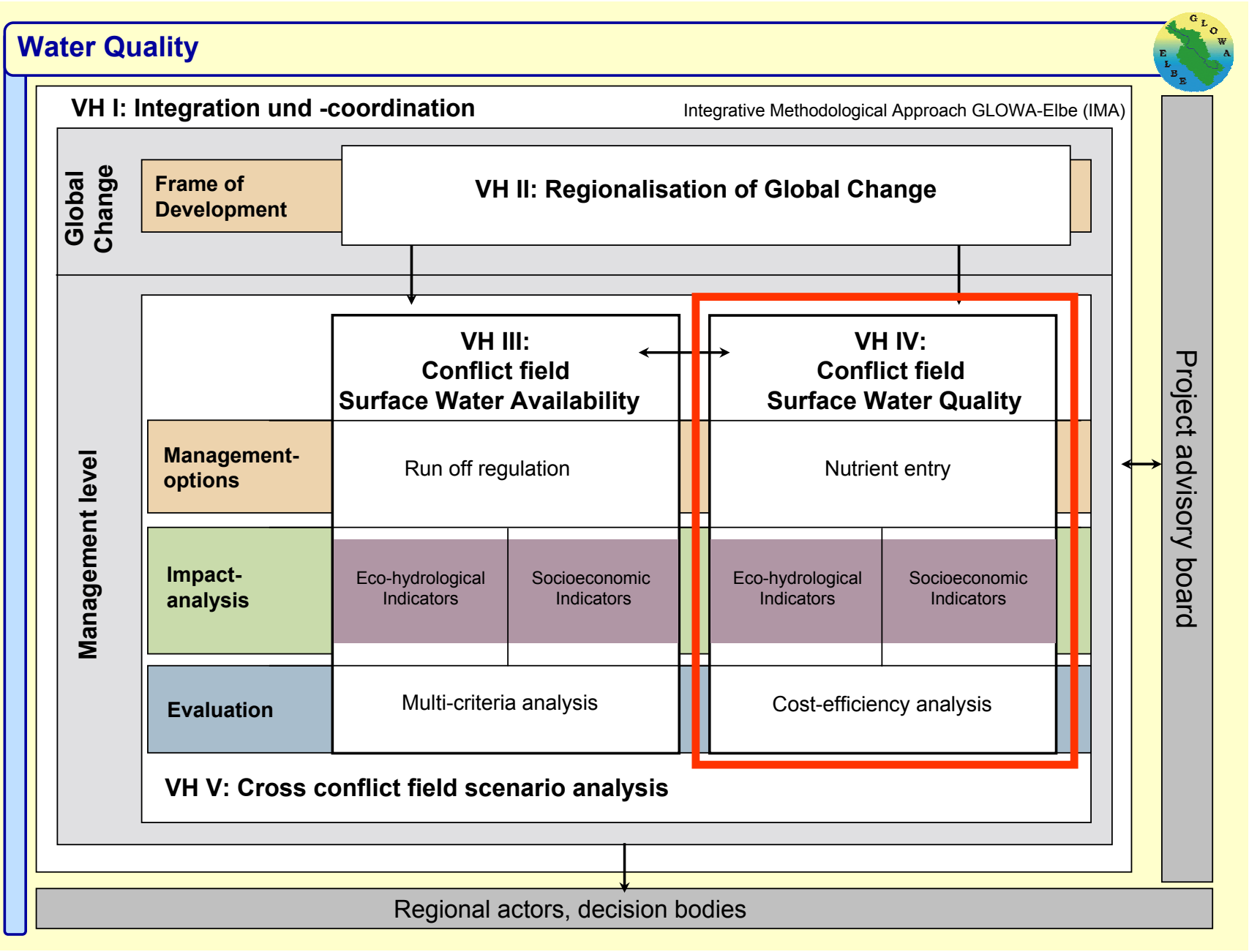
GLOWA-Elbe

Modelling the nutrient emissions retention and loads as well as ecological state in the surface waters of the Elbe catchment

Tools: MONERIS & QSIM

Behrendt, Grossmann, Gömann, Mischke, Schöll, Steidl

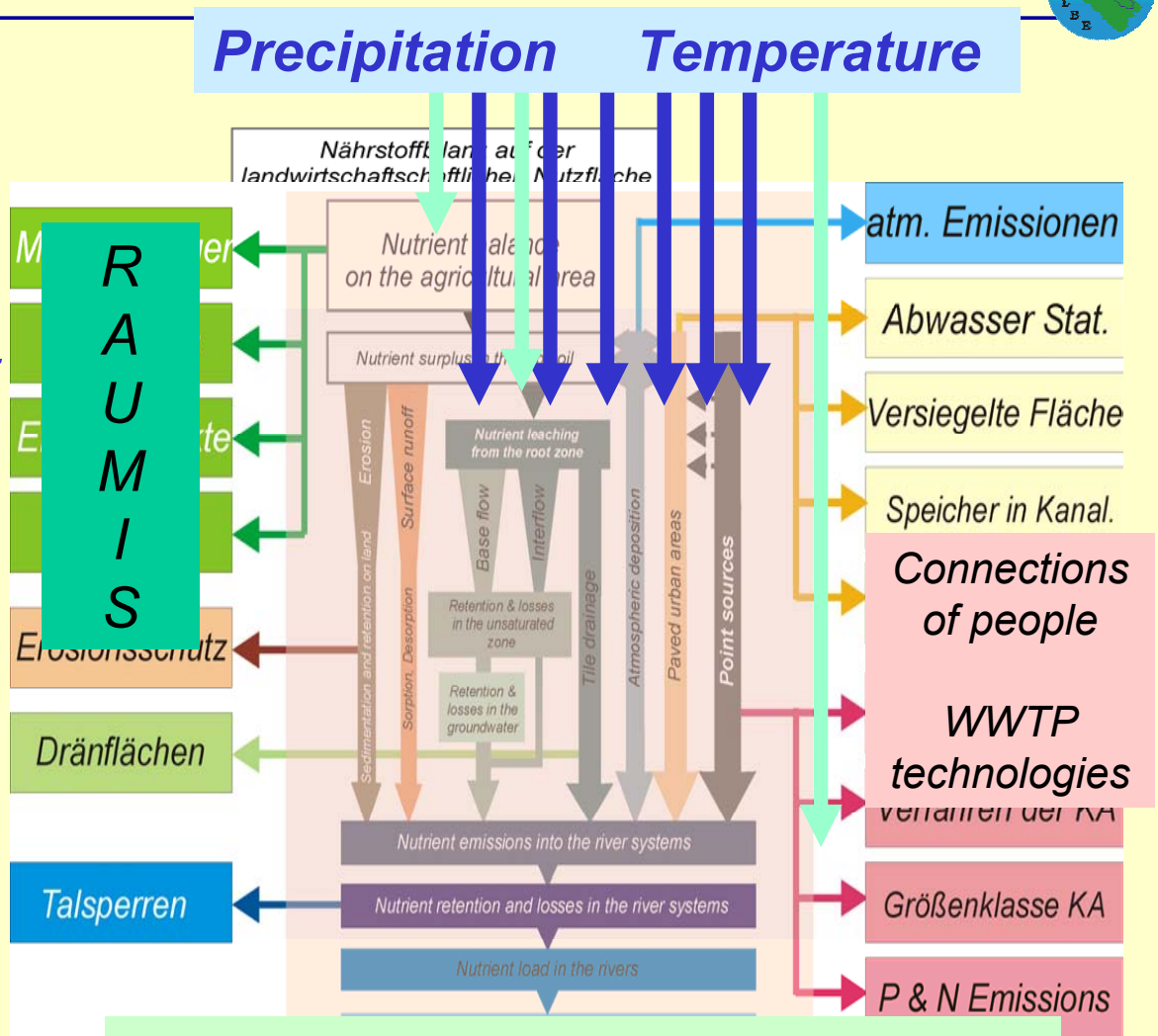

Water Quality
VH I: Integration und -coordination
Integrative Methodological Approach GLOWA-Elbe (IMA)
Global Change
Frame of Development
VH II: Regionalisation of Global Change
Management level
VH III: Conflict field Surface Water Availability
VH IV: Conflict field Surface Water Quality
Management-options
Run off regulation
Nutrient entry
Impact-analysis
Eco-hydrological Indicators
Socioeconomic Indicators
Eco-hydrological Indicators
Socioeconomic Indicators
Evaluation
Multi-criteria analysis
Cost-efficiency analysis
VH V: Cross conflict field scenario analysis
Project advisory board
Regional actors, decision bodies

Tasks

Development of a system of models,

for scenario calculations of possible changes of the nutrient concentrations and ecological state in the Elbe:

- *Due to climate changes and*
- *Socio-economic development and*
- *Environmental targets (e.g.WFD)*

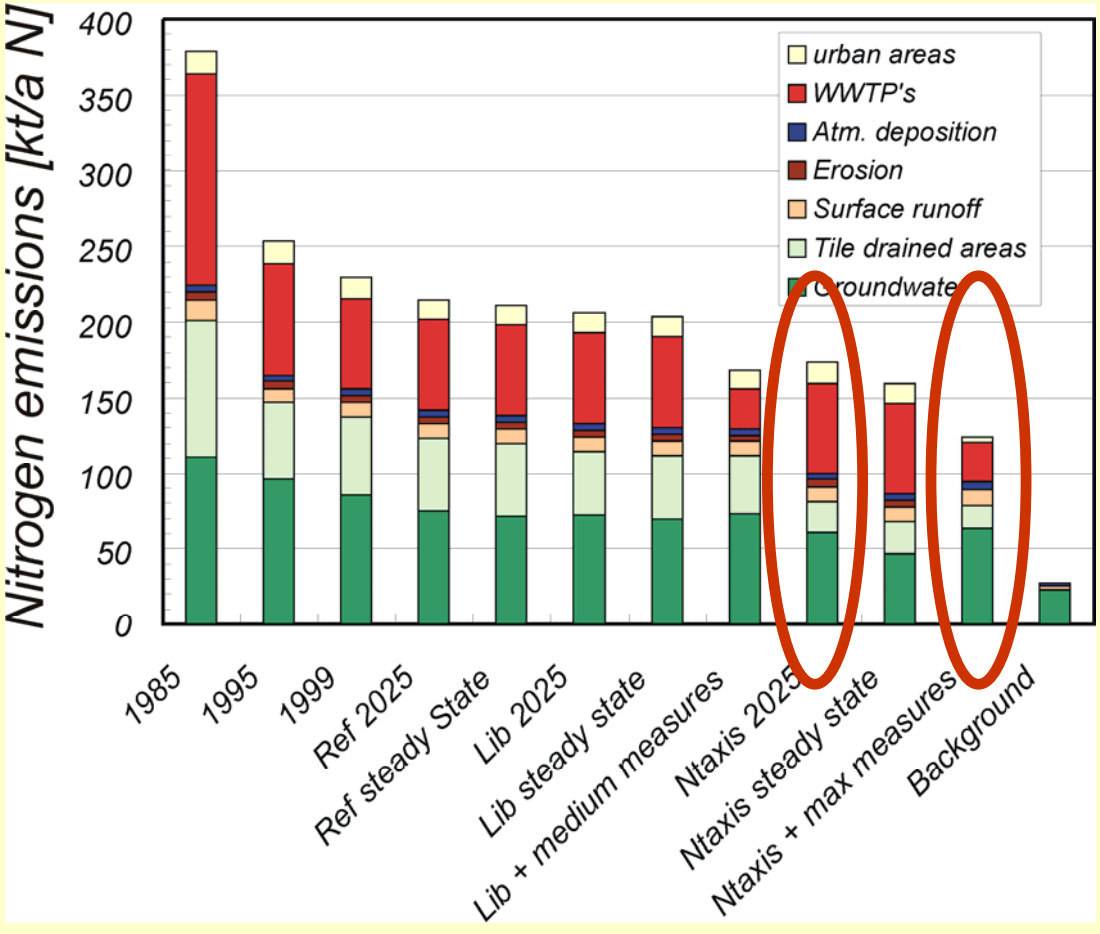


Ecological state of the water bodies of the Elbe and coastal zone

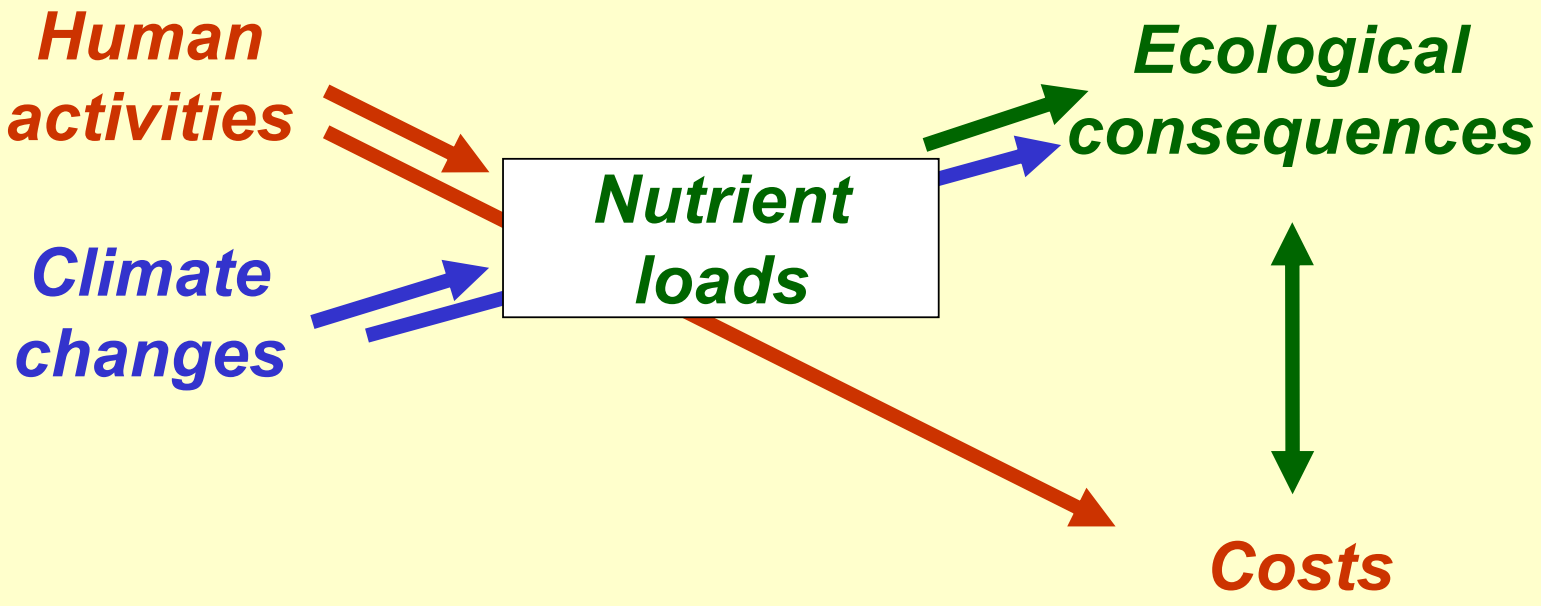
Interactions between agricultural activities and nitrogen emissions

Only the introduction of a strong N-taxes leads to a substantial reduction of the N-emissions from the agricultural areas.

The maximum potential for the reduction N-emissions is about 1/3 compared to 1999



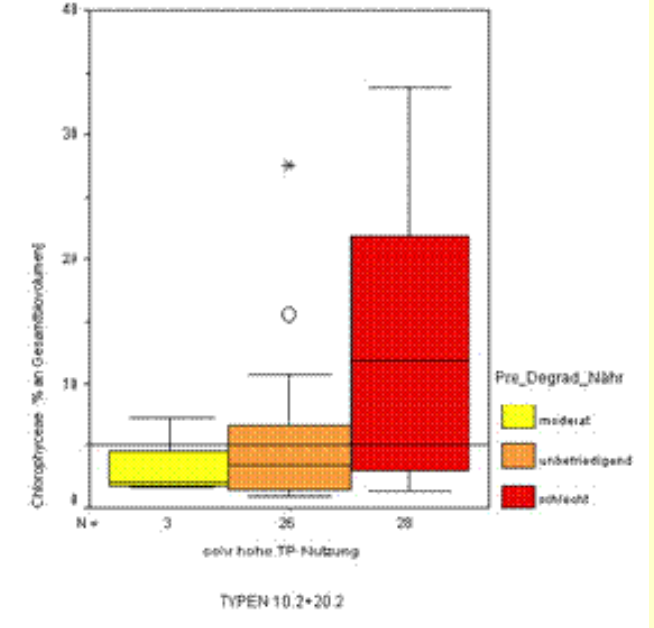
GOWA-Elbe Phase II



Find solutions which have large ecological effects with a optimum of costs

Linkage between nutrient loads and ecological state of the river

Classification of phytoplankton in rivers



Tool for the modeling: QSIM

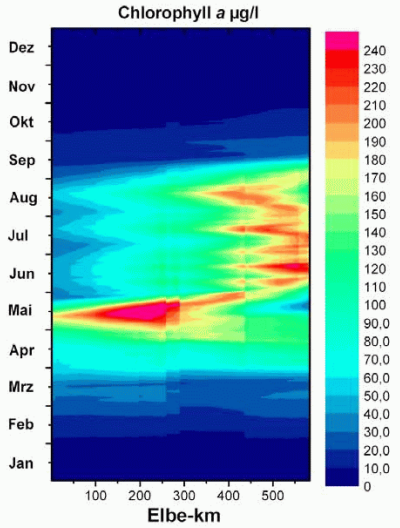


Abb. 4.2.1-2: Modellierte Chla-Gehalte in der Elbe im Jahr 1998.

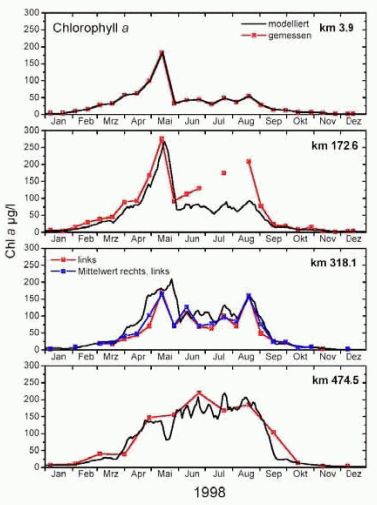
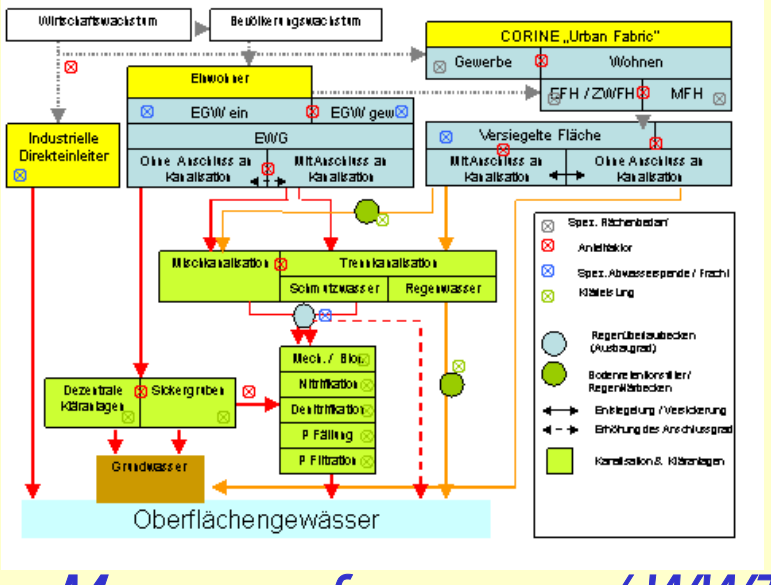


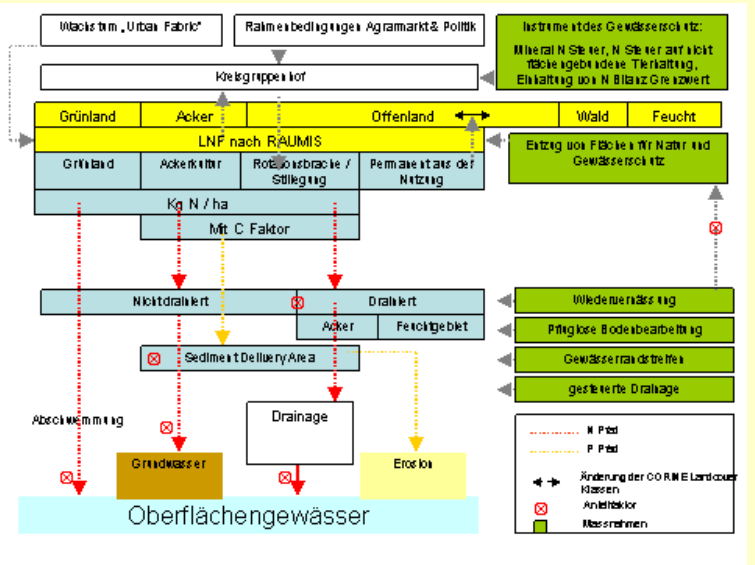
Abb. 4.2.1-3: Validierung der Chla-Gehalte an 4 Stationen mit 14-tägigen Messdaten.

Linkage between human activities and nutrient loads

Activities in urban area



Agricultural activities



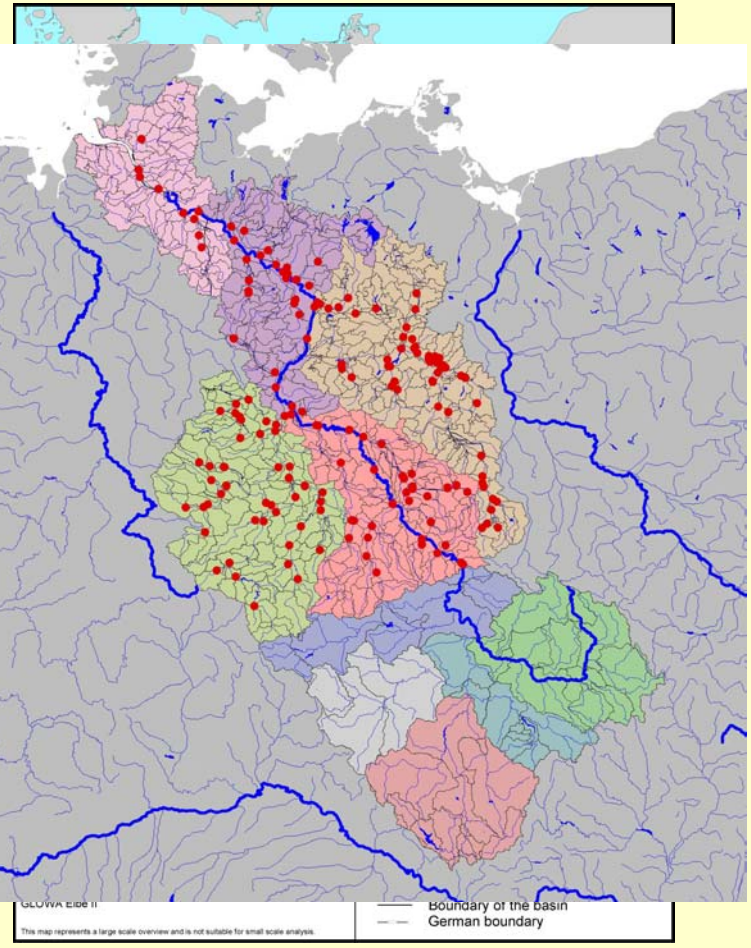
Measures for sewers / WWTP / connection of people central versus decentral

RAUMIS / SWIM

Existing data for the modeling of the Czech part of Elbe

- The modeling of the Czech part of Elbe was focused in Glowa-Elbe I on the diffuse emissions. The spatial resolution of subcatchments was about 2000 km².

- Data on discharge and nutrient loads were only available for the station at Schmilka (outlet of Czech part). For point sources the total values for Czech part of Elbe were distinguished to subcatchments based on population density and urban area.

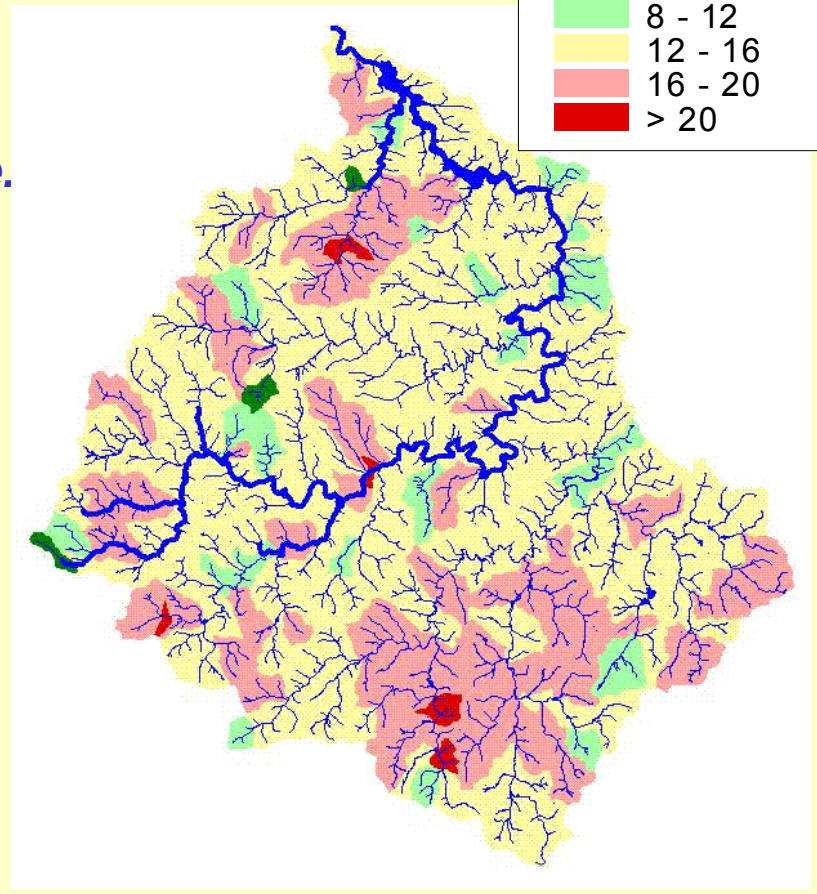


- Present state DE: 645 subcatcments (150km²); 180 stations; CZ: 55 subcatchments (920km²); 1 station

Modelling of CZ-catchments is possible

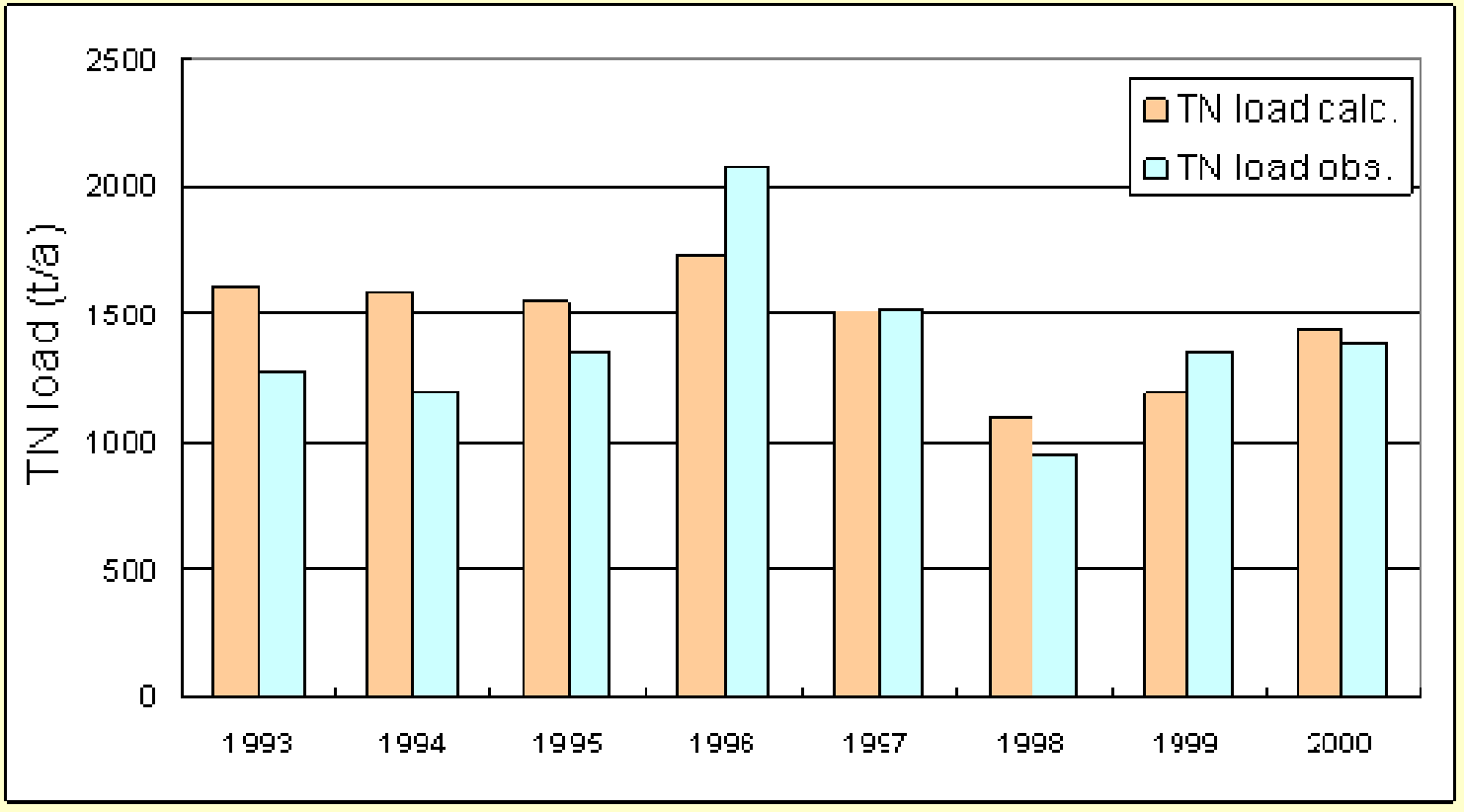
- *Experience from Glowa-Elbe I and Euroharp: In Czech Republic best input data for modeling are available.*

- *This data allows a modeling with high spatial resolution.*
- *Zelivka: about 265 subcatchments (average size 4,5 km²)*

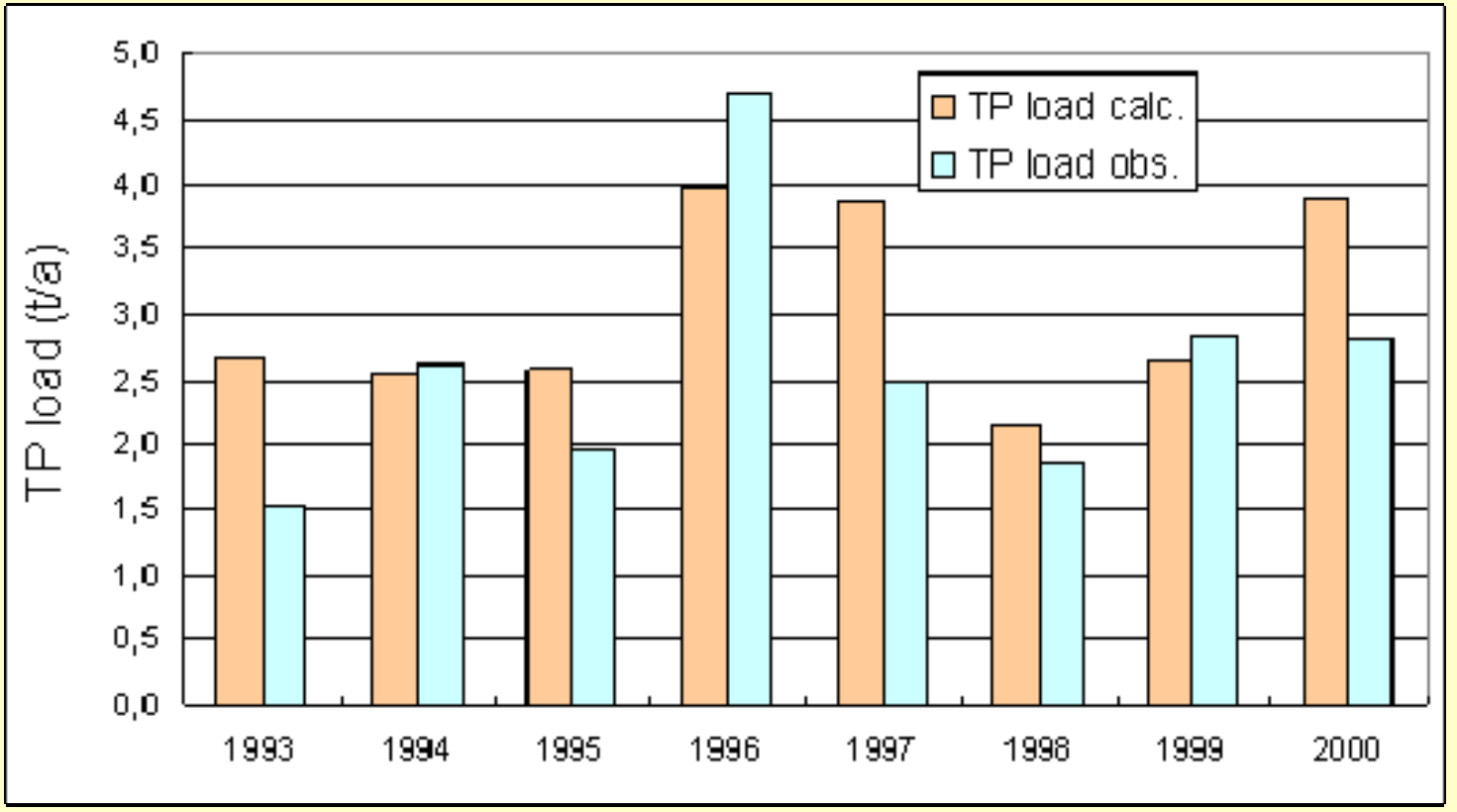


Resolution: 1 to 10 km²

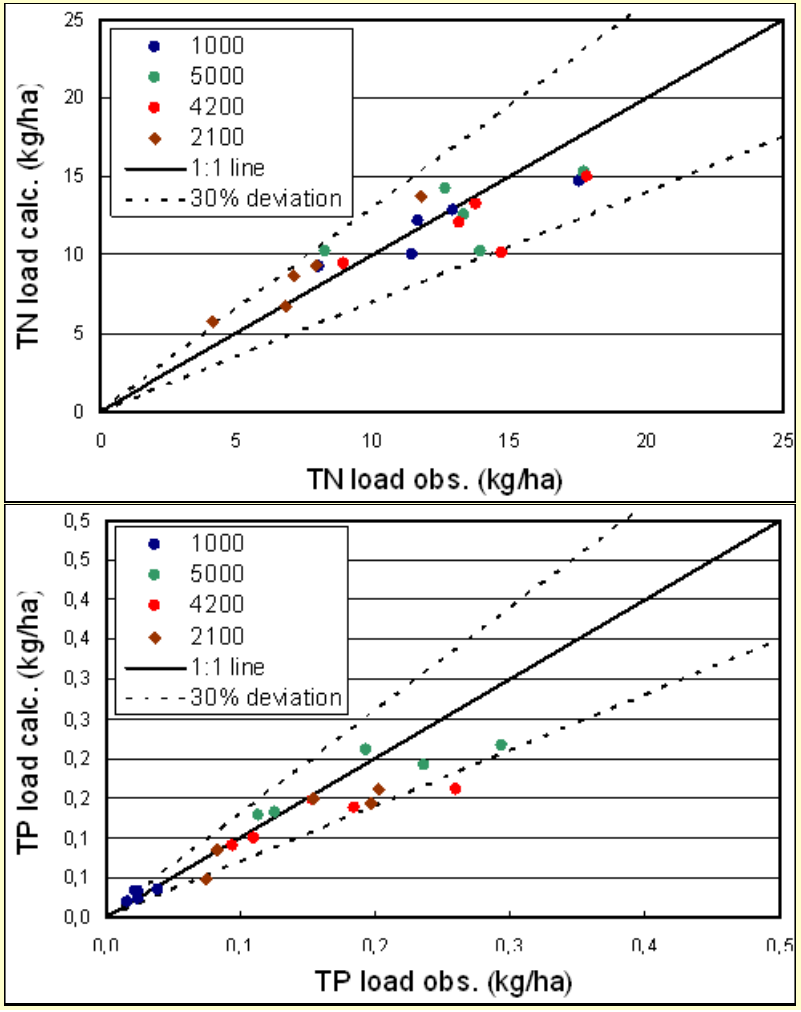
Comparison of calculated and observed TN loads for the Zelivka catchment



Comparison of calculated and observed TP loads for the Zelivka catchment

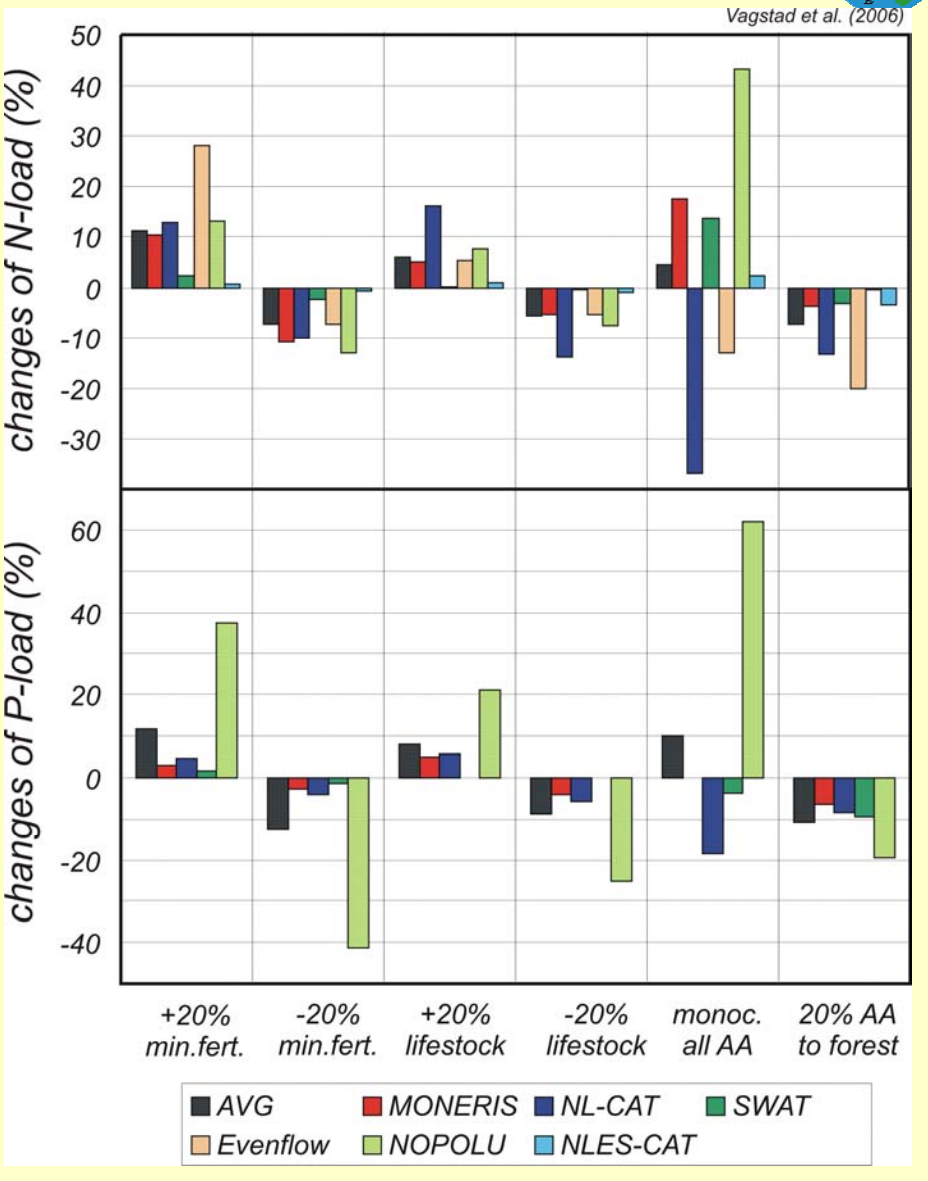


Comparison of calculated and observed TP loads for the Zelivka catchment for different stations



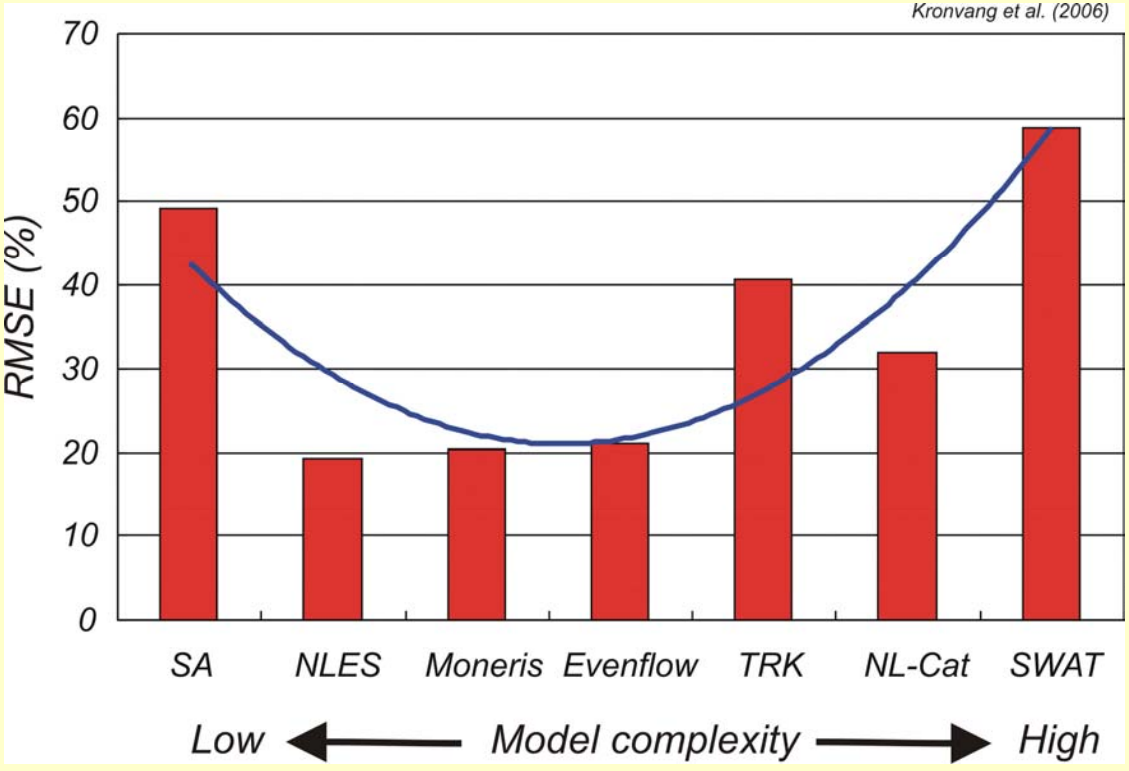
Comparison of the results of Euroharp models for certain scenarios (Zelivka, CZ)

MONERIS calculates changes mostly near by or below the average of all model results that means it produces rather conservative estimations

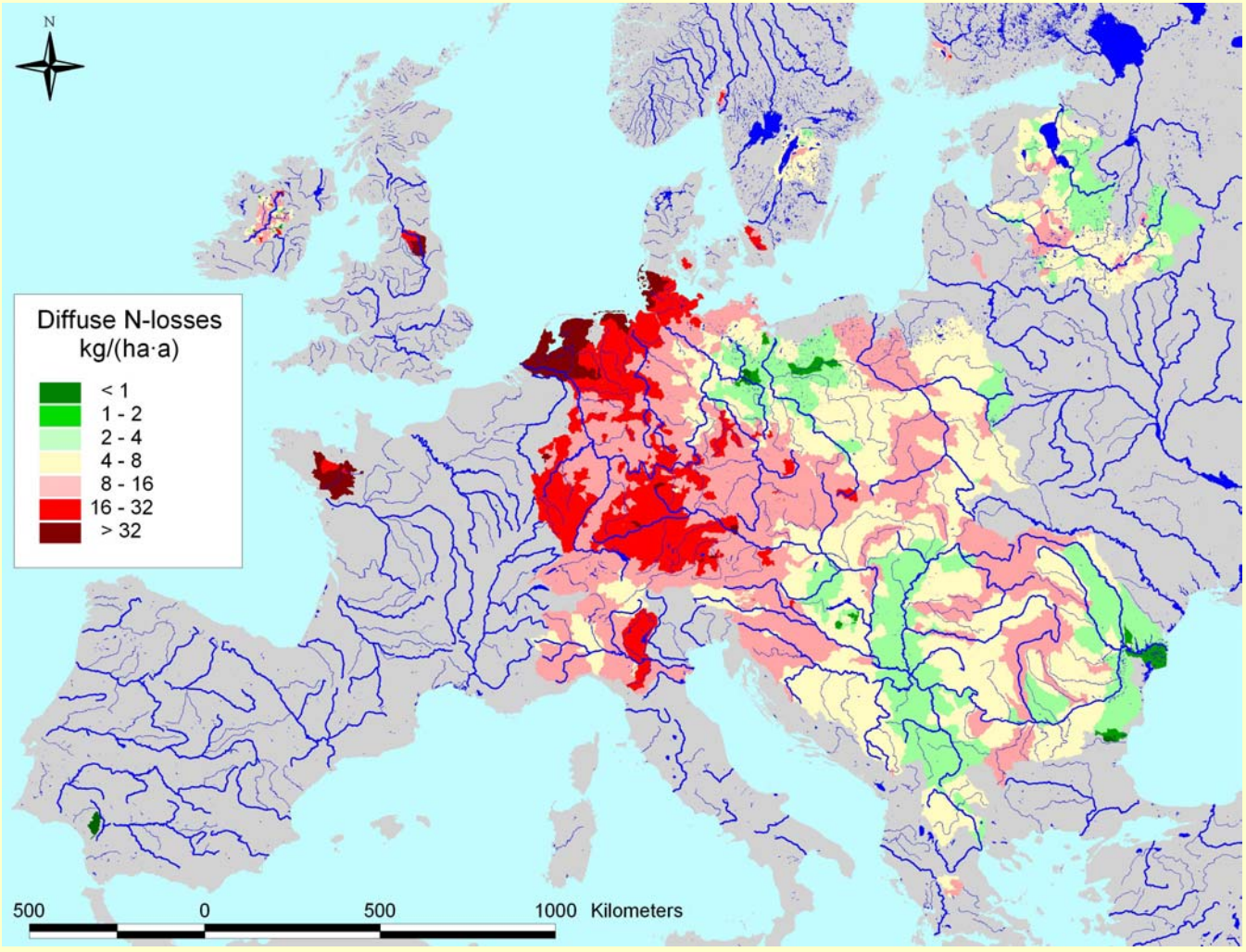


Mean deviation of agricultural losses of the individual models for the investigated catchments

Simple (SA) and high complex models (SWAT; NL-Cat; TRK) show larger deviations than models with medium complexity



Regional Differences of diffuse N-emissions in Europe - MONERIS results -



Needed data for a better modeling

- *Daily discharges for about 5-10 gauging stations for each of the 5 coordination districts within the Czech part of Elbe for 10 to 20 years.*
- *Nutrient concentrations for about 5-10 monitoring stations for each of the 5 coordination districts within the Czech part of Elbe for the last 10 to 20 years (NO3, NO2, NH4, TN, SRP, TP, SiO2, Chl-a, SS, Temperature, DOC, TOC, Cl; best weekly or beweekly frequency).*
- *5 to 10 river profiles along the Labe from the confluence with Vlatava to Usti nad Labem*
- *Discharges of waste water treatment plants larger than 10000 PE (best >2000 PE) values for the 10 to 15 years (kind of treatment, TN or DIN, TP, Q)*
- *Statistics on population (municipalities) and connection of population to sewers and WWTP for 2004 or 2005 (okres)*
- *Statistics on agricultural production and fertilizer application for okres for time period 2000 to 2005*

Thank You!

Deliveries and offers which can be used by Czech partners

- *Using of the calibrated MONERIS model for the Czech part of Elbe and the total Elbe including a tool for own scenario calculations.*
- *2-3 day training of an expert group of Czech colleagues regarding the use of MONERIS. Detailed training of one or two experts regarding the establishment and calibration of MONERIS for the Czech part of Elbe (2 times 3 weeks at IGB).*
- *Joint publications of the scientific results*
- *Modeling of the nutrient emissions and loads for the Czech part of Danube and Odra, if there is a interest for this. Such modeling was already down in the EU-project Danubs and the Odra project but not detailed enough for WFD.*