University of Antwerp
Faculty of Science

ECOSPHERE

The ECOSPHERE research group aims to study aquatic and valley ecosystems that are continuously challenged by natural and anthropogenic stressors. The research focuses on acquiring fundamental and applied knowledge at different levels of structural and functional organisation in order to underpin environmental management decisions.

MASTER THESIS SUBJECT 2026-2027

A paleo-ecological reconstruction as basis for the restoration of a degraded minerotrophic mire

Research group: ECOSPHERE

Hosting laboratory: CDE building C

Promotor(s): Tobias Ceulemans (Tobias.Ceulemans@uantwerpen.be) & Willem-Jan Emsens (Willem-Jan.Emsens@uantwerpen.be)

Daily supervision: Tobias Ceulemans

Peatland restoration works in Vorsdonkbos

- **This topic mostly contains ☒ literature study, ☒ lab work, ☒ field work, ☒ experimental work, ☐ GIS, ☐ numerical modelling, ☐ other: ……**
- **Possession of driver's license B is ☐ needed, ☒ recommended, ☐ not needed**
- **Possession of certificates needed: ☐ FELASA C, ☐ other: ……**

Summary Minerotrophic mires are among the world's most endangered habitats. They are characterized by permanently waterlogged, mineral-rich soils dominated by sedges and mosses such as Amblystegiaceae, Calliergonaceae, Meesiaceae, and specific *Sphagnum* species. These ecosystems provide key services including biodiversity conservation, water purification, and carbon sequestration. Due to anoxic conditions, organic material accumulates as peat, forming a long-term archive of past vegetation and environmental conditions.

Most western European mires have been destroyed or heavily degraded through drainage, peat extraction, and afforestation. The remaining fragments are therefore crucial for conservation and restoration, yet their complex biogeochemistry and ecohydrology make restoration challenging. Knowledge gaps and the "shifting baseline syndrome" — the loss of awareness of former ecosystem states — often lead to lowered restoration targets over time.

Your Master's Thesis

- You will reconstruct the paleoecological and geological history of a degraded minerotrophic mire in Flanders to define realistic restoration targets.
- Use peat depth measurements to create a 3D model of the mire and link it to current, historical, and potential vegetation.
- Analyse subfossil plant remains and perform radiocarbon dating to reconstruct past vegetation.
- Use historical documentation, herbarium specimens (dating back to the 19th century), and photographic evidence (from 1911 onward) to assess previous restoration outcomes.
- Access long-term biogeochemical and hydrological data, and compare with reference datasets from intact mires.
- Evaluate two large-scale restoration experiments (2016–2021 and 2025) to identify key success factors.

Research Setting

- Location: Nature reserve Vorsdonkbos-Turfputten (Gelrode), one of Belgium's last minerotrophic mires, protected under the European Habitats Directive.
- Work on an unprecedented field experiment in Flanders, with access to exceptionally well-preserved peat samples.
- Combine fieldwork, laboratory analyses, and statistical work on large-scale datasets.
- Participate in a long-term monitoring program with opportunities for scientific publication.

Your Profile

- Familiar with, or eager to learn about, mire biodiversity and ecosystem functioning.
- Comfortable collaborating with scientists and local volunteers (Dutch-speaking).
- Flexible, creative, and motivated to work both outdoors and in the lab.
- Enjoys fieldwork in muddy and wet environments.
- Goal-oriented, detail-driven, and aspiring to contribute to an international scientific publication.

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