

Summary of the Project

NordSalt: Climate Change Impacts and Biodiversity Interactions in Nordic Salt Marshes

Short description of the project

Context:

Globally salt marshes store over 50% of the coastal carbon (termed “blue carbon”, BC) and are responsible for 25-40% of the global oceanic carbon storage. Coastal marshes in the Nordic/Scandinavian region are largely understudied and differ substantially from “classic”, well-studied, macrotidal salt marshes due to the microtidal nature and wide climate and salinity gradients of the region, affecting the plant species assemblage. The strong salinity gradient in the Baltic Sea means that marsh vegetation changes from classic, grass (e.g., *Spartina*) dominated marshes to salt meadows to brackish reed lagoons and coastal meadows across the region. We know very little about BC storage, greenhouse gas (GHG) emissions, habitat and biodiversity loss and ecosystem services in Nordic salt marshes under a changing climate. We also lack information about the extent and temporal dynamics of these Nordic coastal marshes, especially in relation to the vulnerability and adaptability of these salt marsh ecosystems to climate change, local stressors and management practices (e.g., livestock grazing). The strong regional salinity gradient is expected to have important effects on BC sequestration and GHG emissions due to the changes plant community and the salinity dependence of the dominant decomposition processes driving GHG emissions, with the emission of much more powerful GHG methane being favoured at lower salinities. Gaining a better understanding of the biodiversity relationships, ecological functioning and ecosystem services provided by these understudied coastal Nordic habitats is essential for understanding their role in climate change mitigation and adaptation.

Main objective(s):

NordSalt will:

- 1) assess relationships between Nordic salt marsh plant community structure, biodiversity and carbon cycling with particular focus on BC sequestration and GHG emissions,
- 2) explore historical changes in the distribution of Nordic coastal marshes and associated changes in community biodiversity related to climatic and local pressures and management practices, and
- 3) evaluate the potential of management of Nordic coastal marshes as nature-based solutions (NbS) in a local, regional and global context.

Main activities

NordSalt will increase public awareness of the ecological role and importance of these habitats for climate mitigation, biodiversity maintenance and coastal protection.

- 1) Multiactor labs (MAL) will be used to engage stakeholders to co-produce knowledge and understanding of Nordic salt marsh ecosystem services.
- 2) Policy briefs based on NordSalt’s main findings and recommendation will be prepared for the Nordic Minister Council and national agencies.
- 3) project results will also be presented to the Commission and in international policy fora.

The project will fuse data coming from multiple sources such as drone, air photo & satellite footage, existing databases and maps using GIS tools to establish a comprehensive inventory of Nordic salt marsh habitats. This will provide basis for an assessment of habitat classification types (EU, Nordic, national), spatial status, dominant plant community and present and future management options for Nordic salt marshes, including maps of salt marsh areas current status. We will also assess environmental and anthropogenic pressures impacting these marsh habitats in different areas of the Nordic region.

NordSalt will measure BC stocks and sequestration rates in salt marshes with grazed and ungrazed marsh plant communities at case study sites. Methane emissions and net CO₂ fluxes will also be measured along different coastal gradients. We will quantitatively link plant biodiversity and plant community composition to carbon stocks, BC sequestration and GHG emissions using field surveys along the Baltic sea gradient. We will also experimentally test how plant functional diversity, fundamentally altered by grazing management practices, changes climate-related C cycling in a common garden, climate warming experiment. Results from project surveys, field work and experiments will be synthesized and assessed in terms of ecosystem services (ES) related to climate mitigation (e.g., net C sequestration), biodiversity (e.g. habitat maintenance) and coastal protection (e.g., sediment stabilization) provided by NordSalt marsh habitats. We will advise on actions by end-users to synergistically manage Nordic salt marshes as NbS to enhance climate protection, increase biodiversity and enhance ecosystem services.

General information on the project

Partners of the project:	<p>Coordinator: University of Southern Denmark - Dept. of Biology – Odense – Denmark</p> <p>Partner: Aarhus University - Dept. of Bioscience - Silkeborg and Aarhus – Denmark</p> <p>Partner: SINTEF Ocean – Section for Circular Economy – Trondheim – Norway</p> <p>Partner: Stockholm University – Dept. of Ecology, Environment and Plant Sciences – Stockholm – Sweden</p> <p>Partner: Åbo Academy University – Dept. of Environmental and Marine Biology – Åbo – Finland</p> <p>Subcontracted partner: Natural Resources Institute Finland (LUKE) – Unit of Bioeconomy and Environment – Joensuu – Finland</p> <p>Partner: University of Hamburg - Institute of Plant Science and Microbiology – Hamburg – Germany</p>
Duration of the project	01/03/2021-28/02/2024
Total grant:	1,549,087 €
Contact:	Head of Dept. Gary Banta banta@biology.sdu.dk
Website and / or Twitter of the project:	Website will be launched March 2021: https://www.sdu.dk/en/forskning/nordsalt Twitter: @NordSalt