

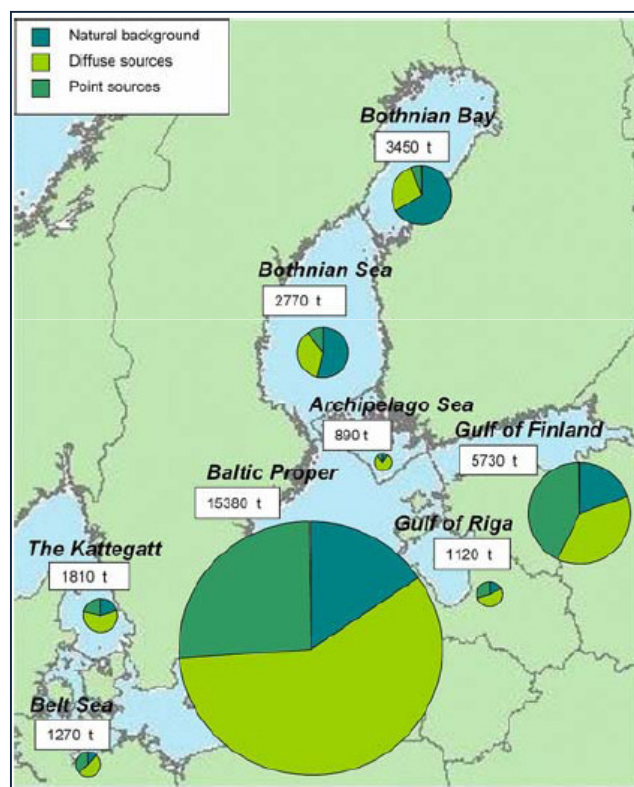


LIFE+ EKOROB Project: Land/water zone for reduction of diffuse pollutions

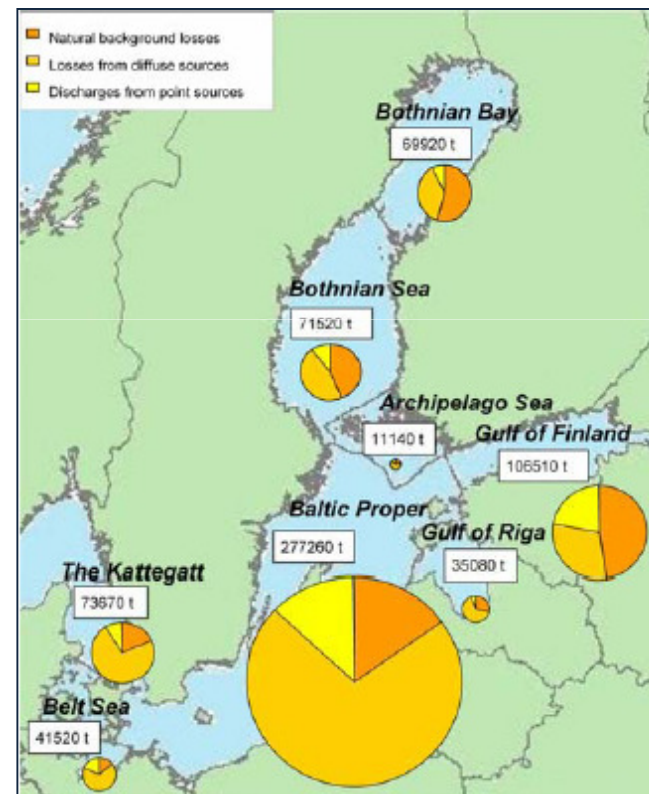
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EUROPEAN REGIONAL CENTRE FOR ECOHYDROLOGY
under the auspices of UNESCO

Proportion of sources contributing to phosphorus and nitrogen input into the Baltic Sea sub-regions



Phosphorus



Nitrogen

(HELCOM 2004)

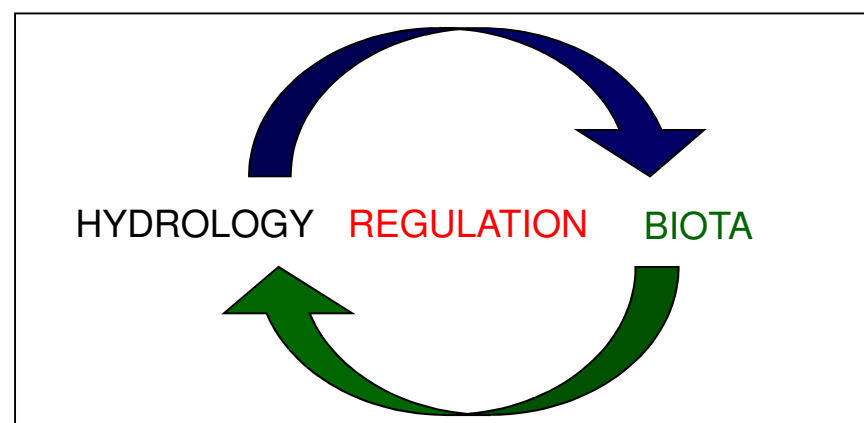
The main sources of diffuse pollution from agricultural areas

- 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 lakes



Ecohydrology: is the sub-discipline of hydrology focused on ecological aspects of hydrological cycle (*Zalewski et al. 1997*)

„Dual regulation” :
Biocenotic processes are shaped
by hydrology and,
vice versa, biocenotic structure
and interactions shape
hydrological processes



(*Zalewski 2000, 2006*)

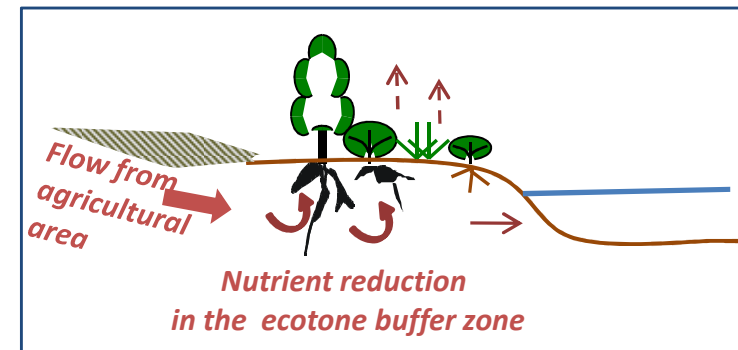
Enhancing the absorbing capacity of the buffer zones for reduce the transfer diffuse pollution from landscape to water ecosystems.

Ecotones as a tools for reduction of diffuse pollution

Ecotones: a linear band of permanent vegetation adjacent to an aquatic ecosystem intended to maintain or improve water quality by trapping and removing various nonpoint source pollutants from both overland and shallow subsurface flow.

It can have a positive impact on agriculture by:

- reducing erosion,
- improving water quality,
- increasing biodiversity,
- expanding wildlife habitats.



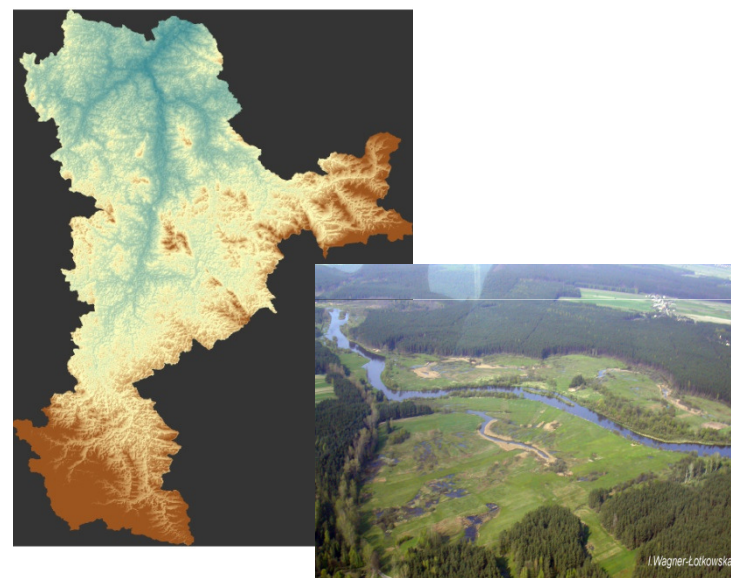
(photos:EKOROB)



EKOROB: Ecotones for reduction of diffuse pollutions

1ST Goal of LIFE+ EKOROB project :

Monitoring of the existing ecotones (characteristic of the Pilica River catchment) in respect of their effectiveness in reducing nutrients



the Pilica River basin



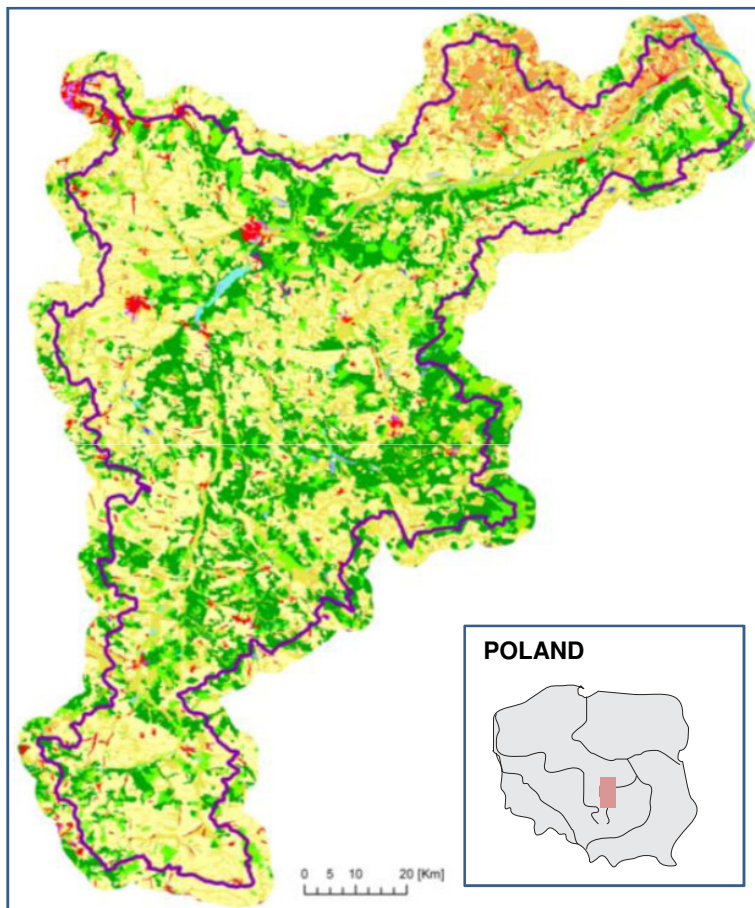
Materials and methods

Monitoring of six-types of natural ecotones chosen all over Pilica River basin located between crop fields and water bodies.

- Ground water quality based on the piezometer nets
- Surface water quality
- Soils analysis
- Plant species composition and N and P content in plant tissues



(photos:EKOROB)



The Pilica Catchment

Catchment

Total area: 9 245 km²

Land use: agricultural - 64%
forest - 31%

The Pilica River

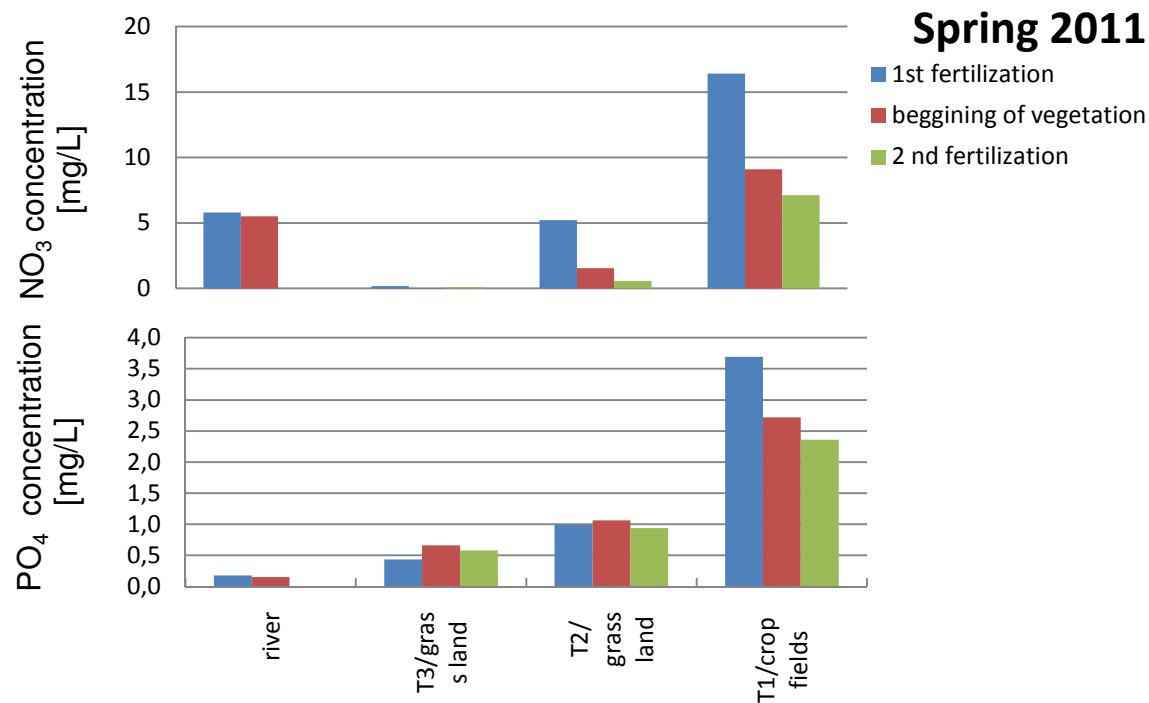
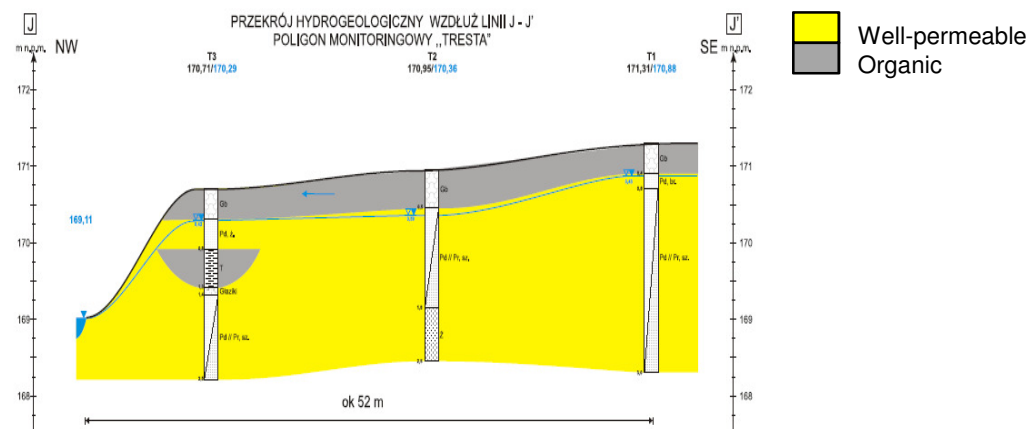
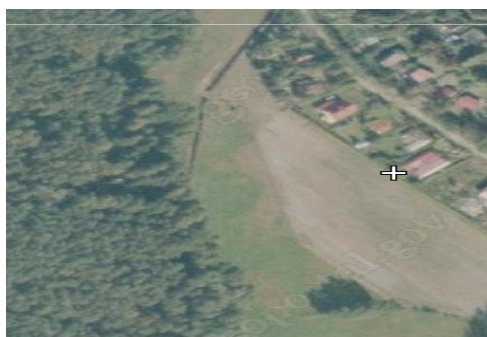
Overall length: 342 km

Mean discharge: 18,51 m³ s⁻¹

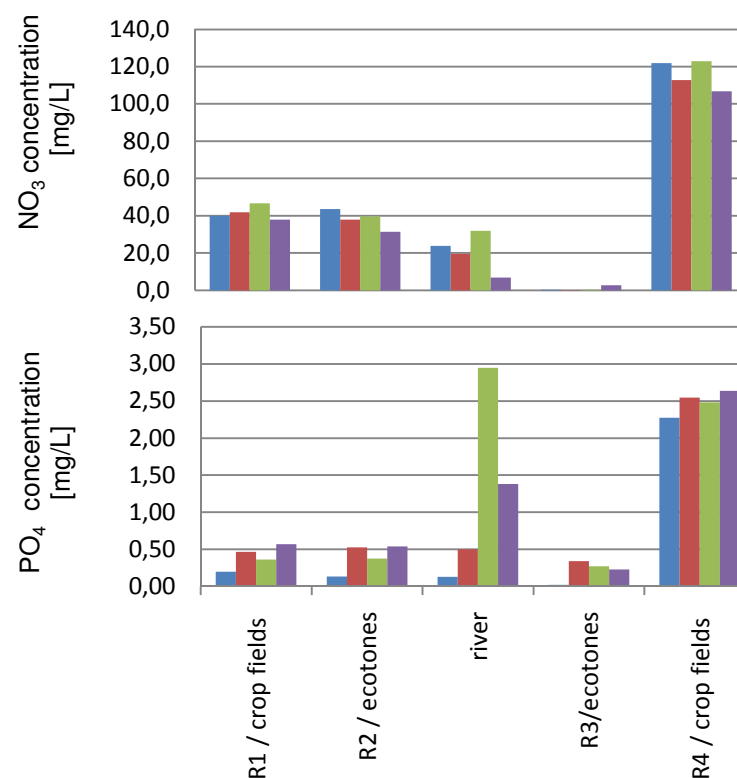
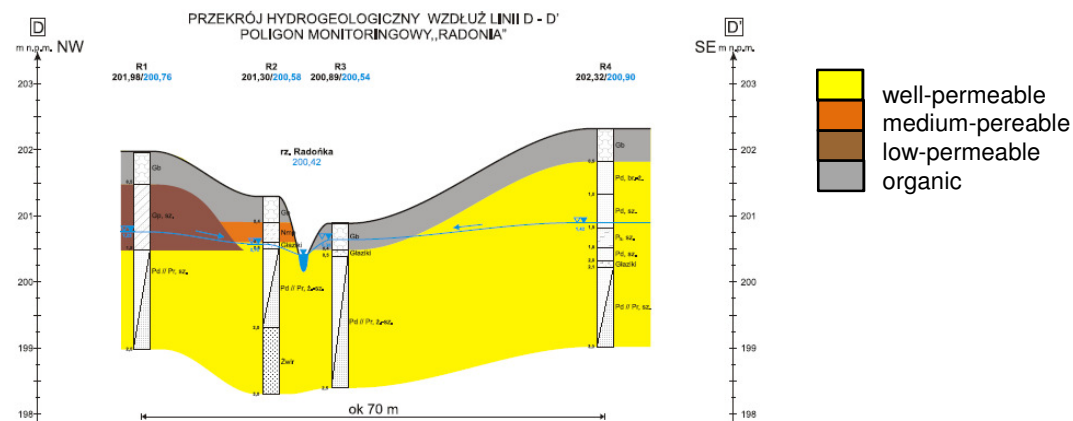
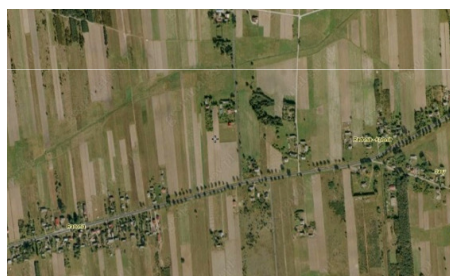
The Pilica LTSER has been launched as the UNESCO/UNEP Demonstration Site on Ecohydrology and Phytotechnology in 1998. Recently it has reached the status of **the UNESCO IHP ECOHYDROLOGY global reference site.**

Monitoring Site Tresta: The role of the width of ecotones

ecotones width	%NO ₃ reduction	% PO ₄ reduction
22m	81	65
50m	99	80



Monitoring Site Radonia: Impact of hydrogeological conditions on groundwater quality



Spring 2011

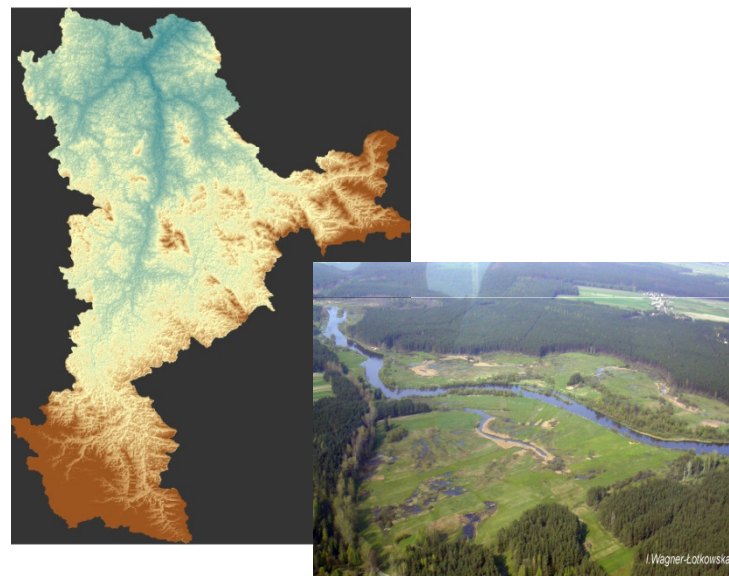


EKOROB: Ecotones for reduction of diffuse pollutions

2nd Goal of LIFE+ EKOROB project:

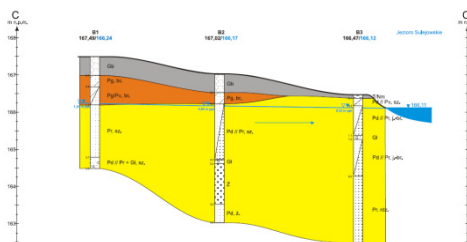
Construction, calibration and optimization of typologically diversified ecotones.

Effectiveness of ecotones enhanced with an additional, innovative element, i.e. the denitrification walls.

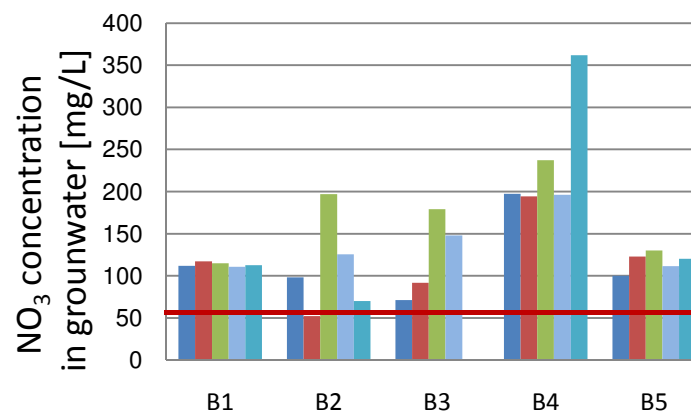


the Pilica River basin

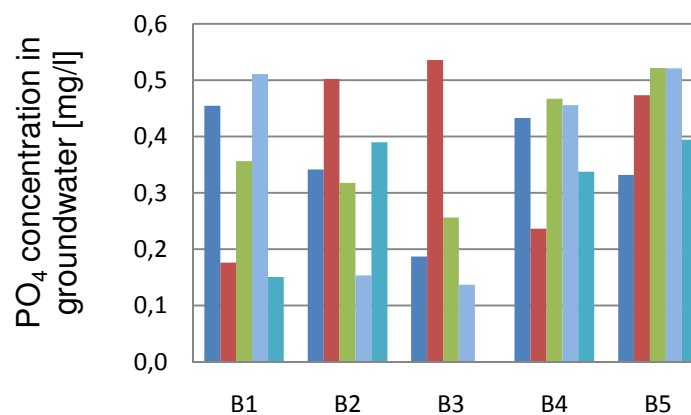




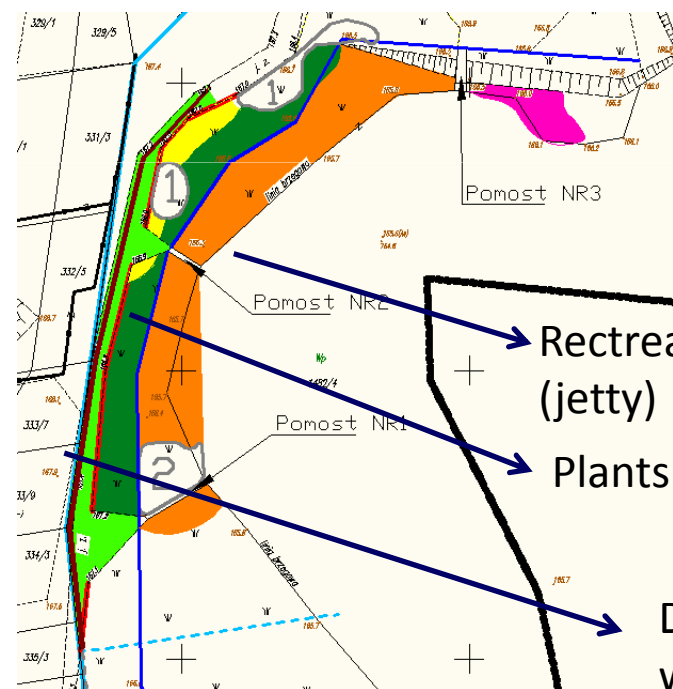
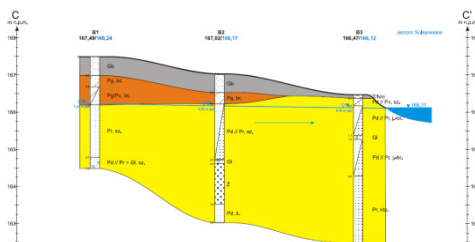
Demosite Barkowice: the optimization of existing ecotones



Critical value marking
polluted water
as per Nitrates Directive



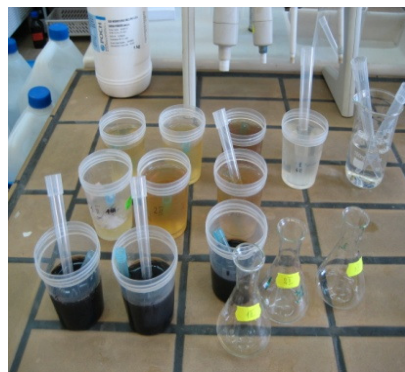
Demosite Barkowice: enhancement of plant buffering zones with denitrification walls



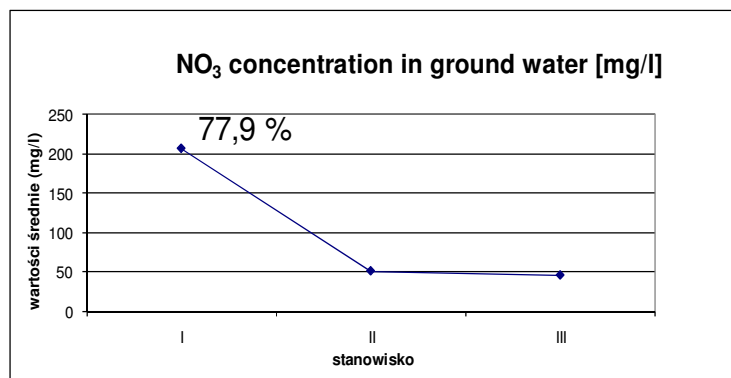
Denitrification wall

is constructing by digging a trench perpendicular to groundwater flow and mixing pinus sawdust, as an organic carbon source, with soil. Degradation of added organic material stimulates growth of denitrifying bacteria and thus conversion of nitrate to nitrogen gas by denitrification

Demosite: denitrification wall around the storage manure located directly on the ground in pigs' farm (stock of 200).

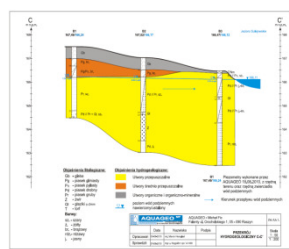


(photo: ERCE)

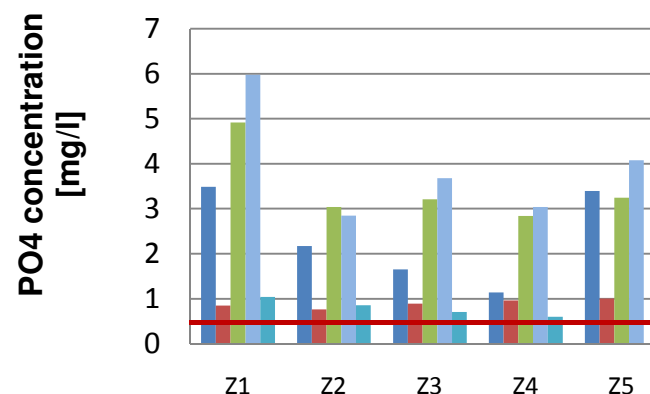


(Bednarek, Ubraniak 2009)

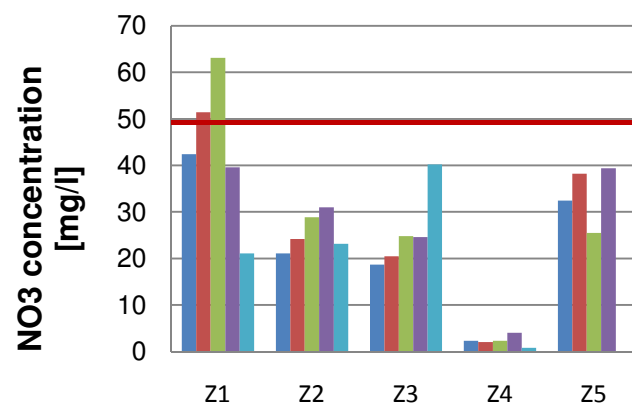




Demosite Zarzecin: Testing ecotone effectiveness under limited area conditions

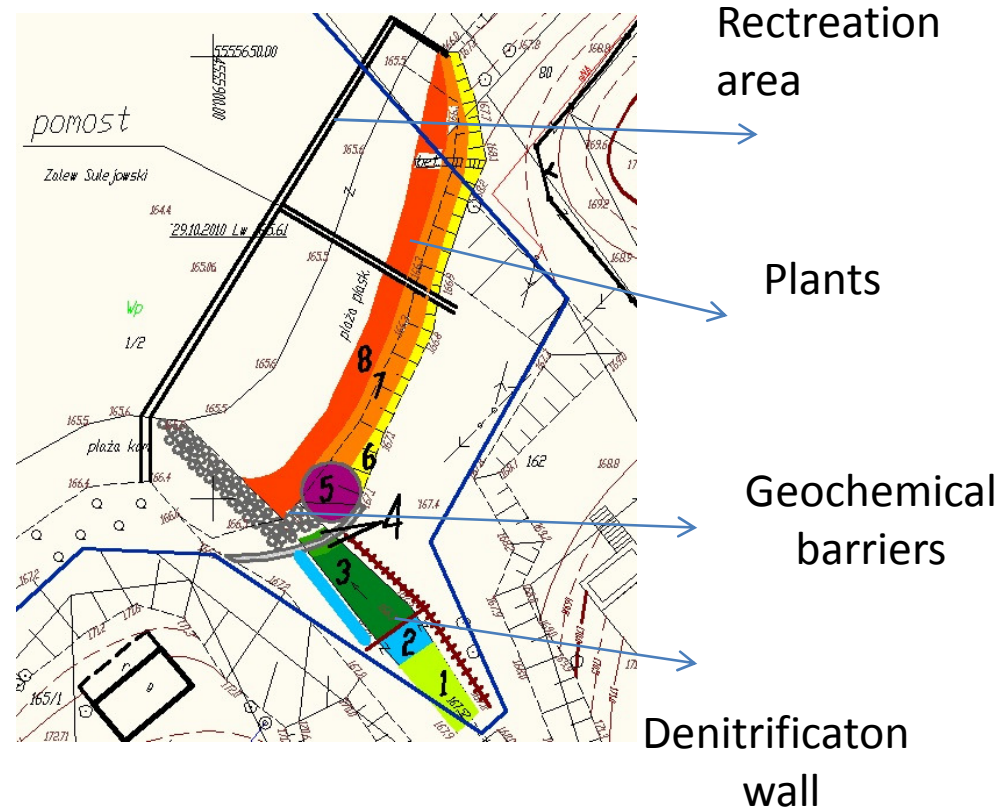
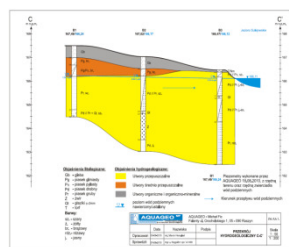


Critical value for appearance cyanobacterial bloom



Polluted water according Nitrates Directive

Demosite Zarzecin: enhancement of plant buffering zones with biogeochemical barriers and denitrification wall





EKOROB: Ecotones for reduction of diffuse pollutions

3rd Goal of LIFE+ EKOROB project :

Setting up a Action Plan for reduction of diffuse pollution in the basin of the Pilica River by means of cost-effective ecohydrological methods, that will help achieve a good ecological status of water in the Sulejow Reservoir.



the Pilica River basin





EKOROB: Ecotones for reduction of diffuse pollutions

4th Goal of LIFE+ EKOROB project :

Establishment of Multi-Stakeholder Platform

Identification of the stakeholders (regional authorities, local authorities, NGOs, schools) and their integration based on an established multi-stakeholder platform that will enable the exchange of experiences, transfer of knowledge





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