

LIFE+EKOROB project: Ecotones for reduction of diffuse pollutions

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Agricultural diffuse (non-point) source pollution of freshwater bodies is an important environmental problem occurring throughout the world an important issue also in the Baltic Sea basin.



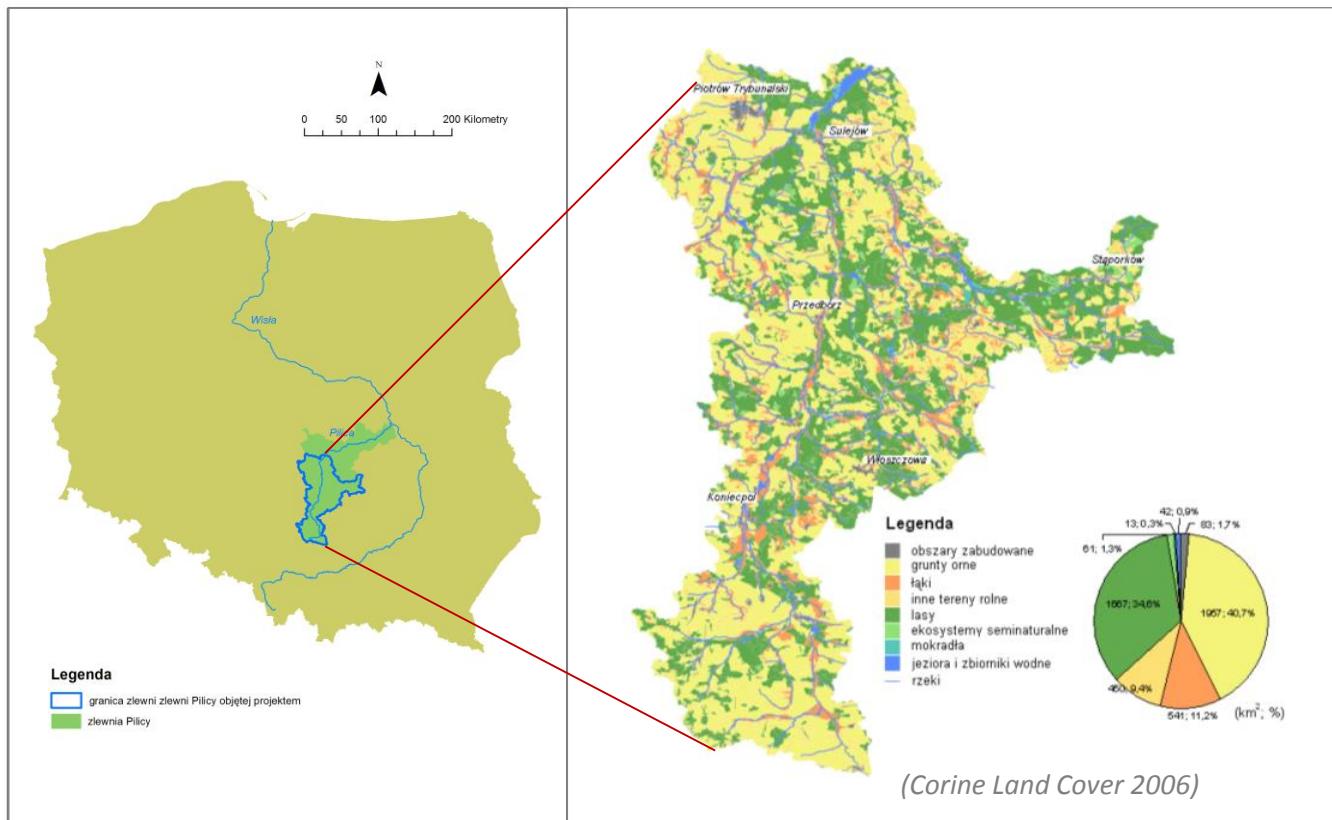
The main sources of diffuse pollution from agricultural areas:

- excessive use of mineral and organic fertilizers;
- poorly secured landfill mineral and organic fertilizers;
- plowing the fields up to the edge of the river and stream;

Pilica River Catchment, Poland

(Tributary of the river Vistula and Global Reference Site for UNESCO IHP Ecohydrology)

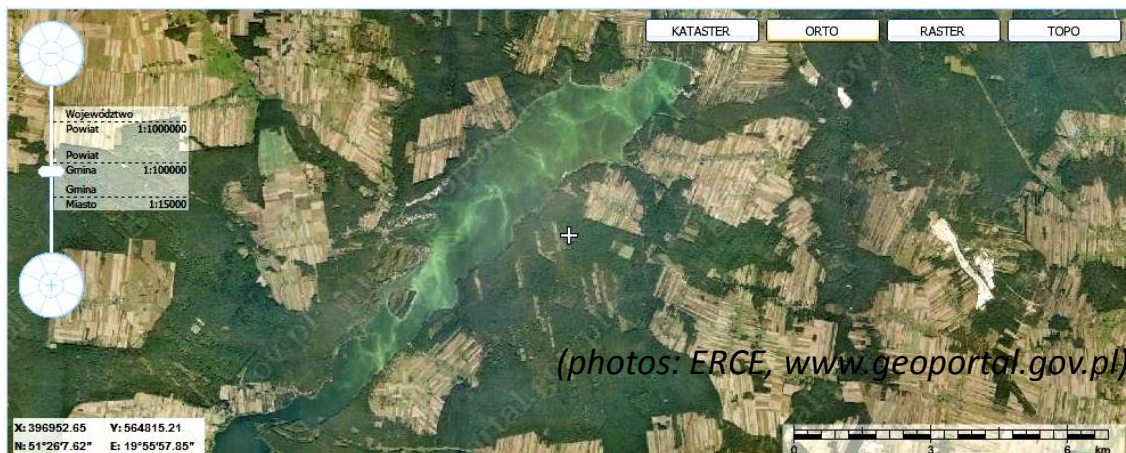
Above 60 % of catchment area is used for agricultural purposes.



The problems of diffuse pollution occurs also in the Pilica river catchment, where 42 years ago was constructed Sulejów Reservoir.

The key ecological problem

Toxic cyanobacterial blooms in the Sulejów Reservoir as a result from low water quality of tributaries

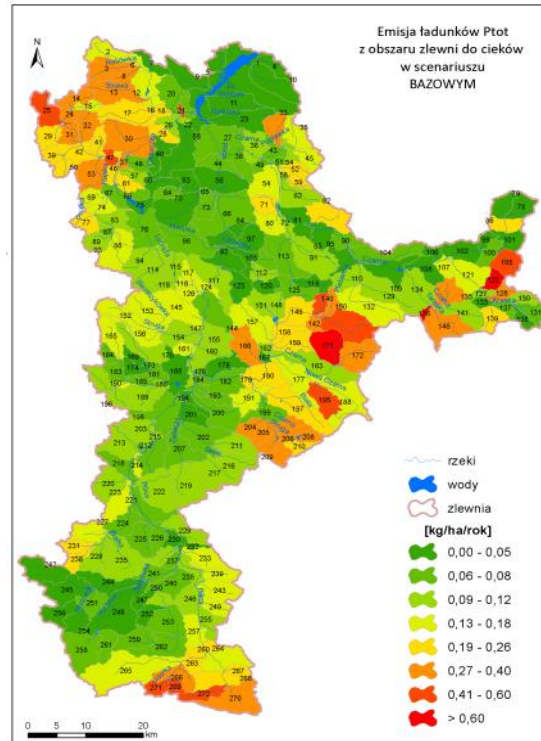
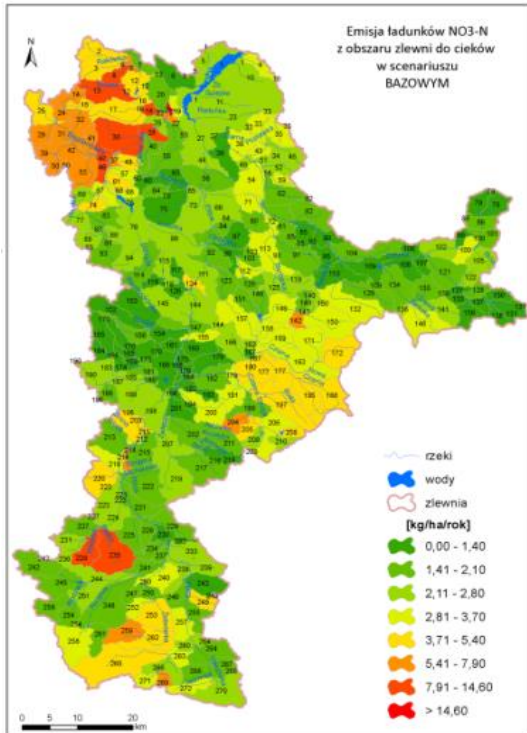


Eutrophic reservoir had been a **drinking-water reservoir** until 2004 but still plays an **important recreational role** in the region.

That is why the main goal of the project was setting up a **Action Plan** for reducing diffuse pollution in the catchment of Pilica River.



The results of SWAT modeling demonstrate a very strong spatial differentiation of nitrogen and phosphorus emissions in the Pilica River catchment



We used SWAT model to identified and quantified the nitrogen and phosphorus sources in the catchment.

(Piniewski et al. 2015)

Action Plan for reduction of diffuse pollution in the Pilica River catchment covers about 60 administrative units

Good agricultural practices:

- Appropriate dosage of fertilisers based on crop requirements and measurements of the nutrient content of the soil
- Control of soil pH through liming
- The use of catch crops
- Proper storage of manures
- Use buffer zones

Reduction of municipal pressure:

- Investments in waste-water infrastructure within the National Program for Waste-Water Treatment
- Compact sewage treatment plants for villages
- Domestic sewage treatment plants
- Administrative actions

Ecohydrological biotechnology:

- Enhanced buffer zones
- Denitrification walls
- Sequential biofiltration system
- Artificial wetlands



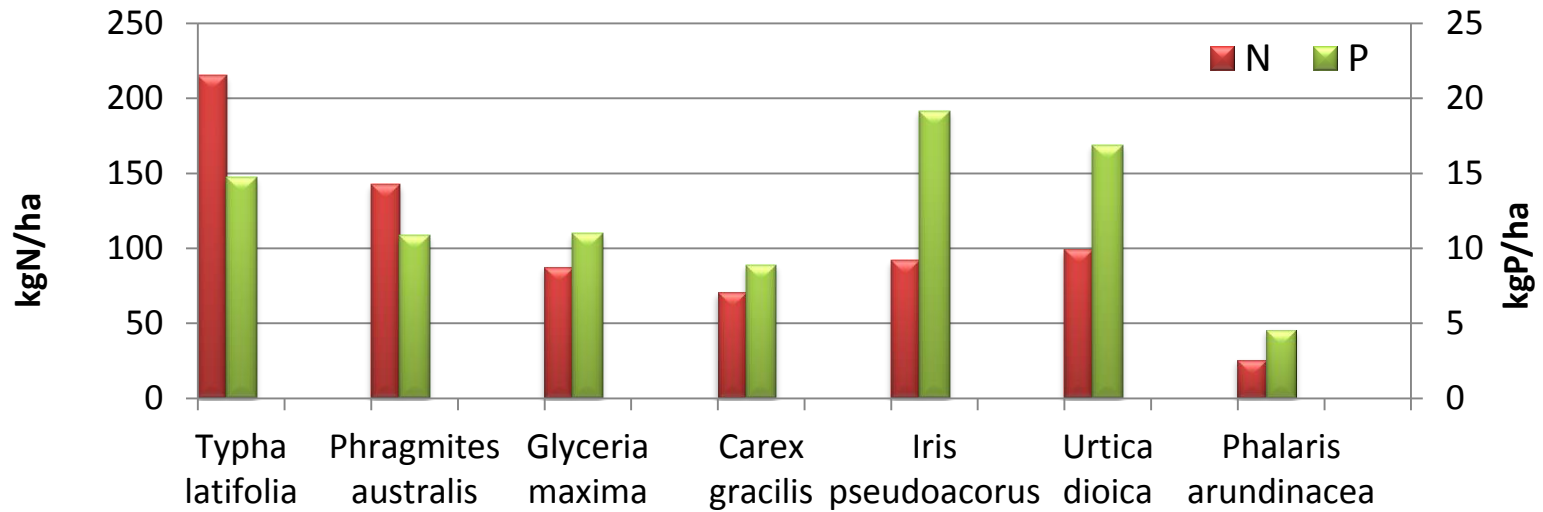
The challenges are not only to develop the Action Plan, but also to implement it.

Riparian buffer zones (ecotones) as one of the tools for reduction of diffuse pollution coming from the landscape

- To maintain or improve water quality by trapping and removing various nonpoint source pollutants;
- To protect banks of water bodies against erosion;
- To improve the microclimate by regulation of water temperature and light penetration to a river bed;
- To create new habitats and migration corridors.



Accumulation of nitrogen and phosphorus in biomass is the key process in the buffer zones

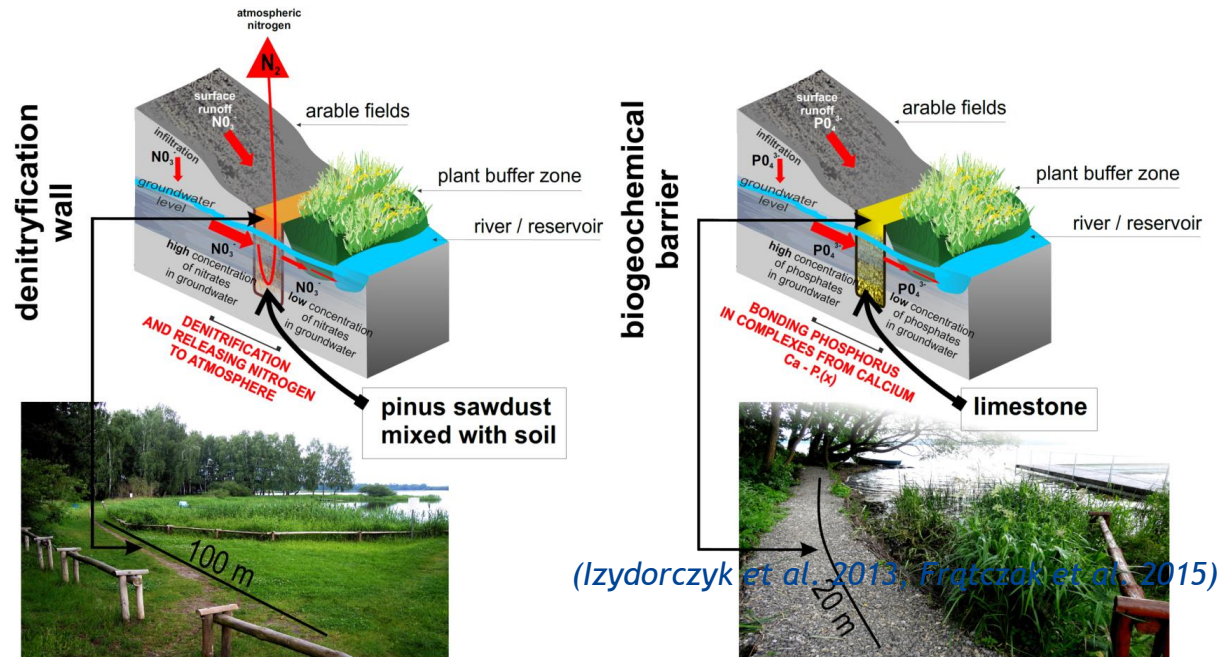


Development of ecohydrological biotechnologies for reducing the impact of non-point pollution

Newly-constructed vegetational buffer zone enhanced with:

- 1) denitrification wall to reduce nitrate pollution
- 2) limestone-foundation barrier to reduce phosphate pollution

Results show that the effectiveness of a denitrification wall in a buffer zone is approximately 86%.
Biogeochemical barrier - 58 %



When space is limited along the shorelines and under high initial load conditions, enhanced buffer zones are recommended.

Multi-stakeholder platform as a tool for transfer of knowledge between scientists and decision-makers

(integrates the representatives from regional and local authorities, scientists, NGOs)



(Frątczak, Izydorczyk et al. 2015)

Platform helps to create independent space for discussion, the exchange of experience and knowledge.

10 meetings of the Stakeholders' Platform were organized during the Project, attended by 74 institutions engaged in water management in the area of the Pilica river catchment

Raise the environmental awareness of local society

For this purpose we organized educational meetings for different groups from open picnics for local people to training for decision makers.

During the six years of the EKOROB project:

- 15 public meetings for local society,
- 11 practical classes for primary and secondary schools,
- 5 training for specialists, decision makers and teachers



All these groups decide about the effectiveness of implementation of the Action Plan and improve the quality of environment.