Call for a 12 month Research fellowship ('Incarico di Ricerca') on the spatial modelling of carbon and biodiversity rich forests in Europe within the framework of the Horizon Europe project FORbEST

Expected Start: No later than July 1, 2026

Activity Plan

The successful candidate will be embedded in Work Package 3 (WP3: *Integrated approaches for advanced carbon and biodiversity monitoring*) of the Horizon Europe FORbEST project (*Safeguarding Carbon and Biodiversity across European Forest Ecosystems through Multi-actor Innovation*). The position focuses on advancing spatial modelling, data integration, and synthesis of the information related to carbon and biodiversity rich forests in Europe.

The candidate will play a leading role in Tasks 3.4 and 3.6, while contributing to other WP3 activities (including field data collection and analysis), as well as cross-work package activities, particularly WP1 and WP7. The candidate will collaborate with international partners across disciplines and contribute to an integrated and policy-relevant research framework. The role might include supporting the supervision of MSc students to be involved in project activities.

Main Responsibilities

- Integrate multi-source biodiversity data and develop spatial models (ML and GDMs) to model the distribution of biodiversity-rich forests in Europe
- Develop EU-scale maps of climate risk for carbon- and biodiversity-rich forests by integrating hazard, exposure, and vulnerability components
- Support EU-scale analyses of connectivity for carbon- and biodiversity-rich forests
- Contribute to WP3 core activities, including field data collection, protocol implementation, data harmonisation, and analysis across case study areas, including collaboration with other Research Units on mapping carbon-rich forests
- Contribute to cross-WP activities, mainly WP1 (literature, glossary, policy context) and WP7 (carbon–biodiversity synergies and management implications)
- Prepare and contribute to scientific publications, project deliverables, and reports

Required Expertise

Soft skills:

- Ability to work independently while coordinating across international teams
- Strong communication skills for interdisciplinary collaboration and reporting
- Capacity to manage complex workflows and meet deadlines in a multi-partner project
- Problem-solving mindset and adaptability in a dynamic research environment

Hard skills:

- Background in ecology, biogeography, or related fields
- Proven experience in biodiversity modelling in R or other programming environments (experience with dplyr and other tidyverse packages is a plus)

- Understanding of commonly used statistical approaches in biodiversity analysis (e.g. multivariate analysis, GLMMs, spatial statistics); knowledge of Generalized Dissimilarity Models and/or time-series analysis is an asset
- Expertise in GIS (QGIS, ArcGIS) or equivalent spatial data analysis in R
- Experience with reproducible data science practices (e.g. Git/GitHub) and reporting tools (RMarkdown, Jupyter, Quarto, LaTeX) is highly desirable
- Experience in vegetation plot data collection and vascular plant identification is a plus

Research Project

Excerpt from the project proposal of the Horizon Europe – FORbEST: Safeguarding Carbon and Biodiversity across European Forest Ecosystems through Multi-actor Innovation.

WP3: Integrated approaches for advanced carbon and biodiversity monitoring

Objectives: (1) Benchmark novel carbon and biodiversity monitoring techniques against traditional monitoring in case studies, and test whether novel techniques can be upscaled at regional scale; (2) Identify forest areas having both high carbon stocks and high biodiversity value; (3) Deploy an early warning system for monitoring forest disturbance discerning between human and natural disturbance events; (4) Quantify the connectivity of carbon and biodiversity rich forests at the EU level and assess components of climate-change related risk.

Task 3.4: Model local species diversity in EU forests and pinpoint biodiversity-rich forests

The output of the literature review (T1.2), the newly collected biodiversity data (T3.1, T3.2) and model outputs on multitaxonomic species responses (T4.1) will be integrated with existing biodiversity repositories (e.g., GBIF, European Vegetation Archive) to provide baseline data to calibrate and validate predictive models of the distribution of biodiversity rich EU forests. We will model both species richness and distinctiveness of different taxonomic groups. For species richness, we will use machine learning (ML) algorithms to predict occurrence of species-rich forests. We will expand a published taxon-specific approach to also include cross-taxon correlations in biodiversity predictions. Generalized dissimilarity modelling (GDMs) will be calibrated to model distinctiveness of forest assemblages as a function of their geographical distances, ecological dissimilarities, and differences in land cover derived by remote sensing. This will enable the generation of wall-to-wall maps of predicted forest biodiversity, pinpointing hotspots of species richness and distinctiveness for directing conservation efforts.

Task 3.6 Create maps of risk to climate change and connectivity for carbon and biodiversity rich forests

We will create maps of climate change-related forest risk to highlight areas where high vulnerability and exposure intersect with high hazard. Hazard reflects the probability of occurrence of negative effects of climate change, and will be assessed through climate models. Exposure reflects the biodiversity value and carbon stocks at risk (from T3.3 and T3.4). Vulnerability measures the intrinsic predispositions of forest communities that may be affected or susceptible to climate change-related harm, such as being composed by drought- or fire-intolerant species, or being located at the rear edge or margin of a forest type distribution. Vulnerability will be assessed analyzing ecological characteristics (e.g., forest type, isolation, plant diversity), the multitaxonomic response to environmental drivers (T4.1), as well as tree species resilience to climate change (T4.2). After identifying areas at risk, we will assess the connectivity of EU forests for different taxonomic groups and functional guilds, utilizing tools such as Conscape, Linkage Mapper or Circuitscape, to better understand limits and consequences associated with the natural comigration of forest communities. In this way, we will identify corridors and barriers to migration, and characterize these in terms of their legal protection status, and level of risk under CC, so to highlight priority areas for expanding the

protected areas (e.g., corridors) or for habitat restoration (e.g., bottlenecks). Results will be benchmarked against regional regional-level restoration strategies and spatial planning techniques developed in T5.3.