



Integrated modelling and management of nutrients and eutrophication in river basin - coast - sea systems: A southern Baltic Sea perspective

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The Odra river basin (area: 120,000 km², average discharge: 550 m³/s, annual N-load 60,000 t) and the Oder (Szczecin) Lagoon (687 km²) are the eutrophication hot-spot in the south-western 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 nitrogen and phosphorus management scenarios in the Oder/Odra river basin on coastal and Baltic Sea 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 lagoon 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 a) summarize recent results (Schernewski et al. 2009, Schernewski et al. 2011, 2012), b) give an overview how the models were used to provide a comprehensive and consistent set of water quality thresholds and maximum allowable riverine loads for the Water Framework Directive and c) will show the implications for an optimised river basin – lagoon quality management.