

eip-agri
AGRICULTURE & INNOVATION

Creating diverse forests with multiple benefits

What can forests offer you?



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Healthy forests have many functions. They purify the air we breathe and filter the water we drink. Forests give us wood to build furniture or houses and they also provide raw material for energy production and the bio-based industry. They can produce mushrooms, chestnuts, berries or game for us to eat, protect the plants and animals living in them and decrease the impact of climate change. They also form an important part of the economy, by providing jobs and a source of income for many people both in rural areas where the forests grow and in cities where the final products are used. Finally, forests have an important cultural function as people can also spend time in them and enjoy the beauty of the landscape.

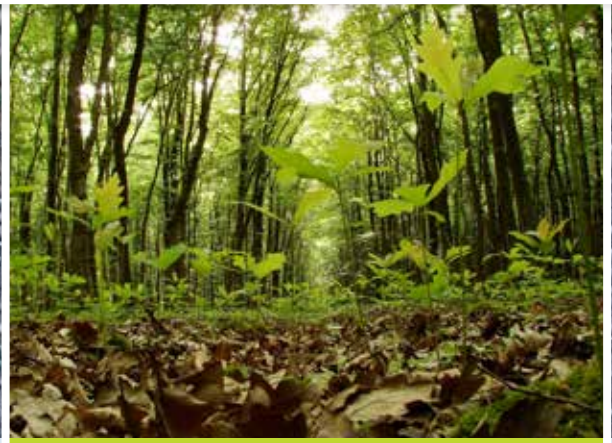
Sustainable forest management is key to maintaining the various functions forests offer to society.

Today, forest managers have to face a number of challenges such as the impact of climate change, an increasing demand for raw materials or a growing international competition.

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This brochure discusses several approaches to address the challenges above. First, diversification could be a way to create alternative sources of income. Secondly, alternative forest management techniques could help to restore the ecological functions of forests. Finally, creating new innovative methods for forest land property management could solve some of the challenges associated with small forest plots.



► Ensuring forest productivity and multifunctionality through innovation

Innovation in forest management can help to increase forest functions and benefits for rural areas. It helps to create diverse sources of income and preserve ecological functions at the same time.

The European Union's (EU) rural development policy has a long-standing tradition of fostering innovation. In the new programming period 2014-2020, innovation has even been introduced as a main objective. The new European Innovation Partnership "Agricultural Productivity and Sustainability" (EIP-AGRI) promotes bringing

together researchers, individuals, foresters, companies and institutions to work on innovative projects. Sharing results and knowledge from research and practice can increase productivity in forestry and agriculture, in ways that are more climate change-proof and that preserve nature. In this respect the EU Forest Strategy (COM (2013) 659 final) explicitly refers to the EIP-AGRI in its strategic orientations as an important tool in transferring technological and scientific knowledge to forest practice and the market. It can also support the development of new products with higher added value.





EXPLORING MULTIPLE FOREST FUNCTIONS

► SPAIN

Common forest lands in Galicia (Spain) are owned and managed by the people living in nearby hamlets. Special laws make sure that all the profit they yield is reinvested in the community or distributed among the inhabitants.

The common forest land of Vincios, near the city of Vigo, mainly produced pine trees for timber and eucalyptus for paper pulp. Both species are fast-growing and very prone to wildfires. To reduce wildfire risk and obtain more products from their forests, Vincios locals found inspiration in innovative enterprises and in research groups from Vigo University.

The Vincios management board created a joint project including different common forest lands from the South of Vigo. One aim is to build a compost plant, to process excess biomass from the forests and reduce fire risk. The specific idea for this project was found thanks to Abonos Lourido, a local enterprise which produces high quality compost out of forest biomass.



The multifunctionality of the Vincios forest land has already been increased by a range of solutions. Chestnut and oak trees were planted in the best soils of the forest. These species are slow-growing, less prone to wildfires, and they produce high quality wood. The chestnuts can also be sold at a good price. In addition, specific high quality edible mushrooms were encouraged to grow on the oldest tree roots. The diversification of the forest has increased its water filtering and storage capacities. This has improved the water quality of the neighbouring Zamáns reservoir, which supplies water to the city of Vigo. Furthermore, wild horses are bred to feed on scrubland which reduces wildfire risk, high quality honey is produced from bees which feed on the heath flowers, and pastures have been created to breed sheep.

The diversity of the forest has made it more attractive to visitors. People can now walk along new trekking paths that have been created on the forest lands, and can find information on the benefits of the forest through a specially developed smartphone app. Studies from the University of Vigo have shown that these investments in multifunctionality have greatly increased the economic, social and ecological benefits for the area.

More information?
[Vincios heritage website](#)



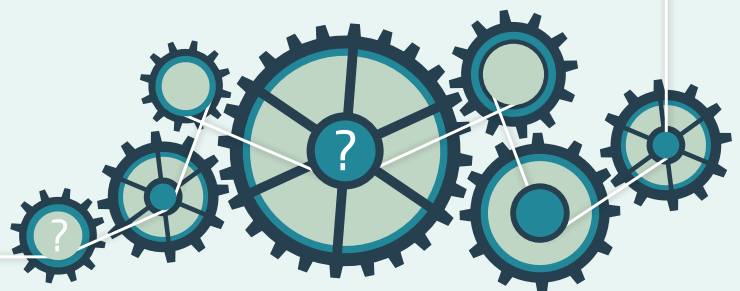
MULTIFUNCTIONAL AND DIVERSE FORESTS

By changing the ways in which ecological functions of natural or man-made woodlands and related sources of income are managed, these areas can reach a higher diversity. Specifically, there are many products and services that are complementary to timber production which can be explored, as well as new methods of managing them. This can create more diversified rural economies and ecosystems, which are in turn more resistant to market changes or to changing climate conditions. This innovative way of looking at forest management may include 'accelerated progressive succession' or 'assisted migration' where long-lasting natural processes may be able to adjust better to the speed of climate change, thus ensuring a more resistant, multifunctional forest for future generations.

► Sustainable forest management: turning problems into opportunities

Forests are complex ecosystems. Their production can be increased if the processes that govern them are better understood and supported. However, climate change can influence these ecosystems by increasing the risk of storms, pests or fires. It is important to ensure sustainable forest management to adjust to these threats while keeping production potential.

Many forest management problems are rooted in changing economic conditions, rural population decline, or how land ownership is organised. To restore the ecological cycles of forests and increase the diversity of products that they can offer, innovative solutions need to be explored. Healthy and diverse forests are more resistant to changes and offer more opportunities for income to local communities.





COMBINING TIMBER PRODUCTION WITH TRADITIONAL SÁMI REINDEER HERDING

► SWEDEN

Reindeer herding is the main source of income for traditional Sámi herders in northern Sweden. However, the current techniques that are used to re-plant harvested pine forests in that area damage the cover of lichen, which is the reindeer's main food. This causes a big impact on the herders' livelihoods, as it takes several decades for lichens to recover.

A helpful solution to this conflict between Sámi herders and forest producers has been found in innovative research. The Department of Forest Ecology and Management at the Swedish University of Agricultural Sciences, in collaboration with researchers from AgroParisTech (France), has discovered that lichen mats grow best on a mixture of mineral soil and humus. Adding organic matter when re-planting the pine trees would help affected areas recover within ten years from the damage this re-planting usually causes, and help pine seedlings settle. Researchers are also examining whether

the artificial distribution of lichen fragments (rather than intact lichen cushions) as well as controlled burning can help to restore lichen pastures. Promoting natural pine regeneration could reduce costs and soften the impact on the lichens. To find better forest management practices, the researchers also highlighted the need to take into account traditional knowledge of Sámi herders. The positive result of applying such a solution would be that ecological functions of forests would be restored, and that both timber production and reindeer herding would become economically viable.

More information?
pub.epsilon.slu.se





IMPROVING HYDROPOWER PRODUCTION THROUGH SUSTAINABLE FOREST MANAGEMENT

▶ ALBANIA

Erosion has always been a problem in the Ulza river watershed in Albania. Due to overexploitation of nearby forest lands, eroded soil started filling up the water reservoir. This reduced its capacity to store water, and therefore also to produce hydro-power.



For a long period of time, forests in the lower river basin were intensively managed by agricultural cooperatives to produce fodder and fuelwood. Trees were coppiced (meaning that the trees were cut to let them regrow), but not in an efficient and sustainable way. The soil was exposed due to clear-cutting (chopping down all trees in an area of land) and trees were not allowed to grow tall. This led to soil erosion and a reduced water storage capacity.

▶ High tree forests as one of the solutions

Recently, the forest lands were transformed into common land, owned and managed by municipalities from the area. The following proposals were made for a different and more sustainable approach, based on studies from the NGO CNVP, the Forestry Faculty of the University of Skopje, and the Communal Forest Federation.

- ▶ The coppiced forests should be transformed into high tree forests, creating a more diverse structure that fosters biodiversity and increases the forest's capacity to store water.
- ▶ Wood harvesting should be programmed to create more diverse forests with trees of different ages and species.
- ▶ Where coppiced forests are kept, the shoots should be cut in alternating 1.5 metre-wide strips along the contour lines of sloping land to avoid soil exposure and prevent erosion.

Some of these practices have already been adopted in the area, and have helped to reduce erosion and soil sedimentation in the water reservoir. This has increased the capacity to produce electricity, and this means that more products and services are available to the local communities.

More information? [Profor and CNVP \(Connecting Natural Values & People\) website](#) & [Facebook page](#)





FROM CHALLENGE TO SOLUTION

? EXCESS FOREST UNDERGROWTH AND HIGHER WILDFIRE RISK

Current economic trends and a declining rural population have caused major changes in agricultural and forestry practices. Many forest products such as forest undergrowth might no longer be seen as an important resource by some. Furthermore, in some areas of Europe, unmanaged forest undergrowth, and hotter and drier summers brought on by climate change, have increased the risk of wildfires. Below, some of the main causes of increased forest fire risk with a link to forest undergrowth are listed:

- ▶ New mineral and chemical nutrient sources have made forest undergrowth unnecessary for composting.
- ▶ Fossil fuels have partly substituted wood for heating and cooking, although nowadays, wood for heating is increasingly being used again.
- ▶ In some areas, forest land is expanding. Due to a decline in rural population, fewer people are available to manage this land and its undergrowth. Also, forest operations that are set up to minimise fire risks, such as pruning and brush cutting, may be expensive or difficult, especially on slopes.
- ▶ Native forest species are often replaced by faster growing non-native species that are easier to manage but are in some cases also more prone to wildfires.

💡 HIGHLIGHTING NEW POSSIBILITIES FOR USING FOREST UNDERGROWTH

Innovative forest management techniques can offer concrete solutions to these issues. In Finland, biomass undergrowth is turned into a profitable source of energy production. This approach helps foresters and forest land owners to manage undergrowth, without compromising forest productivity in the long run.





PROFITABLE ENERGY PRODUCTION FROM BIOMASS

► FINLAND

In the Finnish region of Häme, the Forest Management Association Kanta-Häme has developed innovative and cost-efficient ways to turn biomass into a useful source of energy. As part of the METKA project, new tools have been developed to optimise timber and biomass production. This was done in close cooperation with the Finnish Forest Research Institute (Metla) and the Työtehoseura (TTS) research institute.

Research indicated that it is actually more cost-efficient to harvest timber and biomass at the same time. The project reduced costs by developing improved machines, and by ensuring a more efficient use of wood chippers and hogs. New tools have also been used to calculate biomass volumes from tree crowns, branches and stumps, and help to predict energy yield from biomass. An existing handling system, called OnceNet, has been further developed to improve the efficiency of biomass storage and transportation.

These innovative ways of harvesting and processing timber and biomass can contribute to turning biomass energy production into a profitable and complementary source of income while ensuring sustainability. These methods also reduce the need for fossil fuels and therefore decrease greenhouse gas emissions. The removal of some parts of the stumps and larger roots also contributes to the preparation of reforestation, as seeds can germinate more successfully in mineral soil than on a thick needle layer.

The METKA project also helps to spread useful information by creating a network that stimulates cooperation and shares knowledge.

More information?

Forest Owners' Union of Southern Finland

Or contact Asta Sarkki: asta.sarkki@mhy.fi, Mariankatu 8 a 10, 15110 Lahti, Finland



PROJECTS THAT PUT UNUSED WOODY BIOMASS TO GOOD USE

► NORTH-WESTERN EUROPE

Inspiration

► Twecom project

Interreg IVB-funded project - Aims:

- Put biomass from local hedgerows for heat and energy production to good use - with respect for ecological and social functions.
- Encourage farmers to re-appreciate the value of hedgerows and take ownership.
- Support knowledge transfer in different parts of North-Western Europe.
- Demonstrate that these methods are economically feasible.

More information? www.twecom.eu



Austria:

Biomass trade centres. Energy production from local resources, for local users.



Normandy, France:

Producing biomass energy from hedgerows. Restoring ecological and landscape functions.

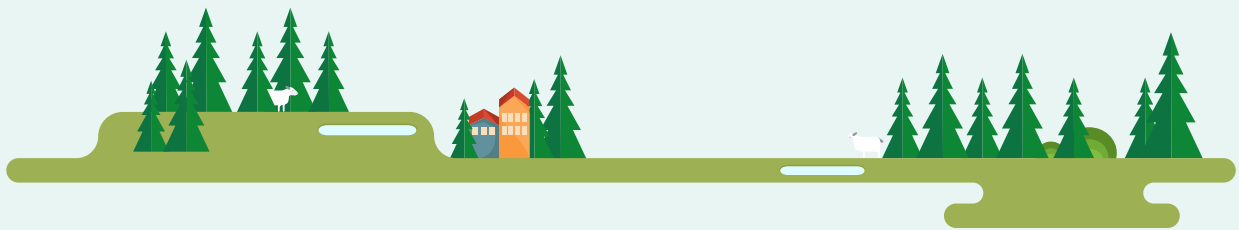


Bocholt, Belgium:

Installing systems that use wood chips from hedgerows, harvested by local farmers, for heating local schools.

MORE INSPIRATION?

- The Italian region of Tuscany developed an observatory on available forest biomass (and its cost) and is using it for different purposes. www.ibionet.eu
- *European Forest Institute (EFI)*
- *Innovation in forestry: case studies*
- *The Forest-based Sector Technology Platform (FTP)*



FROM CHALLENGE TO SOLUTION

? LAND PROPERTY STRUCTURE: LOOKING FOR PROFITABLE SOLUTIONS

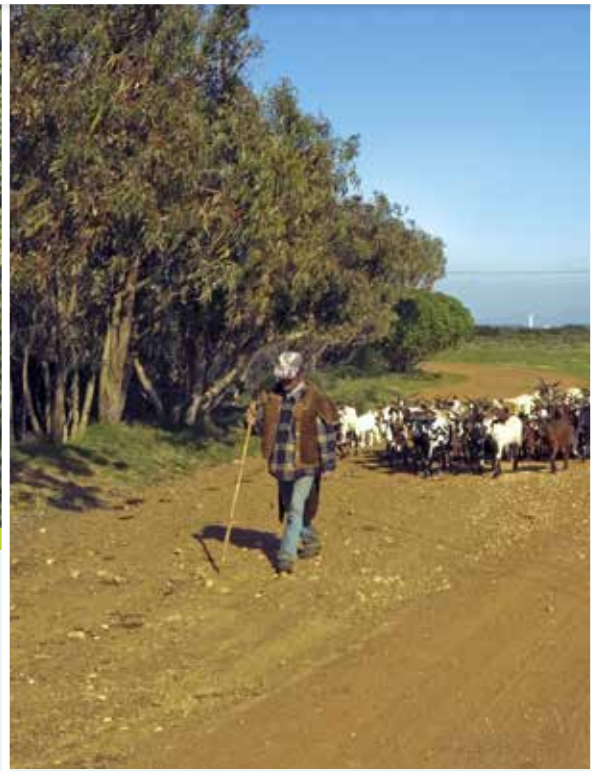
In many European countries, social and economic changes have affected the way in which forest land property is structured and managed. Land fragmentation, or 'fragmented forest ownership' is when a large number of individuals own and manage small-size forest parcels in the same area. One challenge for these land owners arises when the cost of improving land management exceeds potential profit. Increasing demands for wood are forecast for the EU. Another challenge is to see how our small-case land owners are positioned to benefit from this increase in a sustainable way.

💡 NEW FOREST MANAGEMENT WITH BIGGER FOREST PLOTS

Innovative methods for forest land property management can solve some of the challenges associated with small forest plots which can also be very valuable habitats for several species. Larger forest areas can be managed more easily and offer valuable solutions to forest land owners. Preserving ecological functions can be very cost-effective when alternative sources of income, related to woodland, are promoted.

- ▶ Bigger areas allow for sufficient undergrowth to feed cattle. This results in extra profit and in a reduction of management needs.
- ▶ Slow-growing native species can be grown. These produce more valuable wood and can be planted sequentially, so foresters can obtain a regular income.
- ▶ Larger plots make it possible to use alternative methods for harvesting wood, which do not leave large areas of soil uncovered.
- ▶ Fostering social and ecological functions can create secondary sources of income. Outdoor activities and making the most of the beauty of the landscape, for instance, can be supported, contributing to enhancing multifunctionality.





FOREST LAND OWNERS' ASSOCIATIONS MANAGING FOREST LAND

► PORTUGAL

Over the last few decades, a strong population decline has reduced the number of farmers and goat herds in the municipality of Mação, central Portugal. Fewer goats were feeding on forest undergrowth, creating an excess of biomass that set the conditions for frequent wildfires. Higher investments and efforts in wildfire prevention turned out to be ineffective, and in 2003 a large wildfire, which started in a neighbouring municipality, burned down 50% of the forest lands in Mação.

The real problem turned out to be the small size of the forest plots owned by different people, which got in the way of an effective forest land management. The municipal government brought together municipal and external experts, and decided to create a forest land owners' association that would jointly manage the forest lands of the municipality.

This innovative way of managing the forests in Mação was later taken up by the Portuguese authorities, when they implemented the Zones of Forest Intervention (ZIF in Portuguese). These now promote the joint management of forest land by forest land owners' associations, and encourage the creation of such associations nation-wide. Joint management reduces land fragmentation and helps to bring down wildfires and wildfire prevention costs. This profitable type of management reduces the costs for cutting undergrowth and also makes complementary activities, such as breeding goats to feed on biomass, more affordable.

More information? [Website of the Portuguese Institute for Nature and Forest Conservation \(on the ZIF\)](#) (only in Portuguese)



Find more inspiring stories on the EIP-AGRI website: www.eip-agri.eu. Share your own innovative ideas on forest management at the [online meeting point](#).

Profitable and multifunctional forests, providing a wide range of ecosystem services

CHALLENGES



Wildfires



Increasing demands



Land fragmentation

SOLUTIONS



Biomass management



Land property management



Multifunctional & diverse forests

RESULTS

