



LAYMAN'S REPORT

LIFE SORIA FORESTADAPT

Sustainable adaptation to climate change
in forestry sector management





Forests: a natural shield against climate change

The Mediterranean forests of southern Europe play a key role in climate regulation, biodiversity conservation, and the supply of natural resources.

They function as carbon sinks, stabilise soils, and regulate the water cycle, helping to mitigate the effects of climate change. However, rising temperatures and decreasing precipitation are weakening their regenerative capacity. In addition, the abandonment of traditional practices, such as agriculture and grazing, has resulted in homogenous forest landscapes that are more vulnerable to fires, pests, and other extreme events.

To meet these challenges, it is essential to combine scientific knowledge with active land management. Diversification of forest structures and restoration of more heterogeneous landscapes help to reduce the risk of fires and pests, while improving the capacity of forests to adapt to new climatic conditions.



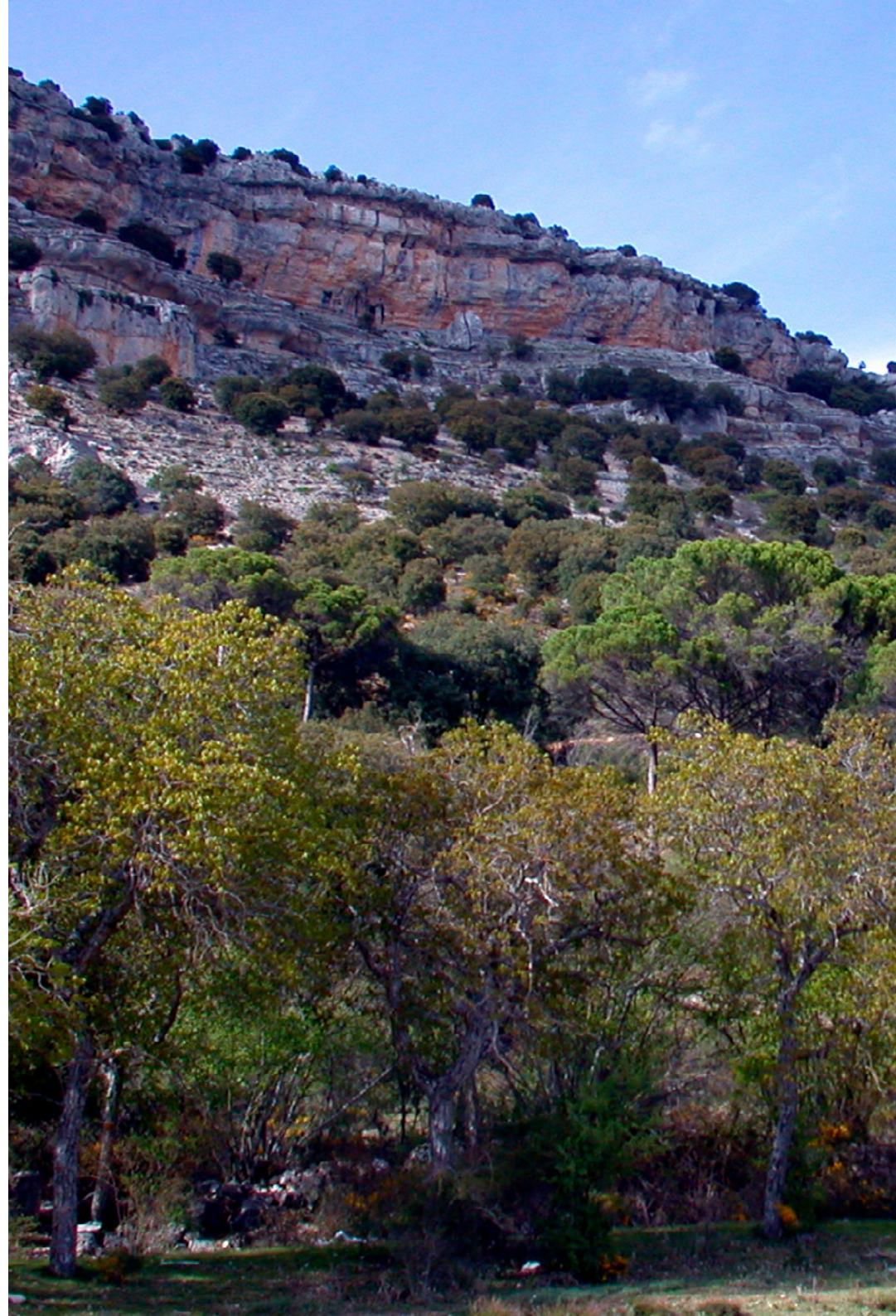


Soria as a reference in forestry adaptation

The Spanish province of Soria is a benchmark in sustainable forest management thanks to its extensive natural heritage, which occupies 42% of its territory (420,000 hectares). The region has demonstrated a strong commitment to the conservation of its forests and has become a model for other Mediterranean areas in Europe, such as those in Italy, Greece, and Portugal.

Climate change not only threatens Soria's forest ecosystems but also has a direct impact on the province's productive and social sectors. The alteration of weather patterns affects the production of timber, natural resins, and wild mushrooms, which are fundamental pillars of the rural economy. This generates uncertainty for all those who depend on them.

The implementation of strategies that increase the resilience of forests not only protects the natural environment but also ensures the economic and social viability of the sector, strengthening its capacity to adapt to an increasingly uncertain future.

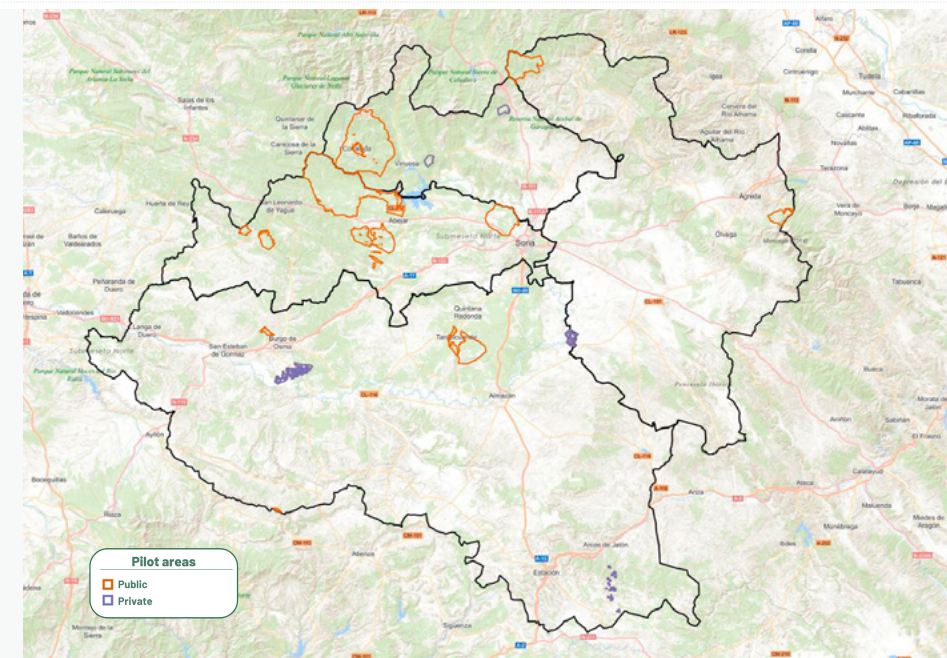


LIFE Soria ForestAdapt: a replicable model for Europe

The LIFE Soria ForestAdapt project presents a transferable model for forest adaptation in Europe. Its methodology combines scientific monitoring, development of digital tools and collaborative work with public administrations, companies, and private landowners.

LIFE Soria ForestAdapt brings scientific research closer to forest management by providing tools to assess the vulnerability of forests and to implement effective and customised adaptive measures.

The methodology developed, which is based on climate models and local data, allows these strategies to be transferred to other Mediterranean regions with similar conditions, fostering forest management techniques that are better prepared to deal with the effects of climate change.





Simulation of the **impact of climate change** on forests



Knowledge applied to forest adaptation

The knowledge generated by the project has resulted in technical reports, scientific studies, and management tools, forming a solid foundation for future actions in adaptive forest management.



Monitoring includes:

- Measurement of climatic variables such as temperature, rainfall, and soil moisture.
- Analysis of the response of forest species to extreme climatic conditions.
- Identification of vulnerable areas and development of adapted management strategies.

In addition, key information has been gathered from a series of technical and scientific studies that have allowed for a deeper understanding of the impact of climate change on forest ecosystems and the effectiveness of adaptation strategies.



13 technical and scientific reports, including:

- A climate baseline report on Soria and its forest regions.
- A catalogue of adaptation strategies and tactics for forest management.
- A study on the evolution of reforestation in Soria.
- A detailed analysis of key forest species in the region.
- Four scientific papers on forest resilience and climate studies.
- Seven reports on adaptation measures for non-timber forest products: beekeeping, grasslands, pine nuts, natural resins, mushrooms, and truffles.
- An assessment report on the current and future carbon sequestration of Soria's forests.



Key research:

- Dendrochronological report, analysing the evolution of eight forest species in Soria.
- Monitoring of bryophytes as bioindicators, which has led to the publication of the 'Guía de campo de briófitos de los bosques Ibéricos' (A bryophyte field guide for Iberian forests).
- Monitoring of control areas in 15 pilot forests.
- Climate monitoring through the installation of 4 weather stations in the study forest area.



Data-driven management tools:

- Development of updated area notebooks with climatic criteria to guide the planning of new forest stands in Soria.
- Publication of the study on the forests of Castille and León (FITOCLIM), with detailed information on the evolution and adaptability of forest species.

These advances have led to the creation of a strategy based on scientific evidence to improve the adaptation of forests to climate change, ensuring their conservation and their key role in environmental regulation.



A replicable model

The data obtained and the methodology developed can be applied at the national level, facilitating its implementation in different organisations and territories.



Innovative tools for forest management

The climate projections of the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) are conclusive: global warming of between 1.5 and 2 degrees Celsius will be a reality for the planet over the course of this century.

Anticipating these changes is crucial for society and, in particular, for the forest sector, which must develop management strategies that help species adapt to a changing climate. Without proper planning, many forests may not survive.

Rising temperatures and altered rainfall patterns can severely affect forest species. Some may lose their ability to regenerate because conditions are no longer favourable, while other species may expand into new areas where they were not present before. These transformations can radically change our landscapes and associated ecosystems.

To better understand how climate change will affect forests and to help decision-making, two key tools have been developed: **ForestAdapt Tool (FAT)** and **Fitoclim**. Both tools model climate scenarios and assess the suitability of different forest species based on future projections.

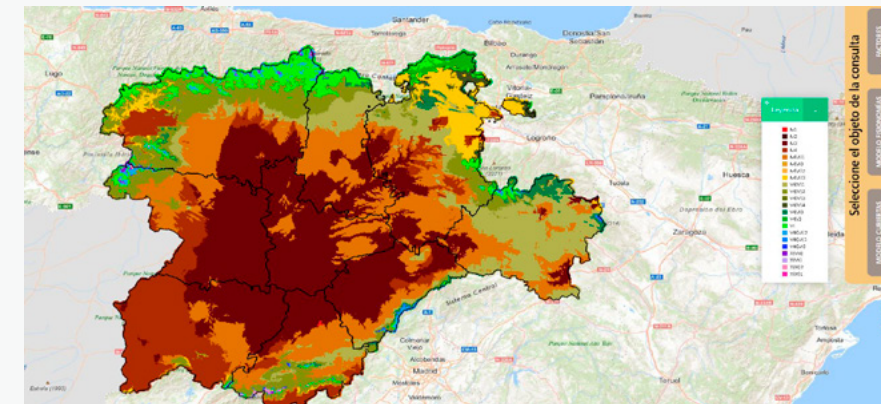


How do these tools work?

- The ForestAdapt Tool (FAT), developed by the University of Valladolid, analyses historical and projected climate data to forecast the evolution of forest species distribution under different IPCC scenarios. Through the generation of suitability and potential richness maps, the tool facilitates the planning of reforestation and conservation efforts based on scientific data. Its use has expanded across Spain. It has been implemented in various forest ecosystems throughout the country, contributing to the conservation of forests, strengthening their resilience to future climate challenges.
- Fitoclim evaluates the relationship between climate and vegetation, determining which species will be most suitable in each territory according to future climatic conditions. Through advanced phytoclimatic models, it provides accurate diagnoses on the climatic suitability of territories, contributing to adaptive forest planning.

FITOCLIM:

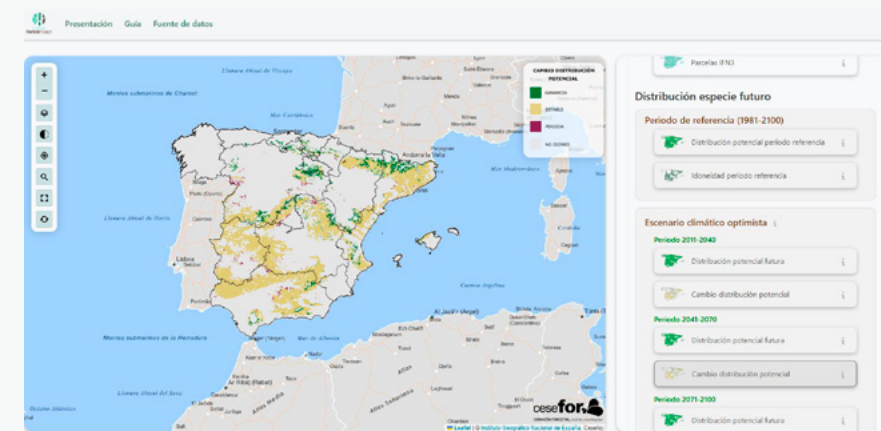
<https://soriaforestadapt.es/fitoclim/>



FORESTADAPT TOOL:

[Nacional App](#)

[Soria App](#)



A milestone in forest monitoring

Four weather stations have been installed on forest land, the first of their kind to be integrated into a network originally intended for agricultural land, significantly expanding the available information.



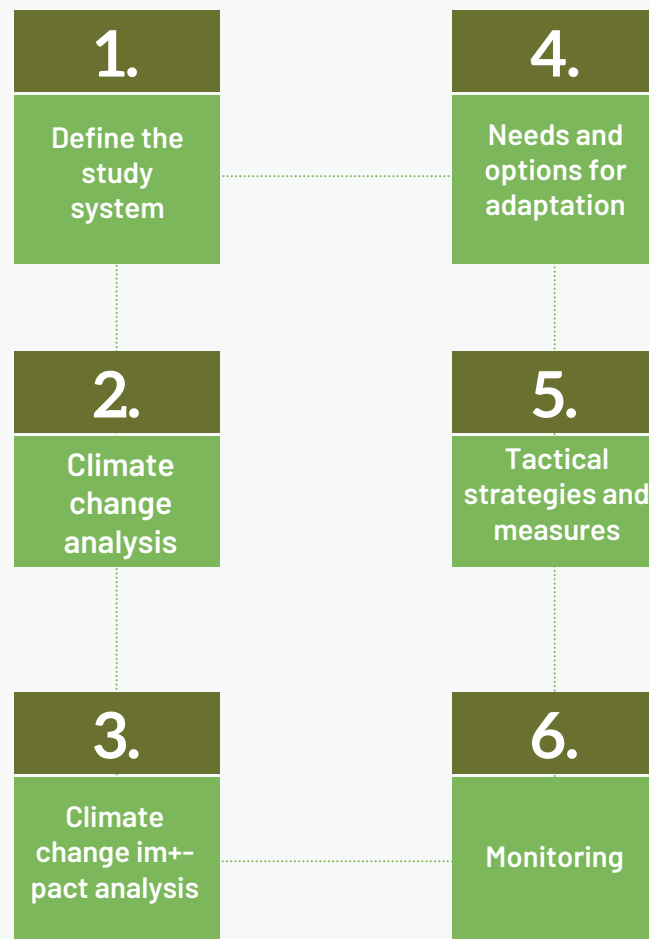
A **practical handbook** for adaptive forest management

Climate change is modifying forest conditions, affecting natural regeneration, and increasing the vulnerability of forests to fire, pests, and drought. To help forest managers make informed decisions and implement effective adaptation measures, the Forestry Management Technical Reference Manual has been developed.

What is this handbook and what is it for?

It is a practical guide designed to facilitate the integration of climate change into forest planning and management. It aims to provide technicians with clear and applicable tools to enable them to adapt their management plans, ensuring the resilience of ecosystems and the sustainability of forest uses.

The manual includes adaptative measures applicable to 15 management plans, which are organised in six steps. The creation of the manual has been a participatory process, in which forest technicians, landowners and public administrations have worked together, ensuring its usefulness and applicability in different contexts.



A resource for forestry planning

Beyond being a technical tool, this reference manual facilitates decision-making and promotes collaboration between experts and public administrations. Its use allows for the effective incorporation of measures for climate change adaptation in the forest planning of any region, contributing to the protection and sustainable management of forests in a changing climate scenario.





Forest certification: ensuring sustainability

Forest certification is a key tool in guaranteeing that forests are managed sustainably, ensuring their long-term conservation and their contribution to climate change adaptation. There are two main certification schemes: PEFC (Programme for the Endorsement of Forest Certification) and FSC (Forest Stewardship Council). Both help to ensure that forests are managed responsibly, but each has its own standards and validation processes.

As part of the project, work has been conducted to include climate change adaptation criteria in forest certification standards in Spain, reinforcing their role in forest conservation. Thanks to this effort, more than 26,000 hectares have been certified under sustainability standards during the implementation of the project.

In the case of PEFC, the criteria and indicators of the Sustainable Forest Management standard have been adapted to include the context of climate change, which was approved in 2023. Since 2021, 16,890 hectares have been certified in Soria, demonstrating progress in the integration of these criteria in forest management. However, the certification of private forests is occurring at a slower pace than that of public forests, mainly due to the lack of spatial forest planning and, in the case of community-owned forests, the absence of governing boards.

With regard to the FSC, 26,244 hectares managed by the Regional Government of Castilla and León have been certified, making it the first group certificate with a resource manager in Spain. Furthermore, in Soria, 6,617 hectares of public land and 1,173 hectares of privately owned forestland have been certified. Technical advice has also been provided to private landowners for the certification of new areas and measures for climate adaptation have been incorporated into the national FSC standard.



These advances help to establish forest certification as a fundamental tool to improve the sustainability and resilience of forests, ensuring that their management contributes to biodiversity conservation and climate change mitigation.



Knowledge transfer and raising awareness

Education and sharing information have been fundamental pillars of the project in pursuit of its goal of bringing adaptive forest management closer to the general population and promoting the importance of adapting to climate change. Through activities aimed at a range of audiences, awareness of sustainable management and its role in the conservation of the territory has been strengthened.



Results:

- A travelling exhibition visited 25 towns in Soria, with a total audience of 19.622 people.
- 43 talks were held in schools and institutes involving 80 teachers y 1.299 students.
- International presentations in Rome, Prague, Brussels, Toulouse, Castelfranco (IT), Joensuu (FI) and Bonn (DE).
- Participation in the European meeting for municipalities and public administrations "Mission Project for Adaptation"
- Organisation on the international workshop "Forests and Climate Change".
- Integration of results into public policies, such as PEPEAC and the LULUCF programme.





Public-private partnerships in forest management

The success of the project has been based on the collaboration between public entities, private landowners and certifying companies, promoting a model of co-responsibility in forest management. This cooperation has made it possible to integrate the results into regulatory processes and forest management plans, as well as actively involving private landowners in the implementation of measures on their land.

A key player in this process has been the Fundación Empresa y Clima (FEC), which specialises in advising companies on the incorporation of climate strategies into their activities. Its role has been fundamental in bringing companies closer to the concept of adaptive forest management, promoting their involvement in initiatives that go beyond the simple offsetting of emissions.



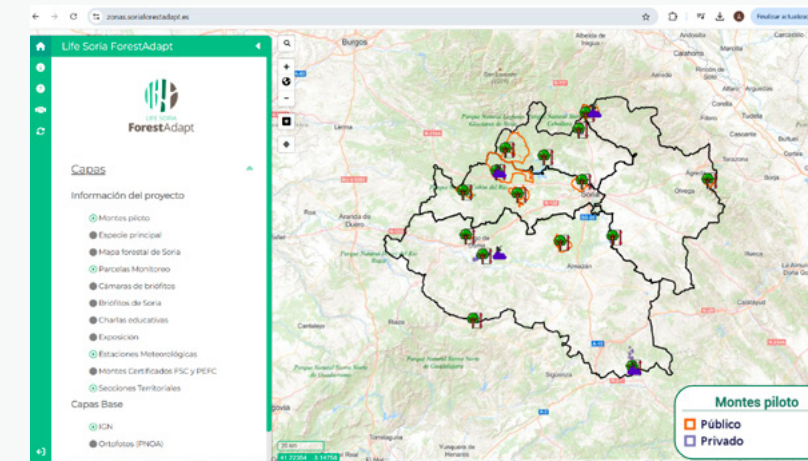
To reinforce this work, training workshops and the **manual 'Adaptation Project Models for Companies'** have been developed, with versions in Spanish and English. This material has served as a basis for conveying to companies the importance of **adaptive forest management**, dispelling preconceived ideas such as 'cutting trees is always negative' or that 'planting trees is the only viable solution'.

The project has demonstrated that public-private partnerships **strengthen sustainable forest management and** generate new opportunities to integrate these approaches into business strategies. Although offsetting emissions is still voluntary and this project does not generate removals, participating companies have shown interest in **including adaptive forest management initiatives in their sustainability**, aligning their actions with a holistic vision of the territory.

An interactive online viewer of the project's actions

<https://zonas.soriaforestadapt.es/>

The project has included all public participants related to the pilot forests in an interactive online viewer, permitting access to key forest management information. This platform includes GIS databases with detailed information on the target forests, data analysis reports and up-to-date maps. In addition, the viewer collects data from monitoring plots, weather stations, main species, and certified forests, facilitating their consultation via web servers. This tool offers greater access to forest information, helping to strengthen data-driven decision-making.

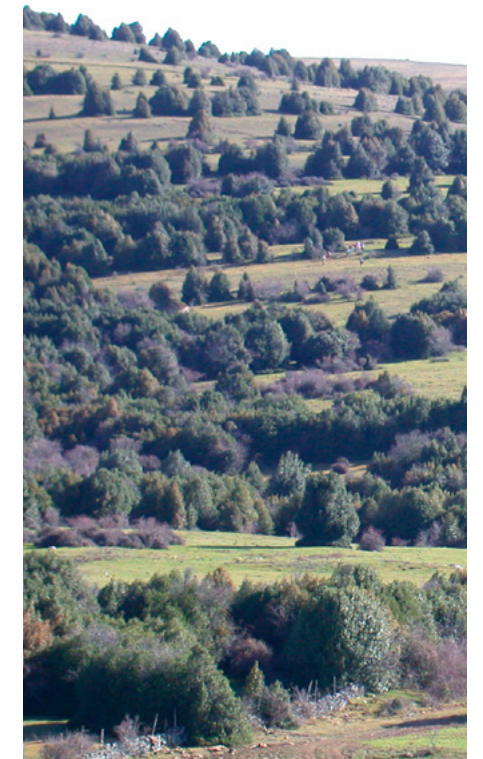


Social impact and economic sustainability

- More than 60% of forest owners recognised the need to implement adaptation measures.
- The perception of the benefits of adaptive forest management has improved considerably as a result of information activities.

These results are drawn from the socio-economic study that was conducted through surveys of forest owners and local residents, which confirmed that the measures implemented within the framework of the project have been judged favourably. The increased knowledge on sustainable management of forest resources, both in timber harvesting and non-timber forest products, has strengthened the role of forests in the rural economy.

However, the project has also revealed some structural difficulties. Forest owners are, in many cases, not very visible actors, with difficulties in their identification and participation in management processes. A large number of them live outside the province, which complicates their involvement in decision-making and the implementation of adaptation measures. In addition, a significant part of the forest area does not have identified ownership or a clear administrative organisation, which is a barrier to the planning and implementation of long-term actions.



The design and implementation of adaptive management plans require longer periods than those established in the project, not only to define appropriate strategies, but also to assess their real impact on the territory. Despite these challenges, the progress achieved in the social perception of forest management is a key step towards a more participatory and sustainable governance model.

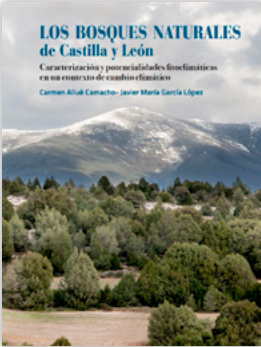
Communication and dissemination of results

The LIFE Soria ForestAdapt project has developed an intense communication and dissemination strategy to reach specialised audiences, local actors, and society in general. Through digital media, press, social networks and events, a significant impact has been achieved in the dissemination of the results and the replicability of the model.

Desde su inicio, el proyecto ha priorizado la accesibilidad a la información, con la creación de plataformas digitales específicas y una fuerte presencia en medios y redes sociales, logrando una cobertura mediática y digital de gran alcance.

Publications available

- Manual for incorporating climate change adaptation into forest management plans.
- Catalogues of adaptation measures by forest services: resins, mycology, pine nuts, truffles, beekeeping, etc.
- Field guide: ‘Bryophytes of Iberian Forests’
- Educational booklet for teachers and students: ‘Forests, a Shield and Refuge from Climate Change’.
- Catalogue of adaptation measures for water resources.
- The natural forests of Castille and León: Characterisation and phytoclimatic potential in a context of climate change.



Much more available at www.soriaforestadapt.es

Results

Press and Television:

- 190 digital media appearances
- 30 television broadcasts
- 39 press releases sent
- 2 press trips to the area of operation

Digital and Web Outreach:

- 41.912 unique users visited the official website of the project
- 3.263 visits and 15.080 clicks on the International Forum website
- Newsletters sent to a base of 3.400 contacts in the sector.

Advertising and Social Media:

- Use of Google Ads to attract specific profiles in the forestry sector
- Optimisation of campaigns to promote the ForestAdapt Tool and Fitoclim
- Dissemination via social networks (Facebook, X, LinkedIn, Instagram, and YouTube).

Open and collaborative knowledge

Networking. Collaboration between public administrations, technicians, and experts to amplify the impact of the project.

Local and global scale. Diffusion from Soria to Europe.

Accessible information. Open results and replicable tools to be applied in other territories.





Project title

LIFE Soria ForestAdapt Sustainable adaptation to climate change in the management of the forestry sector in the province of Soria.

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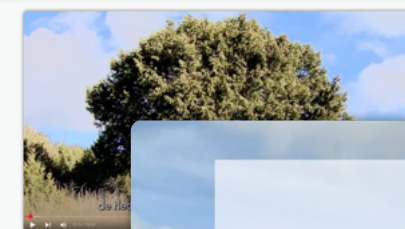


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