

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

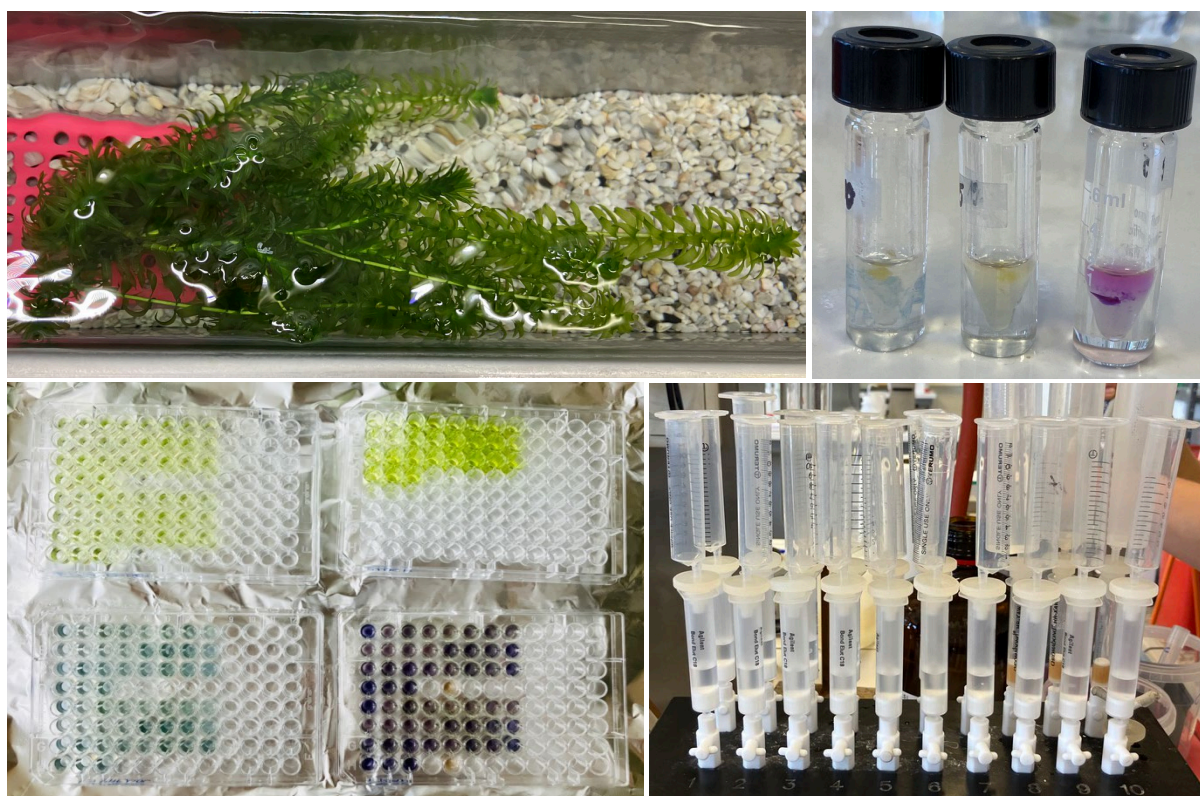
### Make or Break: Discover stress in submerged aquatic plants

Research group: ECOSPHERE

Hosting laboratory: CGB – Building U

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A range of key physiological molecules are being measured to uncover how water flow shapes the lives of aquatic plants. We want to know when and why they become stressed, and how we can make the subtle responses that normally remain hidden within them visible.

- 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

Submerged macrophyte patches in rivers and streams play crucial ecological roles that support the resilience of these aquatic ecosystems to increasing environmental challenges. Yet, the strength of these functions depends heavily on how aquatic plants interact with the surrounding flow.

Traditionally, research has focused on how hydrodynamic forces limit vegetation growth and survival, viewing plants mostly as passive victims of flow-induced stress. However, recent evidence tells a different story. Many aquatic plants can actively adapt to their environment by altering their shoot stiffness, shoot length, or biomass, for example. All these adaptations optimize survival and energy use under changing hydrodynamic conditions.

In this project, you will help put these fascinating hypotheses to the test through a series of controlled flume experiments. We will investigate both physiological and morphological adaptations of submerged plants exposed to various flow regimes. Methods and techniques will include spectrophotometry (assessing enzyme activity and cellulose/lignin content), UHPLC-MS/MS (quantifying phytohormones), mechanical tests, morphological trait analysis, and microscopy. Your tasks will involve assisting with experimental setup and data collection, analyzing results, and watching these remarkable plants reveal their hidden strategies for survival.

This topic is ideal for students who enjoy hands-on lab work, have an eye for details, and don't shy away from problem solving. In return, you'll gain experience in experimental design, data analysis, and team work — plus the satisfaction of colorful reactions, flowing water, and the beauty of aquatic plants in motion.

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