

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 2025-2026

NBS for river restoration: Assessing the relationship between biodiversity and ecosystem services in restored Kleine Nete meanders.

Research group: ECOSPHERE

Hosting laboratory: CDE – building C

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Four restored river meander project sites are monitored (seasonally: dry/wet) to collect data for biodiversity assessment, forming the foundation for investigating its linkage to ecosystem services.

- 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 – Riparian ecosystems have long been disturbed and degraded as a consequence of human activities, with these impacts now being further exacerbated by climate change. Literature shows that **restoration practices** have mostly focused on flow management and structural modifications of watersheds, which have not always delivered success and, moreover, **often overlook the role of biodiversity** in providing ecosystem services through its contribution to the natural processes of rivers. To address this research gap, this master's thesis **aims** to elucidate the relationship between biodiversity and the ecosystem services emerging from nature-based river restoration, particularly **re-meandering** interventions, through a focused literature review, seasonal field monitoring, and analysis and interpretation of the collected data.

To be more specific, biodiversity is quantified across taxonomic, functional, and structural components, targeting **aquatic macrophytes** (key providers of water-circulation services) and **macroinvertebrates** (sensitive ecological indicators). In parallel, physicochemical water quality (pH, conductivity, alkalinity, nutrients, BOD, dissolved oxygen) is measured, and stable isotopes are used to infer water sources and residence times relevant to water-supply services. Nutrient assimilation and organic-matter decomposition are assessed to evaluate purification and nutrient-cycling services. A common sampling framework spans natural, restored, and degraded states, enabling spatio-temporal comparisons.

A series of four restored meanders in Olens Broek, within the **Kleine Nete** river catchment, will serve as the thesis's **case study area**. These sites are part of the currently ongoing international **Water4All project RECHARGE** ("REstoring Catchments And Rivers under Global changE"), which involves partners from Portugal, Poland, Spain, and Belgium. As such, the master's student will be part of and contribute to this project, specifically within **Work Package 2**: Spatial and temporal assessment of implemented NBS. Ultimately, the findings of this master's thesis will assist in promoting and guiding the implementation of nature-based solutions and improving their effectiveness.

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