19th International Conference on Environmental Science and Technology

Kos, Greece, 3 to 6 September 2025

Silvopastoralism as a tool for enhancing forest resilience: LIFE SILFORE demonstrations in Galicia

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Abstract

European forests, especially in Atlantic regions, face growing threats from climate change and wildfires. The LIFE SILFORE project promotes silvopastoral systems—combining livestock grazing with forest areas—to boost forest resilience and biodiversity. Through eleven pilot sites in Galicia, the project demonstrates how silvopastoralism improves land management. It aims to develop scalable, sustainable models for climate adaptation and enhanced forest resilience.

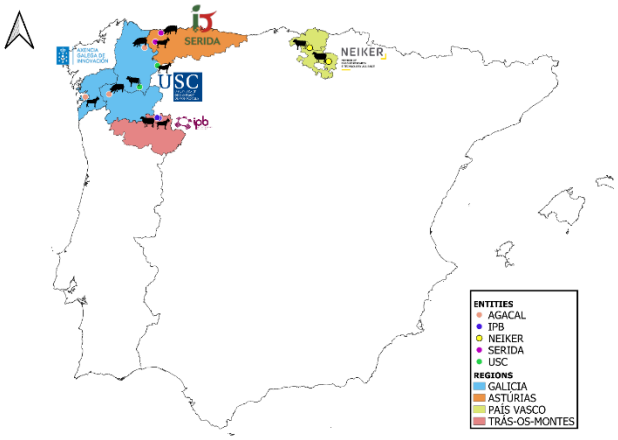
Keywords: biodiversity, precision livestock, ecosystem services, autochtonous breeds, sustainable forest management

1. Introduction

European forests, particularly in Atlantic and sub-Atlantic regions are increasingly vulnerable to climate change, which undermines their resilience and ability to provide essential ecosystem services (Knutzen et al., 2025). In this context, silvopastoral systems have emerged as an effective strategy for climate adaptation and mitigation, as they promote biodiversity, improve soil health, and enhance landscape multifunctionality (Mosquera-Losada et al., 2018; Torralba et al., 2016).

In Atlantic areas, these systems are especially well-suited to local ecological conditions and have strong potential to reinforce the socio-ecological resilience of European forests (Dagar et al., 2023, Castle et al., 2022).

The LIFE SILFORE project is a demonstrative initiative featuring 11 pilot sites (DEMOs) across four Atlantic and sub-Atlantic regions of the Iberian Peninsula. These DEMOs reflect a wide range of ecological and socioeconomic conditions. All DEMOs are focus on integrating forestry and livestock farming to enhance the resilience of both ecosystems and agricultural systems. The specific management goals and characteristics of Galician DEMOs developed by USC researching group (Figure 1) are detailed on this paper.



Demo 5 - Galicia	Forestry plantation (*Pinus sylvestris*)	Timber production	Goat (Galician)	5 ha (Ancares Lucenses)
Demo 6 - Galicia	Young plantations of *Castanea sativa* and *Pinus* pinaster	Timber production	Cattle (Rubia galega)	3 ha (Quiroga)

Figure 1. Demo sites ubicated in Galicia.

2. Galician DEMOs and sampling plots

2.1. DEMO 5. Cervantes

The Cervantes plot, located in Lugo within a *Pinus sylvestris* forest and part of the Natura 2000 network, covers 5 hectares. Initial clearing was done in April 2023, followed by a small-scale experiment in May to test 13 sowing treatments under different tree densities and shade conditions (Figure 2).

Figure 2.Galician goat grazing in a woodland area.

Based on prior experience, a new large-scale experiment was launched in June 2024 across the full 5 hectares. Three

management treatments were applied: (i) ploughed and sown (P), (ii) unploughed (U), and (iii) mechanically cleared but ungrazed (C) (Figure 3). The P area was limed and sown with a mix of grasses and legumes, with a re-sowing in October 2024 due to patchy growth. Both P and U areas will be grazed at two stocking rates, while C serves as a control. Soil samples were collected in July 2024 from P and U areas at two depths and under varying tree densities to establish baseline conditions before grazing begins.

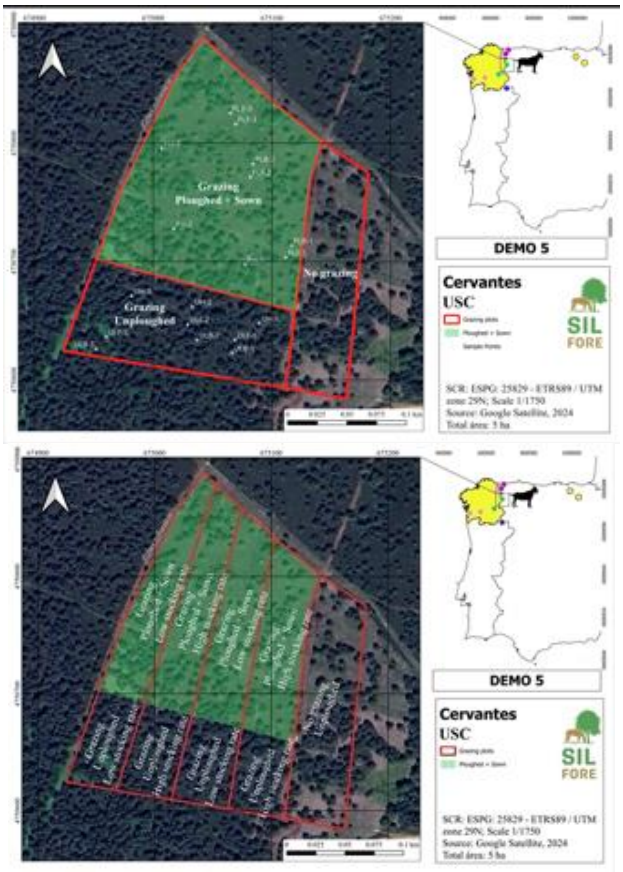


Figure 3. Cervantes demonstration plot and treatments to be grazed on 2025 with cows and goats

2.2. DEMO 6. Quiroga

The Quiroga/Friol unit in Lugo spans 4.1 hectares across four plots. In Quiroga, two plots were established on land burned in 2021—one with *Pinus pinaster* and the other with *Castanea sativa*. Due to poor soil conditions, grazing isn't feasible, but 20 treatments are being tested to assess the effects of mulches and fertilizers (with and without legumes) on tree growth (Figure 4).

In Friol, two *Castanea sativa* plots are being used to evaluate the effectiveness of different tree protectors (mesh, tubex, enveloping, and no protection) against cattle grazing. Each treatment includes 20 trees, and soil samples were collected in both areas following project protocols.

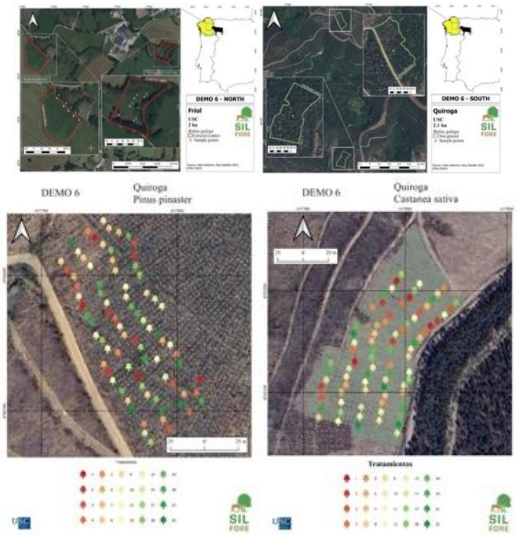


Figure 4. Quiroga plots: North (left) and South (right). Treatments are shown below. In the lower images, treatments for Pinus are on the left, and those for Castanea are on the right.

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Acknowledgments

This project is financed by the LIFE programme of the European Union - "Climate Action" sub-programme within the priority area "Adaptation to climate"