

*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

### Understanding the impact of endocrine disruptors in the environment on zebrafish embryo development

**Research group:** ECOSPHERE

**Hosting laboratory:** Zebrafishlab CDE D.UC1

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**Daily supervision:** Lucia Vergauwen and PhD student



*Effects of endocrine disrupting chemicals in zebrafish embryos will be studied at the biochemical, organismal and physiological level.*

- 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

There is growing concern about the presence of endocrine disrupting chemicals in the environment. Endocrine disrupting chemicals are able to interfere with normal endocrine processes leading to adverse health effects. Recent advances in EU legislation on the evaluation of endocrine disruptive properties of chemicals in the environment both for humans and wildlife are now demanding the development of innovative approaches to screen chemicals for their potential to disrupt the endocrine system. Methods using zebrafish embryos are being put forward based on (1) the presence of functional hormonal axes in this in vivo whole organism model and (2) the fact that zebrafish embryos are not protected under the EU legislation on the use of laboratory animals and are therefore considered alternatives to animal testing.

An important focus in current toxicological research is the development of innovative methods and approaches that move away from mainly measuring apical effects such as mortality in animal studies and rather focus on providing information on the underlying mechanisms and more subtle effects of endocrine disruption. When developing innovative approaches to identify endocrine disrupting chemicals, it is important to consider that endocrine axes in vertebrates are highly conserved. Therefore, effects observed in a zebrafish embryo on the one hand inform on consequences for environmental health and on the other hand may also inform on potential effects in mammals, including humans. In a One Health approach, assessment of chemicals is not conducted from either a human or an environmental health perspective but rather in one harmonised approach.

This thesis will be conducted within the framework of developing methods for identifying endocrine disruptors and understanding the underlying mechanisms. While assessments of endocrine disruption have historically mostly focused on estrogen and androgen hormones, in this thesis, focus will be put on less well characterized endocrine disruption modes of action, such as disruption of the thyroid hormone system or glucocorticoid action. The zebrafish embryo will be used as the model organism and experiments with exposure to endocrine disrupting chemicals will be conducted in the lab. Effects on development will be investigated. Measurements at the biochemical level (e.g., gene expression, protein levels using ELISA, oxidative stress, enzyme activities) will be integrated with observations at the organismal level (e.g., growth, development, imaging of transgenic reporter lines or stains using a fluorescence microscope) and the physiological level (e.g., swimming behaviour analysis) to understand mechanisms of endocrine disruption in fish early life stages. Depending on the mode of action under study, this may additionally include the study of altered energy (e.g., lipid) metabolism or developmental neurotoxicity using behavioural assays in T- and Y-mazes.

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