

Morten Søndergaard: Presentation at a “round-table-discussion” organised by the German Research Council. September 16-17, 2002, Berlin.

Consequences of weather and climate changes for marine and freshwater ecosystems - Conceptual and operational forecasting of the aquatic environment

A 4 year Danish research project (2002-2006) granted 3.2 mill €

Abstract.

Changes in the environmental status of fresh and marine waters have been noted in Denmark and elsewhere during recent decades and considerable research effort has been directed towards elucidating the impact of human activities (e.g. eutrophication, exploitation) on these aquatic ecosystems. Intuitively, it is recognised that weather/climate also impact on both the productivity and the state of aquatic ecosystems and that any anthropogenic influence on these systems is occurring against a background of climate mediated fluctuation.

Significant climate changes at the regional scale are expected in the coming decades. The anticipated climate changes for Denmark are for generally warmer and wetter conditions, with some increase in the frequency of storms and heavy precipitation events. We anticipate that these changes will lead to changes in: (1) the transport of matter from land to sea, (2) the turnover of nutrients and organic matter, (3) water column stability in lakes, fjords and marine areas, and (4) the trophic structure and dynamics of these systems. However, a scientific understanding of the consequences in regional climate change scenario is missing. Thus, the objectives of the project are (1) to develop a conceptual understanding of how the present and future climate will interact with fundamental ecological processes in aquatic systems ranging from streams and lakes to coastal areas and more open seas and (2) to translate and develop this information to operational models with the perspective to quantify effects of climate change over short (decades) and long time scales (centuries).

The research strategy builds on three key elements: (1) development of empirical relationships from historical records/observations, palaeolimnological data and climate/weather time-series (2) key ecological processes influenced by climate are targeted through observations and experiments and (3) development of coupled climate ecosystem models generated by linking and improving existing climate, marine and limnological models to both test hypotheses and provide operational prognoses.

In the presentation I shall focus in some detail on key research areas and shortly introduce the institutions and persons involved.