent dialogue between science and policy requires more than just publications. For this reason, EFIMED cooperates with the Committee on Mediterranean Forestry Questions–*Silva Mediterranea*, the Collaborative Partnership on Mediterranean Forests and other stakeholders in the organization of the Mediterranean Weeks that have so far been held in Antalya (Turkey) in 2010, Avignon (France) in 2011 and Tlemcen (Algeria) in 2013. The next one will take place in Barcelona in 2015, and represents an opportunity to work together for healthy, resilient, diverse and valuable Mediterranean forests that contribute to the wellbeing of their peoples. ♦

The Mediterranean Forest Research Agenda 2010-2020 is the result of an extensive consultation process involving researchers, practitioners and policymakers in the Mediterranean. It is used by EFIMED partner institutions to advocate research priorities and provides the framework for balanced research cooperation efforts. It has identified the following key priorities: 1) *How will climate and land-use changes impact Mediterranean forest ecosystems?* 2) *How to address forest and fire management concerns in a context of global change?* 3) *How can governance, policy, and economic instruments ensure the provision of valuable forest goods and services?* 4) *How to manage multifunctional forests and woodlands in multiple-use landscapes?*

FORESTERRA, an ERA-NET action funded by the European Commission, coordinated by the Spanish Ministry of Competitiveness and supported by EFIMED, involves 14 countries from both sides of the Mediterranean, including Algeria, Bulgaria, Croatia, France, Greece, Italy, Morocco, Portugal, Slovenia, Spain and Tunisia. Its goal is to set up a permanent structure for joint research programming and funding in the Mediterranean. In order to do so, it has identified

¹ Available at http://www.efi.int/files/attachments/publications/efi_what_science_can_tell_us_1_2011_en.pdf.

The International Association for Mediterranean Forests: tackling climate change and integrated land management in the Mediterranean

L. Amandier, A. Khaldi and S. Vallée

Facilitating the exchange of knowledge and experience in the Mediterranean.

Louis Amandier recently retired from his position as forest and environmental engineer with the Centre Régional de la Propriété Forestière (French regional centre for forest-owners).

Abdelhamid Khaldi, forestry researcher and engineer in agronomy, has been President of AIFM since June 2013.

Sophie Vallée, forest engineer specialized in the management of natural environments, has been working as project manager and coordinator for AIFM since February 2013.

The International Association for Mediterranean Forests (known by its French acronym, AIFM) is a non-governmental, non-profit organization established in Marseille in 1996. Its goal is to facilitate the exchange of knowledge and experience relating to forests in the Mediterranean basin. This knowledge exchange should contribute to informing policies, decisions and concrete actions, from the international and national level down to the local and individual level, particularly with regard to the environment, sustainable development and regional planning.

AIFM has been involved in several cooperation programmes, including the FOR CLIMADAPT and MEDLAND 2020 projects presented below, and the facilitation of a network of managers, researchers and experts from various areas (including foresters, agronomists, ecologists and geographers). AIFM is also a founding member of the Collaborative Partnership on Mediterranean Forests (CPMF).

Effects of climate change in Solsona, Catalonia, Spain (October 2012)



FOR CLIMADAPT PROJECT: “ADAPTATION OF MEDITERRANEAN WOODLANDS TO CLIMATE CHANGE”¹

Project objective

The overall objective of the project, which was implemented between 2010 and 2013, was to improve the adaptive capacity of Mediterranean forests to the risks associated with climate change, particularly erosion, fire and dieback, using four complementary approaches:

- development of **observation systems** and monitoring of changes in ecosystems;
- development of **adaptive silviculture** to protect biodiversity while maintaining the economic value of forest stands (e.g. by promoting mixed and irregular stands, adapted species of local origin, etc.);
- development of methods for **ecological restoration** and reforestation of land degraded by erosion, fire or dieback; and
- **information, awareness-raising** and improved **governance**.

Partnership

The project brought together, between 2010 and 2013, eight organizations from five different countries, including local authorities, managers of natural forest areas, and associations:

- Vesuvius National Park – Campania region – Italy
- Umbria region – Italy
- Forest Sciences Centre of Catalonia (CTFC) – Spain
- Mediterranean Directorate of the National Forests Office (ONF) – France
- North Aegean Region – Greece
- Association for the Defence of the Heritage of Mértola (ADPM) – Portugal
- International Association for Mediterranean Forests (AIFM) – international
- Forêt Méditerranéenne – France.

Methodology

The project methodology is set out below:

- establishment of a peer group, consisting of independent representatives appointed by each partner and chaired by AIFM, with support from international experts – including EFIMED, Plan Bleu and the Intergovernmental Panel on Climate Change (IPCC) – providing expertise, critical thinking and collective reflection;
- literature review by the peer group in order to collect data on the initial state of the various pilot sites (bioclimatic context but also geophysical and economic context and regulatory framework) and the activities planned during the project;
- reflection and development of field activities for each of the selected pilot sites;
- site visits and presentation of pilot actions during seven project seminars;
- review by the peer group of the actions implemented in the pilot sites; and

- synthesis and reporting by AIFM: drafting of progress books and the final capitalization report.

Conclusion

The FOR CLIMADAPT project has focused on strengthening techniques for the observation of the evolving Mediterranean climate in forest areas, as well as development of tools and implementation of methods for the adaptation of the forests to these changes, according to three major axes:

- development of adaptive silviculture;
- anticipation of crises and restoration of degraded areas; and
- awareness-raising and improvement of governance.

The final technical recommendations made by the partners and peer group can be summed up as follows:

*“Terra delle Gravine”
Regional Natural Park,
Province of Taranto, Italy*



¹ The section on the FOR CLIMADAPT project was written by Louis Amandier.

1. Adapt forest management to the expected changes, at stand scale, at massif scale, and at regional scale

- Improve stands' resistance and resilience to climate change by:
 - playing on stand density;
 - making forestry rotation shorter,
 - fostering irregular stand structure; and
 - promoting tree species combinations.
- Enhance genetic adaptation of local tree species by:
 - stimulating natural regeneration through seeding;
 - planting adapted local tree species; and
 - identifying more southern provenances of local tree species.
- Possibly replace declining species with exotic species, although this remains a matter of debate between forest owners and environmentalists.
- Adapt reforestation techniques by:
 - loosening soil to a certain depth to favour root growth; and
 - using plantation accessories (soil mulching, shade nettings and green houses, irrigation, etc.), bearing in mind the high costs of these actions.

2. Anticipate dieback, prevent fires, fight erosion and rehabilitate deteriorated lands

- Monitor and manage stands dieback, which requires:
 - learning how to observe dieback;
 - mapping the affected massifs; and
 - taking the right decisions in the short term, and pre-empting dieback in the medium term.
- Observe accurately the dynamics of the vegetation.
- Address the increasing risk of wild-fire by:
 - learning how to “live with fire”;
 - improving knowledge of the vulnerability of the areas concerned;
 - creating and maintaining equipment for fire prevention and

the facilitation of firefighting: prescribed burning, forestry interventions for example in order to avoid crown fires etc.; and

- developing synergies with breeders, in order to encourage grazing by cattle, which contributes to maintaining a “clean” understory and to the control of organic fuels accumulation.

- Prevent soil erosion and desertification.

- Contain localized erosion processes.

3. Transfer knowledge, raise awareness and improve participatory governance

- Improve knowledge transfer from specialists to managers.
- Inform and raise awareness of the populations most exposed to the impacts of climate change.
- Encourage decision-makers to consult experts.
- Reach out to policymakers and institutional decision-makers.

It is obvious that not all of these recommendations can be followed to the letter, overnight and regardless of circumstances. Firstly, because the costs and technical barriers related to local conditions can sometimes be overwhelming. Secondly, because rushed decisions can lead to mistakes, the impacts of which may not be noticed until years later. Serious reflection, validated by experts from all areas concerned, is therefore crucial prior to any large-scale initiative.

The main source of satisfaction for the partners involved in FOR CLIMADAPT has been background work carried out these past three years to build knowledge and experience. It is a modest step forward but a sure one towards increased attention to issues related to climate change in the policies and management methods applied in Mediterranean forests. In the long run, it should help limit the negative impact of these issues and prevent huge crises. The project's conclusions therefore need to be brought to the attention of both stakeholders in the field and

the relevant international, national and regional institutions.

This is one of the objectives of the Declaration of Herculaneum, signed during the project's final conference, which translates the partners' commitment to ongoing collaboration and continuity of the actions undertaken.

Moreover, the capitalization project, MEDLAND 2020 “Design of a future common integrated land management scheme to protect natural resources in synergy with their social and economic valorization” (2013-2014), also constitutes an important means of enhancing the value of the knowledge acquired through FOR CLIMADAPT, via a network of institutions concerned with natural resources management, and notably forest resources in the Mediterranean region.

Finally, addressing the question of adaptation to a changing climate should not undermine the importance of tackling, in parallel, the factors that are at the origin of the changes. In particular, the limitation of greenhouse gas emissions by saving energy and moving towards renewable energy sources is a global challenge to which everyone must contribute within their capabilities. This has a direct consequence on Mediterranean woodlands whose values, in terms of both biodiversity and economic production, depend upon a fragile natural balance.

All project deliverables are available from the FOR CLIMADAPT website (FOR CLIMADAPT, no date).

MEDLAND 2020: “DESIGN OF A FUTURE COMMON INTEGRATED LAND MANAGEMENT SCHEME TO PROTECT NATURAL RESOURCES IN SYNERGY WITH ITS SOCIAL AND ECONOMIC VALORIZATION”

The MEDLAND 2020 project (timeframe: 1 July 2013 to 31 December 2014) aims to promote sustainable land and natural resources management in the Mediterranean basin through good practices, innovations and recommendations concerning governance and forest management.

MEDLAND 2020 is one of 13 MED² capitalization projects selected through a call for capitalization projects funded by the European Union. The project involves 14 partners³ linked to MED projects from seven northern rim countries (Croatia, France, Greece, Italy, Portugal, Spain and Slovenia), and one invited country (Albania), as well as collaboration with the southern and eastern rims.

These 14 partners have participated in 13 projects on Mediterranean forests and natural areas, grouped into four main themes:

- **Integrated management of natural protected areas** as a tool for rural development to improve economic and social conditions of the population.

Projects: QUALIGOUV, 2BPARKS, FORÊT MODÈLE

- **Natural risks management** (especially wildfires), increasing the efficiency of fire prevention, protection of citizens and infrastructure, and general awareness-raising.

Projects: PROTECT, CYPFIRE, FOR CLIMADAPT

- **Social and economic valorization of the area** to reinforce local development through sustainable tourism and marketing of local products.

Projects: 2BPARKS, MEDIS, SusTEn, RURURBAL

- **Smart natural resource management** through innovation and the promotion of new emerging markets (from emerging uses such as biomass, to new challenges such as payments for environmental services).

Projects: WOODE3, PROFORBIO-MED, OSDDT, SYLVAMED

In particular, the project has five specific objectives:

- to create synergies among projects and partners and build up a network of networks in the Mediterranean;
- to develop synergies between operational tools, models and good practices implemented by relevant projects;
- to advocate for the protection and valorization of Mediterranean natural resources vis-à-vis national, European and Pan-Mediterranean institutions;
- to identify the challenges faced by a common integrated land management scheme, in the context of the Europe 2020 strategy; and
- to contribute to the elaboration and promotion of a shared vision among Mediterranean peoples about their woodlands.

In practice, the expected results are:

- creation of a presentation and capitalization website (<http://www.medland2020.eu/>);
- development of databases of transferable elements (tools, methods and best practices) and stakeholders;
- creation of an e-book on best practices;
- publication of a policy brief covering protected areas, natural hazards, integrated land management and intelligent management of natural resources;
- organization of a conference in Brussels for Mediterranean Members of the European Parliament in October 2014, to relay the conclusions and recommendations of the project, present the policy brief, and raise awareness; and
- organization of a final international conference in Marseille in September 2014, within the framework of the Collaborative Partnership on Mediterranean Forests (CPMF). ♦



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MEDLAND 2020. No date. Webpage (available at <http://www.aifm.org/en/our-activities/cooperation-projects/medland-2020>). ♦

² The MED programme is a transnational programme of European territorial cooperation. It is financed by the European Union as an instrument of its regional policy. See <http://www.programmemed.eu/index.php?id=5175&L=1>.

³ The Forest Sciences Centre of Catalonia (CTFC), the Barcelona provincial council (DIBA), the Mediterranean Agronomic Institute of Chania (MAICh), the Province of Turin, the Province of Macerata, the Italian Institute for Plant Protection (IPP), the International Association for Mediterranean Forests (AIFM), the Regional Center for Forest Ownership of the PACA region (CRPF PACA), the Chamber of Commerce and Industry of the Drôme (CCI Drôme), the European University of Scents & Flavours (UESS), the Development and Innovation Network (RCDI), the Chamber of Commerce and Industry of Primorska (CCI Primorska), the region of Istria, and the Regional Council of Shkodra.



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Committee on Mediterranean Forestry Questions—*Silva Mediterranea* of FAO: review and prospects by 2020

C. Farcy, P. Plaza and G. Scarascia-Mugnozza

An independent evaluation of Silva Mediterranea, carried out at the request of members, confirmed the need for such a forum to ensure international dialogue on forests in the Mediterranean.

Christine Farcy, engineer in agronomy, is with the University of Leuven, Belgium.

Placido Plaza is with the International Centre for Advanced Mediterranean Agronomic Studies (CIHEAM).

Giuseppe Scarascia-Mugnozza is Director of the Department of Innovation in Biological, Agro-food and Forest Systems at the University of Tuscia, Italy.

A technical FAO statutory body established in 1948 as the successor to an association founded in 1911, *Silva Mediterranea*¹ is an intergovernmental forum composed of 28 members: the European Union and 27 countries²

¹ After successive names, its official name is now: Committee AFWC/EFC/NEFRC on Mediterranean Forestry Questions—*Silva Mediterranea* (the initials are those of the regional forestry commissions within FAO).

² Albania, Algeria, Bulgaria, Cyprus, Egypt, France, Greece, Iran, Iraq, Israel, Italy, Jordan, Lebanon, Libya, Malta, Morocco, Portugal, Romania, Saudi Arabia, Serbia, Slovenia, Spain, Sudan, Syrian Arab Republic, Tunisia, Turkey, Yemen and European Union.

³ Report of the 8th session of the Committee on Mediterranean Forestry Questions—*Silva Mediterranea*.

either bordering on the Mediterranean Sea, part of the Mediterranean Basin, or, as stipulated in its statutes, with an economy (in terms of forestry, agriculture or rangelands) closely associated with that of the Mediterranean³ region.

Like other bodies of this type, it is a neutral forum for promoting international dialogue in support of countries' efforts to develop relevant policies, practices and institutions. Its terms of reference, formally reviewed in 1970, are divided into three components: i) technical intelligence to better evaluate methods of forest land use;

Above: Christophe Besacier, FAO, reports on Silva Mediterranea at the 3rd World Forest Week organized during the 21st Committee on Forestry meeting at FAO headquarters, 2012

ii) identification of priorities for forestry research in the Mediterranean region; and iii) identifying and implementing studies on forest policy.⁴

The specificities of the Mediterranean region and the need for appropriate responses are recurrent themes in the history of the Committee. The Committee, which was for many years the main regional cooperation body for Mediterranean forests, including on research questions, has gone through both dormant and more dynamic phases, as has been the case in recent years. Its situation and context have evolved with the gradual emergence of new actors, partners and donors, and new issues have arisen in recent decades. In this context, members of *Silva Mediterranea* and FAO (which provides its Secretariat) requested an independent evaluation in order to assess the need for a possible strategic repositioning.

This article presents some of the main results of this exercise, clustered according to five areas: operation and governance; added value of the Committee and its subsidiary bodies;⁵ positioning on the Mediterranean scene; coverage of key issues; and sustainability. The article focuses in particular on the question of positioning, but a full report, presented during an extraordinary session of the Committee during the FAO Committee on Forestry (COFO) in June 2014, is available in English and French and can be downloaded from the website of the Committee⁶ on Mediterranean Forestry Questions.

METHODOLOGY

Conducted by a panel⁷ set up in such a way as to ensure institutional memory at the same time as an objective vision, in order to ensure the required neutrality, the evaluation process was conducted throughout 2013. The methodology for assessing the Committee AFWC/EFC/NEFRC on Mediterranean Forestry Questions—*Silva Mediterranea*, which is a complex entity, was primarily qualitative and based on triangulation (or duplication of information) and on saturation (i.e. the collection of information until no significant new elements emerge). Literature reviews and interviews with members, experts, partners and other relevant stakeholders were the main components of the process. The recommendations were tested on the occasion of an internal brainstorming session within FAO (July 2013) and during a presentation to members and observers from the Enlarged Executive Committee (December 2013).

RESULTS

Towards a renewed framework

Forest administrations in the region seem to demonstrate a real interest in having a neutral forum dedicated to intergovernmental exchanges, and an urgent need to coordinate on forest issues in the region. The panel considered that such a forum would have to be created if it did not already exist.

There were also explicit requests from members for more effective linkages between *Silva Mediterranea* and international high-level bodies dealing directly or indirectly with forests, in order to highlight Mediterranean forestry questions and better address social and environmental specificities. The panel considers that the alignment with the Forestry Department of FAO, worldwide leader in forestry and chair of the Collaborative Partnership on Forests (CPF), is in this case a major asset. Greater visibility of *Silva Mediterranea* in the CPF and during COFO should however be considered because it could contribute to a stronger positioning vis-à-vis the United Nations Convention to

Combat Desertification Conference of the Parties (COP UNCCD), the United Nations Framework Convention on Climate Change (UNFCCC) and Convention on Biological Diversity (CBD), and a more sustained and continuous mobilization of decision-makers in the region, which is essential for the Committee to develop politically rather than just operationally.

However, the efforts required for this evolution will be justified only if they are based on a real interest from Committee members for regional cooperation that takes into account their own concerns. The panel encourages stronger ownership and mobilization of member states around a common vision and the identification of priority areas among the strategic lines and/or recommendations of the Strategic Framework on Mediterranean Forests (SFMF). It believes that this is an essential starting point. Such an evolution implies an adjustment or even a revision of the mandate of *Silva Mediterranea*, particularly with regard to its role in the facilitation of the Mediterranean forest research agenda and a better balance between dialogue on forest policy, on the one hand, and identification of priorities for regional cooperation, on the other. A periodically updated *State of Mediterranean Forests* report would be particularly useful within this renewed framework.

The panel believes that a reflection on the composition of *Silva Mediterranea* should be undertaken after a systematic tour of the capitals of the current member countries to ascertain their continued interest in being members of the Committee.

The panel recommends that the Committee keep a close eye on the progress of negotiations for a legally binding agreement on forests in Europe. If the current text were to become definitive, it would enable non-European members to join the *Silva Mediterranea* Committee, and facilitate the further development of specific protocols dedicated to forestry issues in the Mediterranean region. A link could be considered with the *Silva Mediterranea* Committee.

⁴ Report of the 11th session of the Committee on Mediterranean Forestry Questions—*Silva Mediterranea*.

⁵ For the period 2009-2012, six working groups were launched: WG1: Forest Fires; WG2: Cork Oak; WG3: Mediterranean Forests and Sustainable Development; WG4: Forest Genetic Resources; WG5: Mediterranean Forests and Climate Change and WG6: Sustainable Financing Mechanisms.

⁶ <http://www.fao.org/forestry/40715-047527e39e3973e4853881fb38f95fc.pdf>.

⁷ Christine Farcy (President), Alain Chaudron, Ameur Mokhtar, Placido Plaza and Giuseppe Scarascia-Mugnozza.

More readable links with partners

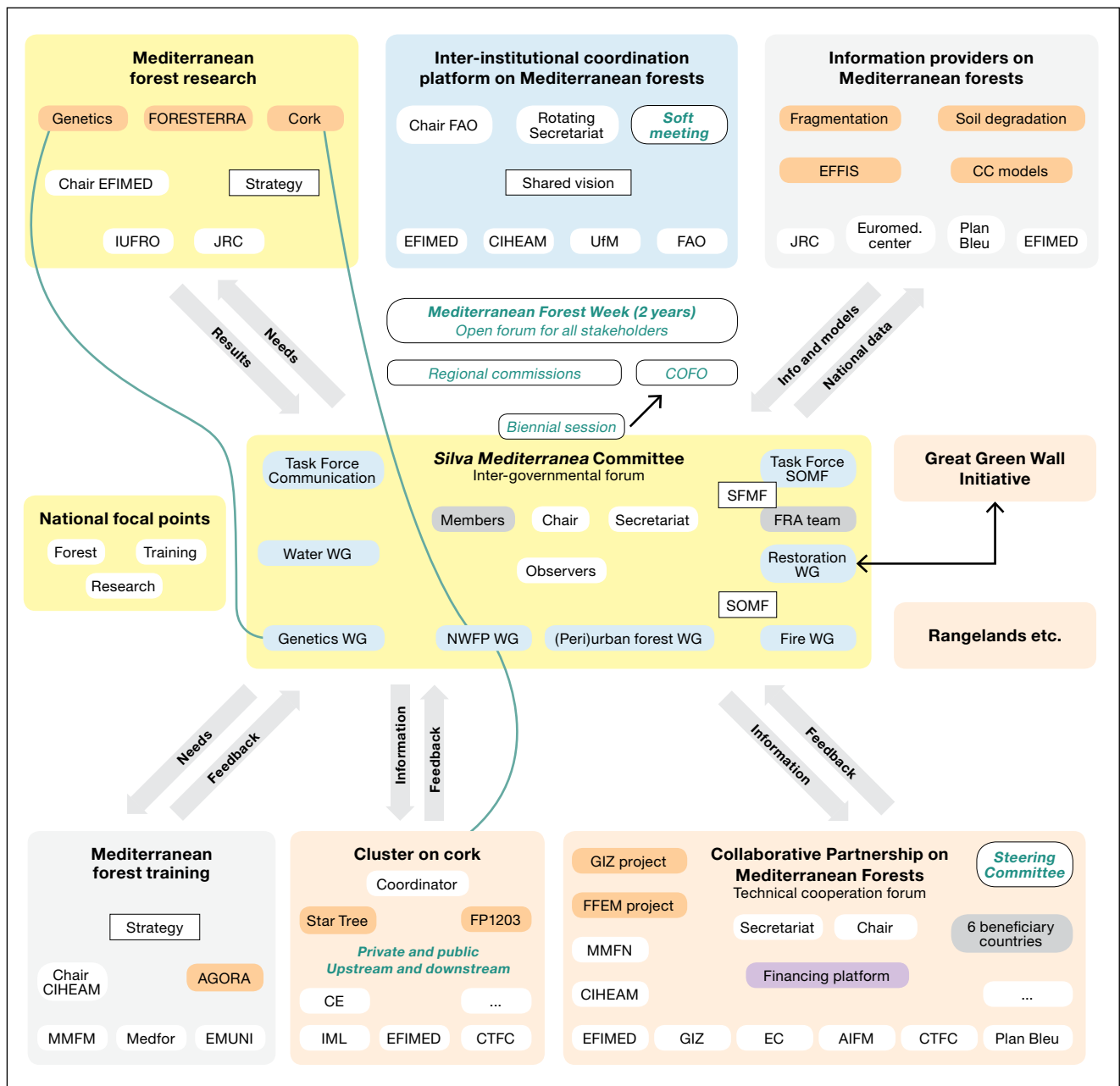
In the absence of specific terms of reference and, in some cases, of a specific strategy, the respective positions of the different actors involved in Mediterranean forests appear unclear. The evolution of the Committee into a more political (rather than operational) body should allow it to better demarcate its scope with respect to its partners.

The panel strongly encourages stakeholders to develop initiatives to better clarify the situation and considers that this is particularly important in the case of the Collaborative Partnership on Mediterranean Forests (CPMF) whose implicit objective of technical cooperation should be clearly identified and displayed. The proximity between the CPMF and donors involved in development cooperation is a

specificity of this instrument, which makes its transformation into a structure with broader goals difficult or inappropriate.

As shown in Figure 1, the panel recommends the creation of a light coordination

¹
Proposal for a possible positioning of the Committee AFWC/EFC/NEFRC on Mediterranean Forestry Questions–Silva Mediterranea on the Mediterranean forest scene



structure among key intergovernmental organizations with a mandate for all or part of the Mediterranean forests, including FAO, EFIMED, Plan Bleu, CIHEAM and the Union for the Mediterranean (UPM). The idea is that, based on a shared vision, these organizations will be able to find a space for dialogue within which they can align their work and their respective fields of action and thus reduce or prevent both the fragmentation of efforts and duplication. This structure could for example endorse the place currently occupied by EFIMED in coordinating Mediterranean forestry research and clarify its role at the interface between research and capacity building on the one hand, and research and policy development on the other. This would be a permanent structure for dialogue, independent of any external influences. Chaired by FAO with a secretariat that could rotate, it would work on the basis of an equal footing between members and would comprise representatives from different organizations involved in Mediterranean forestry questions.

The regular organization of a Mediterranean Forest Week, jointly held by the different actors involved in Mediterranean forests, would serve as an open forum for different sectors, stakeholders and sensitivities and should allow the Committee to cope with realities and expectations while staying abreast of new and emerging ideas. A brainstorming session within FAO at the same time could also be useful to clarify or review the currently ambiguous role of observers within statutory bodies such as *Silva Mediterranea*.

More fluid internal functioning

The panel believes that the efforts of *Silva Mediterranea*, and especially its Secretariat, should in future focus more on strengthening the internal dynamics of the Committee. It encourages thorough, creative and innovative thinking on the interaction between instances of the Committee and its members, in particular the methods of functioning and facilitation of its network of national focal points. The

panel suggests that on this occasion, based on limited-term mandates and a principle of rotating coordination, flexible solutions could be put in place to avoid conflicts relating to vested interests and to benefit from the efficiency generated by the necessary coordination that such an option requires. Given the involvement of FAO in various partnerships and committees and bearing in mind the widespread use of the concept of national focal points, the panel considers that it may be appropriate to exchange experiences on this issue within FAO.

However, the panel finds it useful to recall that these statutory bodies are at the service of the member states and, consequently, at the service of the strategies and projects that they have found it useful to develop jointly. The panel encourages a renewed mobilization of members in order to foster ownership of the Committee AFWC/EFC/NEFRC on Mediterranean Forestry Questions–*Silva Mediterranea*.

Interface subsidiary bodies

The objective of the subsidiary bodies, which do not have decision-making power, is to facilitate the Committee's work and the fulfilment of its mandate. In order to maintain consistency and avoid any possible imbalances, the Panel considers it important that the subsidiary bodies established respect the geographical scope of the Committee and focus on issues of interest to all members.

The panel therefore recommends an explicit link with the strategy to be developed by the Committee. Without anticipating this process, the panel suggests two types of subsidiary bodies:

- task forces mobilized around highly targeted issues or specific projects of the Committee. As set out in Figure 1, one task force could focus on communication at specific events and one on the regular updating of the State of Mediterranean Forests; and
- thematic groups or platforms providing, for priority issues identified by the Committee, a technology watch, monitoring, and an interface with the

initiatives, programmes and projects in progress or planned concerning Mediterranean forests, including within FAO. These clusters could contribute to feeding and to running the network of national focal points during the intercessional period and could constitute the thematic interlocutors of the Committee member countries during formal sessions.

This more flexible and lighter option should allow the Committee to expand its thematic scope without diluting its efforts.

The establishment of better coordination between the *Silva Mediterranea* Committee and its partners, as mentioned above, as well as the monitoring work of the thematic groups, should contribute to expanding the range of opportunities available to member countries without overburdening the functioning of the Committee or requiring additional funds. If we take for example the creation of a cluster on cork as mentioned in Figure 1, such an initiative could be developed by private and public partners involved at various stages of the cork value chain in collaboration with research entities and some member countries of the Committee, but without the direct involvement of the Committee itself (or only upstream at the initiation of the project and downstream in the sharing process of lessons learned and results dissemination). A link would be established with the thematic group in charge of the issue within the *Silva Mediterranea* Committee.

A gradual transition from the current working groups of the Committee to the new task forces/clusters should be organized. Some should be able to evolve quite naturally in this direction while others should probably undergo a profound change.

Opening up progressively to other sectors and disciplines

To face ongoing changes and deal with the complexity of many issues, but also taking into account the often difficult but rewarding periods that the *Silva Mediterranea*

Committee has gone through, the panel would like to draw attention to the opportunity of working more closely with social and human sciences experts. The panel refers in particular, but not exclusively, to communication and political science, not to mention the valuable contribution of a historical perspective to anchor projects in reality or plan for the future. Progressively better linkages between forestry and related sectors and areas (agriculture, water, city and tourism) may also contribute beneficially to the progressive development of more comprehensive solutions. The panel encourages the *Silva Mediterranea* Committee to be creative in this respect.

As stated above, this article includes only some of the key recommendations proposed by the panel. The full report provides more structured recommendations.

CONCLUSIONS

During its 65 years of existence, *Silva Mediterranea* has gone through several phases of questioning about its future or survival. It has shown real resilience, but has also often sought more effective and

relevant ways of functioning. Mandate changes, cohabitation between active and dormant members, transition between presidencies with different personalities or even projects, a stronger or weaker presence of the Secretariat, and difficulty in maintaining involvement of members during periods of waning interest for the Mediterranean, are all factors that have regularly tested the resilience of the Committee.

In recent years, new challenges have appeared and a new dynamic has been set in motion by new actors, partners and donors. Grouped within the Collaborative Partnership on Mediterranean Forests (CPMF) or within other initiatives led by EFIMED, they have combined their efforts with those of the Committee and contributed to increasing visibility on Mediterranean forestry questions.

Heir to a long tradition of cooperation between foresters from around the Mediterranean, *Silva Mediterranea* is now at a crossroads. The recent renewal of attention and interest in Mediterranean issues should offer an ideal framework to rethink the strategic positioning of the Committee.

Acknowledgments

The panel thanks the Committee on Mediterranean Forestry Questions—*Silva Mediterranea*, its President, its Bureau and the Enlarged Executive Committee for entrusting it with this study. The panel also wishes to thank the Forestry Department of FAO and the Secretariat of the *Silva Mediterranea* Committee for their effective collaboration, responsiveness and excellent working atmosphere. Finally, the panel thanks all those with whom it interacted during the course of this evaluation for the quality of the exchanges and rich discussions held throughout the year 2013. ♦



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FAO and ITTO highlight the potential of payments for environmental services for the conservation of tropical forests

FAO and the International Tropical Timber Organization (ITTO), together with the National Forestry Financing Fund (FONAFIFO) of Costa Rica, organized an International Forum on Payments for Environmental Services of Tropical Forests from 7–10 April 2014 in San José, Costa Rica.

The forum highlighted the potential of payments for environmental services (PES) in tropical countries as a tool for conservation and sustainable use of forests and other natural resources, and how to better incorporate them into national policies. It shared best practices and lessons learned, recommending actions at local, national and international levels for the development and effective implementation of PES mechanisms in support of sustainable forest management (SFM) in the tropics.

The event brought together policymakers, researchers and academicians, practitioners, civil society, the private sector, and regional and international organizations engaged in the development, implementation and support of PES mechanisms.

With a majority of tropical forests located in developing and low-income countries, these resources are particularly vulnerable to land-use changes. Tropical forests are found in 65 tropical countries and cover about 1.66 billion ha. FAO, in its recent assessment of global forest resources, noted continued conversion of tropical forests to agricultural land and other land uses, for example for mining, infrastructure expansion, and urban development.

PES schemes may help to reverse deforestation in tropical forests by creating appropriate economic incentives for forest

Field trip, Costa Rica, International Forum on Payments for Environmental Services of Tropical Forests

landowners to protect forests, plant trees and apply sustainable forest management practices. For example, in 1989, Costa Rica's forest cover was down to 29 percent of the country's territory. Eighteen years after the establishment of the PES system, forest cover has increased to 51 percent.

If PES schemes are to fulfil their potential, however, they need to be accompanied by clear land tenure, sustainable land management, updated forest information systems, efficient public infrastructure and consolidated funds to foster reforestation on a large scale.

In countries where PES is an important policy tool for implementing sustainable forest management, such as in Brazil and Costa Rica, significant ecological and socioeconomic outcomes have been noted. In addition to their direct financial benefits, PES schemes were also reported to have widened livelihood opportunities for participating communities, including the diversification of their activities and sources of income.

Costa Rica's PES programme, which was started in 1996, recognizes four environmental services provided by forests: carbon storage, watershed function, biodiversity and scenic beauty. The programme enables farmers who own forests to receive payments for the ecosystem services their forests produce.

The Forum organizers acknowledged the groundbreaking work of René Castro Salazar, Minister of Environment and Energy of Costa Rica, for having pioneered the PES system in Costa Rica, the first in a tropical country, almost two decades ago.

Adapted from a press release issued by FAO on 11 April 2014.



FAO launched new satellite-based data on forest resources on the International Day of Forests

New data released on 21 March, the International Day of Forests, confirm that forest areas continue to decline globally, with the biggest losses of tropical forests occurring in South America and Africa.

FAO used this year's celebration to discuss ways to improve the availability of information on the state of forests at all levels – nationally, regionally and globally – noting that improving information on forest resources is a key means for halting illegal deforestation and forest degradation.

The updated findings of a global remote sensing survey show that total forest area as of 2010 is 3.89 billion hectares, or 30 percent of the total land area of the Earth.

However, the new assessment of changes in the world's forests shows a decline of forest land use between 1990 and 2010. According to the updated survey, the area of forest cover decreased by some 5.3 million ha/year, corresponding, over the period 1990–2010, to a net loss equivalent of nearly four times the size of Italy, or the size of Colombia.

Worldwide, the gross reduction in forest land use caused by deforestation and natural disasters over the 20-year time period (15.5 million hectares per year) was partially offset by gains in forest area through afforestation and natural forest expansion (10.2 million hectares per year). However, there were considerable regional differences in forest losses and gains. The area of tropical forests declined in South America, Africa and Asia – with the biggest loss in absolute terms in tropical South America, followed by tropical Africa – whereas gains in forest area were reported for subtropical and temperate Asia.

The world's forests are distributed unevenly, with just under half the world's forests in the tropical domain (45 percent of total

forest area), about one third in the boreal domain (31 percent) and smaller amounts in temperate (16 percent) and subtropical (8 percent) domains. This is the first consistent survey to show the changes in forest land use for those four main ecological domains over the past 20 years.

To develop the survey, FAO worked with more than 200 experts from 107 countries. The work is the result of a partnership between FAO, its member countries and the European Commission Joint Research Centre (JRC).

FAO's Director-General, Graziano da Silva, also took the opportunity to underline that local forest communities play a crucial role in responding to two of the major challenges that forests are facing today: deforestation and forest degradation. At the same time, he noted that they are among the world's most vulnerable populations. He urged governments to support vulnerable populations and adopt better governance policies to enable millions of people who rely on forests for their livelihoods to benefit from numerous forest products and services.

"In 2014, we are celebrating the International Day of Forests in the context of the International Year of Family Farming," said Graziano da Silva. "Forest people are part of this group of family farmers, pastoralists, artisanal fishers, and indigenous and traditional communities. They represent hundreds of millions of families that play a key role in guaranteeing food security in many countries. In many cases, they are also directly responsible for the sustainable management of forests and natural resources. But, at the same time, they are among the world's most food insecure."

The United Nations General Assembly proclaimed 21 March the International Day of Forests in 2013. The day celebrates and raises awareness about the importance of forests.

Adapted from a press release issued by FAO on 21 March 2014.



*International Day
of Forests 2014,
FAO headquarters*

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Twenty-second Committee on Forestry held with fourth World Forest Week

Over 600 participants attended the twenty-second session of the FAO Committee on Forestry (COFO 22), convened from 23 to 27 June 2014 at FAO headquarters in Rome, to address FAO programme priorities and member countries' concerns in forestry.

COFO 22 saw the launch of the *State of the World's Forests 2014* report (*SOFO 2014*) on the theme of "Enhancing the socio-economic benefits from forests", which was also the main focus of the meeting itself. Discussions covered forests' socioeconomic benefits and related questions, including income and employment; ownership and management rights; wood energy; and the use of forest products in housing. They also examined forest policy measures that promote sustainable production and consumption; access to resources, markets and financing; equitable benefit sharing; and valuation of forest products and services.

As the full range of forests' contributions to sustainable development are often not recognized or properly valued, they are not always reflected in the broader development agenda. COFO 22 provided an opportunity for member countries to consider ways of promoting forests' contributions to global developmental objectives and ensuring that they feed into global negotiation processes. These include the development of the Sustainable Development

Poster produced for the twenty-second Committee on Forestry meeting

Goals as part of the post-2015 development agenda and the review of the international arrangement on forests at the 11th session of the United Nations Forum on Forests (UNFF) in 2015.

The meeting also discussed progress in implementing earlier decisions and considered FAO's programme priorities for forestry in light of the Organization's new Strategic Framework. It specifically addressed work on climate change, REDD, boreal forests and dryland forests.

For the fourth time, COFO was held in conjunction with World Forest Week – a series of meetings and events sponsored by FAO and its partner organizations and institutions. This enabled participants to benefit from opportunities to meet and discuss forest-related issues in more detail.

Highlights from the event can be found here: <http://www.fao.org/forestry/cofo2014/highlights/en/>.

The COFO documents and background information are available on the COFO website: <http://www.fao.org/forestry/cofo2014/en/>.

Mountain communities highlighted at Environment Day

On 5 June, 2014, FAO co-organized, together with Earth Day Italia and the Mountain Partnership, a seminar titled "Intelligent territories: opportunities for future investment – social, environmental and financial innovation." The first roundtable highlighted the role that mountain and rural communities can play in future scenarios of social, environmental and financial innovation.

Panelists included, among others: Eduardo Rojas-Briales, Assistant Director-General, Forestry, FAO and UN Commissioner for Expo 2015; Pierluigi Sassi, President, Earth Day Italia; Renato Grimaldi, Director General, Nature Division, Ministry of Environment, Italy; and Rosalaura Romeo, Mountain Partnership Secretariat, FAO.

Eduardo Rojas-Briales emphasized that forests and mountains can be important social and economic drivers, as proven in those countries where they have been sustainably managed. Rojas-Briales reminded the audience that FAO is supporting member countries in drafting the targets and indicators for achieving and monitoring the Sustainable Development Goals, so that the process towards 2030 can be a truly universal development path.

Mountain peoples' relationship with the environment, their sustainable management of the natural resource base, and a balance between traditional knowledge and capacity to adapt to global changes make them more resilient than communities who live in the lowlands or in cities. Their ability to work in groups, such as cooperatives or farmers associations, and their tendency to diversify their income is a model that could be applied and replicated elsewhere.



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Forests Asia Summit: Sustainable Landscapes for Green Growth in Southeast Asia

The Forests Asia Summit was held in Jakarta on 5–6 May 2014, bringing together representatives from government, research, civil society and the private sector in a regional multi-stakeholder dialogue.

The aim of the summit was to lay the foundations for continued dialogue, transitions toward sustainable investments, and further research to support evidence-based policymaking, all directed toward achieving equitable green growth and more sustainable management of landscapes across Southeast Asia.

The Forests Asia Summit was co-hosted by the Center for International Forestry Research (CIFOR) and the Indonesian Ministry of Forestry, in collaboration with coordinating partner Global Initiatives, seven supporting partners and eight funding partners. Its 31 sessions included discussion forums and high-level panel discussions on: governance and legal frameworks to promote sustainable landscapes; investing in landscapes for green returns; climate change and low-emissions development on the ground; forest landscapes for food and biodiversity; and changing communities, sustainable landscapes and equitable development.

The summit was attended by Indonesian President Susilo Bambang Yudhoyono, and ten government ministers and deputy ministers from across Southeast Asia. Dr. Rajendra Pachauri, Chair of the Intergovernmental Panel on Climate Change, Manuel Pulgar-Vidal, Peruvian Minister of Environment and President of COP20,

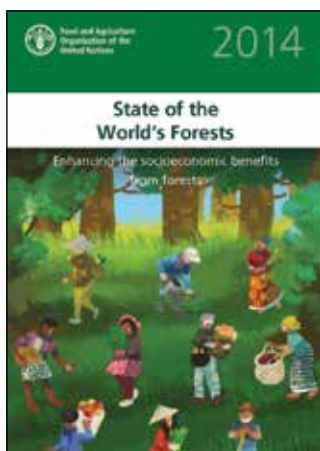
Mangrove canopy photo taken during CIFOR study on above-ground and below-ground biomass in mangrove ecosystems, part of the Sustainable Wetlands Adaptation and Mitigation Program (SWAMP). Kubu Raya, West Kalimantan, Indonesia

and Mark Burrows, Managing Director and Vice Chair, Global Investment Banking, Credit Suisse, all addressed the summit.

The reporting from the summit concluded that:

- to achieve equitable and sustainable green growth in Southeast Asia, all stakeholder groups must strive to overcome communication barriers, engage in continued, participatory dialogue, and act together within a landscape and multilevel governance framework;
- government, the corporate sector and the finance sector must work together to create enabling conditions to unlock private capital and support investments in sustainable landscapes and smallholders;
- the scientific community, with support from the public and private sectors, must engage in integrated and targeted research aimed at increasing understanding of the dynamics that shape landscapes and communicate findings to government and business in a way that supports evidence-based changes in policy and practice toward a sustainable future and action on the ground.

Adapted from the Summit Outcome Statement (see also www.forestsasia.org).



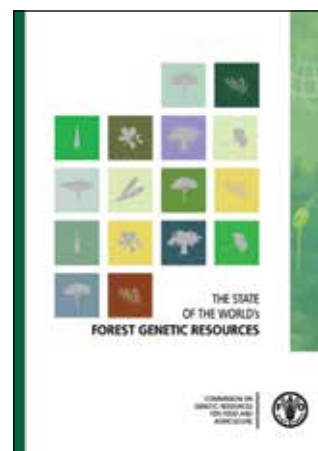
Shifting perspective from trees to people

State of the World's Forests: Enhancing the socioeconomic benefits from forests. 2014. Rome, FAO. ISBN 978-92-5-108269-0 (print), E-ISBN 978-92-5-108270-6 (PDF).

Across the world, forests, trees on farms, and agroforestry systems play a crucial role in the livelihoods of rural people by providing employment, energy, nutritious foods and a wide range of other goods and ecosystem services. They have tremendous potential to contribute to sustainable development and to a greener economy. Yet, clear evidence of this has been lacking. This evidence is critical to inform policies on forest management and use, and to ensure that the benefits from forests are recognized in the post-2015 development agenda, not only with respect to the environment, but also for their contributions to broader social issues.

This edition of *State of the World's Forests* addresses this knowledge gap by systematically gathering and analysing available data on forests' contributions to people's livelihoods, food, health, shelter and energy needs. Crucially, the report also suggests how information might be improved and policies adjusted, so that the socioeconomic benefits from forests can be enhanced in the future.

Also available online: <http://www.fao.org/3/a-i3710e.pdf>.



The first comprehensive overview of forest genetic resources

The State of the World's Forest Genetic Resources. 2014. Rome, FAO. ISBN 978-92-5-108402-1, E-ISBN 978-92-5-108403-8.

Forests and trees enhance and protect landscapes, ecosystems and production systems. They provide goods and services which are essential to the survival and well-being of all humanity. Forest genetic resources – the heritable materials maintained within and among tree and other woody plant species that are of actual or potential economic, environmental, scientific or societal value – are essential for the continued productivity, services, adaptation and evolutionary processes of forests and trees. This first volume of *The State of the World's Forest Genetic Resources* constitutes a major step in building the information and knowledge base required for action towards better conservation and sustainable management of forest genetic resources at the national, regional and international levels.

The publication was prepared based on information provided by 86 countries, outcomes from regional and subregional consultations and commissioned thematic studies. It presents definitions and concepts related to forest genetic resources and a review of their value; the main drivers of changes and the trends affecting these vital resources; and key emerging technologies. The central section analyses the current status of conservation and use of forest genetic resources on the basis of reports provided by the countries. The book concludes with recommendations for ensuring that present and future generations continue to benefit from forests and trees, both through innovations in practices and technologies and through enhanced attention to forest genetic resources at the institutional and policy level.

Also available online: <http://www.fao.org/forestry/tgr/64582/en/>.



Concrete guidance on the genetic aspects of successful ecosystem restoration

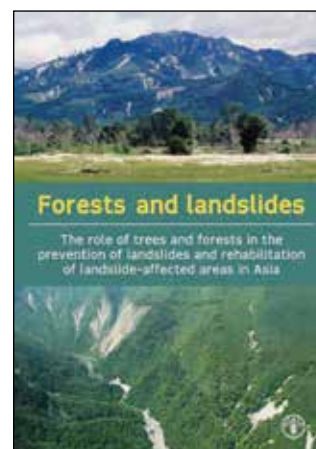
The State of the World's Forest Genetic Resources thematic study: Genetic considerations in ecosystem restoration using native tree species. 2014. Rome, FAO. ISBN 978-92-5-108469-4, E-ISBN 978-92-5-108470-0.

There is renewed interest in the use of native tree species in ecosystem restoration for their biodiversity benefits. Growing native tree species in production systems (e.g. plantation forests and subsistence agriculture) can also ensure landscape functionality and support for human livelihoods.

Achieving full benefits, however, requires consideration of genetic aspects that are often neglected, such as suitability of germplasm to the site, quality and quantity of the genetic pool used and regeneration potential. Understanding the extent and nature of gene flow across fragmented agro-ecosystems is also crucial to successful ecosystem restoration.

This study, prepared within the ambit of *The State of the World's Forest Genetic Resources*, reviews the role of genetic considerations in a wide range of ecosystem restoration activities involving trees. It evaluates how different approaches take, or could take, genetic aspects into account, thereby leading to the identification and selection of the most appropriate methods.

The publication includes a review and syntheses of experience and results; an analysis of successes and failures in various systems; and definitions of best practices including genetic aspects. It also identifies knowledge gaps and needs for further research and development efforts. Its findings, drawn from a range of approaches, help to clarify the role of genetic diversity and will contribute to future developments.



Managing forests to prevent landslides and mitigate their effects

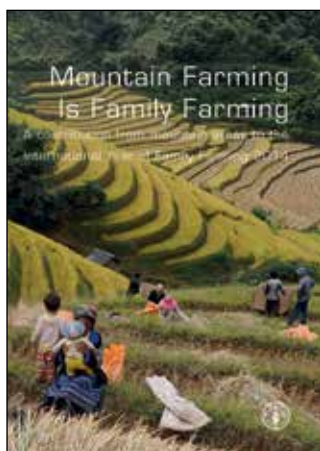
Forests and landslides – The role of trees and forests in the prevention of landslides and rehabilitation of landslide-affected areas in Asia. Second edition. K. Forbes, J. Broadhead in collaboration with: G.B. Bischetti, F. Brandinoni, A. Dykes, D. Gray, F. Imaizumi, S.L. Kuriakose, N. Osman, D. Petley, A. Stokes, B. Verbist, T.H. Wu. 2013. Bangkok, FAO Regional office for Asia and the Pacific. ISBN 978-92-5-107576-0.

In recent years, a number of devastating landslides in Asia have resulted in major tragedies and enormous destruction. Considerable economic losses have also been sustained due to the profusion of smaller landslide events throughout the region.

Current rural development trends and predictions of more extreme weather events will increase the probability of such disasters in the future if efforts to prevent landslides are not stepped up. Better understanding of the roles that trees and forests play in preventing landslides and rehabilitating landslide-affected areas will be critical for a safer, greener and more prosperous future.

This publication outlines the extent to which sound management of forests and tree planting can reduce the incidence of landslides and how forestation can assist in land rehabilitation and stabilization after landslides have occurred. It aims to bridge the gap between science and policymaking to improve management of sloping land both in Asia and elsewhere in the world.

Also available online: <http://www.fao.org/docrep/019/i3245e/i3245e.pdf>.



Supporting mountain communities and protecting mountains

Mountain farming is family farming – A contribution from mountain areas to the International Year of Family Farming 2014. S. Wymann von Dach, R. Romeo, A. Vita, M. Wurzinger, T. Kohler (eds). 2013. Rome, FAO. ISBN 978-92-5-107975-1, E-ISBN 978-92-5-107976-8.

Mountain farming takes many forms – forms as diverse as the world's mountain landscapes – yet largely remains family farming. These mountain farming activities have traditionally fed and supported individual households although, today, they have begun to expand increasingly toward global markets. Yet, mountain farmers still tend to be driven by familial, cultural and ecological values rather than solely profit maximization.

This publication, featuring 25 case studies from across the mountain landscapes, gives an overview of the global changes affecting mountain farming and the strategies that mountain communities have developed to cope. Each study also presents a set of lessons and recommendations, meant to inform and benefit mountain communities, as well as the policymakers, development experts and academics who work to support mountain farmers and protect mountains. Enabling mountain communities to learn from each other's experiences and gather inspirational ideas from around the world will help enhance their resilience.

The United Nations General Assembly has proclaimed 2014 as the International Year of Family Farming. Thus, the Mountain Partnership Secretariat in collaboration with several Mountain Partnership members presents this publication for this International Year to shed light on the merits and challenges of family farming in mountains.

Also available online: <http://www.fao.org/docrep/019/i3480e/i3480e.pdf>.



All about trees and forests – for young people

Forests Challenge Badge. Rome, FAO. Youth and United Nations Global Alliance (YUNGA). YUNGA Learning and Action Series. ISBN 978-92-5-107973-7, E-ISBN 978-92-5-107974-4.

The purpose of the United Nations Challenge Badges is to raise awareness, educate and motivate young people to change their behaviour and be active agents of change in their local communities. Badges are available or being developed on a number of other topics including: agriculture, biodiversity, climate change, energy, governance, hunger, nutrition, the ocean, soils, and water.

The Forests Challenge Badge is designed to help educate children and young people about the crucial role that forests play for life on our planet. This booklet includes basic educational contents on the different types of forests and where they grow. It explains how forests provide essential ecosystem services such as clean air, water, and climate change mitigation. It also describes various forest resources and explains how millions of people worldwide rely on forests for their livelihoods.

The badge describes the threats to our planet's forests and what is being done to protect them. This material is appropriate for use in school classes, Guide or Scout groups or youth meetings generally. It includes a wide range of activities and ideas to stimulate learning about the importance of forests, while motivating children and young people to help protect forests and become aware of the impacts of their actions on the environment.

Also available online: <http://www.fao.org/docrep/018/i3479e/i3479e.pdf>.

More information: <http://yunga-youth.weebly.com/forests.html>.



Forestry communication toolkit

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