

**Title**

How can we tell if forest soil is healthy?

**Network title**

N2025-05

**Integrating soil monitoring in forest and other semi-natural land uses in the Nordic and Baltic region (MoniForSoil)****Contact person**

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**Preamble**

MoniForSoil brought together researchers from the Nordic and Baltic countries, while also linking the region with experts from Canada, Japan and Ukraine, to improve how we monitor soil health in forests and other semi-natural ecosystems. The network focused on practical cooperation around soil carbon, soil biodiversity and the implementation of the emerging EU soil monitoring framework, with the aim of making soil data more comparable and more useful for society.

**Main text**

The soil is easily overlooked. In a forest it may look like little more than dark, wet ground, but in reality it regulates water, stores large amounts of carbon, supports biodiversity and helps trees remain productive and resilient. If we want Nordic and Baltic forests to continue delivering climate regulation, biomass, biodiversity and clean water, we need better methods to monitor what is happening below our feet. This was the core idea behind MoniForSoil.

A major challenge in the Nordic and Baltic region is that soils differ greatly across countries. Iceland, for example, has volcanic *Andosols* that behave differently from many mainland European soils, while boreal and hemiboreal forests elsewhere in the region include a wide range of mineral and organic soils. Because of this variation, countries often use different methods, thresholds and sampling strategies. MoniForSoil created a platform where researchers could compare experiences, discuss common problems and work toward more harmonised monitoring approaches. The network also opened dialogue with scientists from Japan, Canada and Ukraine, which broadened the scientific perspective and made it possible to compare northern soils across continents.

One of the most practical outcomes of the network was the development of a common protocol for collecting soil samples for eDNA analysis. Environmental DNA makes it possible to study soil biodiversity by identifying traces of organisms in soil samples, including microbes and other life forms that are difficult to observe directly. The MoniForSoil partners prepared a shared sampling and transport protocol so that samples from different countries can be analysed in a comparable way. This is important because comparable biodiversity data are essential if Nordic countries want to assess soil health

consistently and build monitoring systems that are scientifically robust and scalable. The pilot project is still being completed, but the protocol itself is already an important step toward harmonised soil biodiversity assessment across borders.

The network also supported exchange on the EU Soil Monitoring and Resilience Regulation (Soil monitoring law) and how it could be implemented in practice. This is where international cooperation becomes highly concrete. Soil legislation only works well if countries can translate legal requirements into field methods, indicators and thresholds that are scientifically credible. Through regular online meetings and a final conference in Iceland, the network helped researchers and institutions discuss how this can be done in real monitoring systems. In Latvia, for example, the network contributed to the development of the national system for implementing the Soil monitoring law, including sampling plot design, methodologies and thresholds.

The Iceland conference became a particularly important milestone. It brought together 42 participants from 10 countries and gave Icelandic institutions an opportunity to highlight the importance of soil monitoring while strengthening connections with scientists from Northern Europe and beyond. For the Nordic region, this kind of meeting has a clear societal value: it accelerates knowledge exchange, reduces duplication of effort and helps small research communities benefit from shared expertise instead of working in isolation.

MoniForSoil also generated scientific and strategic follow-up. The network contributed to publications on harmonising forest soil carbon monitoring and to research papers on greenhouse gas (GHG) emissions and vegetation responses in forest ecosystems. It also helped stimulate new collaborative project development, including a funded Norwegian-led initiative and a larger expression of interest aimed at future forest soil health research. This shows that even a relatively small network can create long-term value by connecting data, people and methods.

For Nordic society, the benefit is straightforward. Better soil monitoring means better evidence for forest management, biodiversity protection, climate mitigation and restoration planning. It means that decisions can rely less on assumptions or even speculations, and more on comparable measurements of carbon, biodiversity and soil condition. In that sense, MoniForSoil was not only a scientific network. It was a practical step toward healthier soils and better informed land-use decisions across the Nordic and Baltic region.

## Photos



**Photo 1:** Participants of the MoniForSoil conference in Iceland, held on 1–2 September 2025. Photographer: Helena Marta Stefánsdóttir.



**Photo 2:** Soil sampling equipment prepared for harmonised eDNA sampling within the MoniForSoil network. Photo taken at Hveragerði, september 3<sup>rd</sup> 2025. Photographer: Helena Marta Stefánsdóttir.



**Photo 3:** Field discussion on soil monitoring methods during the MoniForSoil meeting in Iceland. Photo taken at Hveragerði, Iceland, September 3<sup>rd</sup> 2025. Photographer: Helena Marta Stefánsdóttir.