Effects of coexistence between the blue mussel *Mytilus edulis* and eelgrass *Zostera marina* on sediment biogeochemistry and plant performance

The habitat-modifying suspension-feeding mussel, *Mytilus edulis*, may have facilitating or inhibiting effects on seagrass meadows depending on the environmental conditions. We investigated the effects of *M. edulis* on sediment biogeochemistry in *Zostera marina* meadows under eutrophic conditions in Flensborg fjord, Denmark. Sediment and plant samples were collected at ten stations; five with *Z. marina* (Eelgrass) and five with *Z. marina* and *M. edulis* (Mixed) and at two unvegetated stations; one with mussels (Mussel) and one with sand (Sand). The Mixed sediment was enriched in fine particles (2-3 times), nutrients and sulphides compared to Eelgrass stations. Increased sediment nutrient availability at the Mixed stations were reflected in increased N and P content in eelgrass. The plant biomass did, however, not differ significantly between stations, but shoot features (number of leaves and leaf areas) were significantly reduced at Mixed stations suggesting inhibiting effect of *M. edulis* on *Z. marina*. Negative correlations between eelgrass measures and sediment sulphide at Mixed stations indicate that presence of mussels increase sulphide invasion in the plants. A survey of 318 stations in Danish fjords suggests a threshold of 1.6 kg *M. edulis* m-2 beyond which no coexistence between *Z. marina* and *M. edulis* was found.

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