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

Climate mitigation potential of restored wetlands: carbon storage in vegetation

Research group: ECOSPHERE

Hosting laboratory: CDE – building C

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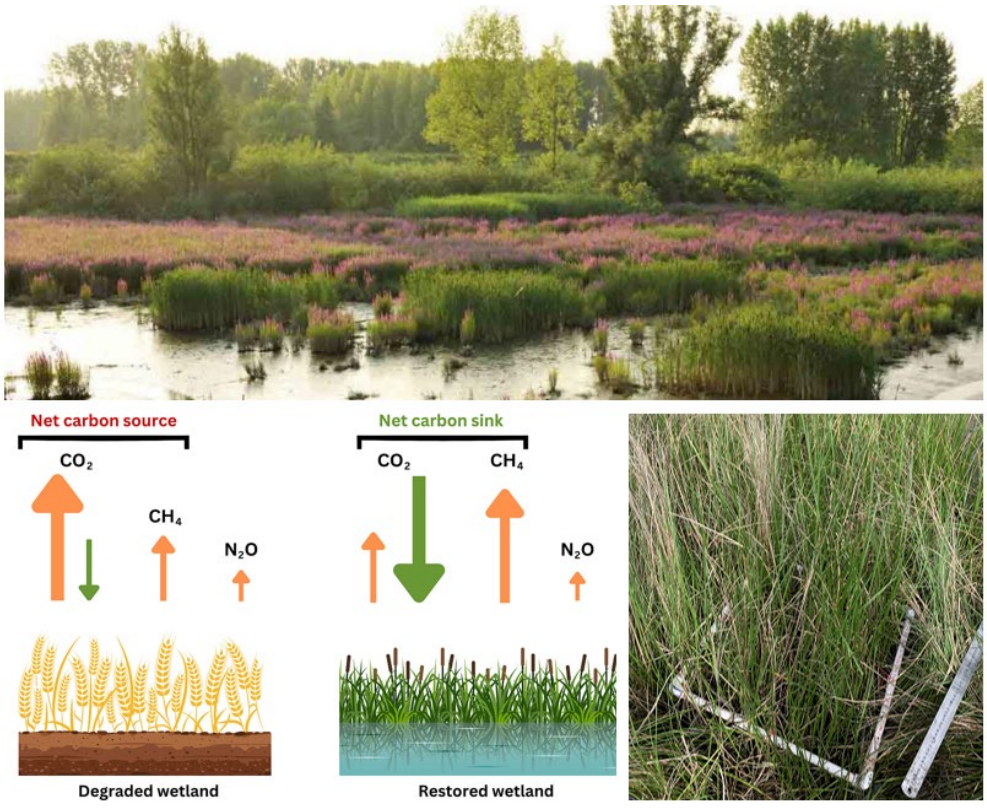

Vegetation samples will be collected in restored wetlands, to estimate the carbon storage in vegetation and understand their role in the greenhouse gas balance of wetlands.

- **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

Wetlands are generally acknowledged to be one of the most important carbon sinks in the world. Moreover, these unique ecosystems serve as natural buffers against flooding, host unique plant communities and provide a home for an abundance of bird-and invertebrate species. Over the past few decades, the Flemish government has been converting areas that were previously drained for agriculture back into tidal marshes and wetlands, as part of the Sigmaplan. This way, Flanders is better protected from flooding, and valuable river nature is being restored. However, the greenhouse gas balance of these areas remains less conclusive. While natural wetlands generally have a clear mitigating effect on climate change, this is less certain in restored wetlands, as it takes some time for the vegetation to return to natural levels and for CO2 uptake to exceed CH4 and N2O emissions. Crucial in understanding this balance is quantifying the carbon stored in vegetation. This is the main goal of this thesis.

The master student will take vegetation samples from multiple restored wetlands and tidal marshes along the Scheldt, following a salinity gradient. The fieldwork will mainly take place during the summer of 2026 (August or September), as this marks the end of the growing season. Tidal marshes and wetlands show a clear pattern of ecological succession, from shallow water or bare mudflats, over pioneer species to reeds and eventually willow forests. Each of these stages will be sampled and evaluated for both above-and belowground biomass. Biomass samples will be analyzed in the lab for their carbon and nitrogen contents and densities. This will allow estimating how carbon storage capacity changes as restored areas evolve and new successional stages of plant communities establish. At each study site, greenhouse gas flux measurements will also be taken using static flux chambers, the measured emissions can then be coupled to the specific vegetation present at the site. We hypothesize that carbon storage in the vegetation will spatially vary depending on multiple factors, including the tidal inundation frequency, duration and water depths, salinity, sediment properties like texture, vegetation type, etc. Therefore such environmental variables, which may affect spatial variability in carbon content in the vegetation, will be quantified for the sampling locations, and relationships will be explored through statistical analysis. The results will provide valuable insight into how vegetation succession influences the carbon balance of restored wetlands, contributing to a better understanding of their climate mitigation potential within the Sigmaplan.

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