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Exploring possibilities for subtidal seagrass restoration in the Dutch Wadden Sea

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Abstract

Seagrasses provide important ecosystem services, such as increasing biodiversity, and providing coastal protection. In the 1930s, the wasting disease caused the degradation of subtidal eelgrass (*Zostera marina*) beds throughout Europe. Although many meadows have recovered, the extensive seagrass beds in the Dutch Wadden Sea are still extinct. Seagrass restoration in general has proven to be challenging due to the dynamic environment where seagrasses usually occur. In systems with seagrass, sediment stability is increased by dense root and rhizome mats, while external forcing is reduced by shoot and leaf tissue. These tissues also trap particles from the water column, leading to clearer water and therefore more light. Once seagrass is lost, the lack of feedbacks make restoration difficult. In my PhD project, I will study possibilities for the reintroduction of subtidal eelgrass in the Dutch Wadden Sea. First, I will identify suitable habitats to support evidence-based restoration attempts. Based on water depth and sediment stability, we have selected ten possibly suitable locations. Here, we will measure environmental parameters like light availability, sediment movement, current flow, and wave height for a year. These measurements will provide the foundation for the development of a habitat suitability map for eelgrass in the Dutch Wadden Sea. Based on literature, environmental parameters will be translated into suitability indices, indicating how suitable different areas are. Multiple layers of these parameter suitability maps are then integrated into the habitat suitability map, of which I will present some preliminary data at this conference. Based on the map, I will further develop restoration experiments in mesocosms and *in situ*. Experiments will be geared towards reinstalling scale- and density-dependent feedbacks, which will later be translated in applications such as planting densities, patterns and sizes. My research will contribute to taking first steps towards reintroducing subtidal eelgrass in the Dutch Wadden Sea.

Keywords

Zostera marina, eelgrass, habitat suitability map, positive feedback