

Increasing surface temperature causes changes in plankton communities of the Baltic Sea

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Marine ecosystems are undergoing substantial changes due to human-induced pressures. We present an analysis of long-term data series from the northern Baltic Sea between 1979 and 2012. The trends and interactions between hydrography, inorganic nutrient concentrations and phyto- and zooplankton community composition were statistically analysed. The most conspicuous hydrographic change was a significant increase in late summer surface water temperatures over the study period. In addition, salinity decreased and dissolved inorganic nutrient concentrations increased in some basins. Based on redundancy analysis (RDA), warming was the key environmental factor explaining the observed changes in plankton communities: the general increase in total phytoplankton biomass, as well as decrease in total zooplankton abundance observed in some basins with differing reflections to plankton community structure. Of the dominant copepods, a decrease in *Acartia* spp. and an increase in *Limnocalanus macrurus* were observed. We conclude that the plankton communities in the areas suffering from eutrophication in the Baltic Sea have shifted towards a food web structure with smaller sized organisms, leading to decreased energy available for planktivorous fish. The shift is most probably due to complex interactions between warming, eutrophication and increased top-down pressure due to overexploitation of resources, and the resulting trophic cascades.

Keywords: Temperature increase, phytoplankton, zooplankton, community change, Baltic Sea

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