

Eight methods to prevent phosphorus loss from agriculture

^{1,2}Kuno Kasak, ¹Indrek Talpsep, ¹Kristjan Piirimäe,
¹Silvia Lotman, ²Jaan Pärn, ²Ülo Mander

¹Estonian Fund for Nature

²University of Tartu, Department of Geography

kuno@elfond.ee

²_{nd} European Sustainable Phosphorus Conference
5-6 March 2015, Berlin, Germany



ELF



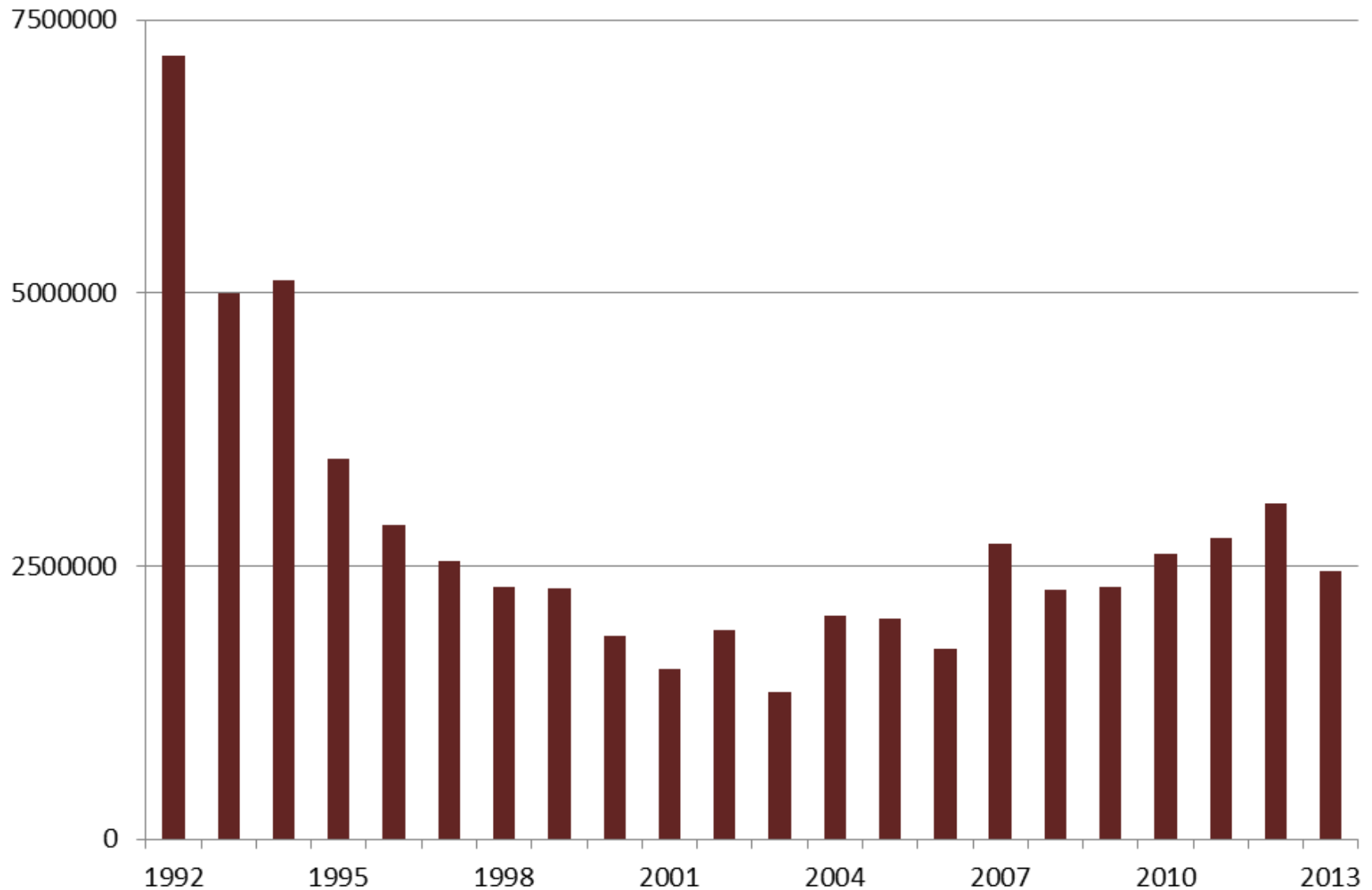
Outline:

The Porijõgi River as a marked example of land use changes and nutrient loss dynamics in Eastern European agricultural catchments

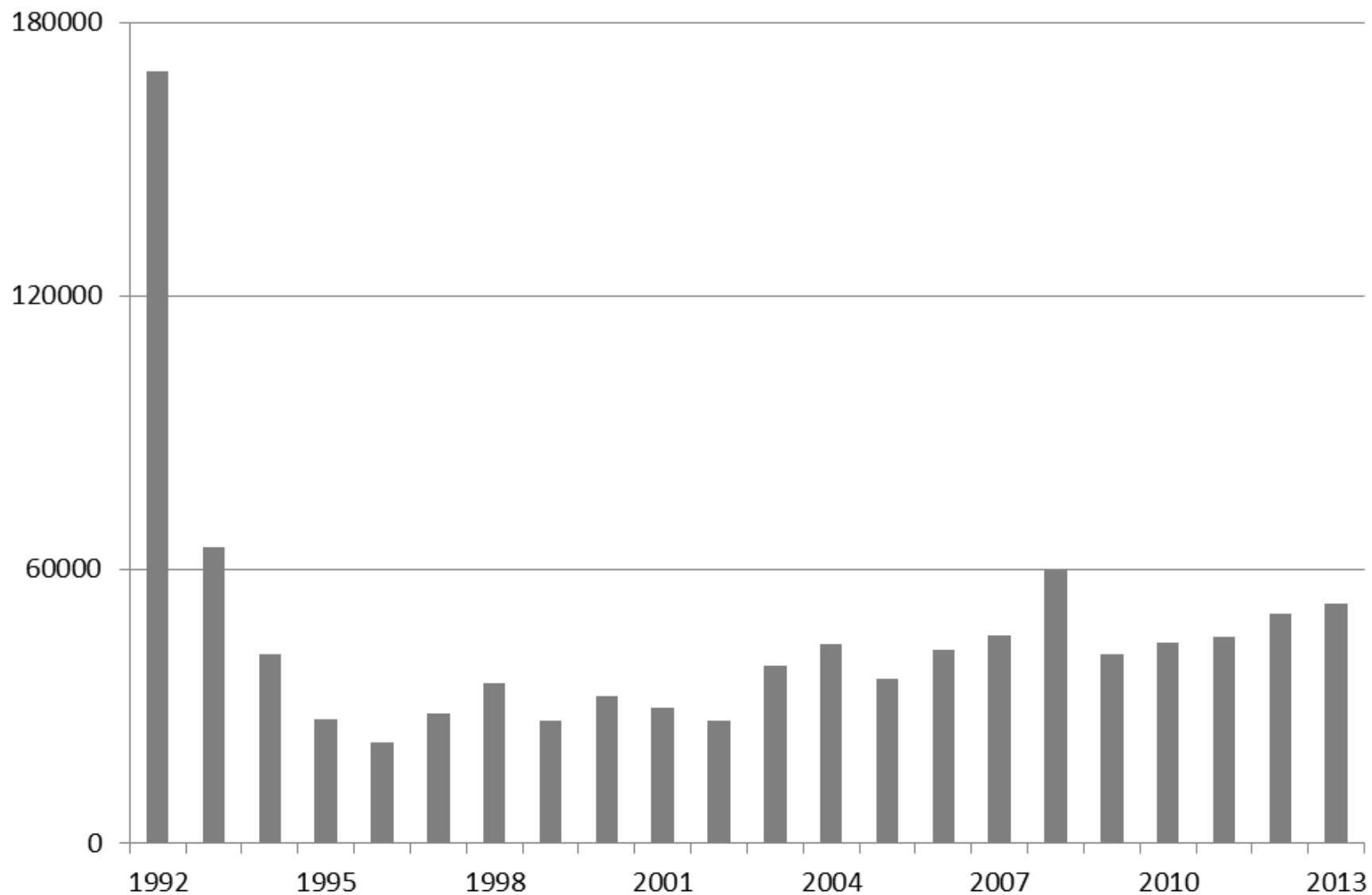
Measurements and fieldworks

Modelling

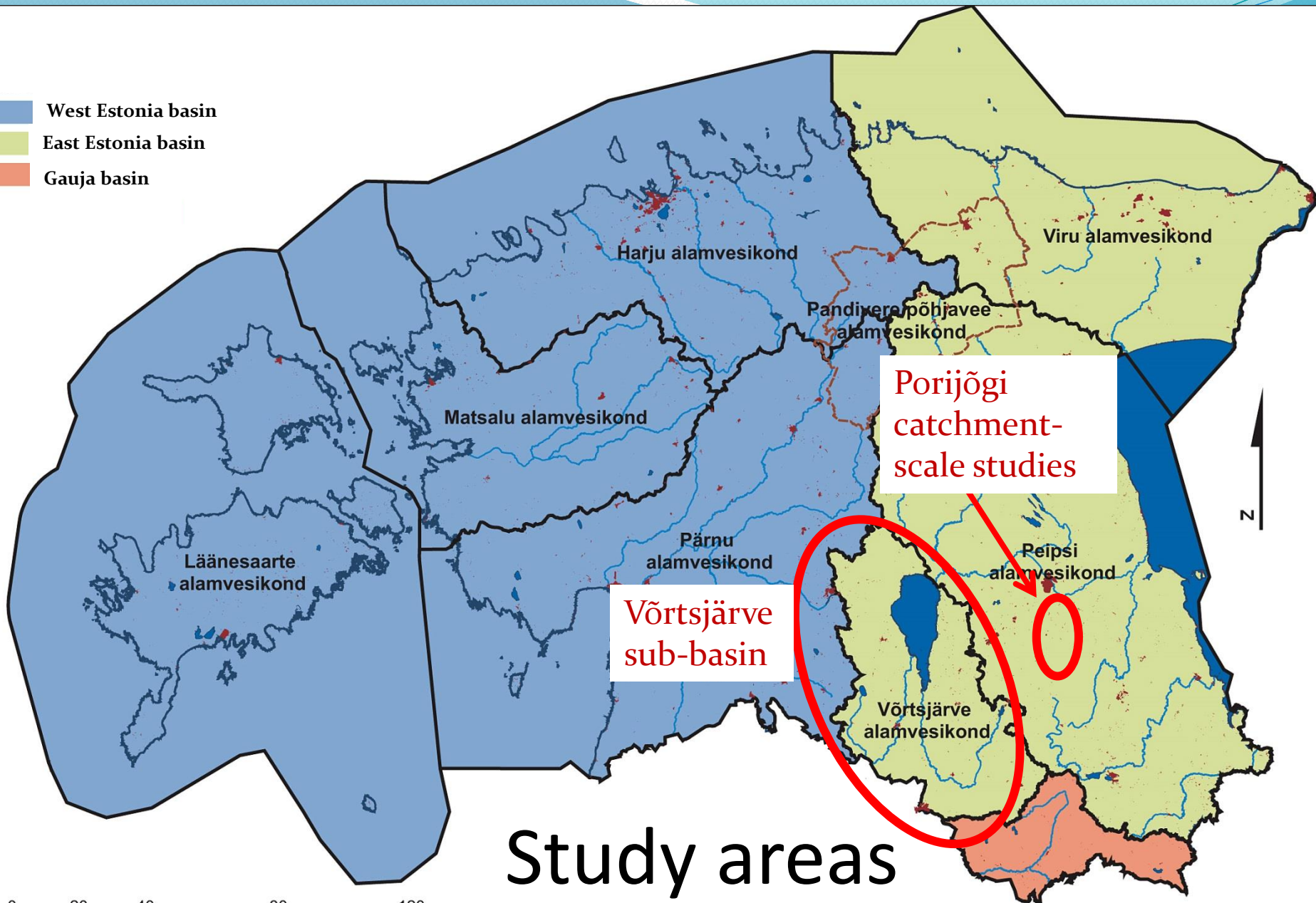
Organic fertiliser application in Estonia [tons]



Mineral fertiliser application in Estonia [tons]



- West Estonia basin
- East Estonia basin
- Gauja basin



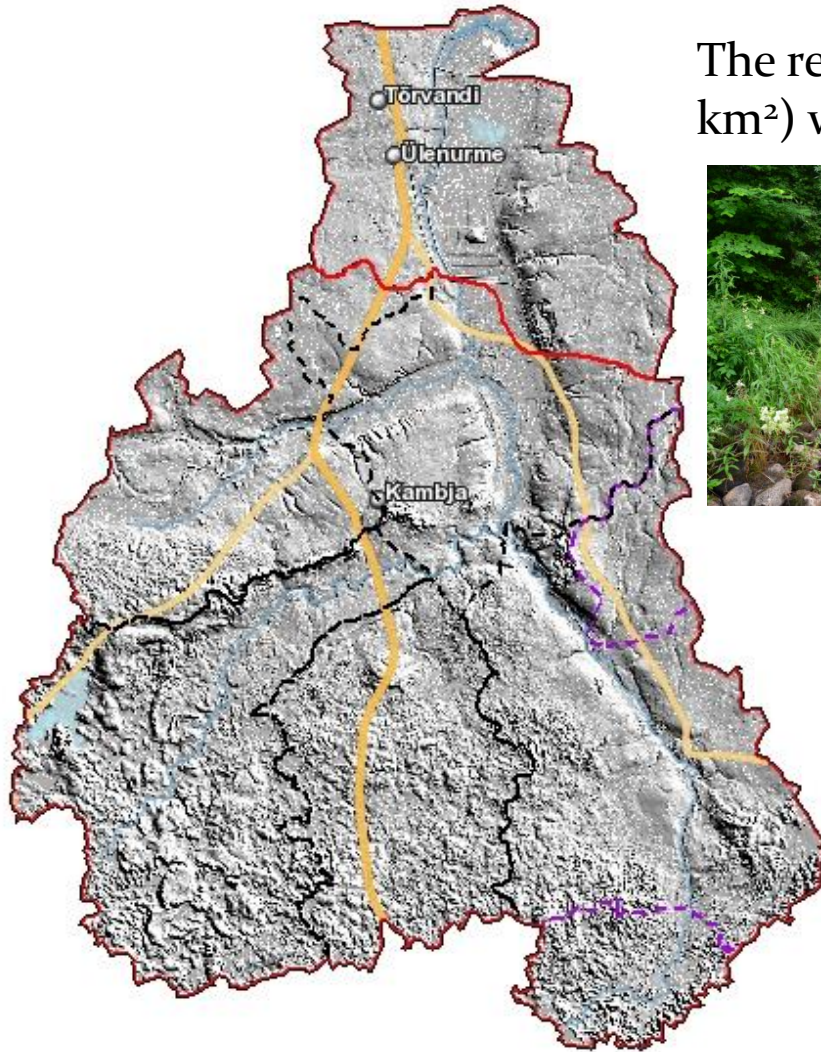
Võrtsjärve sub-basin

Porijõgi catchment-scale studies

Study areas



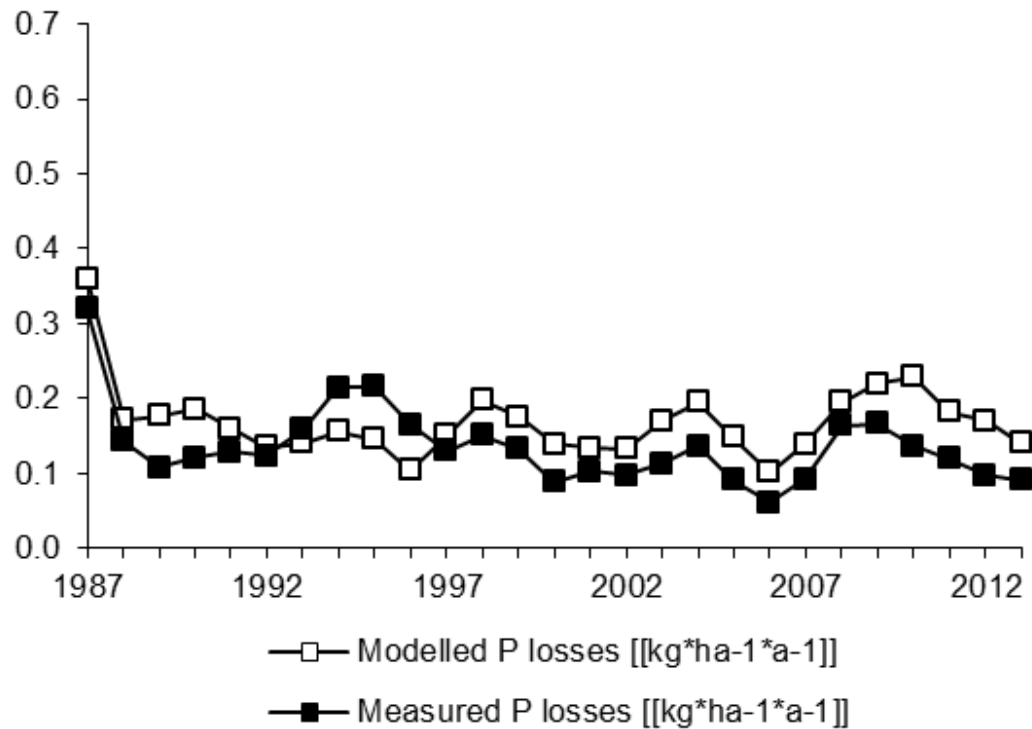
Pilot studies (Porijõgi river catchment → water samples, soil samples, modelling, ...)



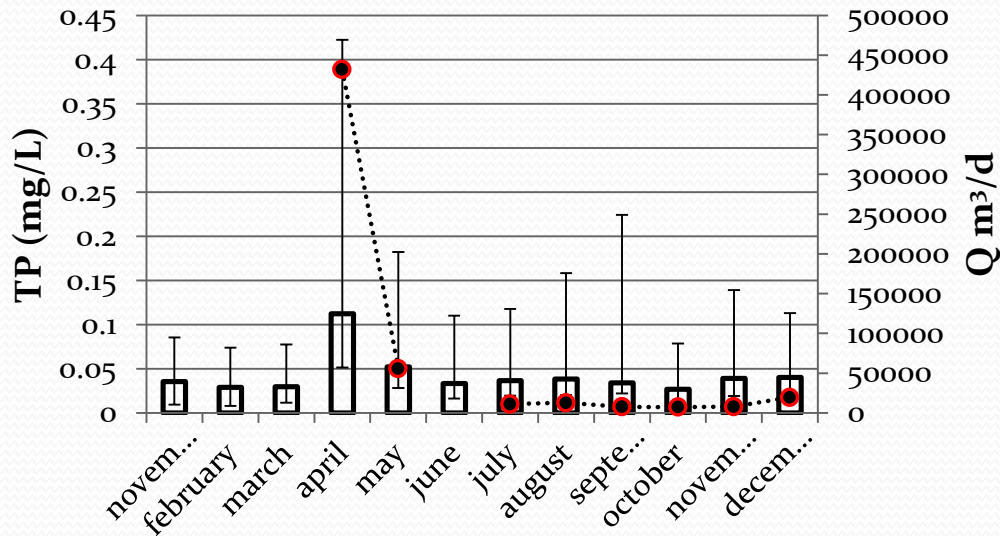
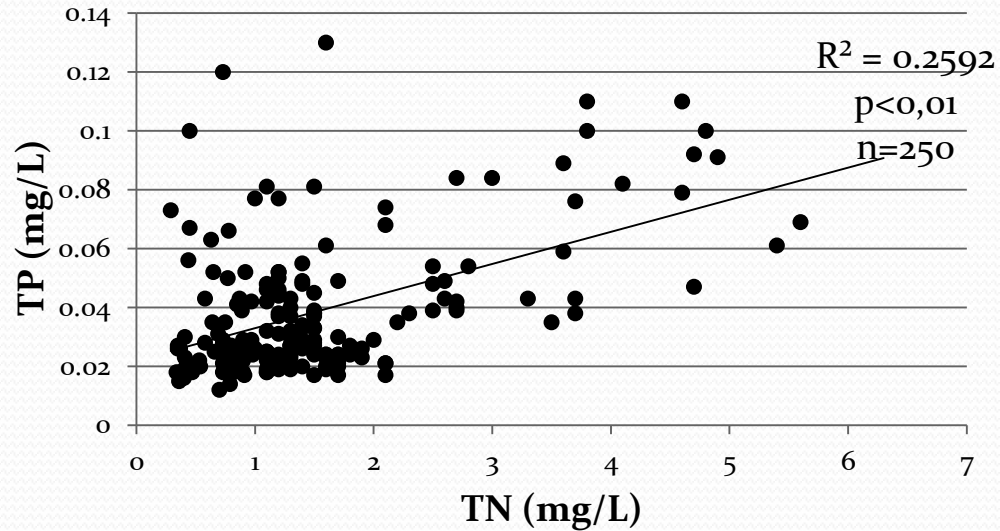
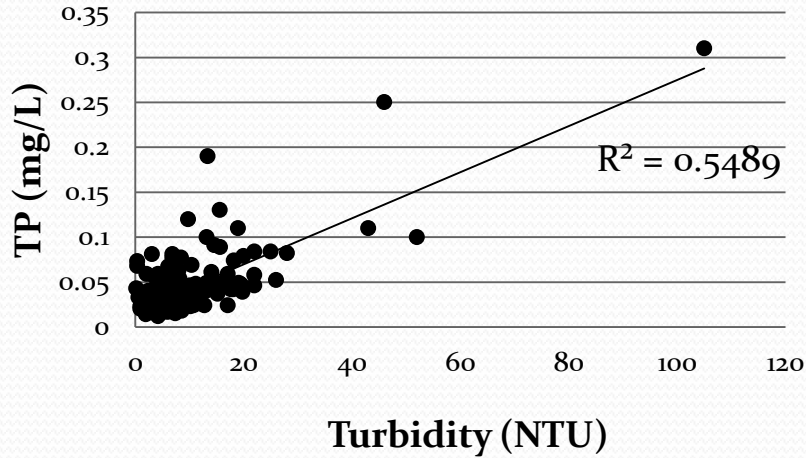
The relief map of the Porijõgi (243 km²) with sub-catchments



P losses from the Porijõgi River catchment



Fieldworks



Input to PolFlow → RasterMode model

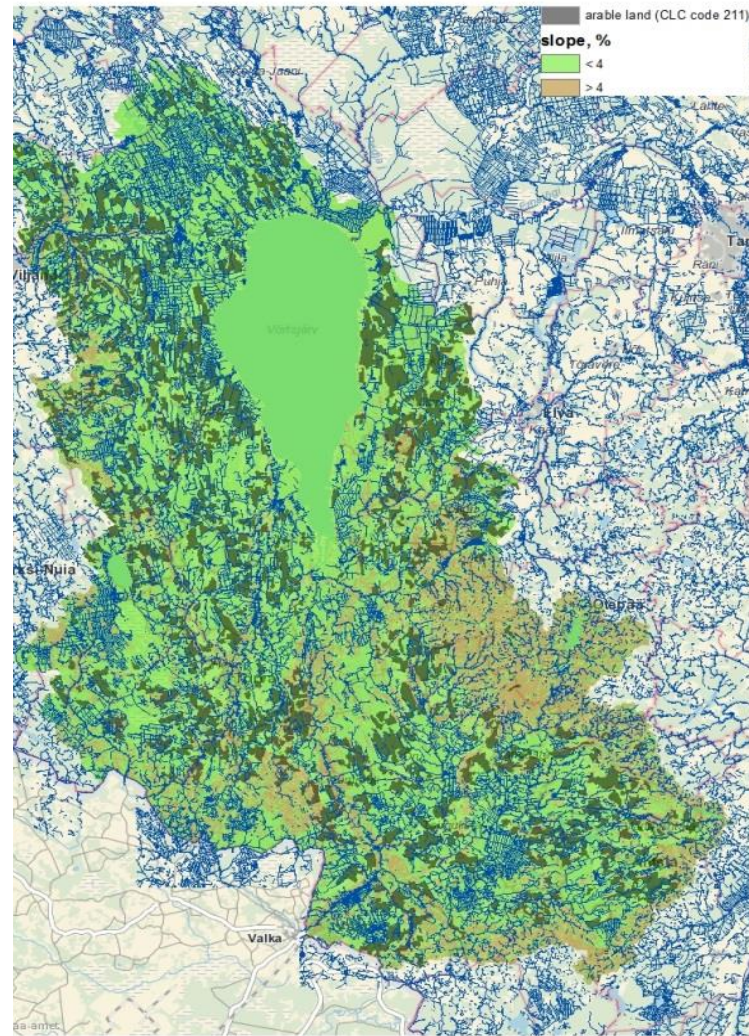
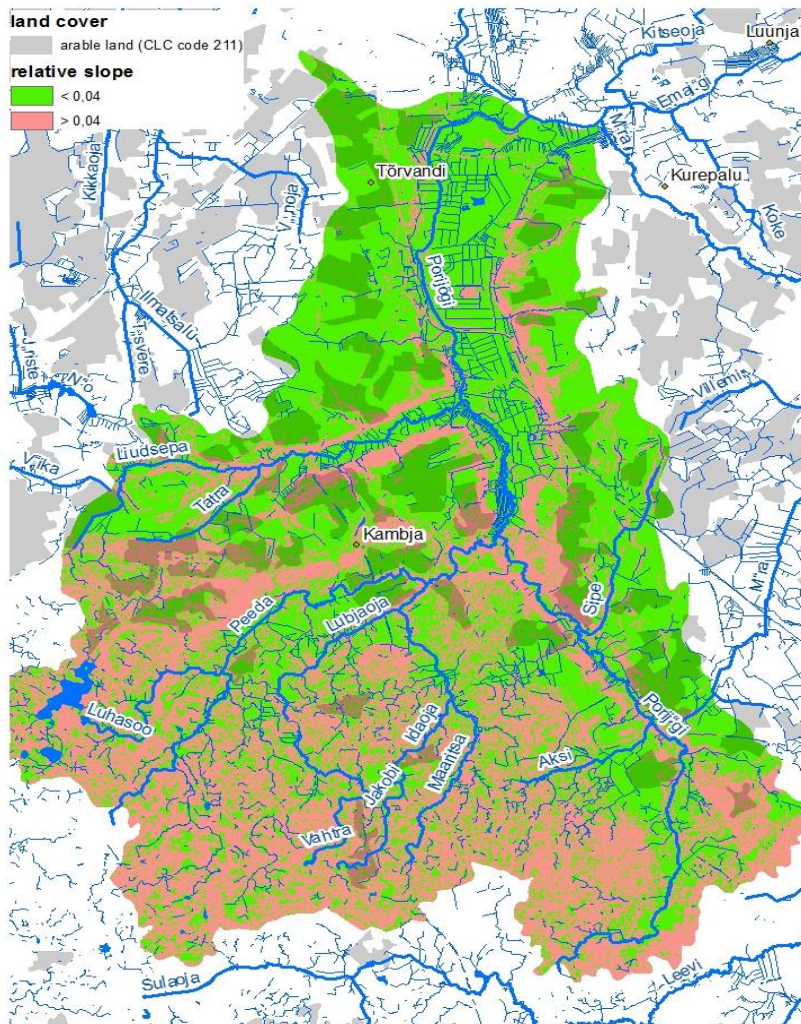
- Resolution: 10x10 m
- Data: land use and cover, relief data (LIDAR), point-pollution sources, soil composition, geological data, drainage information, hydraulic loading rates
- Fieldworks for verification (water samples, soil samples, visual estimation etc.)

Modelled measures

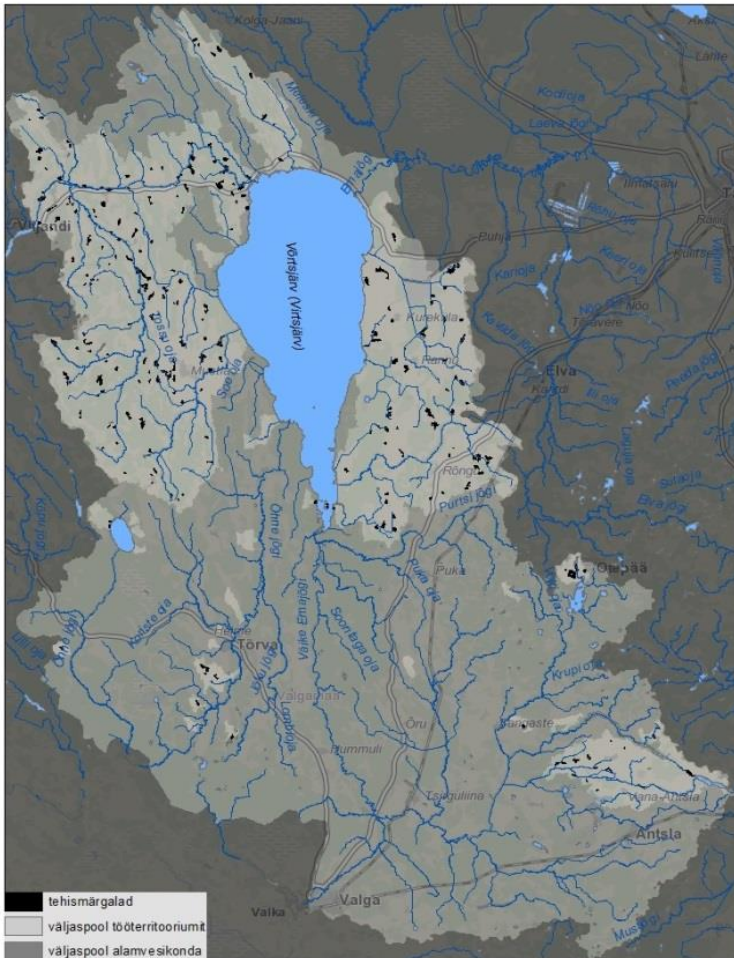
- Constructed wetlands
- Liming
- Buffer stripes
- P-index
- Best technique for manure spreading
- Nutrient balance
- Regulated drainage
- Winter crops



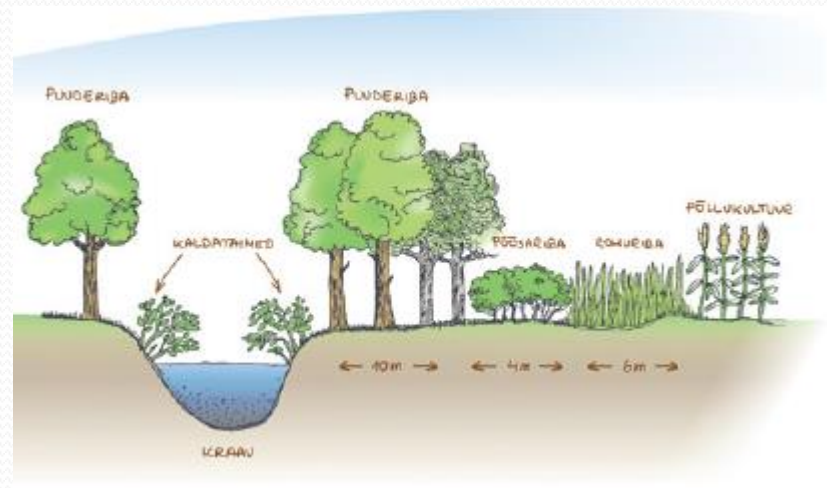
Erosion factors



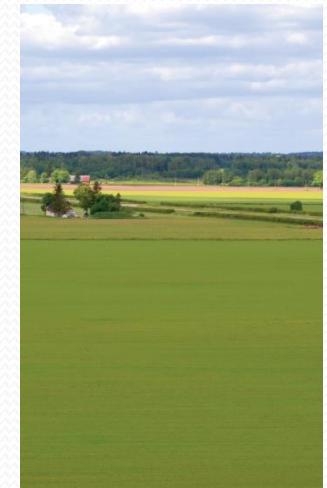
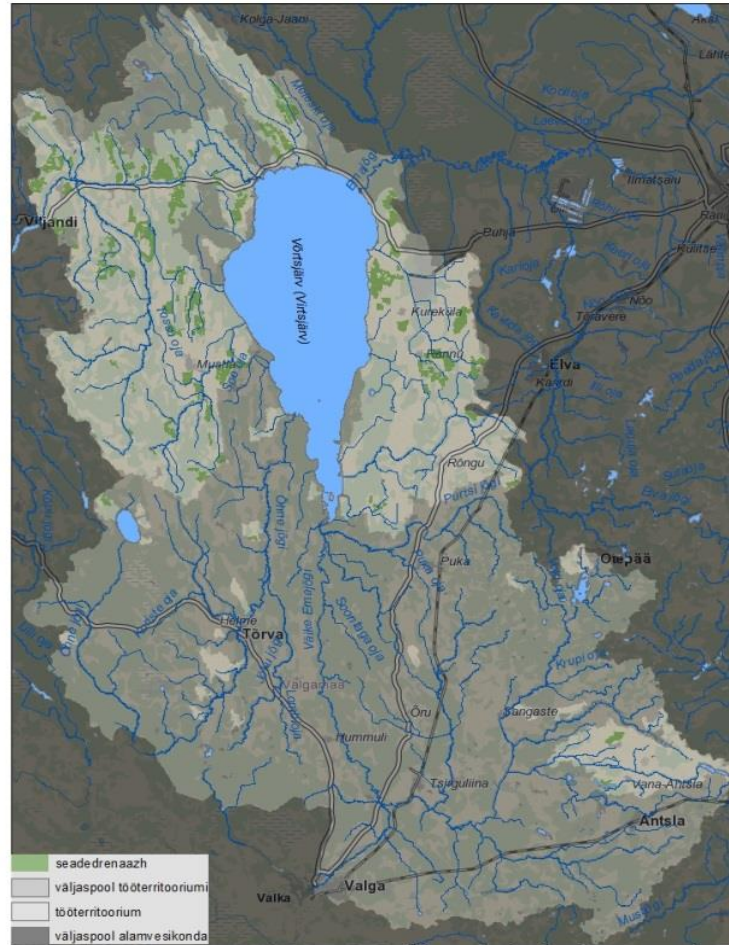
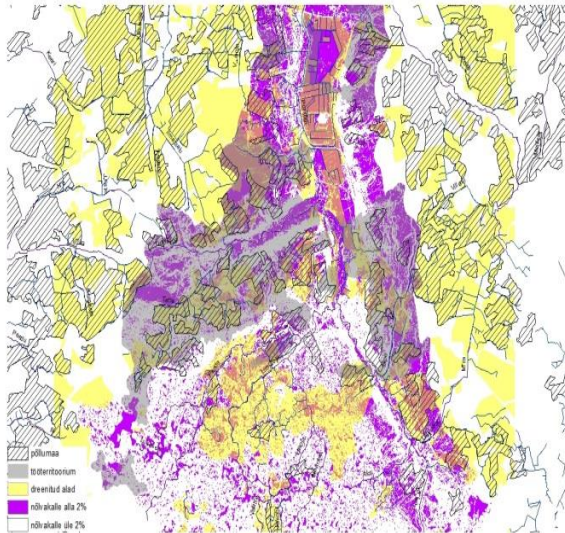
Constructed wetlands



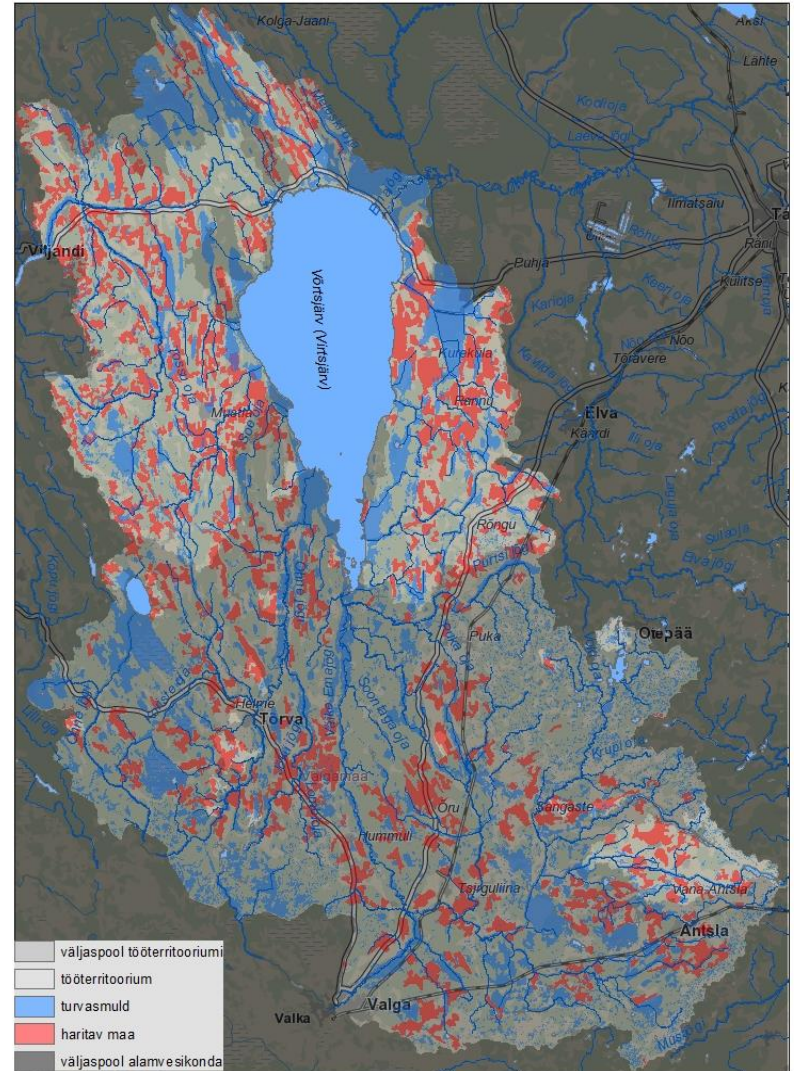
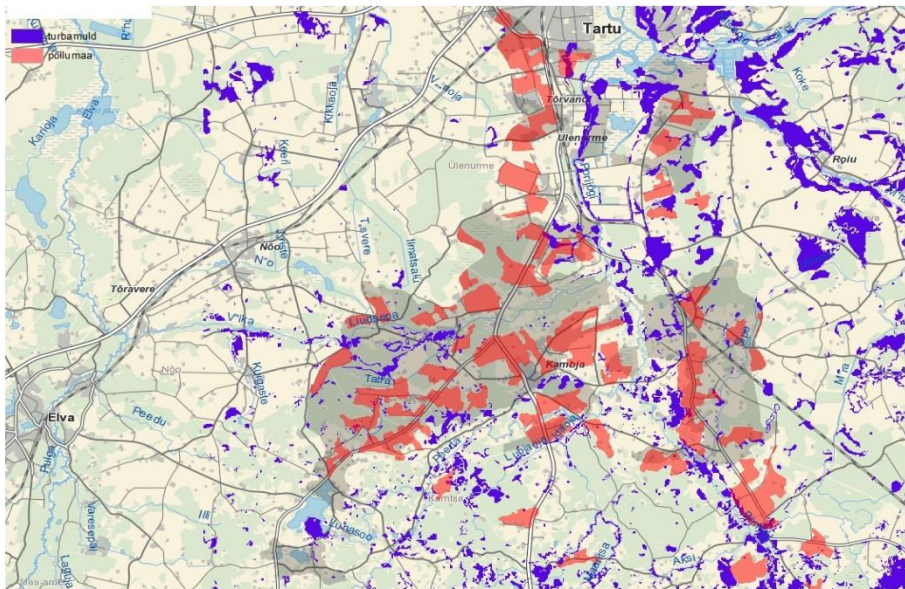
Buffer Stripes



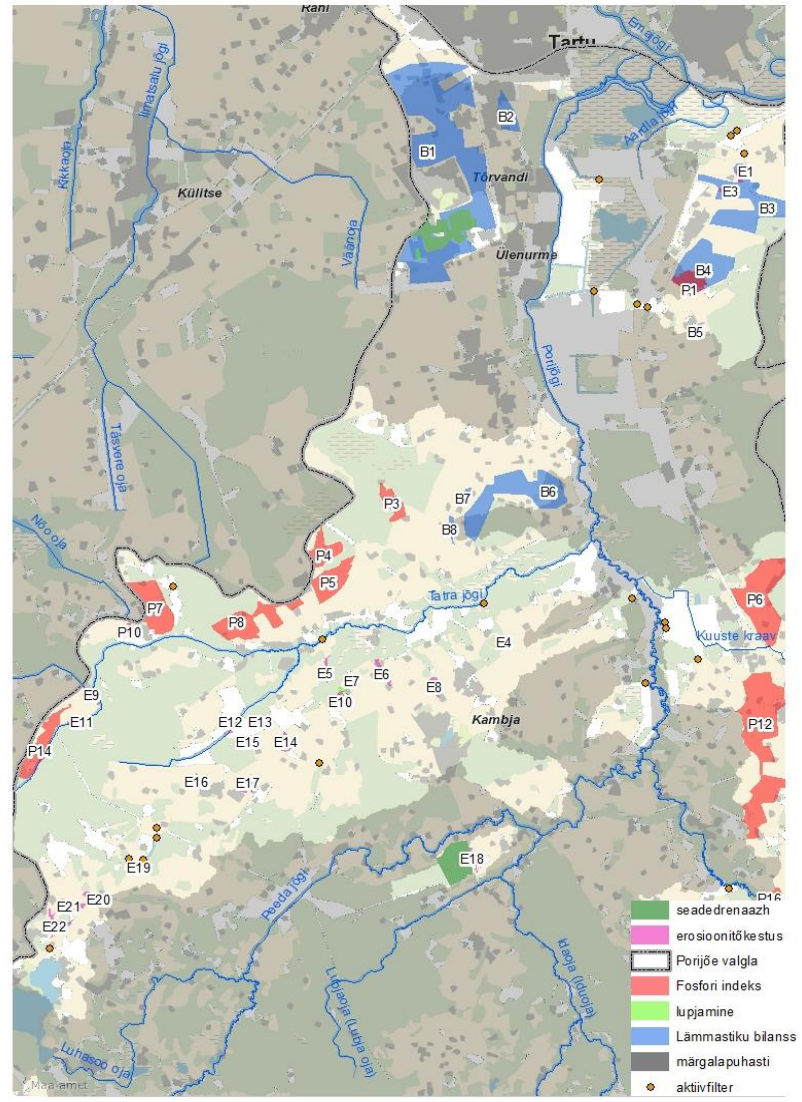
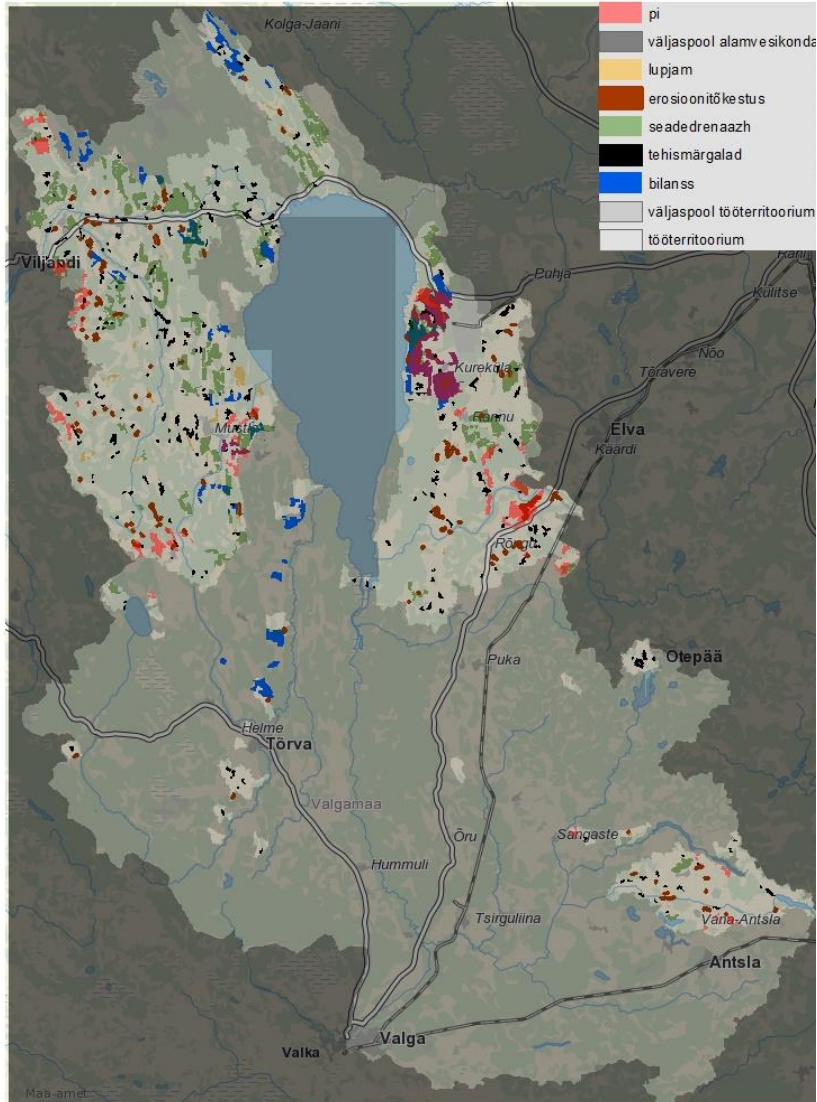
Regulated drainage



Liming



All measures

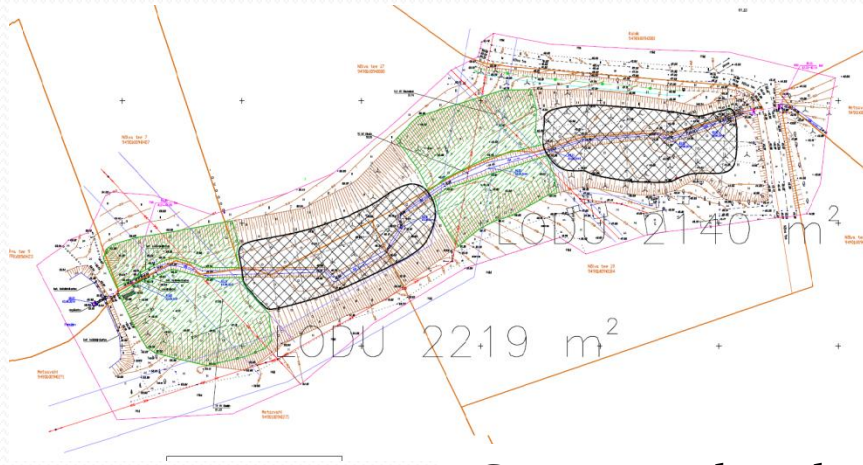


Conclusions

- The N and P losses from the agricultural catchments of the Porijõgi in 2001–2013 increased partly due to the magnification of water discharges.
- The recovery of nutrient flows falls remarkably short of expectations, probably owing to the retention within the catchment and a more optimal fertilisation.
- Buffer zones play a key regulative role
- Most effective measure might be the best technique for manure spreading
- In acid soils liming might be the first measure
- CW-s is the last method for „catching“ the nutrients
- **In the Porijõgi catchment** → if all planned measures (total effective area more than 26 km²) will be established, about 20% of rivers and streams will be in better conditions
- **In Võrtsjärve sub-basin** → effectiveness??

- Farmers need more information as well as funding!!

Ongoing studies



Constructed wetland nr 1
(2219 m²)

