Abstract

The southern Baltic Sea coast is strongly shaped by abiotic variables and is constantly changing. Due to the climate change-related sea-level rise and increased storm-surge events, terrestrial-marine exchange processes are increasing significantly. These processes are enhanced by renaturation of coastal peatlands through deconstruction of dunes and dikes, thereby facilitating exchange processes between the shallow Baltic Sea and the coastal peatlands. However, the ecophysiological consequences to the organisms in these contrasting environments are barely known. This applies especially to the microphytobenthos, a phototropic biofilm often dominated by diatoms, which, due to their function as primary producers, massively contribute to the biogeochemical cycles in both ecosystems.

This dissertation focused on the ecophysiological responses of unialgal diatom isolates from the microphytobenthos in the shallow southern Baltic Sea and adjacent coastal peatlands to the fundamental variables salinity, temperature, and light availability in their respective habitats, as well as the influence of potential mixing of waterbodies of the two ecosystems on growth rates and photosynthetic performance of the benthic diatoms.

Publications I and II described the wide photo-physiological plasticity of diatom strains from the Baltic Sea and peatlands to the prevailing light conditions of their habitats. All diatom strains also showed euryhaline and eurythermal tolerances that greatly exceeded the prevailing temperature and salinity ranges in the two habitats.

In publication III, species-specific growth rates were determined in media with different proportions of sea and peatland water. Peatland water significantly stimulated the growth of the Baltic Sea and peatland diatom strains. The Baltic Sea strains also showed dependency to higher salinities requiring at least brackish water.

Finally, the results in publications I and III revealed a stimulating effect of peatland water on the specific growth rates of the benthic diatoms, indicating mixo-/or heterotrophic capabilities related to the high availability of organic carbon in the peatland waterbodies.

In summary, this dissertation showed that due to their high photo-physiological plasticity as well as wide euryhaline and eurythermal tolerances, Baltic Sea and peatland diatoms are well acclimated to the fluctuating abiotic variables of their respective habitats. The data may indicate that benthic diatoms will thrive under the environmental changes resulting from renaturation of coastal peatlands or climate change.