



Nutrient emissions in the NEMUNAS Catchment with MONERIS

Hürdler, J. and Venohr, M.

Introduction

- Emissions and loads modelled for the years 2001 – 2004 and for mean hydrological conditions
- All input data provided by project partner have been used. Missing data have been derived from general European wide available data
- Only monitoring stations with at least 12 measurements per year have been used
- For Belarus not all needed input data could be collected. Loads from nearest monitoring station in Lithuania were used for loads from Belarus.

Analytical units and monitoring stations

Catchment of the Nemunas River Basin

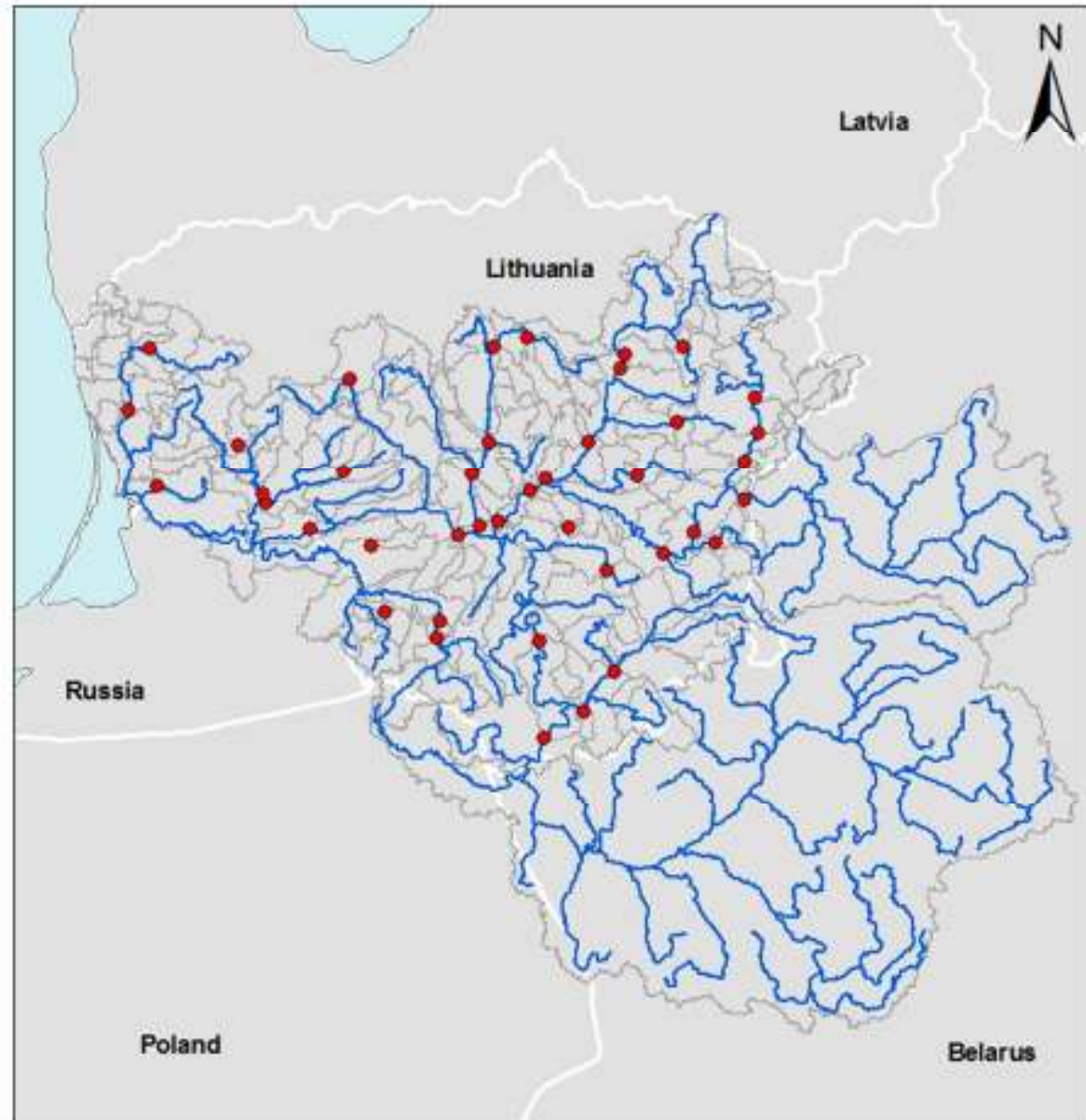
Legend

-  Relevant Gauges
-  Mainrivers
-  Subcatchments

Data source:

Lithuanian EPA Data
(2000)

CCM River and Catchment
Database European
Commission JRC, 2007



Digital elevation model

Digital Elevation Model of Nemunas River Basin

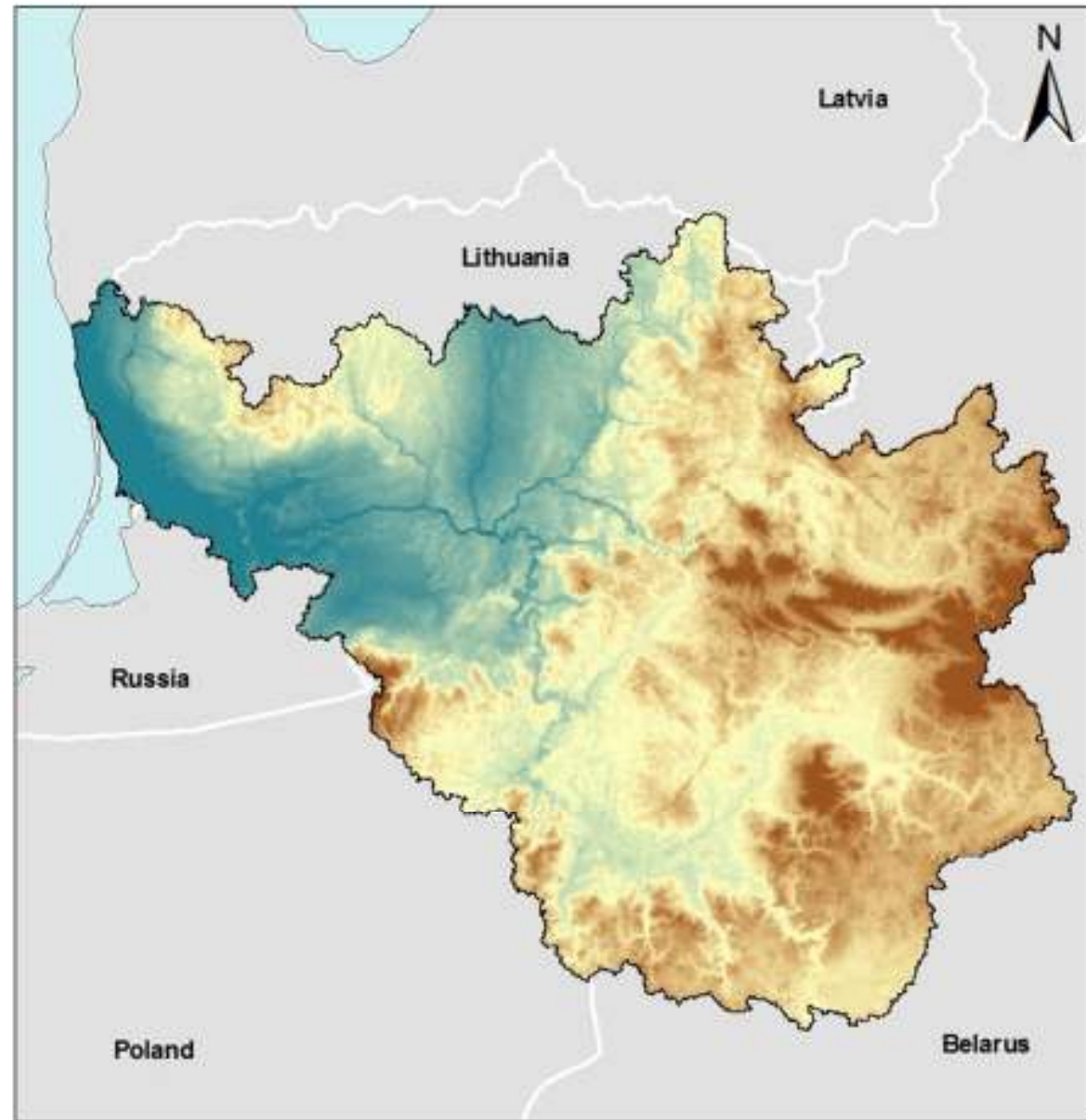
Legend

elevation above sealevel

Value



Data source:
GTOPO30 from U.S.G.S.

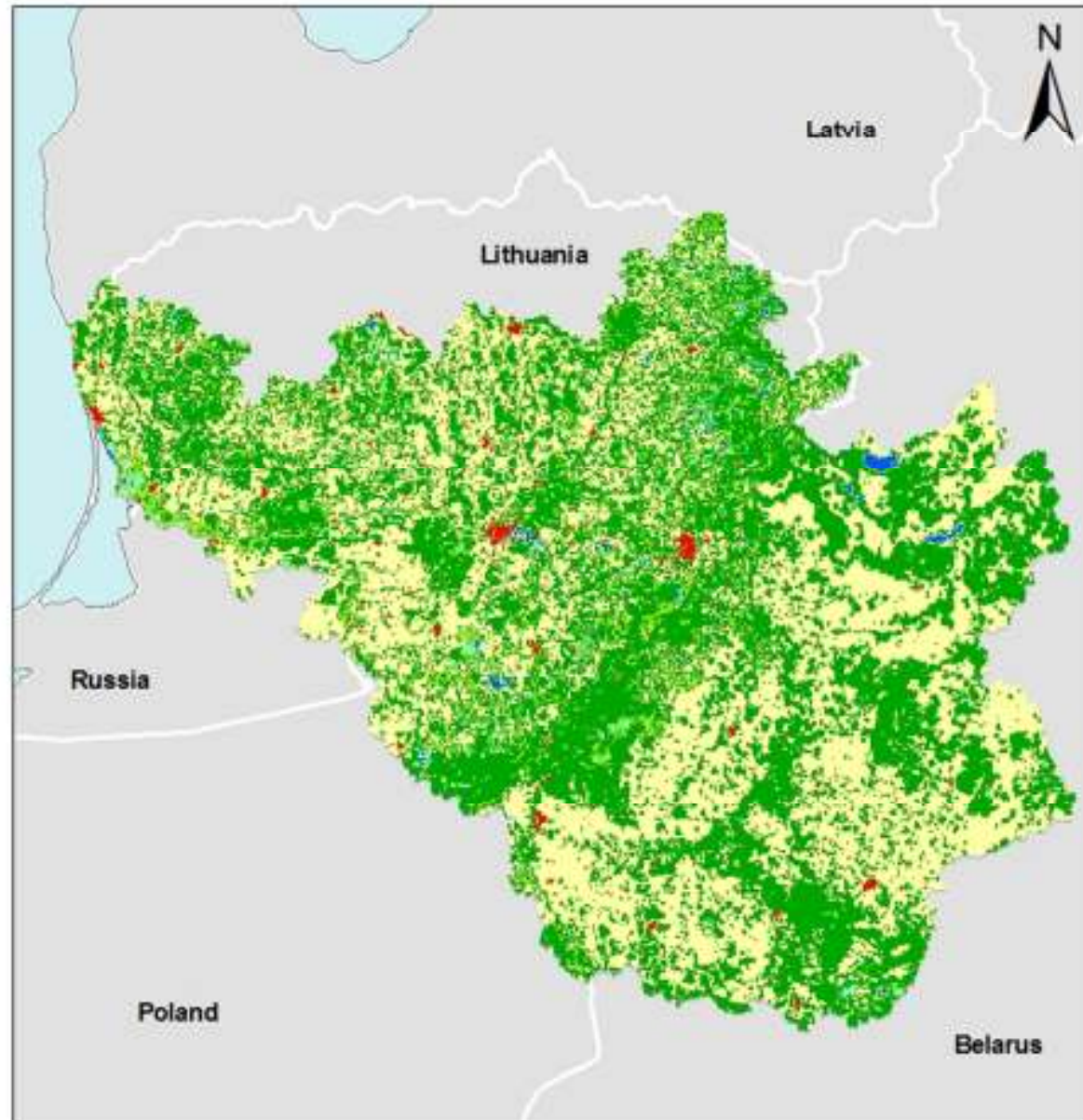


Landuse

Landuse at the Nemunas River Basin

Legend

- urban area
- open pit mine
- arable land
- natural covered areas
- grasland
- wetland
- open area
- water surface area

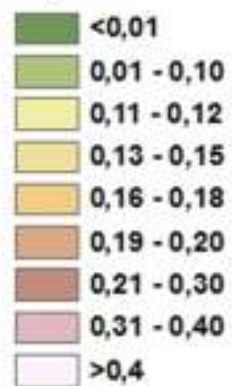


Data source:
Composition of CLC 2000
and GLC by Baltic Nest
Institute

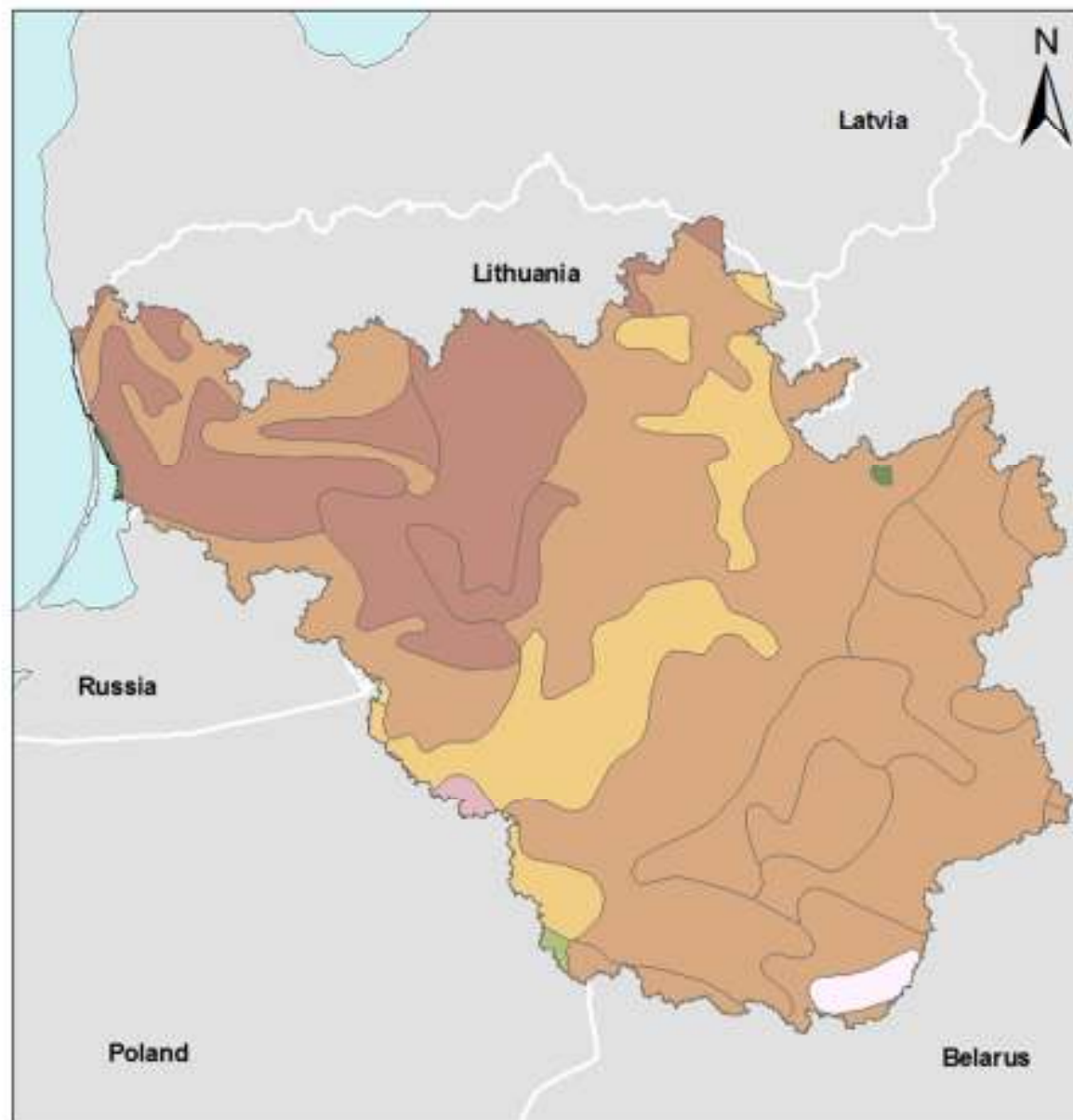
Nitrogen content in top soils

**Average Top Soil Nitrogen
content in %
at Nemunas River Basin**

Legend



Data source:
SOVEUR, FAO Data (2000)



Population density

Population Density in the Nemunas River Basin

Legend

inhabitants per km²

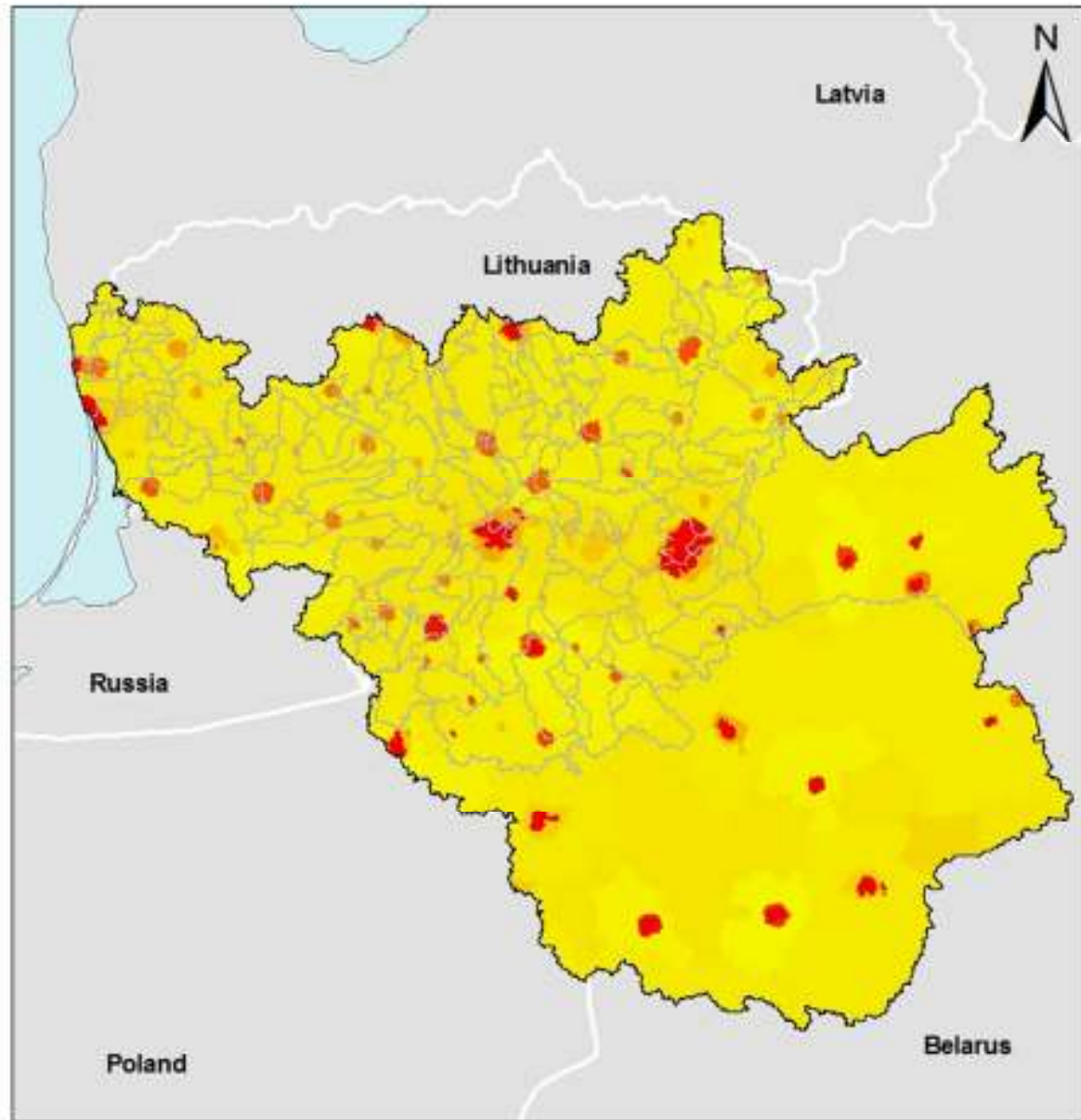
Value



High : 11676

Low : 0

Data source:
GRUMP by CIENSIN data
(2004)



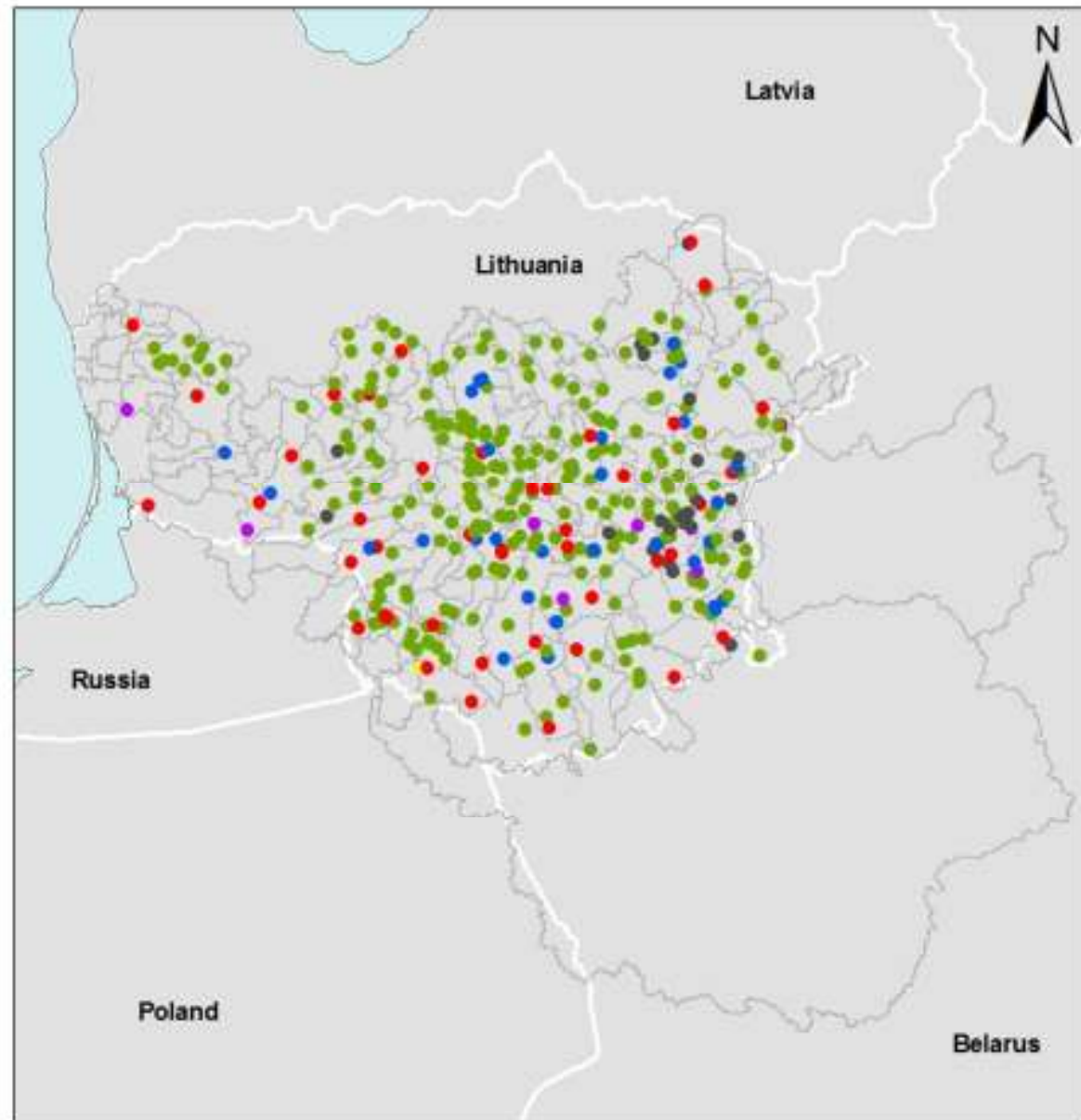
Waste water treatment plants

Types of WWTP in the Nemunas River Basin

Legend

- municipal WWTP
- not included to industrial WWTP
- industrial WWTP
- rural WWTP
- stormwater WWTP
- other WWTP

Data source:
Coastal Research and
Planning Institute (Corp),
Klaipeda University



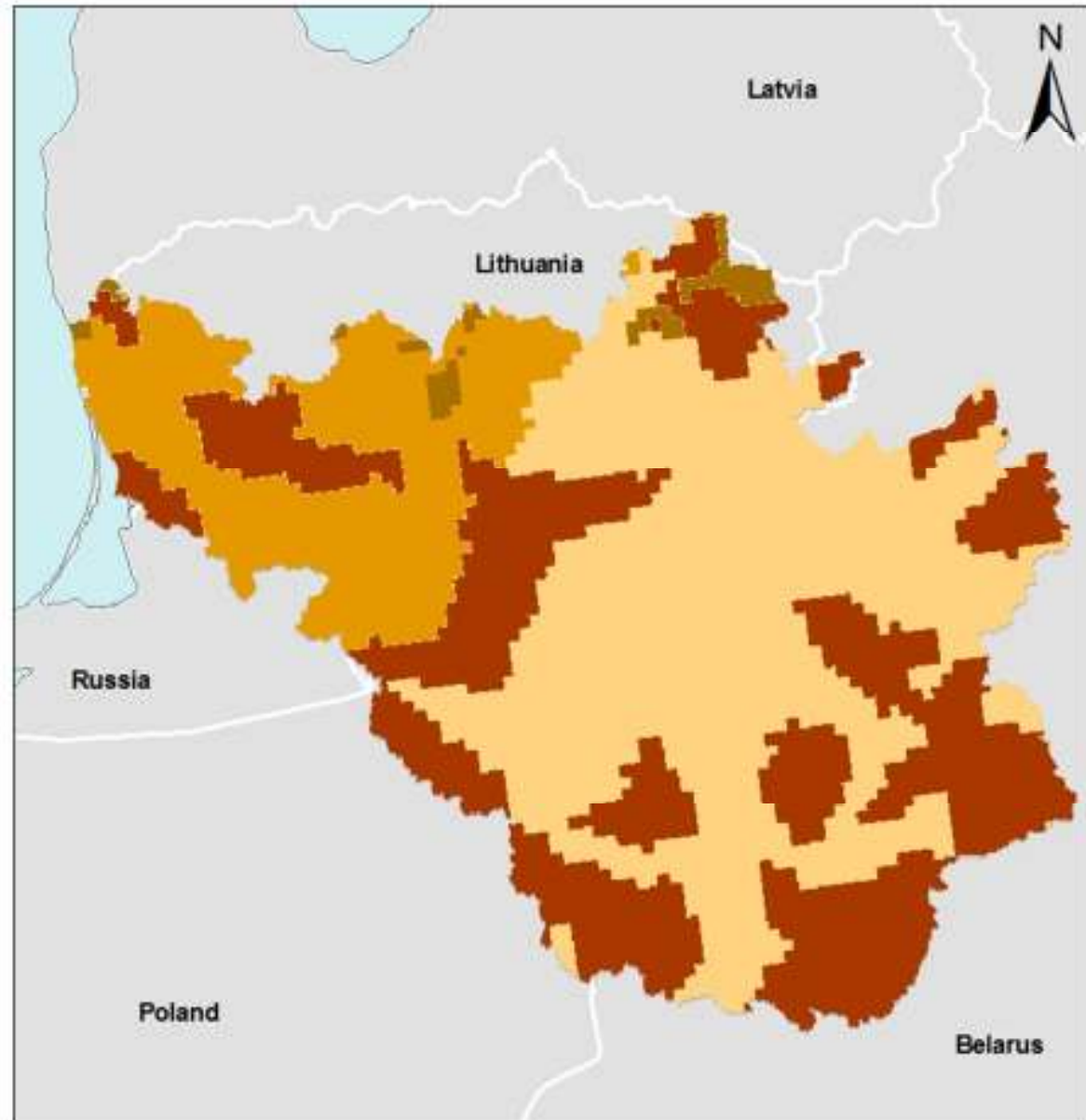
Hydro-geology

Hydrogeology of the Nemunas River Basin

Legend

- consol.rock (no permeability)
- consol.rock (low permeability)
- unconsol.rock (low groundw.)
- unconsol.rock (deep groundw.)

Data source:
RIVM



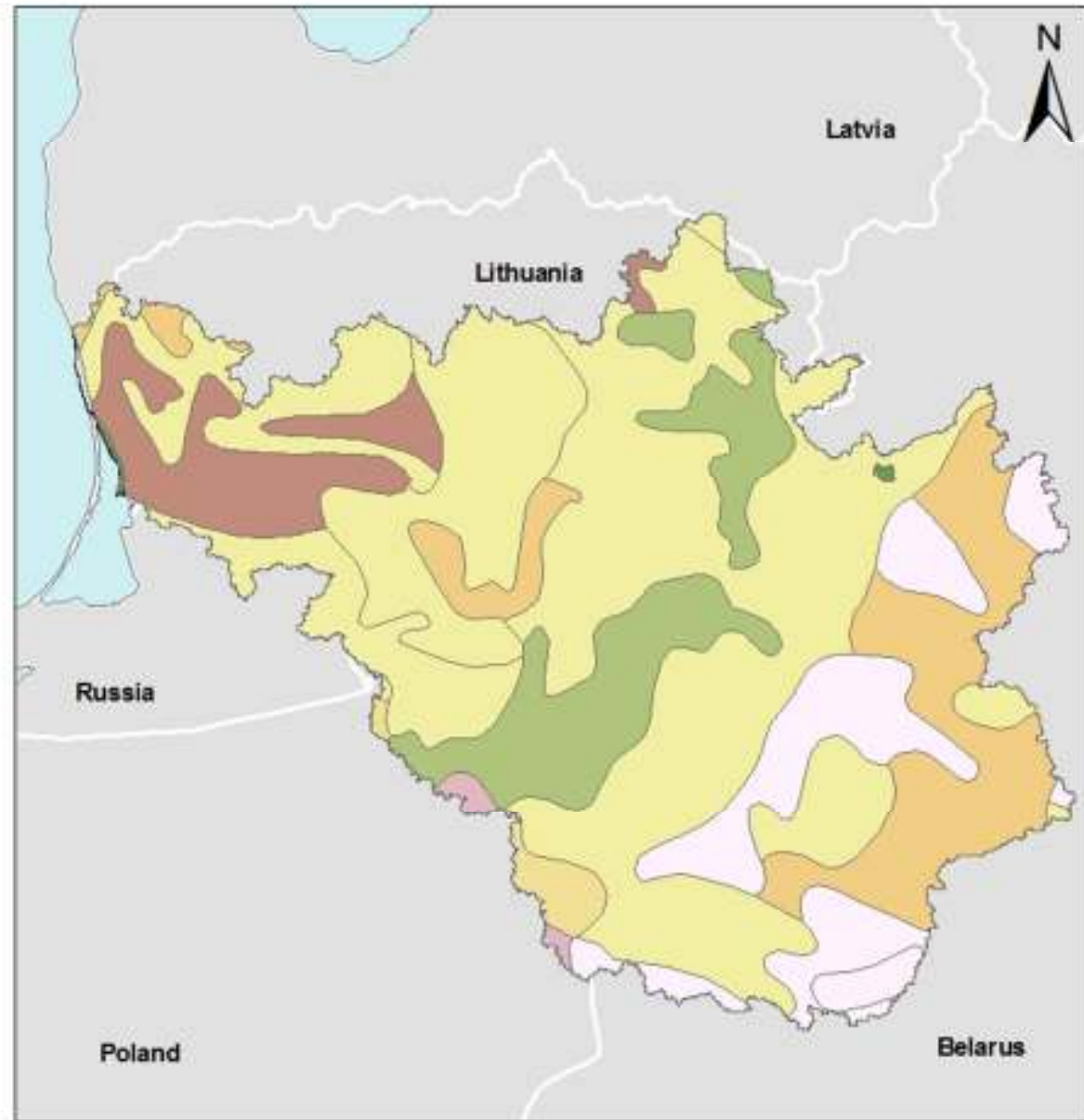
Clay content in topsoils

**Average Top Soil Clay
content in %
at Nemunas River Basin**

Legend



Data source:
SOUVEUR by FAO data
(2000)



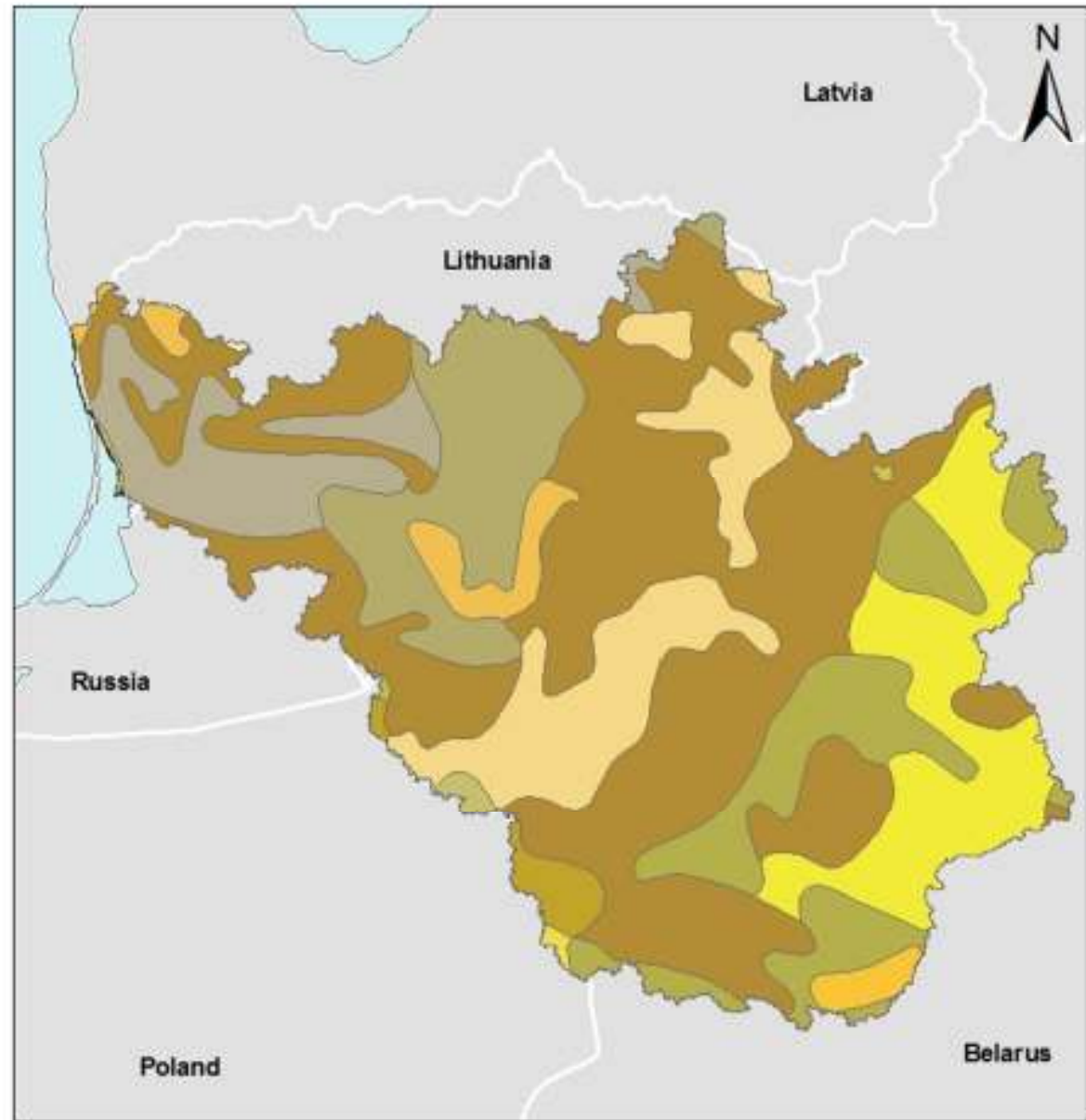
Soil map

Digital Soil Map at Nemunas River Basin

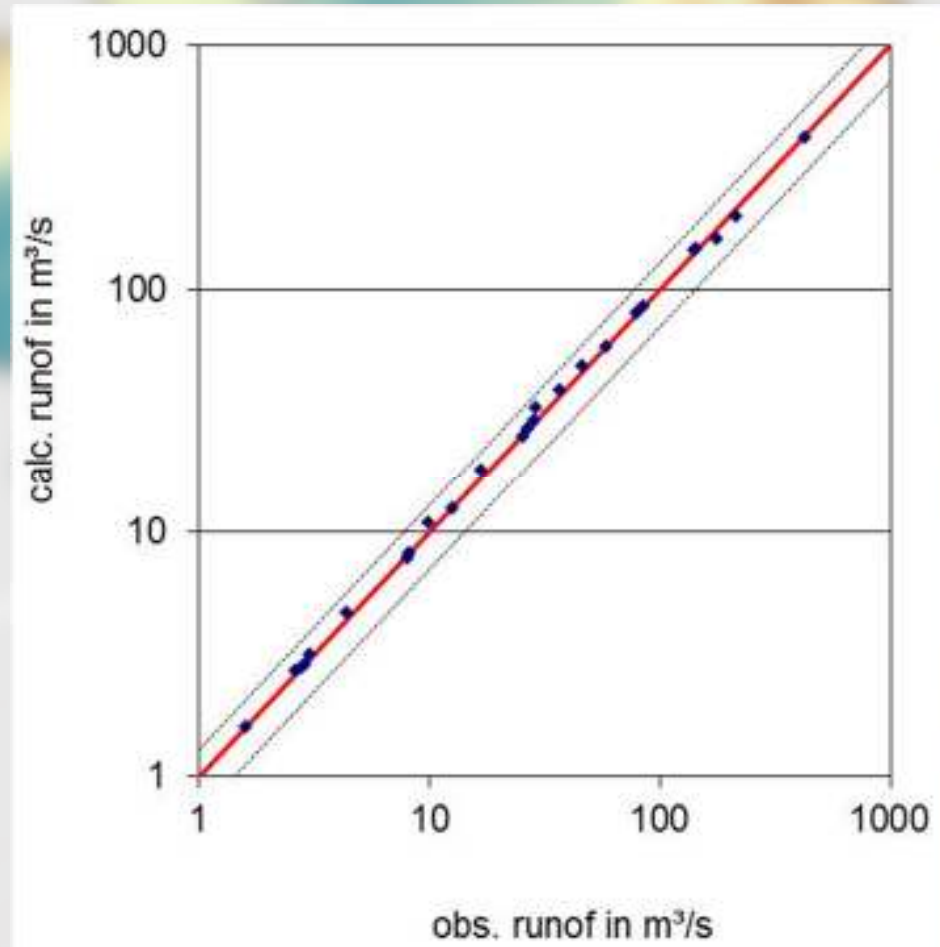
Legend

FAO Soil Type	
Be144-2/3a	Lg55-1a
De17-1/2a	Lo69-2ab
De18-1a	Lo78-1/2a
De18-2a	Od22-a
De19-1a	Oe14-a
De19-2a	Pl5-1ab
De20-2ab	Po30-1ab
Gm32-2/3a	WAT

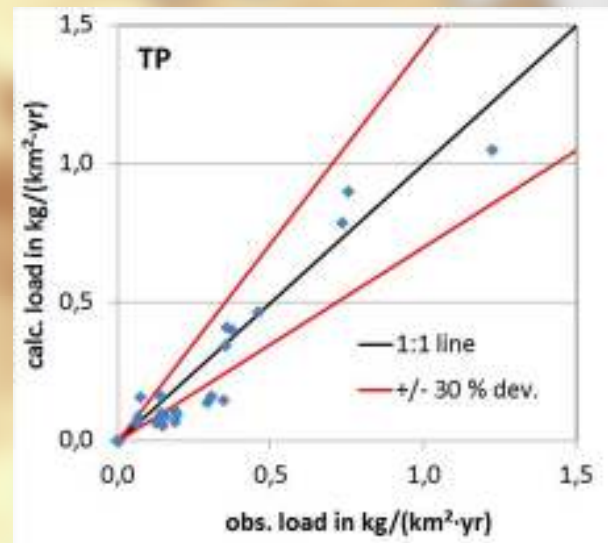
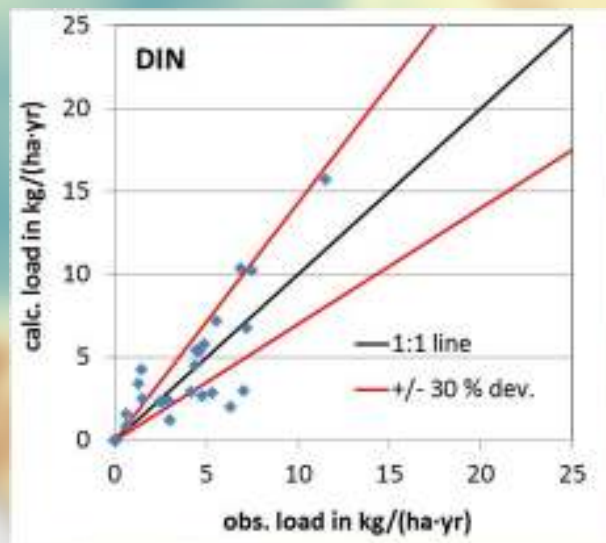
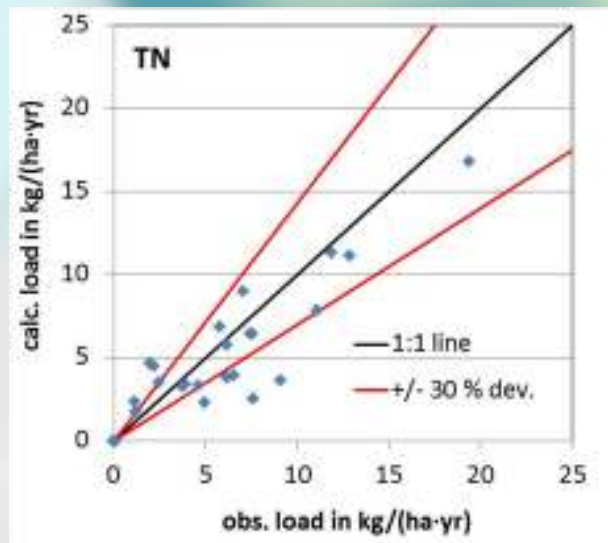
Data source:
SOUVEUR by FAO data
(2000)



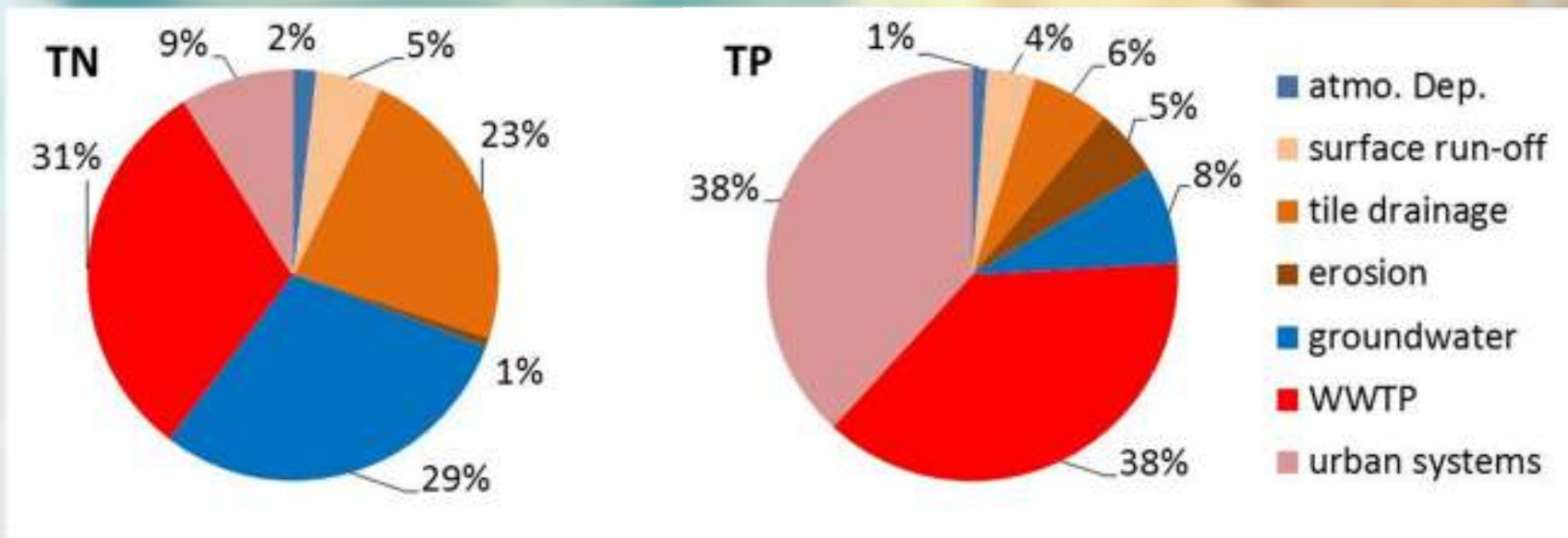
Observed vs. calculated load



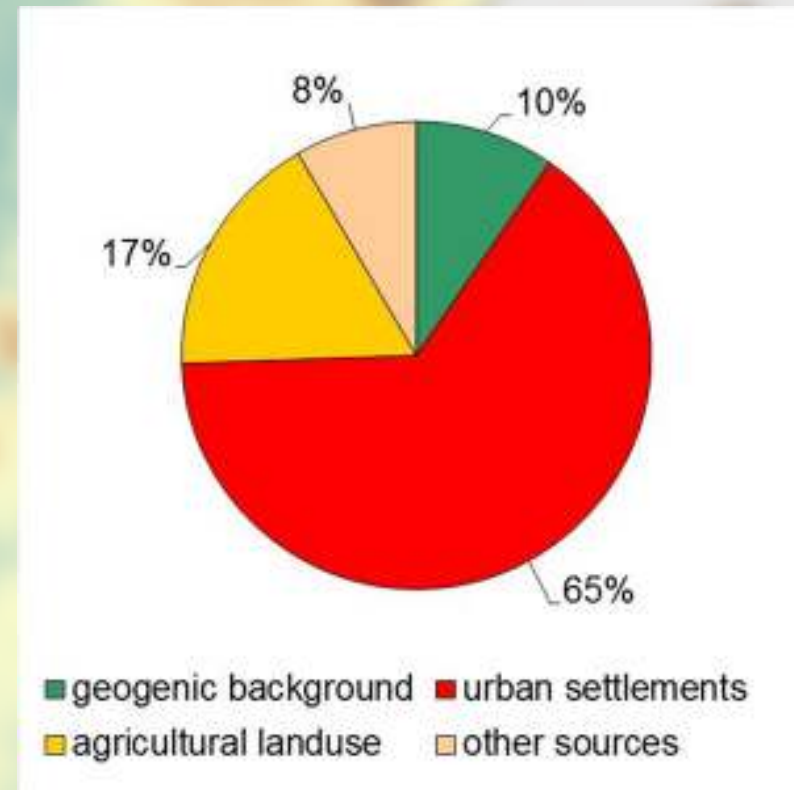
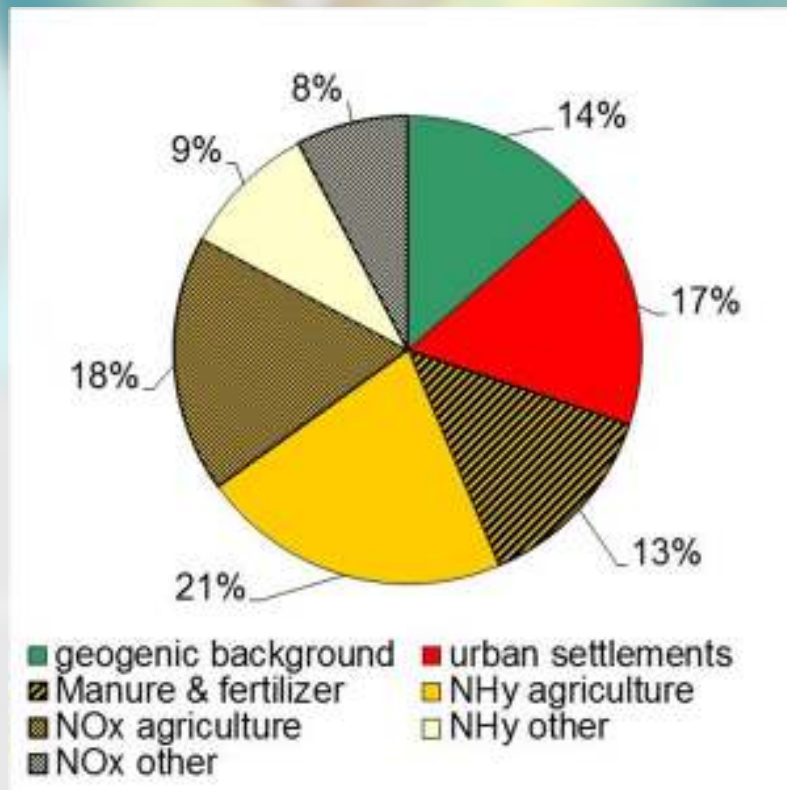
Load comparisson mean 2001 - 2004



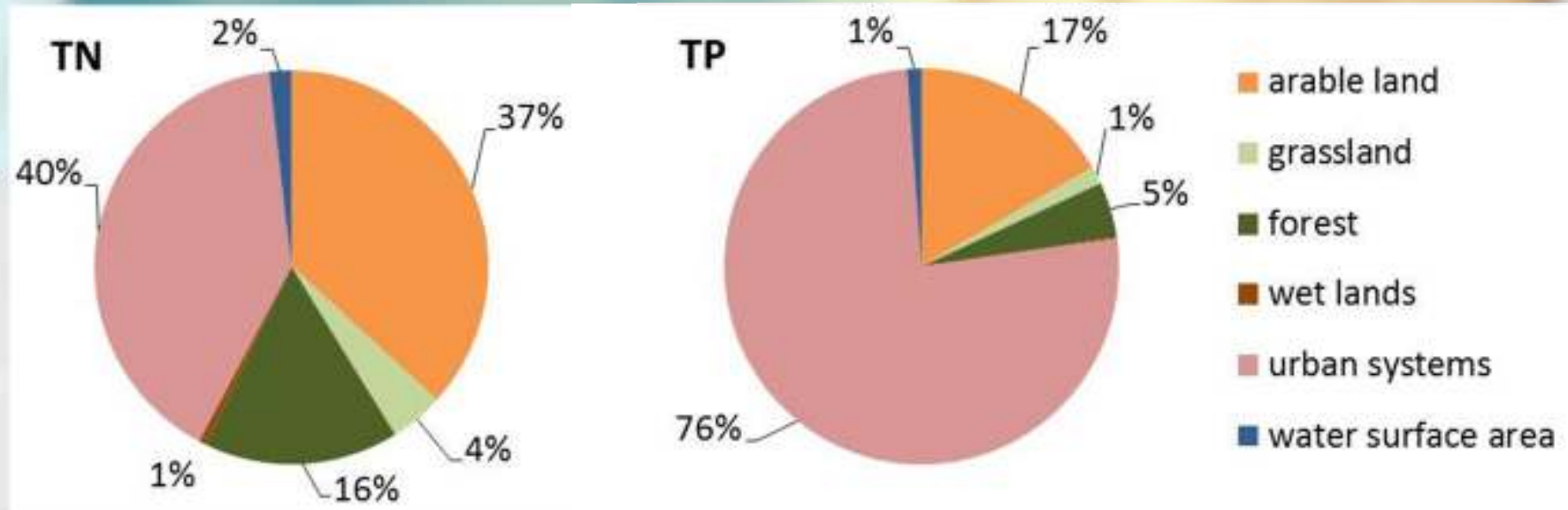
Emissions by pathways – mean 2001 - 2004



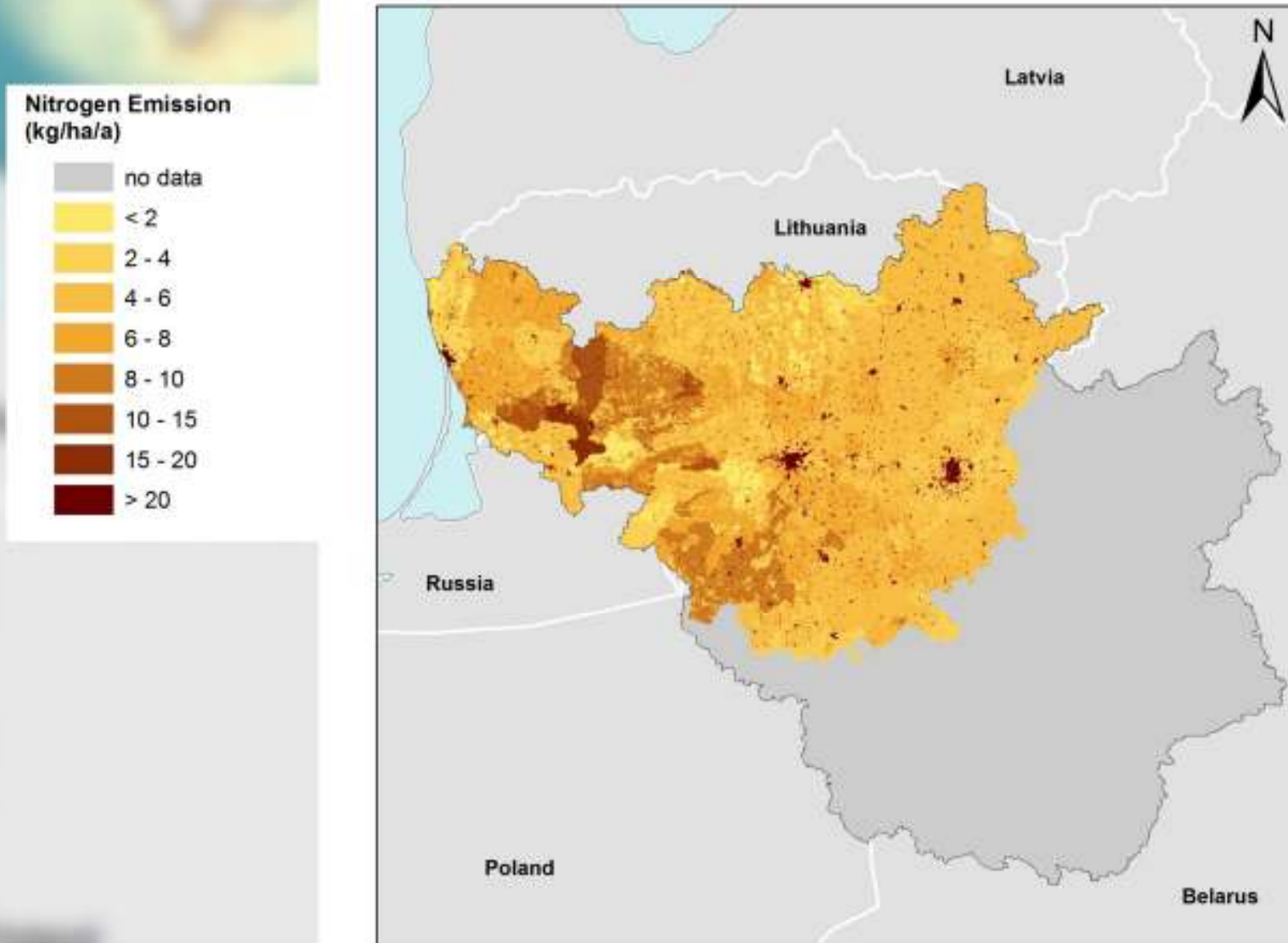
Emissions by sources – mean 2001 - 2004



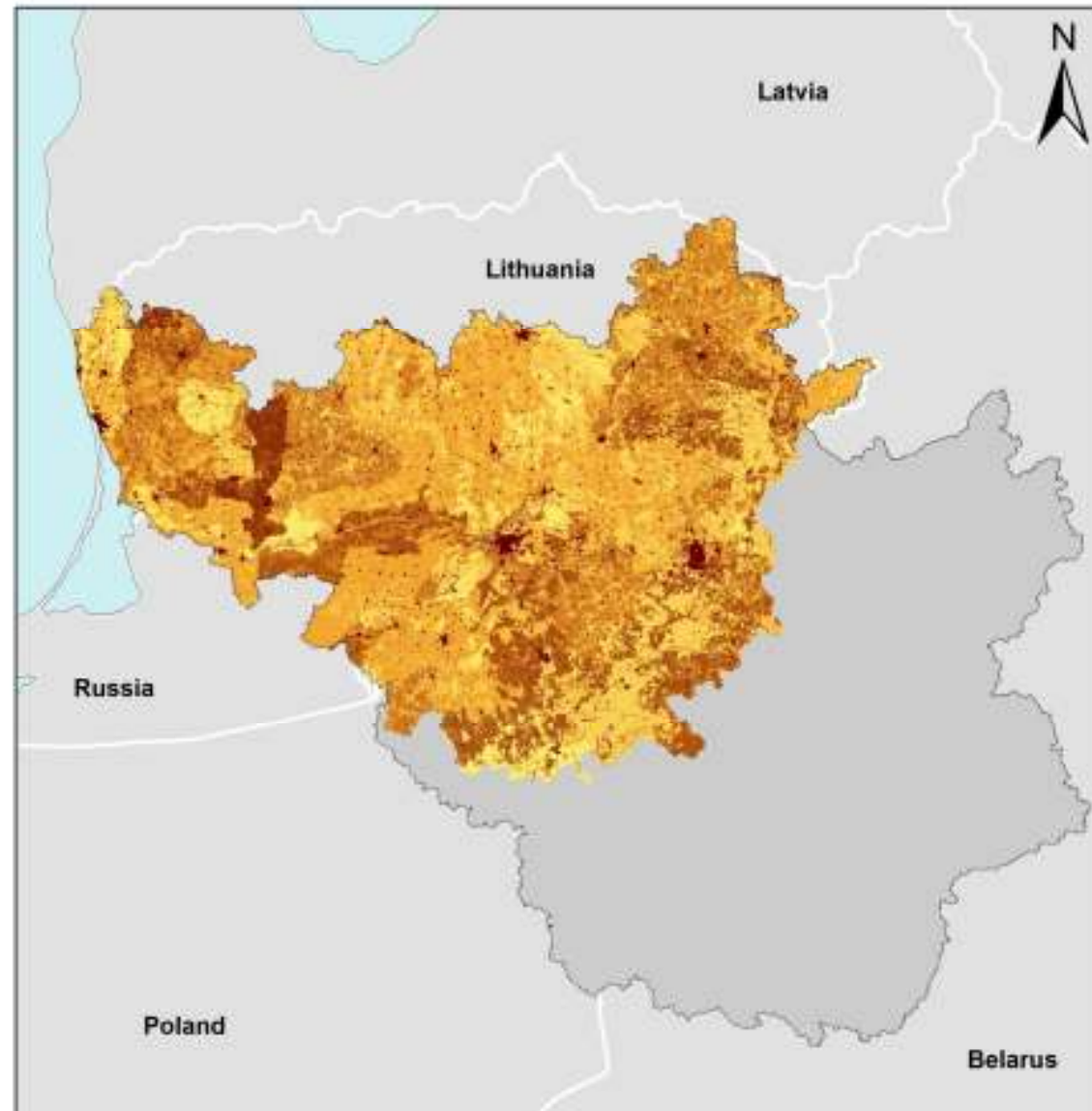
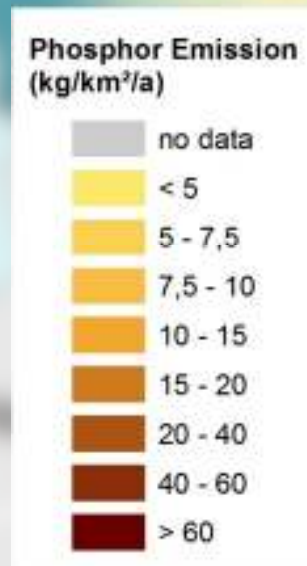
Emissions by land use – mean 2001 - 2004



Specific TN emissions by land use – mean 2001 - 2004



Specific TN emissions by land use – mean 2001 - 2004



Conclusions

- In general a good data base has been available for the model application
- Although 55 % of the catchment is used as arable land, only 13 % of the TN emissions originate from manure application, due to low N-surpluses
- Low total specific TN emissions lead to a high share (56 %) of emissions from atmospheric deposition
- Point sources are dominant for TP emissions, due to a high share of not connected inhabitants
- Low slopes lead to low soil losses and to a small share of emissions via erosion
- Due to low emissions the emissions reduction potential is rather small
- And will very much depend on a reduction of atmospheric deposition