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 2024

Title: Impact of global change and sea level rise on coastal marsh sustainability: a modelling study

Research group: ECOSPHERE

Hosting laboratory: Campus Drie Eiken, Antwerp

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Tidal wetlands, such as salt marshes and mangroves, are coastal ecosystems that provide important ecosystem services, such as protection of coasts and deltas against the impacts of storms, the provision of valuable habitat for fish and birds, etc. Recent studies on the impacts of sea level rise (caused by climate change) and the sustainability of tidal wetland ecosystems are alarming. This sustainability of tidal wetlands depends on their ability to trap sediments and thereby to raise the wetland surface in balance with sea level rise. For an increasing number of places around the world, it is predicted that existing tidal wetlands, or parts of tidal wetlands, will not be able to survive rates of sea level rise that are projected e.g. by the IPCC (Intergovernmental Panel on Climate Change).
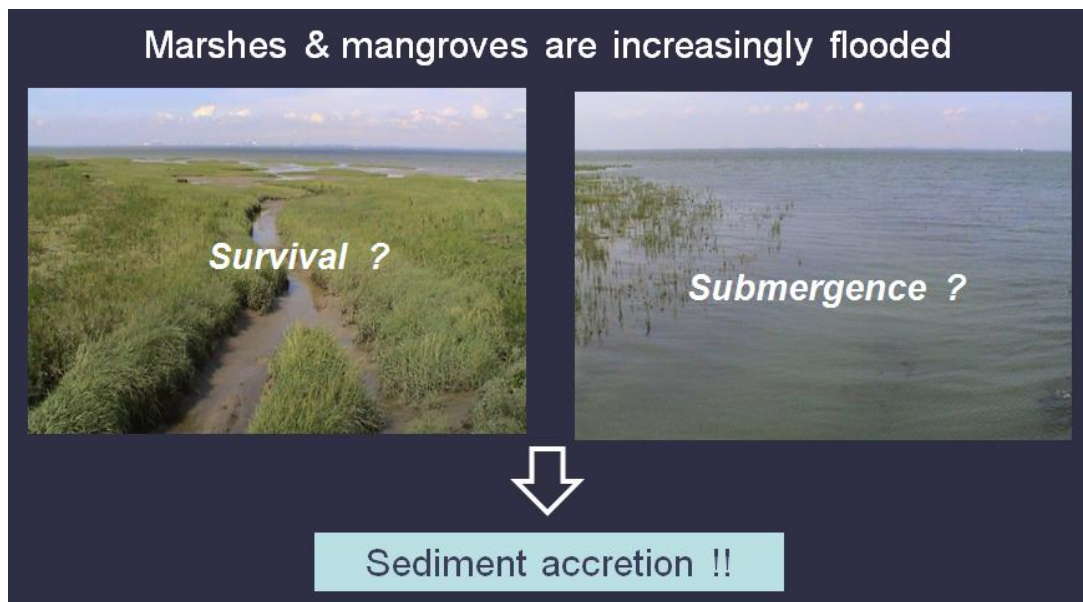
A visual impression of the future evolutionary trajectories of tidal marshes under sea level rise (credit: Stijn Temmerman)

➢ **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: …………………………………………………

This thesis study aims to use an existing, relatively simple computer model that is able to simulate the response of tidal wetlands to different scenarios of sea level rise. A critical input variable in this model is the availability of sediments. In this thesis the model will be used to identify the critical conditions, in terms of sediment supply and rate of sea level rise, for which tidal wetlands are able or not able to survive future scenarios of sea level rise. The model will be tested against a unique historical dataset on tidal marsh development (existing maps of vegetation change and elevation changes) in the marshes of Saeftinghe (Westerschelde estuary, SW Netherlands) for the period 1930 until now. After model testing, the model will be used to simulate future scenarios of sea level rise and the expected response of the marsh system, whether it can survive or not.

Practical info: This thesis does not involve any field or lab work, but is completely based on computer processing of existing datasets using GIS software, and building further upon an existing computer model. Previous experience with GIS and Matlab/Python are an advantage, but is not absolutely necessary (it can be learned during the thesis but of course a strong interest in computer work is needed).

- ➢ **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: ………………………………………………………**