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LOCAL POLICIES, CLIMATE CHANGE AND FOREST MANAGEMENT IN PERI-URBAN FORESTS: A NECESSARY INTEGRATION



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Generalitat de Catalunya Departament d'Acció Climàtica, Alimentació i Agenda Rural Centre de la Propietat Forestal





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This guide seeks to build bridges between three essential aspects for our society: local policies, the management and conservation of forest services and values, and in particular peri-urban areas, and the challenge of adapting to and mitigating the impacts of climate change. These three aspects are strongly interrelated, and therefore it is essential to explore how to progress towards integrating them. Here we provide examples and specific proposals on how the local administration can promote the adaptation and conservation of peri-urban forests in the context of climate change.

The first part of the publication (chapters 1 to 4) explains the characteristics and values of peri-urban forests, the regulations related to them, the threats due to climate change and the importance of sustainable forest management with adaptation criteria to face these threats. The second part (chapters 5 and 6) gives examples of measures and actions that can be used as local policy proposals for promoting peri-urban forests that are more resistant and resilient to the impacts of climate change. The guide provides sources for obtaining additional information and four annex-summaries aimed at specific audiences: government and council technical staff, policy makers, the media, and high school students.

Throughout the document, we use "peri-urban forest" to refer to all types of woodlands in the proximity of a city or town, the citizens of which interact in many ways with these natural spaces, including enjoying the landscape, nature and biodiversity, generating raw materials and for recreational and cultural uses.

The publication is aimed at technical staff of local councils, people in charge of developing local policies and also society in general, especially those living in municipalities with peri-urban forest. We hope you enjoy reading this guide.



## The peri-urban forest and its socioeconomic and environmental importance



## 1.1. What is a (peri) urban forest?

Urban forests are defined as wooded networks or systems (forests or groups of trees) located in urban or peri-urban areas (FAO, 2017), forming part of the green infrastructure of a city or town and connecting the urban area with the rural one. Peri-urban and urban forests can be classified into four categories:



Peri-urban (or metropolitan) forests: forests located in the immediate surroundings of a city or town.



Proper urban forests: large municipal parks or green areas partially equipped with recreational facilities.



Small parks, gardens and green areas fully equipped with recreational facilities.

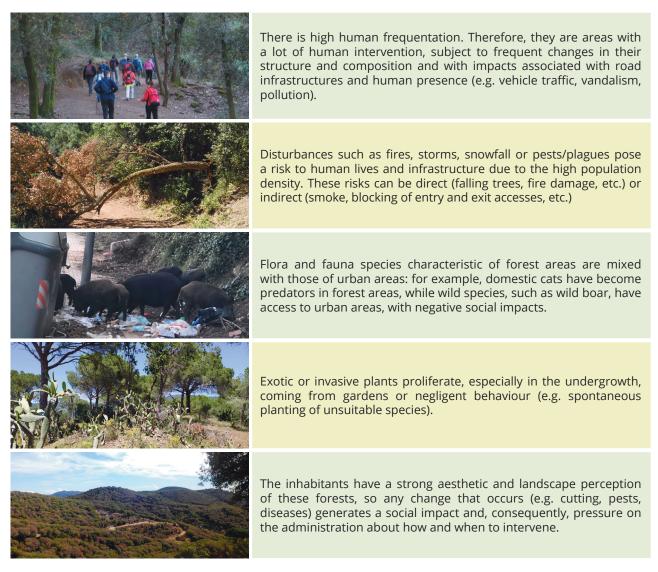


Trees in streets and public squares: isolated trees, or trees in rows or in small groups

**Peri-urban forests (the first category) are considered forest land**, and therefore the regulatory standards described in chapter 4.2 are applied to them. However, the rest of the categories (urban forests, green areas and trees in streets and public squares) are classified as urban spaces, and therefore the regulations for the urban environment apply to them.

Most Mediterranean cities are quite compact and do not usually have extensive green areas within the purely urban fabric. The expansion of urban centres and urbanizations during the last 50 years has meant that many forests that were previously outside the urban area have come to be considered peri-urban forests and share space with various kinds of facilities, industrial zones, urbanizations and areas of residual agriculture.

Some of the differential features of peri-urban forests, in contrast with those located in typically rural areas, are:



In short, these are forests where forest and urban conditions coexist and which are of paramount importance at the ecological, social and recreational levels. The particularities of these forests make it necessary to consider criteria and management objectives that are different from those for forests in rural conditions.

## 1.2 What ecosystem services do forests provide?

**Ecosystem or environmental services** are defined as the benefits that nature provides to society, that is, the improvements that society receives thanks to the proper functioning of ecosystems. These services are essential for guaranteeing human wellbeing. Therefore, when ecosystems are degraded, people's health and quality of life worsens. Ecosystem services can be grouped into four categories (Figure 1), based on the benefits they provide:

### **Support services**





Biodiversity and natural processes of the ecosystem that guarantee the rest of the services. They generally provide indirect and long-term benefits.

**Regulatory services** 



Goods or raw materials generated in the ecosystem (e.g. wood, water, mushrooms, game meat, ornamental or condiment plants, etc.)

These derive from ecosystem functions that help reduce impacts (e.g. climate regulation, water, soil, pollination, etc.)



Non-material benefits related to aesthetics, leisure or culture

Figure 1. Classification of ecosystem services, according to the Millennium Ecosystem Assessment (2005)

## 1.3. The main ecosystem services of Mediterranean peri-urban forests

**Peri-urban forests improve the environment and quality of life of the cities and towns** they surround by providing the ecosystem services shown in Figure 2. All forests provide ecosystem services. The particularity of periurban forests is their proximity to the population, which increases the social value of these services.

Support services	Provisioning services
<ul> <li>Biodiversity</li> <li>Soil formation</li> <li>Photosynthesis</li> <li>Water and nutrient cycles</li> </ul>	Renewable biological resources: wood products (energy use, packaging, furniture, construction, etc.), non-wood products (mushrooms, cork, pine nuts, berries, medicinal plants, etc.), fresh water, etc.
Regulatory services	Sociocultural services
<ul> <li>Regulation of the water cycle</li> <li>Soil protection: mitigation of runoff and erosion</li> <li>Noise and particle filter: absorption of pollutants and improvement of air, soil and water quality</li> <li>Carbon absorption and storage (climate change mitigation)</li> <li>Decreasing the impact of natural phenomena and disturbances: winds, floods, extreme temperatures</li> <li>Pest and disease control</li> </ul>	<ul> <li>Landscape and natural and social heritage.</li> <li>Leisure activities: recreation, sports, tourism.</li> <li>Scientific knowledge and environmental education.</li> <li>The possibility for city populations to learn in nature.</li> <li>Nature tourism and ecotourism</li> </ul>

Figure 2. The main ecosystem services provided by Mediterranean peri-urban forests

Although ecosystem services are essential for citizens, in general their relevance is underestimated. Consequently, there is not enough investment in actions to promote these services by supporting forest management and improvement. In the current context of climate emergency, with its associated threats to forests (see Chapter 2), it is especially pressing to apply forest management with criteria for adapting to climate change (see Chapter 3) to guarantee the persistence of forests and the services they provide.

## 1.4. The bioeconomy

The **bioeconomy** is the economy derived from the production of renewable biological resources and the conversion of these, and their waste, into products with added value (European Commission, 2012). The bioeconomy is essential to sustainable development and allows us to respond to challenges such as reducing dependence on fossil resources, promoting biodiversity and using resources efficiently. For example, the bioeconomy associated with the consumption of firewood or local wood chips makes it possible to reduce the importation of fossil fuels.

Linked to the bioeconomy is the concept of **circular economy**, defined as one in which the value of products and natural resources is maintained for as long as possible, reducing the generation of non-recoverable waste (European Commission, 2015). The bioeconomy can be considered the engine of the circular economy, since the use of renewable biological resources allows the creation of closed cycles in which successive wastes are reincorporated as new resources.

Forests play a key role in the development of the bioeconomy since they offer a large amount of renewable biological resources of plant and animal origin, which serve as food, energy, products or services. In addition, forests create jobs related to obtaining and transforming products and to educational and leisure activities. Figure 3 shows a summary scheme of the forest bioeconomy.

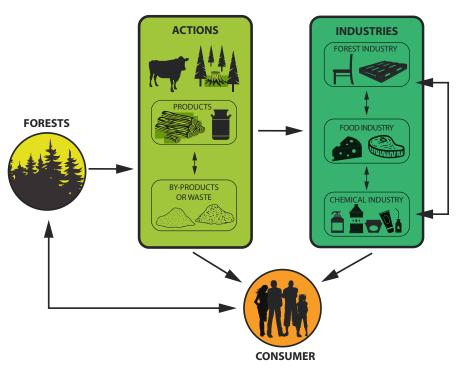


Figure 3. Main components of the forest bioeconomy.



## 2.1. What is climate change?

The climate on Earth is constantly evolving and there is evidence of fluctuations over the millennia, with alternating hot and cold episodes (glaciations). Even so, the phenomenon that we currently call Climate Change is unprecedented in terms of the speed and intensity of these fluctuations and because it is mainly caused by greenhouse gases emitted by human activities.

Climate change has varying effects and intensities in different areas of the planet. In addition to the generalized increase in temperatures (Figure 4), in the case of the Mediterranean, an increase is expected in the irregularity of precipitation (Figure 5) and in the frequency and severity of extreme episodes of drought and storms.

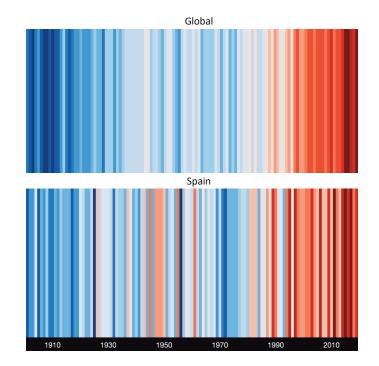


Figure 4. Average annual temperature, global (top) and in Spain (bottom), 1901-2019. The blue lines correspond to colder than average years and the red lines to warmer than average years. Source: adapted from Ed Hawkins (https://showyourstripes.info/)

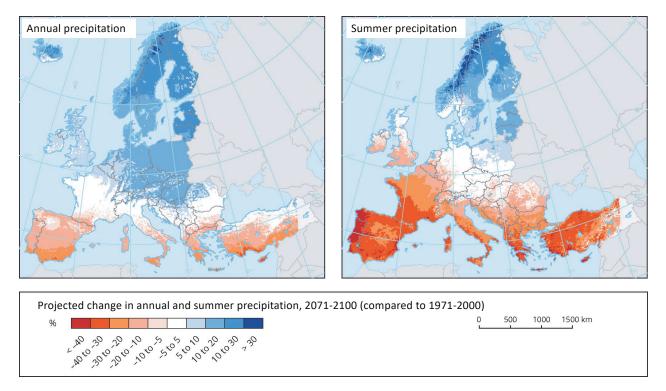


Figure 5. Projected evolution of annual (left) and summer (right) precipitation in the period 2071-2100 compared to the period 1971-2000, according to the climate change scenario RCP 8.5. Source: adapted from the European Environmental Agency, 2019. https://www.eea.europa.eu/data-and-maps/figures/projected-changes-in-annual-and-5

This climatic context forces us as a society to adapt our habits and take measures to mitigate climate change to the full extent of our individual possibilities. This shared responsibility has to make us more aware of the implications of the way we travel, what food we eat and what products and services we consume.

Climate and Meteorology: climate change is evidenced by trends observed around the world over the last decades. Specific phenomena, such as heat or cold waves, exceptional snowfalls or storms should not be used as arguments for debate on the impact of climate change.

## 2.2. How does climate change affect the Mediterranean forest?

The observed and predicted effects of climate change on forest systems are highly variable depending on the geographical area. Figure 6 shows the main manifestations of climate change in the Mediterranean region, the impacts of these manifestations on forests and the main adaptation measures offered by sustainable forest management.

## Manifestations of climate change

- Increase in temperatures
- Lower and irregular rainfall
- Increase in days without rain
- Heatwaves
- High intensity precipitation episodes
- Higher intensity of droughts

### Impacts on forests

- Reduced growth and ability to fix carbon
- Weakening of the forest masses, decay and mortality
- Regeneration problems due to phenological and physiological changes
- Increase in the frequency and intensity of fires
- Increase in erosive processes and soil degradation
- Mechanical damage from severe storms
   and gales
- Higher severity and frequency of pests and diseases
- Genetic and compositional changes in plant communities (migration, extinction)

## Adaptation measures

#### Improving the vitality of the forest masses

- Reducing density (clearing activities)
- Restoring degraded and fire-affected areas

### Adaptations in regeneration actions

- Promoting sexual regeneration
- Adapting reforestations: species, provenances, diversity

### Reducing vulnerability to fires

- Creating less vulnerable forest structures at the stand level
- Designing strategic areas for preventing large fires

## More heterogeneity to increase resistance and resilience

- Diversification of species and phenotypes
- of the trees and understory
- Diversification of structures
- Promotion of islands of diversity

#### Promotion of genetic adaptation

- Conservation of genetic reserves
- Maintenance of genetic diversity
- Assisted migration

Figure 6. The main manifestations and impacts of climate change in the Mediterranean forest, and some management measures for promoting adaptation (adapted from Vericat *et al.*, 2012)

Figures 7a and 7b show an example of the current vulnerability of the Catalan sub-humid Mediterranean forest to water restrictions and forest fires, two of the main threats induced by climate change. You can see them and consult the methodology used at the LIFE MixForChange project website (<u>www.mixforchange.eu</u>).

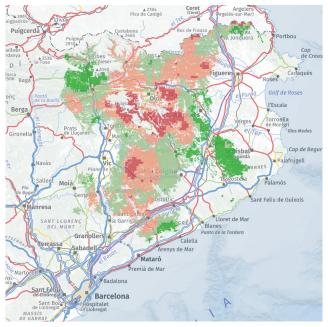
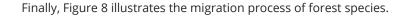


Figure 7a. Vulnerability to water restrictions (trend of the difference between potential evapotranspiration and annual precipitation) of the subhumid Mediterranean forest in Catalonia. Dark green: low vulnerability; light green: moderate; orange: high; red: very high. Source: LIFE MixForChange



Figure 7b. Vulnerability to forest fires (generation of crown fires and large forest fires) of the sub-humid Mediterranean forest in Catalonia. Green: moderate vulnerability; orange: high; red: very high. Source: LIFE MixForChange





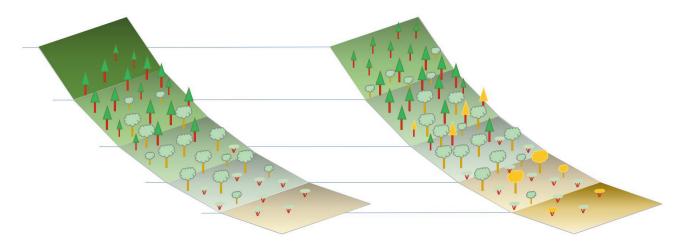


Figure 8. Migration scheme (left: initial; right: final) of forest species: as the temperature increases, each species tries to move up in altitude, and the individuals located at the lower distribution limit of each species gradually die (yellow trees/plants) because they are not adapted to the new conditions.

Sustainable, multifunctional and adaptive forest management is one of the main tools available to us for mitigating the negative effects of climate change on forests (FAO, 2013) and guaranteeing their persistence and adaptive capacity, as described in Chapter 3.







Sustainable, multifunctional and adaptive forest management

## 3.1. Interaction between society and peri-urban forests

The forests that we currently see in our environment are the result of millennia of interaction with the societies that have used them with many, sometimes simultaneous, demands: provision of wood, firewood, charcoal, pine nuts, aromatic and medicinal plants, hunting, recreation, landscape, or the opening of spaces for agriculture, livestock, mining or urban use. Therefore, all the characteristics of a current forest, from its species composition, its structure and age, to the existing infrastructures (tracks, terraces, remains of charcoal bunkers) are the result of this interaction, which has varied in type and intensity throughout history. In peri-urban areas the interaction is especially intense because the forest is very accessible to the local population. In general, in our context, forests were subjected to intensive use, especially for wood, firewood and pastures, until the middle of the 20th century, and since then a double situation has prevailed (Figure 9):

- In the most accessible areas there has been an increase in urban pressure, in the form of housing and other occupations. As a result, frequentation in the forest has increased (leisure activities mainly concentrated on weekends, holidays and specific events) and also the risk of forest fires starting and the danger of these for human lives, homes and infrastructures.

- **The rest of the forest** (including many fields and pastures close to or interspersed with the forest mass) has undergone a process of abandonment, with an increase and densification of the forest cover, which entails new associated problems: low vitality of the trees and high vulnerability to drought, disease and to generating large fires.



Figure 9. Changes in the peri-urban landscape. The surrounding area of Gavà (Barcelona) in 1956 (above) and 2020 (below). A large part of the old farmlands have become homes, industrial areas or forests. In 1956 the fields separated the forests from the houses, but now they are intimately mixed. Source: ICGC.

# We have increasingly more forest: to protect it we have to manage it

The area and density of forests in Catalonia was minimal in 1930-40 due to pressure from agricultural and livestock activities (Cervera, 2017). The progressive abandonment of these activities, which began in the least productive and accessible areas, has resulted in the spontaneous expansion of the forest: between 1970 and 2013-16, the wooded forest area in Catalonia increased by 36% to 1.6 million hectares (4th National Forest Inventory - IFN4).

Another phenomenon observed since the last quarter of the 20th century is the loss of profitability of obtaining wood, firewood or other renewable products from the forest. Currently, in Catalonia the wood use rate (that is, the percentage that is used with respect to the annual increase) is 25-30%, while in Spain the figure is 22%, dropping to 17% if Galicia is not considered (Rojo-Alboreca, 2015; IFN4). These figures contrast with the average utilization rate in the EU, which reaches 73% (Forest Europe, 2020).

As a result, and according to IFN4, the volume of wood that has accumulated in the forest in Catalonia has doubled from 1990 (80 million m<sup>3</sup>) to 2013-16 (151 Mm<sup>3</sup>), despite the logging and forest fires that have occurred in this period.

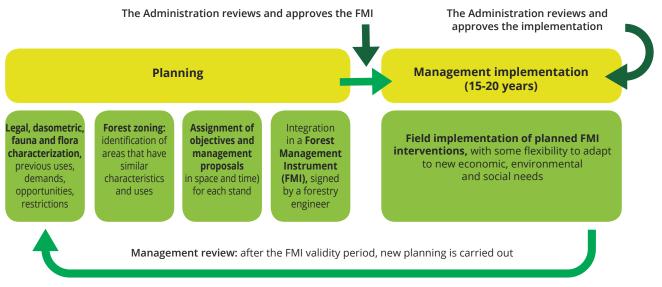
We can conclude that we have never had so much forest, or so much abandoned forest, and that the high density of trees and shrubs make it very susceptible to the impacts of climate change: fires, drought, pests and diseases.

## 3.2 What is and how do we apply sustainable and multifunctional forest management?

The Helsinki Resolution (MCPFE, 1993) defines **sustainable forest management** as "the protection and use of the forest and other forest areas in a way and at a rate such that their biodiversity, productivity, regenerative capacity, vitality and potential are maintained to fulfil, now and in the future, the ecological, economic and social functions on a local, national and global scale, without damaging other ecosystems". In other words, it is about using the forest's resources, and guaranteeing its persistence and that of the ecosystem services it provides.

**Sustainable and multifunctional forest management** is a concept that emphasizes the need to consider the maximum number of ecosystem services that a forest generates. Forest management cannot optimize the generation of all ecosystem services at the same time, at all times and across the entire area. However, it is possible to manage this multifunctionality by prioritizing in each forest area (sometimes during specific periods) the provision of certain ecosystem services over others, seeking to satisfy the most relevant ecosystem services in the entire surface. Forest management is developed in Spain through the **Forest Management Instruments (FMI)**, in a regulated process at the administrative level, as described in Figure 10. In Catalonia, 40.2% of the forest area has a Forest Management Instrument (OFC, 2019), while in Spain the figure is 32% (Forest Europe, 2020).

Figura 10. Procediment de la gestió forestal.



The management is characterized, planned and implemented considering the complexity of the forest, and therefore needs to be flexible in space and time, seeking a balance between detailed interventions and logistical and operational efficiency.

The management of a forest in a given period can give rise to very varied interventions in its different areas: in some areas, interventions may be proposed to reduce the risk of fires and also obtain firewood; in other areas, wood harvesting may be programmed according to close-to-nature forestry criteria to promote the regeneration of the forest; and other interventions may be designed for maintaining the natural evolution. These decisions are made based on the appropriate characterization of the forest area, and together they should contribute to the preservation of the forest's many ecosystem services as well as its adaptation to climate change.

## 3.3. Sustainable forest management for adapting to climate change

Sustainable forest management is one of the measures identified by the Intergovernmental Panel on Climate Change (IPCC) as a key tool for contributing to the adaptation and mitigation of climate change, limiting desertification and soil degradation and also contributing to food security. In addition, sustainable forest management favours a series of processes in this line: increasing soil organic carbon, reducing erosion, managing the fire risk and reducing the landslide risk (IPCC, 2020). Therefore, forest management is a key tool in the framework of climate and environmental policies, especially in territories where the forest area is in the majority, such as Catalonia (65%) and Spain (55%).

The LIFE MixForChange project has developed and implemented innovative forestry management to promote adaptation to climate change in the Mediterranean forest, incorporating biodiversity conservation criteria and promoting the economic sustainability of forest management, which is essential for it to be repeated. These techniques have been applied in sub-humid conditions (Montnegre-Corredor, Montseny, Bellmunt-Collsacabra and southern Ripollès massifs), although the foundations of this forestry management are applicable to other areas. The **main objective** is to increase the **resistance**<sup>1</sup> and **resilience**<sup>2</sup> of the forests to the main disturbances due to climate change: drought, fires, pests and diseases.

<sup>1</sup> **Resistance**: the forest's capacity to maintain its integrity in the event of a disturbance (low vulnerability)

<sup>2</sup> **Resilience**: ability to return to its state before the disturbance (spontaneous recovery)

The LIFE program is a European financing instrument for environmental and climate actions. Since 1992, more than 5,000 projects have been granted in this line. The main objective of the LIFE MixForChange project is to contribute to the adaptation of sub-humid Mediterranean forests to climate change. Its website (www.mixforchange.eu) contains various publications on climate-adaptive forestry.

### The three basic principles of Mediterranean adaptive silviculture are:

**a) Regulate the density**, that is, apply clearing activities to reduce the number of trees per hectare, always in favour of the most vital plants and trees and seeking to keep all the species present. The most vital trees are those with a highly developed crown and a high density of deep-green leaves, with no visible damage or exudate on the trunk or bark. In addition, in the case of species with the capacity for trunk or root regrowth (mainly broadleaf species), it is advisable to promote trees with seed origin, since the regrowth usually shows signs of decrepitude at a younger age.

Forest that is too dense



Trees are under fierce competition for water, light and soil nutrients.

Vitality is affected, and vulnerability to pathogens and mortality are increased.

The continuity between trees and the abundance of fuel and dead trees increases the forest's vulnerability to large forest fires. Forest that is not dense enough

Forest with a density in a suitable range



The strong insolation increases the temperature in summer and reduces the environmental and soil humidity.

Extreme proliferation of scrub, giving rise to a continuity of fuel that increases the forest's vulnerability to large forest fires as well as the cost of future clearing activities.



The competition between trees is moderate, not leading to a loss of vitality.

The microclimate of the innerforest is dark and humid, with little transpiration, insolation and development of the understory.

Trees grow continuously. Therefore, by applying periodic clearings it is possible to avoid situations of excessive density and the associated problems: decay, mortality and excessive fuel accumulation. The intensity of a clearing action, that is, the percentage of trees to be extracted, depends on many factors: the species and its growth rate (conditioned by environmental factors, age and density of the forest), the forest's stability, the cost and the expected periodicity of future clearings. Silviculture is the science that defines the most suitable type and intensity of clearings in each case.

b) Promotion of mixed forests with complex structures (trees of different species and sizes).



All trees have a crown and roots with the same geometry and need for light  $\rightarrow$  more competition between them and less vitality.

All trees have the same way of recovering from fires: regeneration by seed or resprouting.

If there is a particularly serious plague or disease for that species and age group, the entire forest is damaged.

Management is simple: the trees grow at a similar rate and produce relatively homogeneous products.

Mixed forest with a complex structure

The trees of each species and age have a different crown and root shape and a different demand for light  $\rightarrow$  there may be some complementarity.

In the event of a fire, there are likely to be different spontaneous recovery options: seed and/or resprouting, depending on the species.

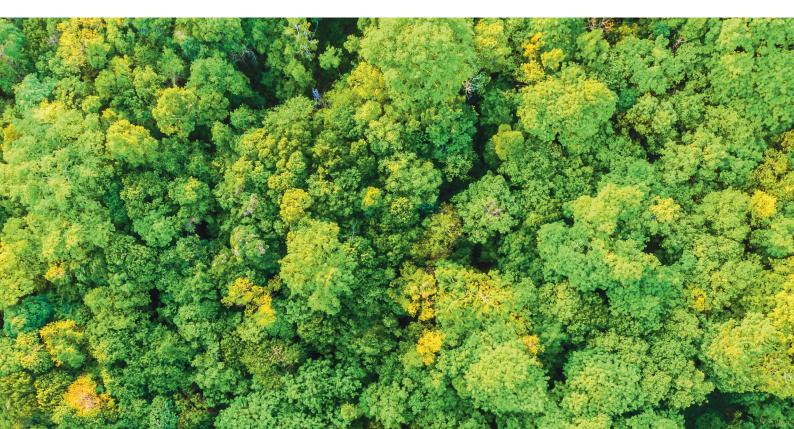
Pests and diseases of a species have difficulty finding susceptible trees and are more likely to have predatory organisms.

Management is more complex due to the diversity of situations according to the various species and ages mixed in the forest, the proportion and stage of development of each one, and the types of mix: tree by tree, in small or large groups.

The search for the maximum diversity of species refers to the trees and also the understory plants. In other words, clearing must be applied partially (respecting around 20-25% of the soil covered by scrub) and selectively: the most abundant species, the pyrophytes (high flammability) and the species of less interest for fauna (shelter and food) as well as the larger individuals must be cleared most intensively to break the continuity of fuel (see the next section).

In a pure and highly simplified forest, there may not be enough trees of other species to achieve a mixed and complex stand for several decades. In this case, it is possible to consider making enrichment plantations, that is, taking advantage of the spaces created during clearing to plant species compatible with the habitat to obtain a mixed and complex forest mass in the future.



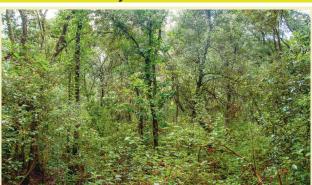


**c) Breaking or reducing the fuel continuity:** the vulnerability of a forest to generating large forest fires is evaluated according to the propensity for the fire to reach a sufficient intensity to burn the canopies and to spread throughout the forest as a whole, exceeding the capacity of the firefighting equipment and teams. This situation occurs when there is a large accumulation of fuel (biomass) and when it is has vertical continuity.

When a fire starts (due to natural or human causes) the fire begins to burn the dry fuel that is on the ground (fine remains such as twigs, leaves, etc.). If it reaches a sufficient intensity it begins to burn thicker remains: low dry scrub, fallen branches...The evolution of this incipient wildfire depends on the forest structure, as described below.

Structure very vulnerable to crown fire

Structure not very vulnerable to crown fire



The fire gains height as it finds more fuel: tall brush, low branches, small and medium trees and, finally, it reaches the crowns of the largest trees, which spread the fire. The horizontal continuity of the fuel favours the propagation in space.

Almost all the trees are burned, with an intensity that exceeds the capacity of the extinguishing equipment, and it will take decades to have a forest with the characteristics prior to the fire.



The fire gains height occasionally, reaching a moderate intensity that only allows it to burn the bottom of some tree crowns. The fire does not spread between the crowns of different trees.

Practically all the trees, and especially the largest ones, survive the fire; firefighting teams have more opportunities to control the fire. As a result, the forest maintains, or will soon recover, its ability to generate the same ecosystem services prior to the fire.

### Summary of forestry measures for reducing the main impacts of climate change in our context:

Drought: regulate the density (neither excessive nor deficient) and promote vigorous trees: healthy, vital, of seed origin.

**Fires:** break the vertical continuity of fuel (structures that are not very vulnerable to crown fire), and promote the overall vitality of the forest to avoid the accumulation of dry biomass and advance the maturity of the forest.

**Pests and diseases:** promote mixed and complex stands (diversity of species and ages) to hinder the spread of pathogens, and keep trees healthy and vital.

## Forest governance: ownership, regulations and policies



## 4.1. Forest ownership

The entire area, whether urban, agricultural or forest, belongs to someone. In our context, the forest area is mostly privately owned (Figures 11 and 12), often in small properties. Therefore, when we are in a forest we have to know that the trees, mushrooms and paths belong to someone and therefore we have to use them respectfully. Similarly, the forest owner has a legitimate right to use the resources of their forest in accordance with current regulations and guaranteeing its sustainability.

	Catalonia <sup>1</sup>	Spain <sup>2</sup>	European Union (UE28)
Percentage of forest area that is private	73,1%	73,1% <sup>2</sup>	60,7%4
Number of forest properties	221.779	5,2 milions <sup>3</sup>	16 milions⁵
Average area per private forest property (ha)	6,7	3,6³	135

<sup>1</sup> Fletas *et al* (2012); <sup>2</sup>MAPA (2020); <sup>3</sup>Rojo Alboreca (2015); <sup>4</sup>Olschewski & Köhl (2020); <sup>5</sup>CEPF (2021)

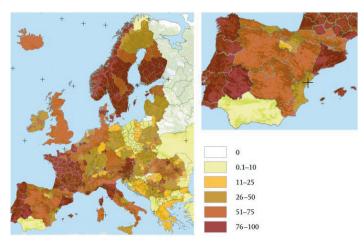


Figure 11. Map of Europe by percentage of forest area that is private (adapted from Pulla *et al.*, 2013)

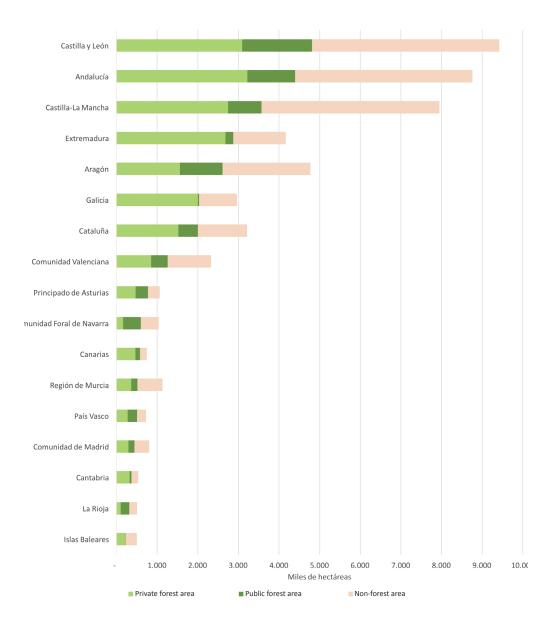


Figure 12. Areas by Autonomous Communities in Spain: private forest, public forest and non-forest, in thousands of hectares. Data: MAPA (2020)

## 4.2. Forest legislation and planning

Any intervention and use that is made in a forest, whether public or private, is legally regulated at the European, state, regional and local levels. The forest area is subject to a very complex regulatory body due to its large extension and the great diversity of uses and demands that fall on it. In addition to the specific regulations that regulate the different forest uses, the forest management is affected by regulations and instruments for territorial and urban planning, biodiversity conservation and protected areas, climate and energy policy, rural development and agricultural policy and the protection of waters and soils, among others. Below is a summary of this normative body and the planning instruments that affect forests:

### **Basic regulations applicable in Catalonia**

The Statute of Autonomy attributes to the Catalan government (*Generalitat de Catalunya*) the shared competence with the Spanish State regarding the regulation and regime of administrative intervention and use of the forests, forest utilization and services and livestock routes of Catalonia. At the state level, **Law 43/2003, on Forests**, and its amendments 10/2006, 21/2015 and 9/2018 stand out, and at the Catalan level, **Law 6/1988, on Forests**.

From the forest management point of view in protected areas, **Law 42/2007**, **on Natural Heritage and Biodiversity**, and **Law 12/1985**, **on Natural Areas** stand out. The preservation of species and habitats and the **Natura 2000 Network** are regulated by the respective European directives: Directive 2009/147/EC, relative to the conservation of wild birds; and Directive 92/43/EEC, relative to the conservation of natural habitats and wild fauna and flora, later adapted with directive 97/62/EC.

Law 21/2013, on Environmental Assessment and Law 5/2003, on Measures for the Prevention of Forest Fires complete the regulations to be considered to implement the planning and management of forests in Catalonia.

On the other hand, **Law 3/2019**, **on Agricultural Areas** regulates the planning, management, conservation and protection of agricultural areas of Catalonia, understanding these as the set of ecosystems with aptitude and productive agricultural, livestock or forestry vocation, transformed by human exploitation and occupation and that are or can be mainly used for the production of food and raw materials, forming an essential part of the territorial matrix. The law contemplates the drafting of specific agricultural sector territorial plans, which can complete what is determined in the agricultural sectorial territorial plan of Catalonia.

Chapter VI of the law establishes the concept and conditions of **peri-urban agricultural activity**, citing the following characteristics:

**a)** It is subject to strong urban pressure.

**b**) It has competition from other economic sectors for the use of land and the resources necessary for food production.

**c)** It is subject to instability due to the prospects of land use.

**d)** It has a high parcel fragmentation.

e) It is under pressure from intensive social use, which can generate incompatibilities with agricultural activity.

All peri-urban agricultural activity must meet the following conditions:

**a)** Produce food and forest products, both in the form of goods and services.

**b**) Contribute to the quality of the environment and generate environmental and forestry services.

c) Be a professional activity.

**d)** Provide social and cultural values.

The objective of **Law 16/2017**, **on Climate Change** is to reduce greenhouse gas emissions, favour the transition towards an emission-neutral economy and increase the capacity to respond to the impacts of climate change. Regarding **forests and forest management**, the measures are aimed at reducing the vulnerability of forest systems and optimizing their capacity to act as carbon sinks, as regulators of the water cycle and as sources of renewable energy and sustainable construction materials.

Within the framework of state and regional legislation, the **competencies of local entities** are, in their capacity as owners of forest land, the following:

a) the management of the forests in their ownership not included in the Catalogue of Public Utility Forests (MUPs).

**b**) the management of the MUPs in their ownership, when so provided and as established by the forest legislation of the autonomous community.

**c)** the provision of the economic performance of the uses of all the forests of their ownership, without prejudice to the provisions related to the MUP improvement fund or in the regional regulations.

d) the issuance of a mandatory report on the procedure for preparing the MUP management instruments owned by them.

**e)** the issuance of other mandatory reports provided for by regional or state legislation, relating to the forests in their ownership.

However, urban regulations can also establish determinations at the municipal level regarding forest areas, as in the case of changes in land use.

## Territorial and urban planning in Catalonia (Figure 13)

The **General Territorial Plan of Catalonia (PTG)** is the instrument that defines the objectives of territorial balance of general interest for Catalonia, guiding the actions of the public powers to create the appropriate conditions to attract economic activity to the ideal spaces, ensuring that citizens have similar life quality levels, regardless of the territory in which they live. The **Sectoral Territorial Plans** are deployed based on the PTG, including the <u>Plan for Spaces of Natural Interest (PEIN)</u>, which in turn, with the rank of derived urban plan, is implemented through the <u>Special Protection Plans of the Natural Environment and Landscape</u>. The legislation also provides for other sectoral plans for forestry and agricultural policy.

In parallel to the Sectorial Territorial Plans, the PTG is deployed through other figures such as the **Partial Territorial Plans** (e.g.: Partial Territorial Plan of the metropolitan area of Barcelona) and the **Sectorial Master Plans** (e.g.: Alt Penedès county territorial master plan).

**Urban plans** are the government instruments for carrying out its territorial planning policy. **Urban Master Plans** (**PDU**) are urban planning instruments that are coherent with territorial planning and establish the guidelines for coordinating urban planning in a supra-municipal territory. The competence of urban planning at the municipal level is materialized mainly through the **General Urban Management Plan (POUM)**, which can cover one or more municipal areas and have the following objectives:

- **a)** Classify the land to establish the corresponding legal regime.
- **b)** Define the urban implantation model and the determinations for urban development.
- c) Define the general structure of the urban planning of the territory and the guidelines for its development.
- d) Determine the circumstances that may lead to its modification or revision.

The **urban planning norms** supplement or complement the POUM, and are able to establish determinations at the supra-municipal level to achieve objectives established in the territorial planning or in a PDU. These urban planning regulations are intended to delimit and qualify urban and undeveloped land, establishing determinations with an adequate degree of precision to allow land management.

Finally, the <u>partial urban plans</u>, the <u>special urban plans</u> and the <u>urban improvement plans</u>, are urban instruments for deploying the determinations of the municipal competence planning.



Figure 13. Summary and hierarchy of the figures of Territorial and Urban Planning. Source: Generalitat de Catalunya.



## 4.3. European forest policy and climate change

Since its treaties do not expressly mention forests, the European Union does not have a common forest policy. The competences therefore belong to the State, although there are many European actions that clearly have an impact on forests, especially strategies and plans related to climate change, rural development, biodiversity and the bioeconomy, which are adapted to the needs at each time.

The **European Forestry Strategy** is an action launched in 2013 to coordinate and ensure coherence in forestry policies and reinforce the contribution of forests and the forestry sector to meeting EU objectives. Its guiding principles are sustainable forest management, multifunctionality of forests, efficient use of resources and global responsibility towards forests. The new Forest Strategy, one of the actions envisaged in the 2019 European Green Deal, is contextualized in the growing vulnerability of forest ecosystems to climate change. It is planned to promote effective reforestation, forest conservation and restoration to increase their potential for absorption and storage of CO<sub>2</sub>, improve their resilience, promote a circular bioeconomy and protect the biodiversity, in line with the **EU Biodiversity Strategy**, by 2030, as well as promote the many ecosystem services that forests provide.

The **European Green Deal** 2019 is a new growth strategy aimed at transforming the EU into an equitable and prosperous society, with a modern, resource-efficient and competitive economy, without net greenhouse gas emissions by 2050 and where economic growth is decoupled from resource use. This pact establishes an action plan for promoting the efficient use of resources by transforming towards a clean and circular economy, restoring biodiversity and reducing pollution. In order to achieve the EU's climate and energy objectives for 2030, it is essential to direct investments towards sustainable projects and activities. The 2020 **EU Taxonomy Regulation** is a result of this. It establishes the general conditions for an economic activity to be classified as environmentally sustainable.

In 2021, the **European Strategy for Adaptation to Climate Change** was approved following the criteria of the 2013 Strategy but focusing on international action. The European Union recognizes that climate change affects all levels of society and sets three priorities: to integrate adaptation into macro-fiscal policy, to adopt nature-based adaptation solutions and to carry out local adaptation actions.

The 2018 **European Bioeconomy Strategy** also establishes mitigation and adaptation to climate change as the great challenge of this generation. It is emphasized that a sustainable and circular bioeconomy is key to achieving a carbon-neutral Europe, promoting efficient, active and sustainable primary production practices and helping to improve the capacity of ecosystems to regulate the climate.

Another action is the **Covenant of Mayors for Climate & Energy**, which brings together thousands of local and regional authorities with the voluntary commitment to apply the climate and energy objectives of the EU. This action arises from the union of the initiatives of Mitigation of Climate Change (Covenant of Mayors) and of Adaptation (Mayors for Adaptation) under the same figure, which involves local authorities and their citizens in the fight against climate change. This Covenant began in 2008 with the objective of reducing CO<sub>2</sub> emissions by 20%, increasing renewable energies and energy efficiency by 20% for 2020. The adhered local authorities committed themselves to these objectives through a **Sustainable Energy Action Plan (SEAP)**. In 2015, according to the COP of Paris, the goal for 2030 is to reduce CO<sub>2</sub> emissions by 40%, increase renewable energies and efficiency by 27%, compared to the base year considered. In addition, climate change adaptation aspects are incorporated, such as risk and vulnerability assessment, including droughts, fires and loss of biodiversity. The adhered local entities commit to these new mitigation and adaptation objectives through the **Sustainable Energy and Climate Action Plan (SECAP)**. This new international covenant has been named, since 2017, the **Global Covenant of Mayors for Climate & Energy**.

The **2030 Agenda for Sustainable Development** was approved in 2015 by the UN General Assembly with the agreement of 193 countries. The implementation of this Agenda is guided by the 17 **Sustainable Development Goals** (SDG; Figure 14) of an environmental, social and economic nature. The SDGs most related to forest ecosystem services and climate change are numbers 6 (Clean water and sanitation), 7 (Affordable and clean energy), 13 (Climate action) and 15 (Life of terrestrial ecosystems).



Figure 14. The 17 UN Sustainable Development Goals

Proposals for integrating local policy and forest management adaptive to climate change This chapter presents some **examples of actions that the local municipal administrations can implement** to promote the application of forest management that is adaptive to climate change, and environmentally and economically sustainable, which guarantees the vitality of the forest and the generation of ecosystem services.

The measures presented are compatible and synergistic with each other. The actions adopted by a municipality have to be chosen and promoted in a coordinated way and according to a development plan with an associated calendar and budget.

Apart from those that derive from their status as owners of forest lands, the municipalities do not have direct competence over the planning or implementation of forest management, which are the responsibility of the forest administration. However, municipalities have many powers that can give a decisive boost to adaptive forest management in their territory, for example, through the measures proposed below. On the other hand, supra-municipal administrations (county councils, metropolitan areas, etc.) can positively contribute to the success of these measures. In this sense, its functions of coordinating and providing coherence to the measures implemented by the municipalities in its area are essential, in addition to logistical and technical support. For example: create advisory spaces and training activities for municipal technical and political personnel in this matter, offer repositories of document models to carry out the necessary procedures to implement the different measures, publicize the initiatives carried out by the municipalities or create dissemination materials and contents related to the role of forests and adaptive forest management for different educational levels.

## 5.1. The local municipal administration: a key driver

The local municipal administrations have extensive knowledge of the territory they manage and of the stakeholders present in it. In addition, they have direct access to citizens and can effectively determine their demands, thus defining the direction the town wants to take on the economic, ecological and social levels. Therefore, they play an essential and dynamic role among the different actors in the territory.

#### Promotion of sustainable management of peri-urban environments

- Promote a sustainable primary sector (extensive livestock, forestry) in peri-urban forests and provide infrastructure for establishing it. E.g.: facilitating the use of existing buildings and infrastructures for primary sector activities: sheds for livestock, space for storage yards for forest products, restoration of abandoned or rundown spaces, etc.
- Review the wording of the regulations and planning to avoid contradictions with the deployment of measures to improve forest vitality. E.g.: the use of ambiguous concepts such as "protection", "preservation" or "conservation" can become an impediment to the application of active forest improvement measures, such as fire prevention actions or the recovery of open spaces to improve biodiversity.
- Promote actions that make it possible to create a mosaic of habitats. E.g. facilitate conversions into pastures, breaking or changing land uses when justified by the general interest for fire prevention, promotion of extensive livestock and recovery of habitats for unique fauna and flora.
- Control of improper uses, regulation of access and potentially dangerous uses. E.g.: damage to roads, theft of forest products, landfills and illegal developments, vehicle deposits, etc.
- Evaluate the ecosystem services present in the municipality and define the necessary objectives to enhance them.



Mosaic in peri-urban forests.

#### Promotion of forest planning and management

- Promote planning: drafting of FMIs for municipally-owned lands, promote the drafting of FMIs in private land and joint FMIs (in coordination with forest owners' associations) or municipalities (in municipalities with sufficient forest area under municipal ownership) and promote the execution of the actions planned in the FMI.
- Integrate tools such as the FMI, SGD, SECAP and the landscape charter in urban planning so that the management objectives of peri-urban spaces are consistent, and identify priority areas for adaptive forest management with political consensus and the actors of the territory.
- Inform private forest owners about the options available for the development of forest management. E.g.: educating and encouraging private forest owners to carry out forest management and facilitate communication between them and the forest administration.
- Execution of agreements with associations of forest owners to facilitate adaptive forest management.

#### **Promotion of fire prevention**

- Auxiliary maintenance of the basic forest road network, especially after episodes that may have damaged it, for example, after an intense storm.
- Subsidiary execution of the opening and maintenance of protection strips in urbanizations against forest fires.
- Identify the priority areas of intervention for fire prevention based on their vulnerability and strategic importance. E.g.: promoting forest management in forests adjacent to the protection strips of urbanizations.



Protection strip of an urbanization.

#### **Promotion of extensive livestock**

- Facilitate the logistics to maintain or establish herds. E.g.: use of municipal buildings and infrastructures, access to housing for shepherds, etc.
- Encourage recovering abandoned elements of rural heritage for livestock use (old sheds, tanks, troughs, etc.).
- Reach agreements with shepherds for grazing municipal forests, fire prevention strips, etc. and recovery of open spaces in these areas to regain a mosaic landscape.
- Facilitate spaces for creating demand for extensive livestock, starting with forests of the local administration and promoting the subsequent incorporation of private forests. E.g.: promoting generational change, land banks for livestock activities, promoting grazing agreements, etc.



Extensive grazing in a peri-urban forest

#### Interaction actions with other actors

- Work in a coordinated way with other public entities to make a common value of adaptive forest management in local policies.
- Encourage the association of forest owners (public and private) to facilitate joint management.
- Coordinate the consensus between the different areas of the local administration to carry out measures.



#### Conference on associationism.

- Mediate and promote participatory processes for the different activities that take place in the forest (e.g. forest exploitation, livestock, hunting, public use, etc.) to make the demands of the different stakeholders compatible with the promotion of adaptive forest management and the enhancement of ecosystem services. E.g.: promoting a public-private work committee between local stakeholders (owners, foresters, farmers, shepherds, hunters, conservation entities, neighbourhood associations, etc.) for managing peri-urban environments: agree on objectives and their implementation.
- Promote custody agreements with shepherds, owners or naturalist entities to improve the environment, especially in areas with a high landscape value, high social pressure or with elements of special interest for conservation.

The assignment of a specific unit within the local administration (green council, green office, section in the environmental area) in charge of coordinating the actions carried out in the municipal forest area can increase the efficiency of the measures and be a reference point for citizens and the local stakeholders.

## 5.2 The challenge of economic sustainability

To guarantee the vitality and persistence of the forest and avoid it being abandoned, forest management has to be economically sustainable. Currently, however, in most Mediterranean forests it is not possible to achieve this sustainability without external support (aid and incentives from the administrations), due to different factors: the low price of wood, forests are often young, abandoned areas with a highly developed understory, scarce road network and divided into small properties. Nor is there a payment system to forest owners for the ecosystem services they provide to society. Thus, economic sustainability is the great challenge for achieving and carrying out adaptive forest management.

#### Promotion of the consumption and commercialization of forest products, both wood and non-wood

- Promote local forest products. E.g.: promotion of traceability systems.
- Increase municipal demand for forest products: supply municipal facilities and services with local forest products. E.g.: installing wood chip boilers in municipal facilities or building public facilities with local wood.
- Prioritize the use of wood, preferably local and in products with a long life cycle (e.g., structural wood), over non-renewable materials. E.g.: urban furniture, infrastructure and municipal equipment.
- Facilitate the implementation of storage points for forest products (e.g. patios or wood warehouses) and auxiliary infrastructure for forestry and livestock activities (e.g. sheds and enclosures) in the urban planning figures and in the processing of licenses.
- Develop spaces for training, dissemination and promotion of local forest products where the products can be sold or producers can be contacted. E.g.: agricultural cooperatives, interpretation centres for peri-urban spaces, etc.
- Mediate in introducing local forest products in consumer groups. E.g. school canteens, nursing homes, consumer cooperatives, restaurants, tourist accommodation, etc.



Production of wood chips from peri-urban forests and children's playground equipment made with local chestnut wood.

#### Search for direct and indirect sources of financial support

- Offer companies in the area the possibility of sponsoring volunteer environmental activities carried out in the municipality. E.g.: promoting corporate social responsibility actions to improve the ecosystem services of the municipality's forests.
- Assess the possibility of allocating a part of the municipal taxes (e.g. circulation, waste, real estate tax) to improving peri-urban forests.
- Assess the implementation of measures so that the organizers of public events in peri-urban forests compensate for the possible impacts caused to the forests.
- Promote crowdfunding projects by companies and local entities to obtain financial or material contributions to forest improvement initiatives. E.g.: temporary assignment of spaces, machinery or contributing with material or services.
- Search for sources of external financing (e.g.: projects with European funding) with the participation of entities in the territory to implement actions to improve the forest and to quantify and value the ecosystem services it offers.

## 5.3. The importance of communication and citizen involvement

The effectiveness, impact and replication potential of the aforementioned measures increases if they are communicated and disseminated effectively, both to local citizens (schools, associations, the general public) and to other local stakeholders and administration areas. This facilitates the acceptance of the measures as well as active participation, especially by citizens who are closest to peri-urban forests or who use them more often.

Communication actions have to be planned in a coordinated way, with consistent messages adapted to various target audiences.

#### Training, dissemination and awareness actions

- Periodically publicize the actions carried out to promote forest management and ecosystem services, including them into the area's communication programmes.
- Promote the training of technical staff and political positions in the local administration in the sustainable management of natural resources.
- Promote environmental volunteer activities for improving the forest. E.g.: the "*Let's clean up*" initiative to eliminate rubbish in the forest through volunteering in Natural Parks, etc.
- Accompany the incorporation of concepts on adaptive forest management in specific pedagogical programmes (theoretical and practical) of primary and high schools as well as schools for adults. E.g.: learning activities and services or community services (CS) with the participation of forest managers and owners' associations, proposals for research projects in high schools, etc.
- Promote professionalism in the forestry and livestock sector through specific and applied training. E.g.: collaboration with specialized training centres (vocational training, workshop schools) and forestry companies to facilitate the realization of professional work experience in companies that carry out forest improvement works (adaptive forestry, perimeter protection strips, etc.).
- Promote and disseminate studies or research projects, citizen science and knowledge transfer. Offer municipally owned forests to carry out studies.
- Develop an annual activities programme (talks, guided visits, workshops, exhibitions, etc.) in municipal spaces for environmental education for learning about local peri-urban forests. E.g.: guided tours in managed areas, forest products workshops, etc.

- Coordinate dissemination and training actions with private entities of environmental education, social education, hiking entities, neighbourhood associations, homeowner associations, nature conservation entities, etc.
- Recognize the support of the companies, entities and individuals that collaborate with the different initiatives to promote forest management, explaining what they have done.



Guided forest tours.

Local administrations can use different means to develop awareness, communication and dissemination actions: municipal websites, social networks, brochures, physical municipal spaces for environmental education, neighbourhood information sessions, fairs or events related to the forest, etc.

## **Citizen actions**

- Participate in public activities related to improving the forest. E.g.: outings, talks, workshops, volunteering, etc.
- Spread information about local initiatives and promote products derived from the forest in the social environment and networks.
- Use forest infrastructures for recreational purposes responsibly.
- Consume local forest products and reuse byproducts and residues.

Volunteer rubbish collection in peri-urban forests.



Examples of local policy measures to incorporate adaptive forest management

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This chapter shows recent cases of local policy measures to promote adaptive forest management.

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### Adaptive municipal policies Mataró



LIFE Clinomics



#### Extensive livestock grazing in Sitges



Local Green Infrastructure (SNU)

#### Urban Master Plan of Rialb reservoir



Name of the initiative: Incorporation of adaptive forest management measures into municipal policies

**Promoting Entity:** Mataró Council and Forest Owners Association of Montnegre - Corredor, within the framework of the LIFE MixForChange project

Other entities involved: Escola de Natura del Corredor

Year/s of realization: 2020 (planning) - from 2021 (implementation)

Area affected: Mataró municipal district

Type of initiative: Changes in municipal policies

**Brief description:** The measures currently applied are reviewed, a SWOT analysis is carried out and new measures are modified or proposed.

Modifications of existing planning instruments to facilitate adaptive forest management, especially:

- **General Plan of Urban Planning**: the concept of "protection" is made more flexible; the development of sustainable activities of the primary sector is facilitated (e.g.: extensive grazing); the logistics of forest products and the establishment of forestry and livestock infrastructures (sheds) are facilitated; the forest management criteria are referred to the competent forestry administration.

- **Strategic Plan for the Management of Agricultural Space** (PEGEA): forestry and livestock uses are made visible by promoting training and adding value to their products; there is an impact on fire prevention; sustainable forest uses are encouraged and the need for adaptive forest management is highlighted.

Economic support measures are promoted: supplying municipal facilities with local forest products, seeking sponsorships for environmental volunteer activities and promoting crowdfunding.

Logistical support, working with the different actors of the territory, mediation between the different forest uses and demands and promotion of local forest products.

Awareness and communication in the existing informative spaces (*Casa Capell, Can Boet*) with various activities (excursions, workshops, talks); incorporation of didactic material in the *"Sustainable Mataró"* program; promotion of initiatives in high schools through learning activities and services or community services; information on adaptive forest management is disseminated.

**Lessons learned:** It is essential to have a council or an aware working group that promotes these measures to the government team and that serves as a means of contacting with the citizens and actors of the territory.

For more information: www.mixforchange.eu/docs/Caso\_adaptacion\_politicas\_Mataro\_EntregableC7.pdf

**2**Name of the initiative: LIFE Clinomics

Promoting Entity: Barcelona Provincial Council

**Other entities involved:** Alt Penedès county council, Chamber of Commerce of Barcelona, CCOO Catalunya worker's union, COPATE, Catalan Office of Climate change, UGT Catalunya workers' union, UP Farmers' Union

Year/s of realization: 2016 - 2020

Area affected: Agro-forestry, fishing and tourism sectors

**Type of initiative:** LIFE project in which public and private entities collaborate to develop new investment and governance mechanisms and processes to increase the resilience and economic development of the territories and improve the competitiveness of various productive sectors.

#### **Brief description:**

- **Creation of MeTACC** (Territorial Tables for Adaptation to Climate Change), multi-level governance structures for adaptation to climate change, providing tools to various municipalities, economic sectors and territories.

- **Preparation of the Strategy and Action Plans for adaptation to climate change.** Development of six pilot adaptation actions. Preparation of adaptation planning, investment processes, criteria for favouring private investment, modernization of local economies and demonstration of socioeconomic viability.

- Creation of the Covenant for Adaptation to Climate Change (ACC) with the aim of creating a network of administrations, companies, entities and other organizations committed to implementing actions.

#### **Lessons learned:**

**Governance:** it is essential that the local stakeholders are involved; the constitution of MeTACC has been a success that has been highly valued by the territories. It is important to identify the main actors and take advantage of existing participation structures. Challenge: encourage and involve participants in the whole process.

**Knowledge:** it is essential, at both the technical and experiential levels (experience of the people of the territory) to be able to work on adapting to climate change in the territory and the activities that take place in it. Challenge: complexity and being able to foresee what will happen.

Actions: specific actions are needed as well as actions that involve the different actors. Challenge: innovation, uncertainty, barriers to change.

**Support**: support must be given throughout the process: training in adaptation, design of a joint strategy for governance and action, mobilization of economic resources and private investment. Challenge: who takes the lead? Where can funding be obtained?

For more information: http://lifeclinomics.eu

Name of the initiative: Promotion of extensive livestock grazing in the municipality of Sitges

Promoting Entity: Consortia of Colls and Miralpeix

Other entities involved: Barcelona Provincial Council, Sitges City Council, shepherds, landowners

#### Year/s of realization: 2018

Area affected: Collaboration between administrations, landowners and shepherds

Type of initiative: Land use and forest management

**Brief description:** Forest improvement project in an Aleppo pine forest and recovery of abandoned carob plantations. The objective was to reverse the abandonment of a peri-urban Mediterranean landscape and reduce the risk of forest fire. The continuity of the actions was ensured through a grazing agreement between a private owner and a shepherd of the Garraf Natural Park and a fence was installed for temporary stays. The Provincial Council carried out all the works as well as the accompanying and custody task to facilitate the processing and understanding between all parties. The landowner provides the land to install a temporary fence and allows grazing within the forest. The neighbours allow grazing in the vineyards during the winter to ensure quality pastures. The shepherd is committed to maintenance, with a flock of sheep that stays for one or two weeks, six times a year. The city council provides the drinking water. Support was also given to the shepherd with administrative procedures: livestock executive project and herd health card, necessary for changing municipality.

**Lessons learned:** Extensive livestock grazing is in decline and shepherds starting new herds have very little financial support, despite playing an essential role in the conservation of the mosaic landscape and in the maintenance of open spaces, necessary to reduce the risk of forest fire and favour biodiversity. Shepherds need technical and financial support from the administrations for the activity to be viable. The presence of herds in peri-urban environments is very well received by the public. In this case, there is also the opportunity to make family visits to learn about traditional uses and the value of the rural heritage.

For more information: https://www.diba.cat/en/web/infraestructura-verda/-/p-258

**A** Name of the initiative: Design of the Local Green Infrastructure (SNU)

**Promoting Entity:** Technical Office for Territorial Planning and Analysis - Area of Infrastructure and Natural Areas - Barcelona Provincial Council

**Other entities involved:** The SITxell cartographic-base has been prepared with the collaboration of research centres, university departments, sector institutions and specialized companies

Year/s of realization: 2015 - 2021

Area affected: Municipalities of the province of Barcelona

Type of initiative: Improvement in urban and sectoral planning policies

**Brief description:** The concept of Green Infrastructure promoted by the European Union is adapted to respond to the needs of the local area for promoting the conservation of biodiversity and the provision of ecosystem services. The Catalogue of Services of the Barcelona Provincial Council offers municipalities the preparation of an analysis of the undeveloped land for developing local green infrastructure and the SDG. This integrated green infrastructure proposal is implemented through territorial planning (municipal urban planning, in this case), since it is based on an overall analysis of the environment and integrates the set of policies that determine land uses.

The work focuses on the undeveloped land of the municipalities, with the aim of zoning these areas exhaustively, taking into account current and future ecosystem values and services. Their vocations are defined based on the reality and potential of each area, which will guide subsequent planning and management. For example, in the town of Sant Vicenç de Castellet six zones are differentiated, each with a specific project: enhancement of cultural ecosystem services (scenic quality and link with the population); creation of a green corridor (tree-lined promenade) as a perimeter road of the urban area; landscape improvement of a stream; promotion of a forest management action of forest thinning; maintenance of cultivation areas encouraging the conversion to wood products.

**Lessons learned:** The mapping of local green infrastructure and ecosystem services has provided some municipalities with a more understandable socio-political argument for the population. This approach has been very useful for the preparation of Municipal Urban Planning Plans and for promoting improvement interventions in the natural environment to optimize the provision of ecosystem services.

For more information: https://www.diba.cat/en/web/ods/la-diputacio-amb-els-ods

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Name of the initiative: Promotion of forest ecosystem services in urban planning around the Rialb reservoir

Promoting Entity: Consortium Segre-Rialb and Department of Land and Sustainability of the Catalan Government

Other entities involved: Local authorities and the Forest Ownership Centre of the Catalan Government

Year/s of realization: 2018 - 2020

Area affected: Municipalities: Ponts, La Baronia de Rialb, Tiurana, Bassella, Oliana and Peramola

**Type of initiative:** Promotion of the provision of forest ecosystem services in the Rialb Reservoir Urban Master Plan (PDUER)

**Brief description:** The general objective of the PDUER is to create the appropriate urban and territorial framework to improve the potential of the territory around the Rialb reservoir and economically boost the area of the water surface and its area of influence. Actions to implement the specific objectives include: i) <u>Integrating multifunctional forest management</u> as a backbone of the territory, understanding the forest floor as a generator of environmental services and promoting it as an economic asset that generates jobs; ii) <u>Preserve, manage and value the territory</u> from the perspective of the landscape, promoting it as a key element for creating a common identification of the scope of the plan.

In the plan's report, forest management is defined as an area of special attention with a double objective: to guarantee one of the main economic activities of the territory avoiding the loss of population and jobs, and to reduce the fragility of forests in the face of potential risks, such as forest fires, through good management and conservation of agricultural land.

**Lessons learned:** Urban planning can be a tool for adapting forests to climate change from adaptive forest management, diagnosis of the territory in the provision of ecosystem services and considering the potential offered by agricultural space.

**For more information:** Urban Master Plans (PDU) http://governobert.gencat.cat/en/transparencia/Territori/plans-urbanistics/plans-directors-urbanistics/

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