

## ABSTRACT

---

F R M Larson, 2005, The role of marine microphytobenthos with emphasis on resilience. Department of Marine Ecology, Marine Botany, Göteborg University, Sweden.

The role of microphytobenthos in the resilience after perturbations of anthropogenic origin of shallow-water sediment systems were investigated through manipulative experiments of complete sediment systems under natural conditions. The influence that microphytobenthos play on depths below the autotrophic littoral zone was also considered.

Influence of microphytobenthos on key biogeochemical processes (e.g. nutrient cycling) decreased gradually with increasing depth, but was still measurable at 10 to 15 m depth. Microphytobenthos showed to be important for resilience after hypoxia through its resistance and thereby quick restoration of the surface sediment oxygen profile. The importance of the duration of perturbations was also evident since the rate of recovery of sediment systems was proportionally dependant on the duration of hypoxic events. Increased sediment deposition showed to be a severe disturbance upon microphytobenthos and led to long-term reduction of microalgal biomass and also a persistent increase of the surface layer porosity. After a week of daily sedimentation with a final deposition of ~1 cm, the biomass of microalgae in the uppermost sediment layer was predicted to take ~6.5 weeks to converge to control levels. Despite this, the function of primary production was restored rapidly by large motile diatoms that migrated up to the surface. A manipulation with the combination of nutrient status and the antifouling biocide copper pyrithione (CPT) revealed that more measurable effects occurred under higher nutrient status. Microphytobenthos showed no direct effects from the CPT but indirect, food-web mediated effects through effects on grazers, led to increased algal biomass. Algal diversity and average biovolume were also affected by the CPT, leading to increased diversity and dominance of species with large cell volume under high nutrient status. Opposite patterns of the response of several functions of the microbenthic community pointed at non-additive effects from the combination of nutrient status and CPT. The attempt to assess resilience after the exposure to these combined stressors could not be fulfilled within the time frame of the experiment.

The results emphasized the importance of microphytobenthos in resilience in being a resistant component with high productivity and exerting a major influence on the basal functions and structuring of the microbenthic community.

**Key words:** Microphytobenthos, microbenthos, meiofauna, bacteria, resilience, recovery, resistance, sensitivity, sediment, oxygen, primary production, nutrient fluxes, denitrification, single perturbations, combined perturbation, disturbance, hypoxia, sedimentation, toxicant.