



## **Impact of river basin management on coastal water quality and ecosystem services: A southern Baltic estuary**

Gerald Schernewski (1), Jens Hürdler (2), Thomas Neumann (1), Nardine Stybel (1), and Markus Venohr (2)

(1) Leibniz-Institute for Baltic Sea Research, Rostock, Germany (schernewski@eucc-d.de), (2) Leibniz-Institute of Freshwater Ecology and Inland Fisheries, Berlin, Germany

Eutrophication management is still a major challenge in the Baltic Sea region. Estuaries or coastal waters linked to large rivers cannot be managed independently. Nutrient loads into these coastal ecosystems depend on processes, utilisation, structure and management in the river basin. In practise this means that we need a large scale approach and integrated models and tools to analyse, assess and evaluate the effects of nutrient loads on coastal water quality as well as the efficiency of river basin management measures on surface waters and especially lagoons and estuaries.

The Odra river basin, the Szczecin Lagoon and its coastal waters cover an area of about 150,000 km<sup>2</sup> and are an eutrophication hot-spot in the Baltic region. To be able to carry out large scale, spatially integrative analyses, we linked the river basin nutrient flux model MONERIS to the coastal 3D-hydrodynamic and ecosystem model ERGOM. Objectives were a) to analyse the eutrophication history in the river basin and the resulting functional changes in the coastal waters between early 1960's and today and b) to analyse the effects of an optimal nitrogen and phosphorus management scenario in the Oder/Odra river basin on coastal water quality.

The models show that an optimal river basin management with reduced nutrient loads (e.g. N-load reduction of 35 %) would have positive effects on coastal water quality and algae biomass. The availability of nutrients, N/P ratios and processes like denitrification and nitrogen-fixation would show spatial and temporal changes. It would have positive consequences for ecosystems functions, like the nutrient retention capacity, as well.

However, this optimal scenario is by far not sufficient to ensure a good coastal water quality according to the European Water Framework Directive. A "good" water quality in the river will not be sufficient to ensure a "good" water quality in the coastal waters. Further, nitrogen load reductions bear the risk of increased potentially toxic, blue-green algae blooms.

The presentation will summarize recent results (Behrendt et al. 2009, Schernewski et al. 2009, Schernewski et al. in press, Schernewski et al. submitted) and give an overview how Climate Change and socio-economic transformation processes in the river basin will effect coastal water quality during the next decades. The opportunities and threats of a changing lagoon ecosystem for tourism and fisheries, the major economic activities, will be shown.