

eip-agri
AGRICULTURE & INNOVATION

Innovation for European forestry

Creating resilient and multifunctional forests



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Commission

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This brochure has been produced within the framework of the European Innovation Partnership for Agricultural Productivity and Sustainability (EIP-AGRI), which was launched by the European Commission to promote innovation in the agricultural and forestry sectors and to better connect research and practice.

The brochure follows up on the work of the EIP-AGRI Focus Groups on '[Sustainable mobilisation of forest biomass](#)', '[New forest practices and tools for adaptation and mitigation of climate change](#)', '[Agroforestry: introducing woody vegetation into specialised crop and livestock systems](#)' and their respective reports. It also builds on the outcomes of the EIP-AGRI workshop '[New value chains from multifunctional forests](#)'. All results from these events can be found online via www.eip-agri.eu. For more details on the Operational Groups and other innovative projects presented in this brochure, please see the [project database](#) on the EIP-AGRI website.



► Innovation for European forestry

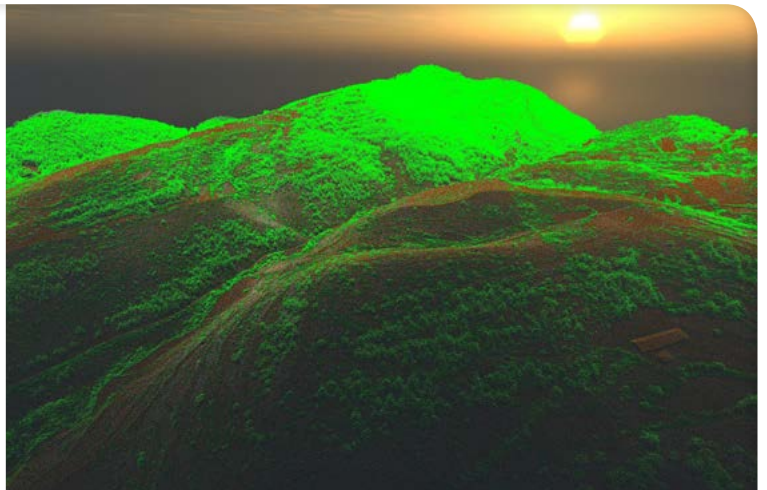
The EU has almost 182 million hectares of forest and wooded land, covering 43% of its land area. European forests offer a wide range of benefits for the environment, society and the economy. Resilient forests maintain valuable ecosystem services and support biodiversity. They can mitigate the effects of climate change by storing carbon in the soil, providing clean air and better water flows, and controlling erosion. Wood and by-products also offer opportunities for producing energy and biobased materials.

European forests currently also face a number of challenges, including the effects of climate change. Foresters, forest owners and public authorities are looking for sustainable solutions to storm damage or drought, pests and diseases, or the increasing occurrence of forest fires.



A number of EIP-AGRI Operational Groups and other innovative projects across Europe are exploring new solutions to tackle forestry challenges. This includes using digital tools to map forest resources for more sustainable management, improving value chains and developing management practices that tap into the potential of multifunctional forests, and setting up networks to exchange knowledge and build resilient, future-proof forests together.





► Forest monitoring for better management

Forest areas represent one of Europe's most important renewable resources. Digital technologies including satellites, drones, LiDAR, and aerial photography can map forest resources in a detailed way. Accurate data can help detect pests and diseases or other health issues due to storms or drought, and locate underutilised biomass to support forest fire prevention. Forest owners, firefighters, public authorities and others can use these detailed inventories to make informed decisions for more sustainable forest management and a more efficient use of forest resources.



Monitoring forests through remote sensing in La Rioja

Operational Group 'Forest LidaRioja' uses remote sensing technologies to map forests in the Spanish La Rioja region. The project uses satellite data and LiDAR scans to create a highly detailed 3D model of the 130 million trees in the area, but also of shrubs and undergrowth.

"Forest owners and regional authorities use our data to update the National Forest Map of La Rioja with information about the number of trees, biomass and species in mixed forest", says technical project coordinator José Luis Tomé from lead partner Agresta. "It helps them to understand how the forests are evolving, and allows them to develop sustainable forest management plans."

The Operational Group's partner from the wood industry had noticed that the number of poplars – the most important forest resource in La Rioja – had been decreasing. José Luis explains: "Thanks to our analysis of the satellite and LiDAR data, they now have a cost-effective way to calculate the actual wood supply, understand the evolution of the poplars in the region, and estimate future availability."

The scans also deliver 'fuel maps' that give an up-to-date overview of forest shrubs and undergrowth, which is vital information in the fight against forest fires. "Firefighters and contractors can see where to apply preventive measures."

The forest maps are freely available through the [website of the Government of La Rioja](#) or an [application designed by the Operational Group](#). José Luis sees benefits for the entire sector: "The forest sector can be very fragmented. Everyone is used to working in their own way, but the Operational Group gives us the opportunity to address these challenges as a team and find solutions that are useful for all partners."

► **More information** on www.forest-lidarioja.info or in the [EIP-AGRI database](#)





► Boosting the benefits of multifunctional forests

The environmental benefits and ecosystem services that forests support cannot be underestimated. Resilient forests sequester carbon, control erosion and protect biodiversity and water resources. Sustainable practices such as agroforestry or silvopastoralism integrate forestry and woody vegetation into crop or livestock systems. This can benefit the soil, the farm and animal welfare, and can also result in additional income for the farmer or forest owner.



Trees as an asset in mountain livestock systems

Silvopastoralism, a form of agroforestry, combines crop and wood production with extensive livestock grazing systems. The practice is found across Europe but could still benefit from further knowledge exchange between farmers, forest owners and breeders. "There is a high innovation potential for these practices in mountainous grazing systems", says Mehdi Bounab, project coordinator of Operational Group AGROSYL.

AGROSYL has set up seven pilot sites at five participating farms in the Ariège region in the French Pyrenees. In this area, climate extremes strongly affect forage production. "We explore how farmers can increase forage autonomy and animal welfare on the farm by integrating trees in their mountainous grazing pastures", Mehdi says. "Acorns can for instance serve as sheep fodder, white mulberry trees produce green fodder in summer, and also forest fruits can increase fodder autonomy. We are testing the effect of wood mulching from shredded branches on animal welfare in the stables."

This practice can make livestock systems more resilient to climate change. Tree shade can for

instance shield pastures from the sun. It can also help farmers reduce costs and diversify their income, through undergrowth management, by selling forest by-products for timber or energy, or by marketing specific livestock breeds. The first results are positive, Mehdi says: "Many farmers have already contacted us to get more details on the results and to see how they could set up silvopastoral practices on their farms."

► **More information** in the [EIP-AGRI database](#)

- [Horizon 2020 Thematic Network AFINET](#) fosters knowledge exchange in the field of agroforestry.
- For more agroforestry inspiration, browse the [innovation leaflets](#) and [best practices leaflets](#) published by FP7 project [AGFORWARD](#).
- More ways to develop profitable and sustainable agroforestry systems? Read the results from the [EIP-AGRI Focus Group on Agroforestry](#).





► New value chains and opportunities in the bioeconomy

Wood, forest biomass and woody by-products are a major source of income for European forest owners and the forestry industry. By improving existing value chains and by building new ones adapted to current and future demands, forest resources can be optimally used. Processing forest biomass and woody by-products into renewable materials or bioenergy can generate additional income for farmers and foresters. Especially owners of small forests may need tools and support for this. Many of these non-fossil products also contribute to climate change mitigation by reducing greenhouse gas emissions.



AGREEGREEN - Models for managing woody biomass

In a highly wooded region such as Umbria, Italy, actively managing forests and woody biomass can prevent forest fires, make forests more accessible, and increase their capacity to capture carbon. Forest biomass can also offer additional income when processed for bioenergy. Italian Operational Group AGREEGREEN is developing tools and models to optimise the wood supply chain, helping agricultural and forestry companies find the best ways to harvest and sell their raw biomass.

“Logistical problems can be an issue for efficient forest resource supply chains”, says coordinator Diego Rossi. “We work with companies that are interested in enhancing by-products from sustainable forest management, and biomass coming from agriculture and from public and private green management. The companies help us test tools that can allow them to build appropriate logistical platforms.”

The project has developed a software tool that automates drafting contracts with others in the supply chain and that calculates sales rates and costs. Another tool helps companies identify potential sources of biomass and choose the right mix for composting biomass of low quality, which could otherwise create problems in combustion. The resulting organic compost has a high agronomic value.

Diego continues: “The AGREEGREEN tools help companies use and market biomass for energy production, offering them an additional source of income. Making biomass mobilisation profitable can also encourage the sustainable management of our forests, making full use of Umbrian wood resources.”

► **More info** on www.agreegreenproject-umbria.it or in the [EIP-AGRI database](#)

- The ROSEWOOD network connects people in the forestry sector to advance sustainable wood mobilisation in Europe: <https://rosewood-network.eu/>



- Finland is one of the leading countries for innovations in wood-based products. This includes [packing solutions from wood fibres](#) as a new alternative to plastic or paper, and technology for [developing clothing from wood-based textile fibres](#).
- The EIP-AGRI Focus Groups on [Sustainable mobilisation of forest biomass](#) and [Forest practices and climate change](#) discussed more ideas for revaluing forest residues.

► Thinking ahead: creating climate-smart forests

The effects of climate change, including extreme weather events, drought, forest fires and damage through pests and diseases pose a major challenge to our forests. Innovative practices and tools for forest management are needed to ensure that forests can adapt to climate change.

Decision support tools can give forest owners insight into the future conditions of their forests – allowing them to predict risks or choose species and varieties that are better adapted to the expected climate. Also genetic resources are increasingly important in the search for trees that can cope with the effects of climate change, and that are for instance more resilient to specific pests and diseases.



Decline of the 'Montado' forests in Alentejo

Portuguese 'Montado' oak forests are traditional agroforestry systems where trees are combined with agricultural or pastoral activities. Especially in southern areas, the undergrowth of the Montado forests is managed by free-ranging 'Porco Alentejano', a local pig breed that lives on a diet of acorns. For local farmers this means an income through cork from the trees, tree produce for feed, or animal breeding.

The cork oak and holm oak trees in the Alentejo area have been increasingly affected by *Phytophthora cinnamomi*, a pseudo-fungus that causes root rot. The mortality of the slow-growing oak trees is forming a serious threat to the preservation of the Montado ecosystem. Higher temperatures due to climate change are causing the disease to expand fast across Europe, especially in the Mediterranean area.

An Operational Group is testing whether herbaceous crops in the Montado pastures can help mitigate the disease and reduce its activity in the soil. "We will be sowing pastures improved with plant species

that have a suppressive effect on the disease", says researcher Ana Cristina Moreira from project partner INIAV. "Our first results show that the herbaceous mixture may reduce the activity of *P. cinnamomi* in the soils of the Montado forests, and could protect the roots of the trees from infection."

"An increase in plant biomass and organic material in the pasture soils could also improve soil quality and fertility, water retention, biodiversity, and the growth of the trees. The herbs can be sown on large areas, while providing pasture. Farmers will be happy to see that this may benefit tree health as well as acorn production."

► **More information** in the [EIP-AGRI database](#)



- Several [decision support systems for the forestry sector](#) can help forest owners adapt to climate change, select species, check ground conditions and future climate conditions.
- The French [RMT AFORCE](#) network speeds up knowledge exchange, shares decision support tools and fosters innovations to adapt forests to climate change.



- Discover more forest-based Operational Groups in the [EIP-AGRI project database](#).

CHALLENGES FOR FOREST MANAGEMENT



Drought

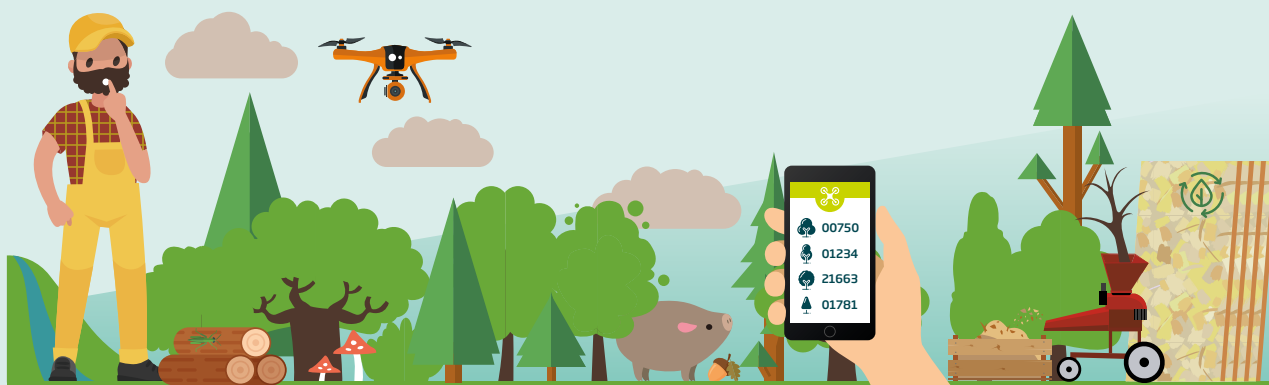
Damage

Pests & diseases

Forest fires



SOLUTIONS THROUGH INNOVATIVE PRACTICES



Forest monitoring

Agroforestry
Silvopastoralism

Decision
support tools

New value chains
Bioeconomy



BENEFITS FOR MULTIFUNCTIONAL AND RESILIENT FORESTS



Clean air and
water flows

Biodiversity

Carbon storage

Erosion control

More income