DIFFERENT FORESTS, SHARED EXPERIENCES

BEHIND THE SCENES OF FORbEST FIELDWORK

HOW WAS THIS NEWSLETTER MADE?

Hello from Luana, Paola and Martina!

This newsletter edition comes straight from the field. Over the past months, the first FORbEST fieldwork season has taken us and many other consortium members into forests across the different Case Study Areas in Italy, Hungary, Romania, Thailand, Czech Republic and Finland. FORbEST is exploring novel forest monitoring techniques that are both reliable and cost-effective to enable land managers to identify forest areas with high conservation value and detect changes in biodiversity trajectories. Our monitoring will begin this evaluation as well as document biodiversity benchmarks for our six forests of interest in our project.

We spent part of our summer sampling in Sila National Park, in southern Italy, and wanted to use this newsletter to bring together not only our own experience, but also the stories and impressions emerging from fieldwork across the whole project.

The articles in the next pages grew out of our own experience and of conversation with other consortium members. Together they offer a glimpse into what happens when protocols leave our laptops and meet the forest: the practical challenges, unexpected moments, teamwork and time spent under the trees.

For work package 3 (WP3), this first field season marks an important step: putting our monitoring approaches into practice across very different forests and contexts.

We hope you enjoy this small journey through FORbEST's first field season and, as always, we would love to hear your thoughts!

Luana, Paola and Martina
FORbEST Researchers
University of Bologna, Italy
WP3

Work Package 3: Integrated approaches for advanced carbon and biodiversity monitoring is bringing together researchers across FORbEST to build a shared framework for monitoring forests carbon and biodiversity

WHAT IS INSIDE THIS NEWSLETTER

Page 2 - Before the First Plot: Building a Shared Sampling Framework

Page 3 - WP3 AT GLANCE

Page 3 & 4 - Through the Lens of Fieldwork. From Hidden Lichens to Forests in 3D
Articles on this page takes us into the field through two different but complementary monitoring approaches. Luana Francesconi brings us closer to one of the forest's most easily overlooked communities, lichens. Francesco Solano shows how mobile light detection and ranging, or more commonly referred to as LiDAR, can turn a walk through the forest into a detailed three-dimensional view of its structure.

Page 5 - Field Notes from Across FORbEST
This page brings together field reflections from Hungary and Finland. Péter Koncz takes us through a season of sharp climatic contrasts in the Pilis Mountains, while Janne Toivonen reflects on the challenges of capturing Kivalo's diverse forest conditions.

Page 5 - News to Celebrate: A Step Forward for Forest Protection in Slovakia

Page 5 - Policy Corner: Diverse Forests Are Key to Europe's Climate Resilience

Luana Francesconi is a postdoctoral researcher at the University of Bologna (UNIBO). Her research investigates the factors shaping lichen diversity and distribution by combining field surveys and ecological modelling, while investigating the potential of lichens as bioindicators of ecosystem health and environmental change.

Martina Livornese is a postdoctoral researcher at the University of Bologna (UNIBO). Her research focuses on forest biodiversity and ecosystem responses to anthropogenic pressures and environmental change. She combines ecological field data, remote sensing and spatial modelling to investigate biodiversity patterns, forest resilience and disturbance across spatial and temporal scales, with the aim of supporting forest monitoring and conservation.

Paola Merelli is a PhD student in Environmental and Applied Botany at the University of Bologna (UNIBO). Her research focuses on vascular plant diversity and combines field-based and modelling approaches to investigate the relationships between forest carbon stocks and biodiversity across spatial scales, with the aim of identifying forests of high conservation value.

BEFORE THE FIRST PLOT: BUILDING A SHARED SAMPLING FRAMEWORK

By Paola Merelli
University of Bologna, Italy

Fieldwork starts long before anyone steps into the forest. Before the first plot could be selected and the first species recorded, a lot had to happen behind the scenes. FORbEST brings together researchers working across different countries, forest types and areas of expertise, and turning all this diversity into a shared fieldwork framework was one of the first challenges of WP3.

The goal was simple in principle: collect data that could be meaningfully compared across the different Case Study Areas. Getting there, however, required many steps.

Designing a Shared Approach

To guide this process, we organized our shared framework around three simple questions: What to sample? Where to sample? & How to sample?

The first question, "what to sample?", was about deciding which ecological gradients and sources of variability we wanted to capture. Forests differ in many ways, from management histories to local environmental conditions. The challenge was therefore to identify a common set of gradients that would be meaningful across six Case Study Areas, while allowing each site to reflect its own ecological context.

The second question, "where to sample?" was about translating this conceptual framework into actual plots, guiding partners through a standardized selection process while accounting for practical constraints, accessibility, and the need for independent and representative sampling.

Finally, "How to sample?" This was where many different areas of expertise within the consortium came together. Protocols covering different components of forest biodiversity and carbon had to be discussed, compared and refined so that data collected by different teams would ultimately speak the same language.

The Challenge: Coordinating Many People

Protocols' drafts travelled back and forth between partners; tables were filled in, documents commented on, meetings were held, and questions raised There was a unique challenge for WP3 protocol coordinator, Paola Merelli, who coordinated over twenty FORbEST topical experts to produce 13 protocol drafts. There were lots of emails exchanged with protocol drafts requiring one more topical expert review, update, or revision and a final datasheet or file be included. However, these exchanges were precisely what allowed us to learn from each other's expertise and gradually build a shared approach that could be applied across six different forests ranging from a tropical forest in Thailand to the boreal forests of Finland.

From Planning to Practice

Over the course of summer and fall 2026, the spreadsheets and protocols made their way into the FORbEST forests. This first field season has been the first real test of the framework we developed together. It has shown us what works, where local adaptations are necessary, and which questions and challenges only become visible once a protocol meets steep slopes, changing weather, and all the other surprises that come with fieldwork.

Before the first plot was sampled, many discussions, decisions, and emails were needed. But our shared preparation is what now allows data collection across different countries and from different teams to become part of the baseline biodiversity data to be able to understand the bigger picture.

FORbEST consortium meeting 2026 - visiting the Giants of Sila during the field trip in Sila National Park. Photo credit: Tomáš Hlásny

Looking Closer: What Lichens Can Tell Us

By Luana Francesconi
University of Bologna, Italy

Lichen community on a beech tree in Sila National Park. Photo credit: Paola Merelli

Luana Francesconi taking a closer look at lichen diversity on a beech tree during field activities in Sila National Park. Photo credit: Sönke Hardersen

Some organisms in a forest are easy to miss. Growing quietly on tree trunks and branches, lichens can tell us a great deal about the environment around them, even though much of their diversity often goes unnoticed. Lichens are stable symbiotic associations between a fungus and a photosynthetic partner, such as an alga or cyanobacterium. While the fungus provides protection, the alga provides food through photosynthesis. This life strategy has allowed lichens to successfully colonize a remarkable variety of habitats and substrates, including tree bark, rocks, soil, leaves, and even artificial materials. Within FORbEST, lichens have a special role: their diversity and presence can provide valuable clues about the continuity and ecological quality of forests, including the characteristics of old-growth forests.

Yet, looking for lichens is not as simple as it might seem. Many species are tiny, inconspicuous, or very similar to one another at first sight. Some differences can only be distinguished by looking closely at their structures, using a hand lens or through more detailed laboratory observations and analysis.

During FORbEST field activities in Living Lab Sila, we turned this challenge into a small game. Standing in front of a beech tree, project partners were asked to look carefully at its bark and count all the different lichen species they could see. Once they had finished, I repeated the count. The results were striking: the participants had detected only a fraction of the diversity found by a trained observer, and the number of lichens growing on a single beech tree was much higher than many had expected. Looking more closely, with a hand lens and later in the laboratory, could likely reveal even more diversity, allowing us to distinguish species that appear almost identical to the naked eye. What initially looked like a simple patch of bark turned out to be a small, complex community.

Perhaps this is part of the lesson that lichens can teach us. They are easy to overlook, yet they can carry important information about forest history, continuity, and ecological conditions. In our forests, some of the most informative organisms may also be among the most neglected, and sometimes, all it takes is looking a little closer.

WP3 AT GLANCE

Climate change and biodiversity loss are deeply interconnected, and forests sit at the heart of both challenges: they store large amounts of carbon while supporting much of terrestrial biodiversity. WP3 builds on this link by advancing integrated approaches to monitor forest carbon and biodiversity, while testing how novel technologies can strengthen or complement existing methods.

WP3 aims to:

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.

Exploring Forests in 3D: LiDAR SLAM in FORbEST

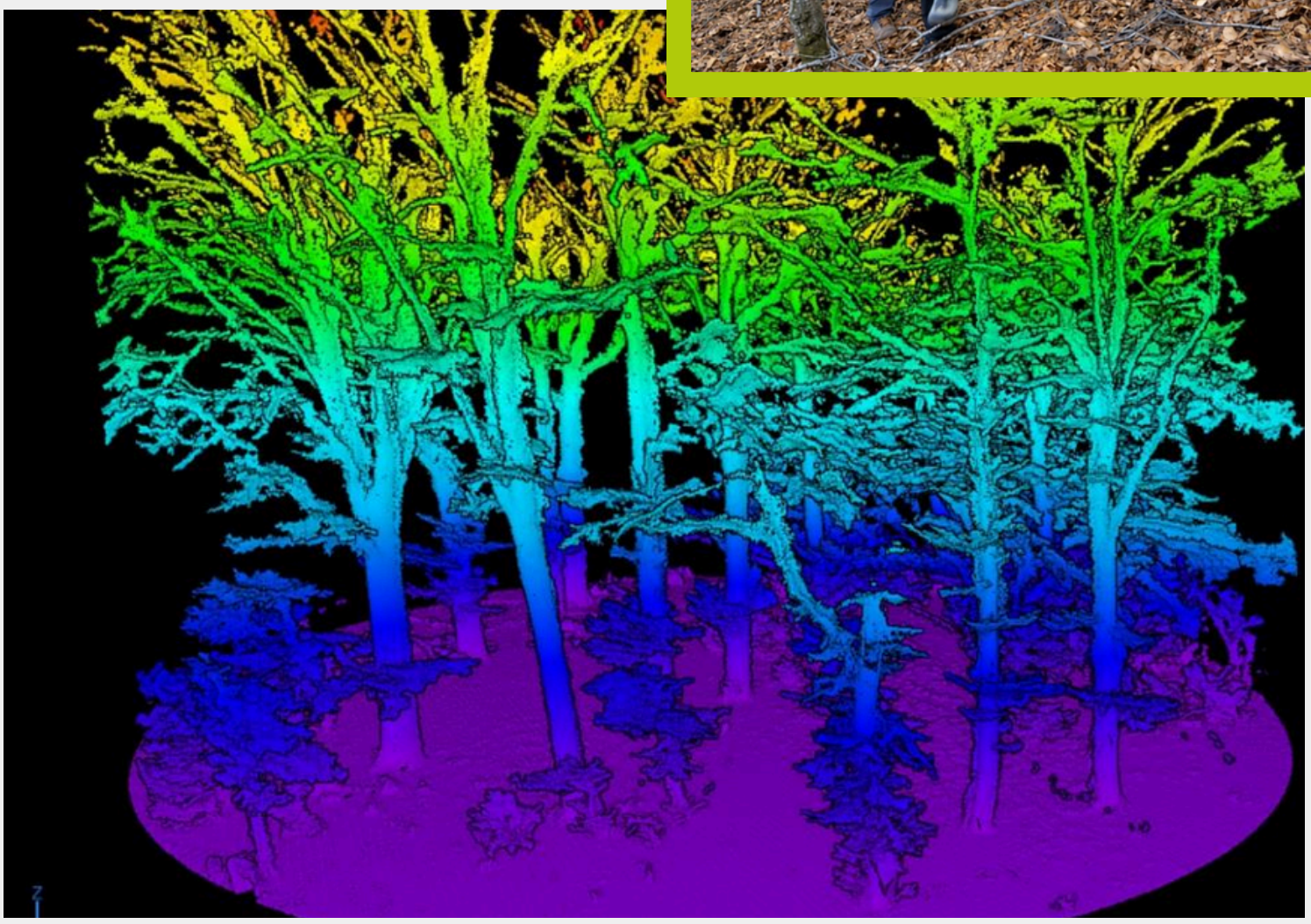
By Francesco Solano
University of Tuscia, Italy

A forest is much more than a collection of trees. Stems, branches, canopy layers, deadwood and regeneration create a complex three-dimensional environment. However, capturing all this complexity is not easy. Traditional field measurements provide essential information, but they can require considerable time and often describe only part of the forest structure. Within FORbEST, we are therefore exploring mobile LiDAR (Light Detection and Ranging) as a complementary tool for forest monitoring.

A LiDAR scanner emits thousands of laser pulses every second and measures their distance from surrounding objects. As the operator walks through the forest, SLAM (Simultaneous Localization and Mapping) allows the instrument to track its position while gradually building a three-dimensional representation of the forest stand. The result is a point cloud made up of millions of measurements, in which trunks, branches and different forest layers can be explored in detail.

During FORbEST field activities in the Sila Living Lab, project partners had the opportunity to see this process in real time. Following a short walking route through the forest, we watched the stand appear point by point on the screen. In just a few minutes, the scanner captured a detailed digital representation that could later be used to examine tree shapes and stand structure, as well as to map the position and estimate the dimensions of individual trees. Repeating these surveys over time could also help us monitor how forest structure changes.

Three-dimensional point cloud of a forest stand generated using mobile LiDAR SLAM. Credit: Francesco Solano.



However, scanning a forest is not as simple as walking among the trees with an instrument. Dense vegetation, overlapping branches and large stems can block the laser's line of sight, leaving gaps in the point cloud. Survey routes must therefore be carefully designed to capture the forest from different angles. The demonstration provided a practical opportunity for FORbEST partners to discuss these challenges and consider how LiDAR surveys could be carried out across different study areas.

These exchanges are now helping us develop a common survey protocol, making data collection as consistent and comparable as possible across the FORbEST network. Mobile LiDAR is not intended to replace traditional forest measurements. Instead, by combining the two approaches, we can look at forests from a new perspective and describe their structure in greater detail, one point at a time.

Mobile LiDAR survey during FORbEST field activities in the Sila Living Lab. Credit: Gianluca Piovesan.

A Season of Extremes in the Pilis Forests

By Péter Koncz, Centre for Ecological Research (CER), Hungary

From water flowing along forest roads in spring to temperatures reaching 41 °C in summer, fieldwork in Hungary's Pilis Mountains unfolded across a season of striking contrasts. By August, drought stress was visible in early autumn colours and falling leaves. Yet some beech forests sheltered in steep, high-elevation ravines remained in surprisingly good condition, suggesting that local microclimates and topography may provide important refuges. Within the biodiverse Pilis Biosphere Reserve, the FORbEST team combines GIS-based plot selection with bioacoustic monitoring, vegetation surveys and forest structure measurements. In a landscape where old-growth patches are rare and fragmented, being in the field reveals rapid changes and local differences that datasets alone can easily miss.

A Mosaic of Forests in Kivalo

By Janne Toivonen,
Natural Resources Institute Finland (LUKE), Finland

In Kivalo Research Forest, one of the main fieldwork challenges arises before measurements even begin: identifying plots that represent its diverse forest conditions. The area ranges from old-growth control sites to experimental stands of less common species, including Siberian larch (Larix sibirica). In addition, some of Kivalo's most biodiversity-rich old-growth stands are particularly narrow, making plot delineation and replication difficult. Beyond these practical challenges, fieldwork offers a perspective that is difficult to capture through data alone. While analysis necessarily breaks the forest down into individual metrics, being in the field brings those pieces back together and helps reveal how they interact within a living system. This broad perspective help researchers move beyond isolated metrics and interpret forest structure as part of an interconnected ecological system.

The case study areas are located within FORbEST Living Labs. Find out more about the Living Labs at**:** **https://www.forbestproject.eu/living-labs/**

Drought, falling leaves in 2026 August in Pilis Mountains. Photo credit: Péter Koncz

Drone-based remote sensing during the Kivalo field inventory, near the centre of the study area. Photo credit: Katalin Waga

News to Celebrate: A Step Forward for Forest Protection in Slovakia

Slovakia has taken an important step towards stronger forest protection by approving new zoning plans for four national parks, namely Tatras, Low Tatras, Malá Fatra and Poloniny National Parks. The most significant change concerns Tatra National Park, where more than 61% of its 74,606 hectares will now fall within Zone A, the strictest protection category. The zoning is not simply a conservation map. In defining the new zones, decision makers considered habitat quality and rarity together with forestry, agriculture, recreation and infrastructure, reflecting the challenge of balancing conservation with other uses of the landscape. Conservation organisations welcomed this zoning outcomes, while cautioning that valuable old forests and other important areas remain outside strict protection, particularly in Poloniny and its UNESCO-listed areas.
More information in the article: https://www.teraz.sk/spravy/vlada-schvalila-zonaciu-tanap-u/974614-clanok.html

Policy Corner: Diverse Forests Are Key to Europe's Climate Resilience

By Zoltan Kun, Wild Europe, the Netherlands

As the European Commission advances new policies on climate resilience and wildfire risk management, FORbEST highlights the importance of diverse, multifunctional forest landscapes in strengthening resilience to increasingly frequent disturbances. Emerging policy frameworks should support mixed-species and mixed-age forests, landscape heterogeneity, and management approaches that simultaneously enhance biodiversity, carbon storage, and climate adaptation leading to fire resilience through increased naturalness.

Through our forest Living Labs across Europe and beyond, FORbEST is generating practical evidence on how these approaches can be implemented on the ground to increase resilience within the landscape and reduce risk of wildfire-related loss. The project aims to contribute knowledge that supports effective forest landscape restoration and planning that can be used to inform EU-policies while ensuring that a wide-range of forest management approaches, from strict protection through active management, delivers long-term benefits for people, nature, and climate.