

Observation of Ecosystem Changes for Action

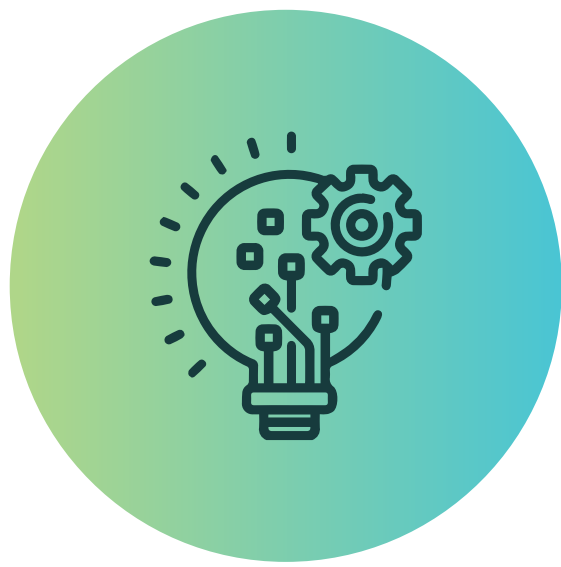
Maria J. Santos¹⁰, Maria Hällfors¹, Risto K. Heikkinen¹, Margarita Huesca Martinez², Ben Smith³, Bruno Smets⁴, Sander Mucher⁵, Wilfried Thuiller⁶, Gabriela Popova⁷, Nikola Ganchev⁷, Petra Philipson⁸, Carsten Brockmann⁹, Andrew Skidmore², Claire Brown¹¹, Petteri Vihervaara¹

The aim of OBSGSESSION is to monitor and predict biodiversity change and its direct and indirect drivers in terrestrial and freshwater ecosystems. This is done through integrating state-of-the-art multi-sensor Earth Observation (EO) data, innovative in-situ (including citizen science) data and products, and next-generation ecological models that account for uncertainty. The project, which started in 2024, is anchored in science and policy needs, interdisciplinarity between terrestrial, freshwater, EO and ecosystem modelling, and FAIR open science practices. The project will share research outputs with both the scientific community and the general public, to propel the understanding of ongoing processes and the needed innovations for science-based solutions.

Mission

To pioneer a transformative approach that combines diverse data sources and innovative ecological models for monitoring , predicting, and addressing biodiversity changes in terrestrial and freshwater ecosystems. Through robust science-policy links and open science practices, we support EU & international biodiversity agreements, goals, and policies.

Main objectives of OBSGSESSION



Responding to current science and policy needs, as well as technological gaps while supporting relevant EU policies and directives related to biodiversity.

How? Explaining when and to what extent Essential Biodiversity Variables (EBVs) can be used to implement, measure and monitor the effects of policies, and how the technical underpinnings of EBVs can be strengthened to provide the most reliable results.



Compile and analyse time series Earth Observation data from satellite and airborne sensors, and in-situ data from researcher, monitoring programmes and citizen science initiatives to assess the impact of natural and human-derived pressures on ecosystems, and use it to develop Essential Biodiversity Variable (EBV) indicators and models.

How? Collating time series of satellite and airborne EO data with in-situ and citizen science datasets, and data based on environmental DNA (eDNA). These feed into innovative methods to generate EBVs describing different ecosystem features.



Create science-based and robust solutions for planning and prioritising conservation and restoration actions while accounting for uncertainties.

How? Elucidating the effects and propagation of errors in remote sensing data, and developing workflows and best practices to minimise and make errors traceable.



Share findings and promote state-of-the-art research and policy support for biodiversity conservation and restoration.

How? Strategic communication, dissemination, and exploitation activities to a wide range of stakeholder groups including academia, policy, business, and the general public ensure that the findings have the best possibility for supporting policy.



Understand the current and long-term dynamics of terrestrial and freshwater ecosystems.

How? Improving modelling of ecological processes and biodiversity change as a fundamental set of processes that interact within the Earth System and different anthropogenic pressures. A tailored detection-attribution-modeling framework will be built, which ensures applicability to other regions too, enabling a large-scale understanding of mechanisms behind ecological change and mapping areas of ecosystem risk.

