

Harmonized modelling of nutrient emissions into and loads in European river systems

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Abstract:

According to the current state of knowledge there is a lack of models with a harmonized approach to calculate nutrient emissions into and loads in transnational river systems and to consider measure implementation, respectively. The challenge of an Europe-wide policy aiming at the development and implementation of river basins management plans can only be faced with large-scale spatial modelling. For this on the one hand detailed country data, on the other a harmonized view on different river basin scales have to be taken into account.

To meet these necessities we applied the model MONERIS (MODelling Nutrient Emissions in River Systems) at the European-scale. MONERIS is a semi-empirical, conceptual model to calculate nitrogen and phosphorus emissions into surface waters, in-stream retention, and resulting loads on a river catchment scale (Behrendt et al., 2000, Venohr et al., 2009 & submitted). With the implemented scenario manager the effect of measures on the nutrient loads in rivers can be determined. The model results allow a comprehensive, large-scale assessment of nutrient emissions into and loads in river systems as basis of decision-making regarding to the EC Water Framework Directive. They could support across border cooperation to develop specific management options and coherent management plans for European rivers basins.

For the Europe-wide MONERIS calculation a harmonized data base with freely available data from, for instance, European agencies (EEA, JRC, Eurostat) or international associations (FAO, OECD) was prepared. Calculations were done for nearly 2,000 hydrological sub-catchments with a mean size of 2,800 km² covering EU 27, Norway, Switzerland and Balkan States. Based on the results of the EU-wide application different scenarios were calculated to assess the effect of measures to reduce nutrient emissions such as scenarios for the use of phosphate-free laundry and dishwasher detergents, changes in land-use intensities and the fulfilment of the target values of the EC Urban Waste Water Treatment Directive.

References:

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