

Has human-induced eutrophication promoted fish production in the Baltic Sea?

Margit Eero, Helén Andersson, Elin Almroth Rosell, Brian R. MacKenzie

Human-induced eutrophication, i.e. nutrient enrichment from land and atmosphere, is among the greatest threats to the good environmental status of the Baltic Sea. There is ample evidence of negative impacts to the environment associated with eutrophication, such as toxic algal blooms and degradation of habitats, affecting negatively on biodiversity and other ecosystem functions. However, nutrient enrichment up to a certain level may also contribute in a positive way to the secondary production in coastal systems. In the Baltic Sea, a number of changes in the physical environment in relation to nutrient enrichment since the 1950s have been documented. However, knowledge of consequent changes in biological production in the open Baltic Sea is less conclusive and there is relatively little empirical evidence available on the possible link between nutrient enrichment and enhanced fish production. The analyses conducted in this paper, based on statistical analyses of long time series of monitoring data, are aimed to elucidate whether the sharp multi-fold increase in nutrient concentrations from the 1950s to the 1980s enhanced fish production. The analyses are facilitated by reconstructed historical stock dynamics (incl. growth, recruitment production) of sprat and cod, supplemented by nutrient concentrations from a 3D coupled physical-biogeochemical ocean model. These analyses provide useful insights to whether reduced fish production can be expected resulting from reduction in nutrient concentrations and may be helpful for setting management targets taking into account wider ecosystem consequences.