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Effects of seagrass recovery on the food web of the northern Wadden Sea

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Abstract

In contrast to global trend, seagrass beds recovered in extension and density in the northern part of the European Wadden Sea, but ecosystem effects of seagrass recovery are largely unknown. We used temporal-dynamic food web modeling Ecopath with Ecosim to assess potential ecosystem effects of seagrass recovery in the semi-enclosed Sylt-Rømø Bight at the German-Danish border. In addition to changes in the system's structure and functioning over time, the model predicted changes in biomass of seagrass associated species. Seagrass consumers increased due to an increased food supply. Likewise, the majority of seagrass meadow inhabitants increased in biomass due decreased predation pressure. In accordance to this, predators of the inhabitants decreased in biomass. With increasing seagrass meadows, the model predicted an increase of ecosystem services such as carbon sequestration and touristic attractiveness of the study site. Indirect mediation effects of seagrass severely influenced the model output and are thus crucial to forecast potential effects of the recovery of habitat-forming species. Holistic approaches such as food web models could provide a suitable basis in predicting ecosystem effects of changes in the biomass of habitat-forming species such as seagrasses.

Keywords

Ecosystem effects, Ecosystem services, Recovery effects, food web modelling