

Impact of Global Change on the Water Quality of the Elbe Concept and Model Validation



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CONCEPT

Background and Objectives

Eutrophication problems dominate the water quality of the Elbe because of high nutrient loads and low water availability in the catchment. Predictions of future water quality, driven by reduction of average rainfall and changes in nutrient availability, are of major interest for river basin management. In this project, we plan to

- **Analyse** regional effects of the global change on the water quality of the Elbe
- **Evaluate** the future ecological state of the Elbe with regard to the EU Water Framework Directive
- **Develop strategies** for water quality management under various climatic and socio-economic scenarios

Tool - the water quality model QSim

- **Process-oriented, mechanistic model** (Schöl et al. 1999, 2002)
- **Modular structure** including hydraulic, physical, chemical and biological processes (Fig. 1)
- **Driving forces:** meteorological conditions (radiation, air temperature etc.), nutrient input and discharge
- Calculates **longitudinal profiles** and **annual cycles** of all important water quality variables and biomass of various algae groups and zooplankton

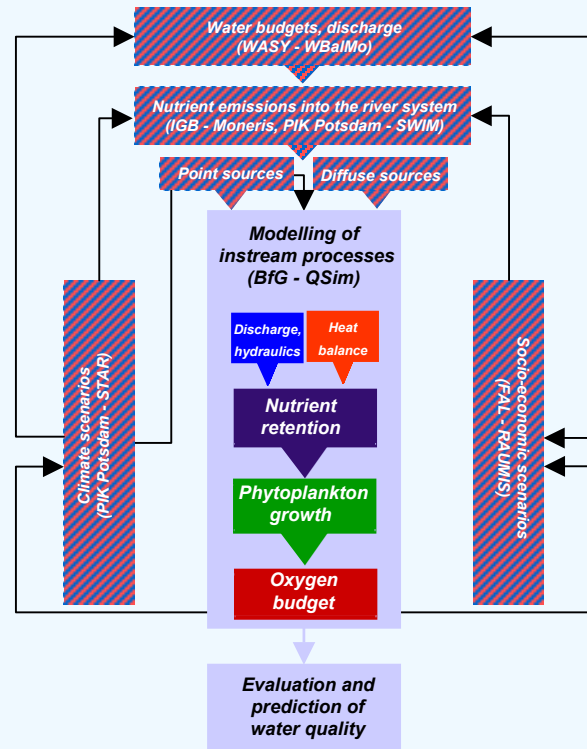


Figure 1: Integration of QSim into GLOWA-Elbe

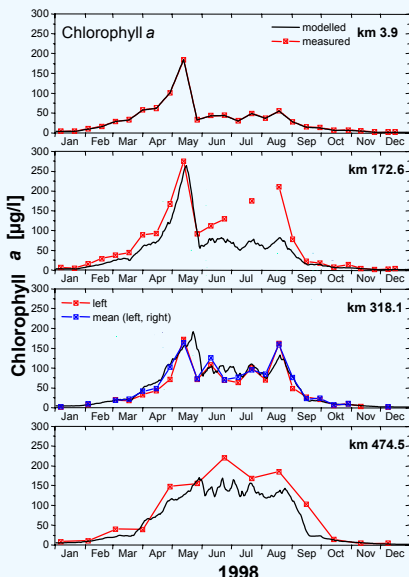


Figure 2: Validation of modelled chlorophyll a concentrations at four stations with bi-weekly measurements.

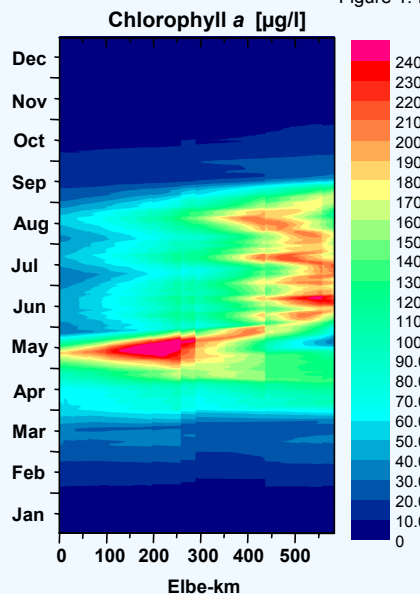


Figure 3: Spatiotemporal simulation of chlorophyll a concentrations in the Elbe, year 1998

VALIDATION

Phytoplankton is an important variable in the river's organic matter and oxygen budget and serves as indicator for water quality according to the EU Water Framework Directive (Mischke et al. 2005). The validation results (Fig. 2) demonstrate the usefulness of QSim for the simulation of the ecological status of the Elbe (Fig. 3; Schöl et al. 2005 for a more complete overview).

Perspectives

Based on extended validations for the years 1995 - 2004, scenarios for changes in nutrient inputs and climate will be simulated and evaluated.

References

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