



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

*Executive Summary
for High School Students*

April 2021

The project LIFE MixForChange



The LIFE MixForChange project (2016-2022) is coordinated by CTFC and has as other beneficiaries the Catalan Forest Ownership Center (CPF), the Forest Owners Association (FOA) Montnegre - Corredor and FOA Bellmunt - Collsacabra. The Barcelona Provincial Council is also a collaborating entity. The main objective of this project is to contribute to the adaptation and resilience to climate change of sub-humid Mediterranean mixed forests, favouring their conservation and maintaining their productive, environmental and social functions.

The project includes the development, implementation and monitoring of forest management for adapting to climate change in 164 forest hectares of Montnegre-Corredor, Montseny, Bellmunt-Collsacabra and the south of Ripollès, in the provinces of Barcelona and Girona.

A series of communication, dissemination and transfer actions have also been carried out, including the "Guide to local policies, climate change and forest management in peri-urban forests: a necessary integration", summarized in this document.

The objective of this guide is to explain to the public the characteristics, interests and threats of peri-urban forests in the context of climate change as well as the importance of sustainable forest management and adaptation criteria necessary to face these threats.

The forest that surrounds us: nature shaped by humans

Today's forests are the result of millennia of interaction with societies that have used them in many different ways, including for obtaining wood, firewood, charcoal, pine nuts, aromatic and medicinal plants, as well as for hunting, recreation, landscape and agricultural use, and livestock, mining and urban uses. Therefore, the characteristics of any current forest, from its species composition and age structure to the existing infrastructures (tracks, terraces, remains of charcoal bunkers), are the result of this interaction, which has varied greatly over history.

In general, the forests of our context were subjected to intense use (especially for wood, firewood and pastures) until the middle of the 20th century. Since then, a double situation has prevailed:

- **In the most accessible areas close to cities** there has been an increase in urban pressure (housing and other occupations), more frequent use and a higher risk of fires.
- **The rest of the surface** (including fields and grasslands interspersed with the forest) has undergone a process of abandonment, and with this the forest cover has increased and become more dense, which has new associated problems, such as low vitality and high vulnerability to diseases and fires.

We have increasingly more forest that is more dense

The wooded forest area in Catalonia in 2015 occupied 49% of the total area (1.6 million hectares). From 1970 until now, the forest area has grown by 36%. Furthermore, due to the low utilization rate (28% of the annual volume increase in Catalonia and 17% in Spain as a whole if Galicia is not included), the amount of wood accumulated in Catalan forests has doubled between 1990 (80 Mm³) and 2015 (151 Mm³). We can conclude that we have more forest than ever and at the same time it is more abandoned than ever. Insufficient application of sustainable forest management leads to increased vulnerability to the impacts of climate change, especially fires, drought, pests and diseases.

The forest area is mostly privately owned in the EU (61%), Spain (73%) and Catalonia (73%), often in small properties. All forests belong to someone and therefore we have to use them respectfully.

Peri-urban forests

This interaction between human societies and forest ecosystems is especially intense in peri-urban forests, that is, those located in the immediate surroundings of a city or town. The expansion of urban centres and urbanizations during the last 50 years has meant that many forests, which were previously outside the urban area, have come to be considered peri-urban and share space or borders with facilities, industrial zones, urbanizations and areas of residual agriculture.

These are forests in which forest and urban characteristics are mixed and which are of great importance at the social, recreational and ecological levels.

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



Forest ecosystem services

Ecosystem or environmental services are the benefits that nature brings to society, that is, the improvements society receives thanks to the functioning of ecosystems. Conserving these services is essential to guarantee human well-being. Thus, when ecosystems are degraded, people's health and quality of life worsens. Ecosystem services can be grouped into four types:

Service type	Basis	Examples
Support	Basic processes for the rest of the services	Biodiversity, soil formation, photosynthesis, water and nutrient cycles, ecological connectivity
Provision	Renewable, biological, raw materials or goods	Wood for furniture, construction and energy; mushrooms, game meat, medicinal plants, cork, pine nuts, fresh water, among others.
Regulation	To help reduce impacts	Climate regulation, soil protection (avoid erosion and landslides), filter of pollutants and noise, protection against floods, carbon fixation
Socio-cultural	Aesthetics, leisure and culture	Landscape, leisure activities, sport, tourism, environmental education

The bioeconomy

The **bioeconomy** is the economy associated with the production and transformation of renewable biological resources and their waste into value-added products. The bioeconomy is key 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.

Forests play a key role in the development of the bioeconomy since they offer a wide range of renewable biological resources that serve as food, energy, products or services. In addition, they create jobs related to obtaining and transforming products and also leisure activities.

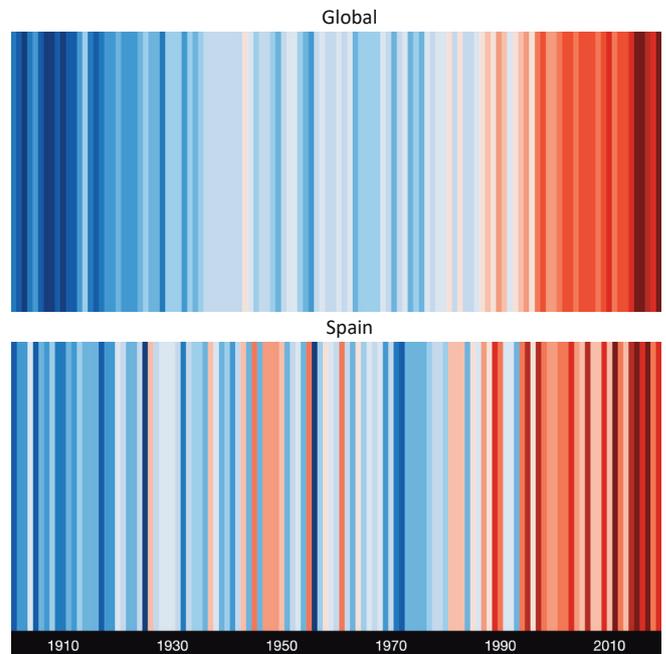


Climate change

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

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

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/>)



This new climatic context forces us to adapt our habits and take measures to mitigate climate change to the extent of our individual possibilities. This shared responsibility should make us more aware of the implications of the way we travel, the food we eat and what we buy.

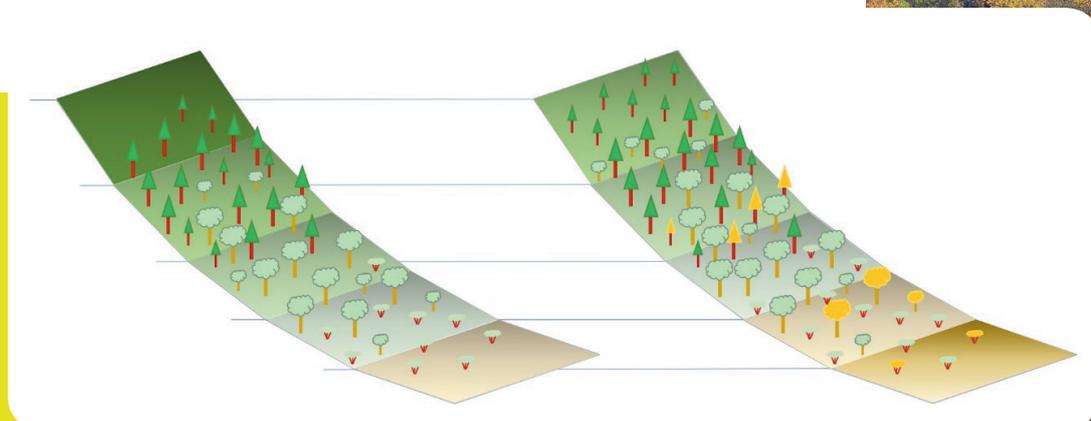
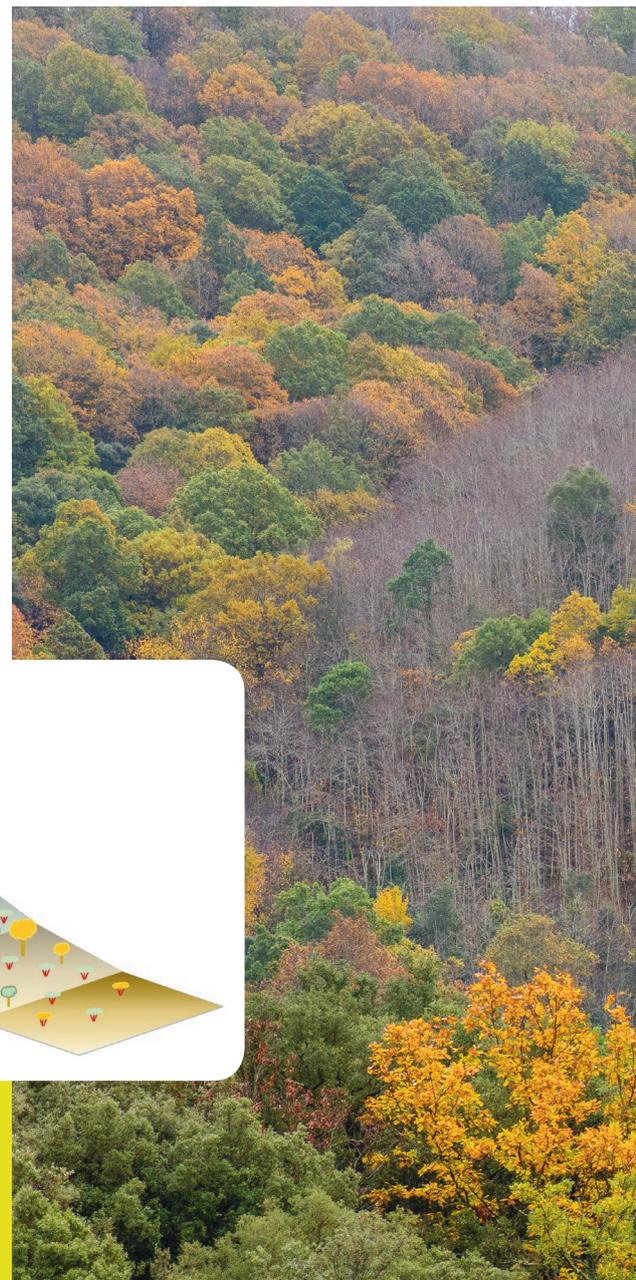
Climate change affects the forest

Climate change affects all ecosystems directly or indirectly and, therefore, it affects all human activities.

In the case of Mediterranean forests, the main impacts of climate change are:

- Reduced growth and vitality.
- Larger impact of pests and diseases.
- Higher frequency and intensity of forest fires and damage from storms and gales.
- Migration of species, which are looking for their habitat at a higher altitude. If they cannot continue to increase in altitude, local extinctions will occur.

We have a key tool that can be used to face these threats and guarantee the provision of essential ecosystem services provided by forests: **sustainable, multifunctional and adaptive forest management.**



Tree species migration scheme (left: initial; right: final): as the temperature increases, each species progressively moves up in altitude, and the individuals located at the lower distribution limit of each species die (coloured in yellow).

Sustainable, multifunctional and adaptive forest management

Sustainable forest management is the protection and use of the forest in a way and at a rate such that its biodiversity, productivity, regeneration capacity, vitality and potential are maintained to fulfil, now and in the future, 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, guaranteeing the persistence of the forest and its ecosystem services.

Sustainable and multifunctional forest management emphasizes the need to consider the maximum number of ecosystem services that a forest generates. It is not possible to optimize the generation of all ecosystem services across the entire surface at the same time. However, it is possible to manage this multifunctionality by prioritizing in each area of the forest (and perhaps during certain periods) the provision of some ecosystem services over others, but generating all of them on the surface as a whole. This multifunctionality is planned through the **Forest Management Instruments (FMI)**, drafted by a Forest Engineer and based on a previous characterization (to determine in detail what the forest is like) and on planning of the interventions necessary for regulating the generation of the maximum number of ecosystem services. In the same forest there may be areas in which interventions are applied to reduce the risk of fires and also obtain firewood, others that apply naturalistic forestry criteria to promote the regeneration of the forest, and others that do not intervene in the natural evolution. Both the drafting and implementation of the FMIs are reviewed and approved by the forest administration.

Sustainable, multifunctional forest management that is adaptive to climate change incorporates a series of criteria in forest management decisions to make forests more resistant¹ and resilient² to climate change.

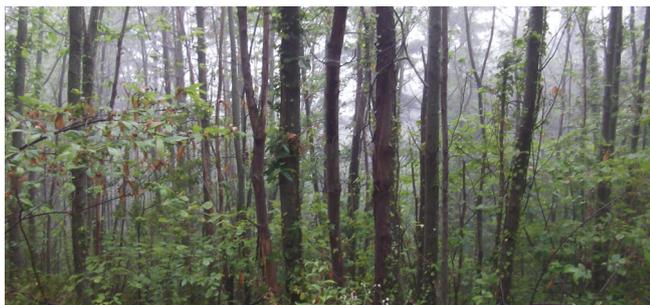
¹ **Resistance:** the forest's capacity to maintain its integrity faced with a disturbance - fire, drought, pests or diseases (low vulnerability).

² **Resilience:** the forest's ability to return to its pre-disturbance state (spontaneous recovery).

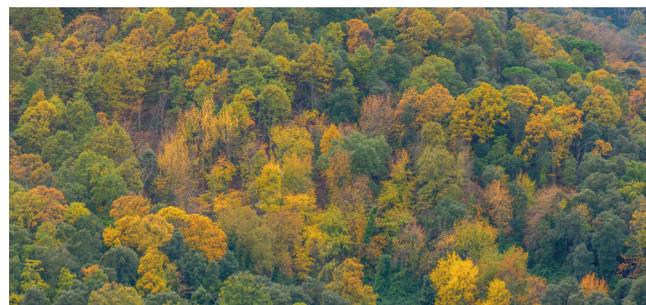


The three basic principles of Mediterranean adaptive forestry

a) Regulate the density (number of trees per hectare): apply forest-clearing activities to reduce the competition between the trees as they grow (left) to maintain their vitality (right).



b) Promote mixed forests and forests with complex structures: a pure and simplified forest (left) is more vulnerable to climate change than if it has a large diversity of species and tree sizes (right), which increases the joint response capacity.



c) Break the fuel continuity: a forest with vertically continuous vegetation (left) is more vulnerable to high intensity fires than one with gaps between the vegetation strata (right).



The complete document can be consulted at: <http://www.mixforchange.eu/en/publications/>



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Generalitat de Catalunya
Departament d'Acció Climàtica,
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ASSOCIACIÓ DE PROPETARIS FORESTALS
DEL MONTNEGRE I EL CORREDOR

serra de bellmunt
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With the collaboration of:



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