



Daria Sikorska, Piotr Sikorski

**Effect of hydrogenic habitats
restoration in a strongly urbanized
landscape**

Warsaw University of Life Sciences

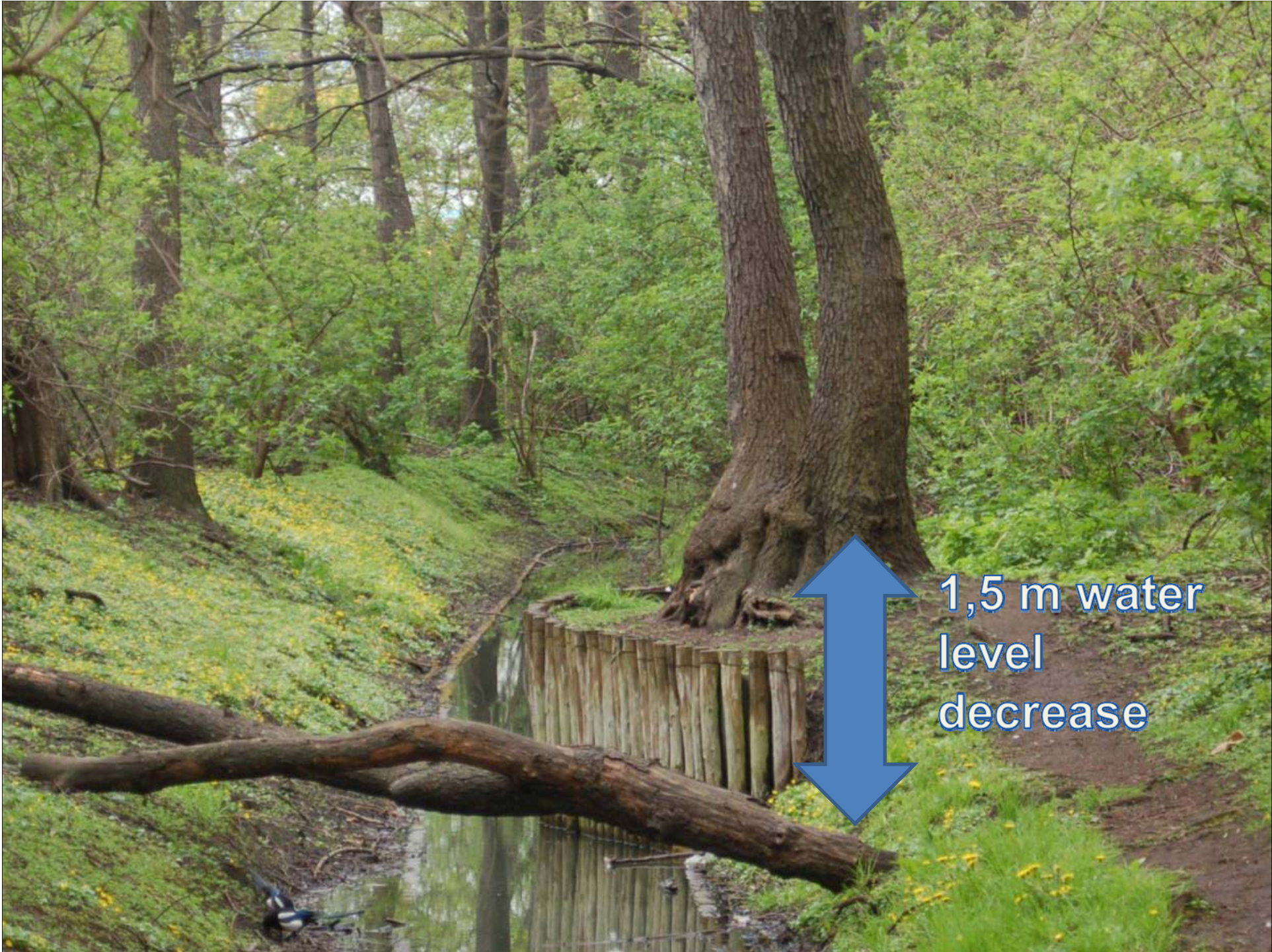
Introduction

- Ecosystem services in urban areas
 - act as refuges of high biodiversity
 - Social and ecological values
 - diversification of homogenous landscape
 - affect microclimate
- Listed functions are best fulfilled by **NATURAL** ecosystems
- **Water dependent ecosystems** are one of most precious and valuable ones



Introduction

- Greatest threat to water dependent ecosystems is their **dewatering**
- Exploration of processes occurring in these ecosystems due to drainage and its long term effects, is crucial for proper protective activities practises



1,5 m water
level
decrease

Aim of the study:

1) Assessment of changes:

- physical and chemical soil properties
- water quality
- vegetation of woodlands and grasslands

in Ecological-Landscape Complex „Olszyna” in Warsaw

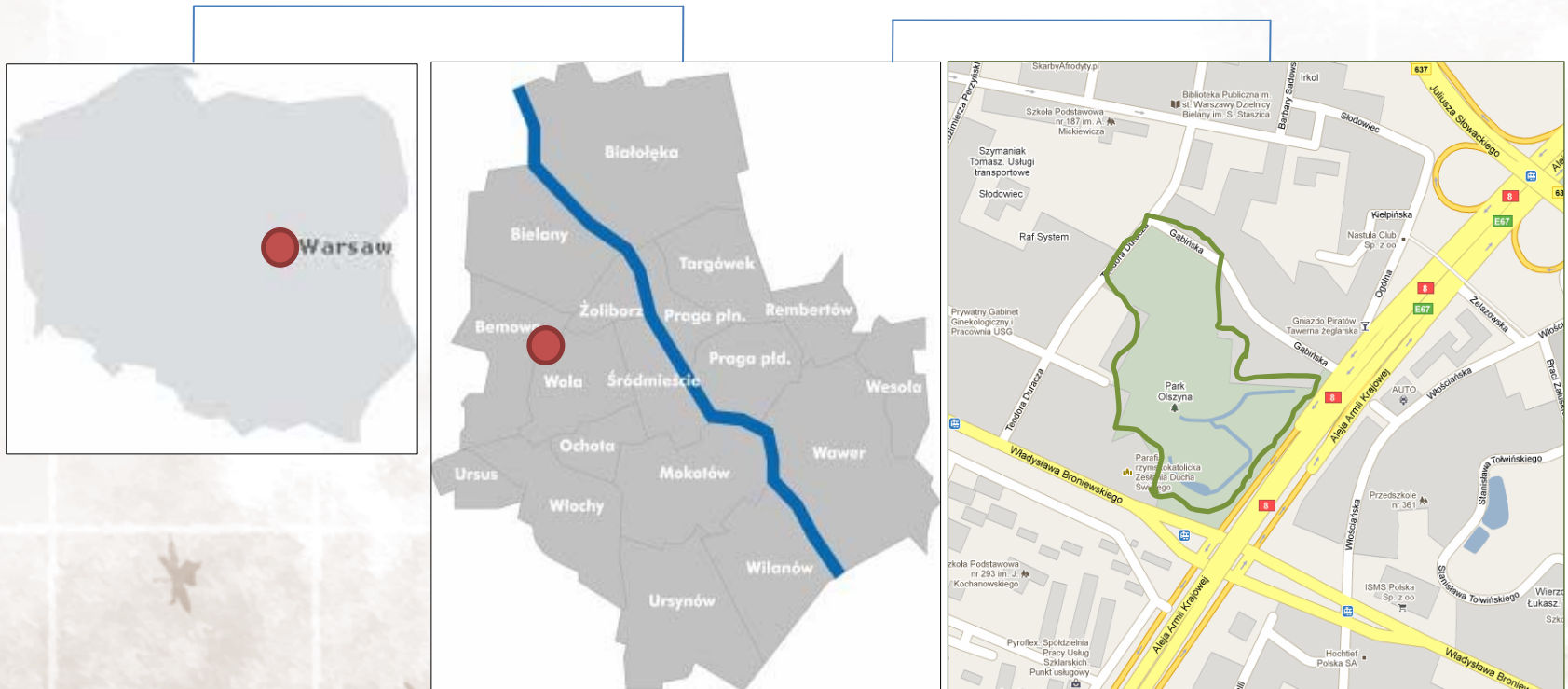
Which occurred after its drainage

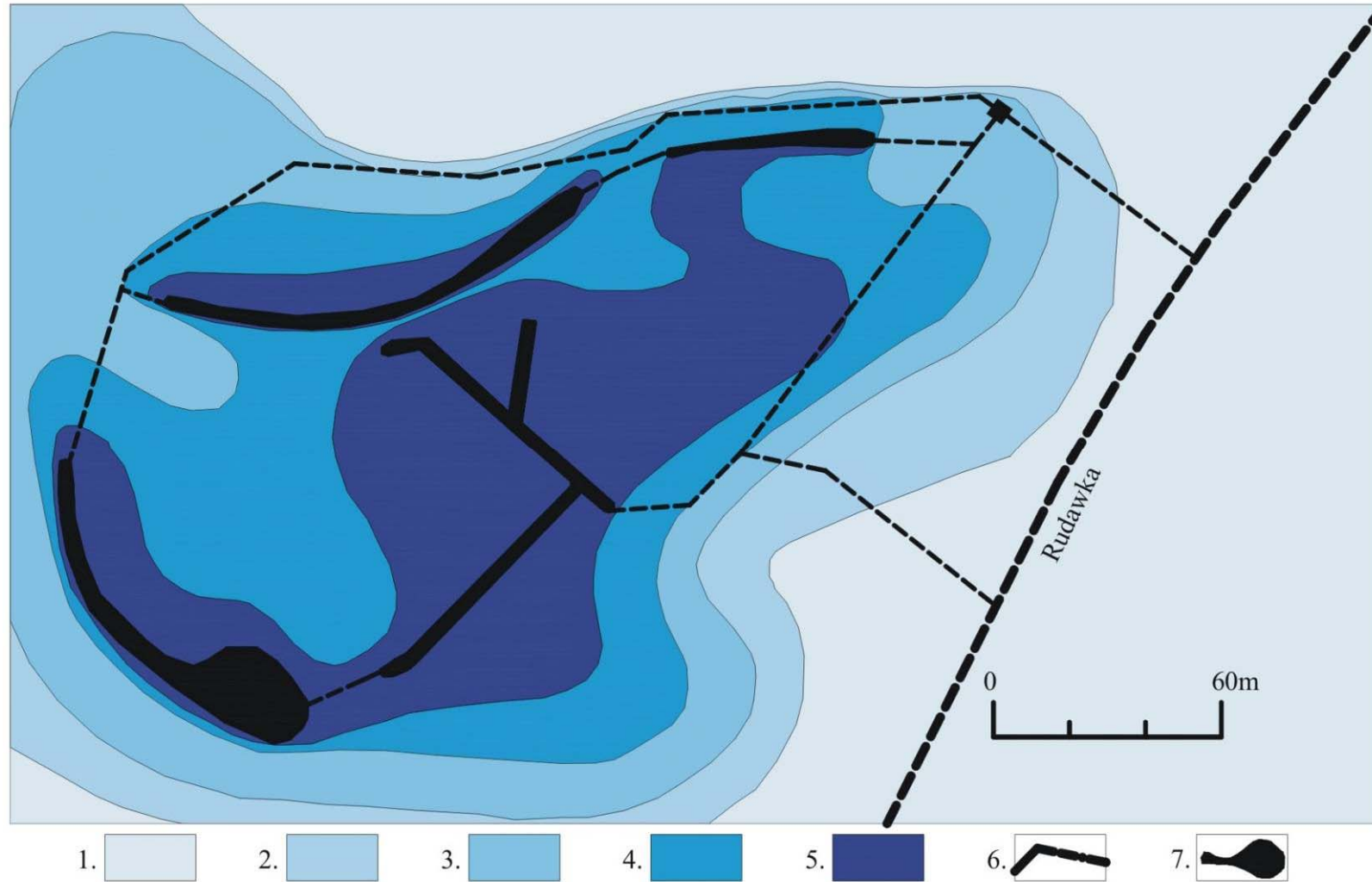
2) Identification of factors associated with habitat properties, which determine changes in the past

3) Proposal of protective activities

Study area

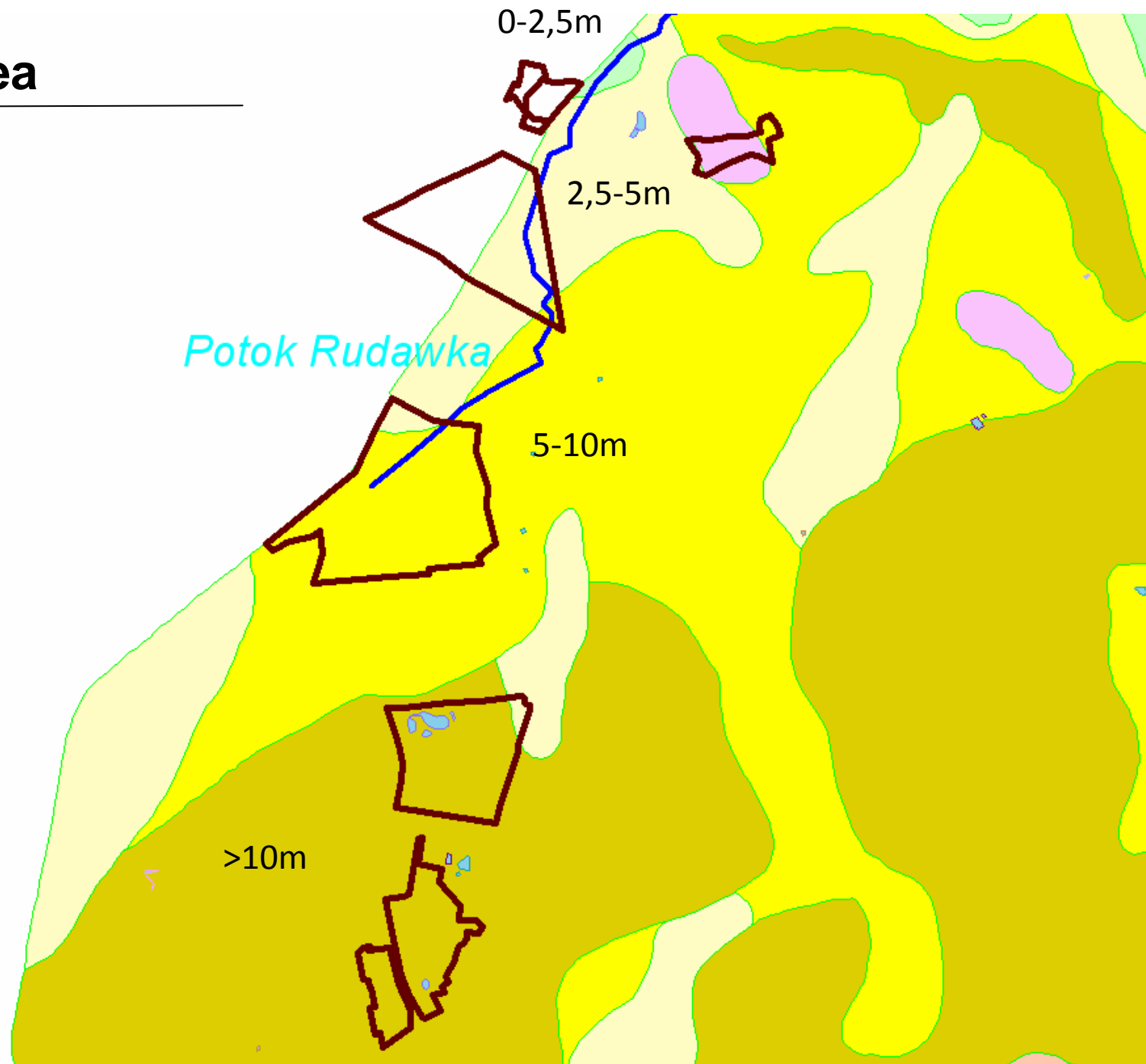
Study area





Map of the depths of ground water table in the Natural Landscape Complex „Olszyna”: 1 - >2 m, 2 - 1.5-2 m, 3 - 1-1.5 m, 4 - 0.5-1 m, 5 - 0-0.5 m, 6 - underground pipelines, 7 – surface waters (Pajnowska et al. 1996, modified)

Study area



Study area



Water and soil parameters

surface waters (n = 8)

- pH
- color
- ash content
- nitrogen (ammonium, nitrites, nitrates) [mg/dm³]
- sulfates [mg/dm³]
- iron [mg/dm³]
- alkalinity [mval/dm³]
- hardness [mg /dm³]

Soils (n = 12)

- pH (in H₂O)
- total nitrogen[% N]
- total phosphorus[% K]



soil samples
1996 and 2010

water samples
1996 and 2010

Investigation of plant features

Indicators calculated on the basis of phytosociological data
(n = 16)

- Total number of species
- Assessment of plant communities naturalness
 - Synanthropization index
- Assessment of diversity
 - Shannon's diversity index
 - Simpson's diversity index
- Percentage of plant species belonging to different phytosociological groups
 - *Phragmitetea* (rushes)
 - *Stellarietea* (segetal)
 - *Quercus-Fagetea* (forests)
 - *Artemisietea* (perennial, ruderal)
 - *Molinio-Arrhenatheretea* (meadows)



**Floristical mapping
1973, 1996 i 2010**

Habitat changes – SOIL

Mean values of soil chemical parameters in 1996 and 2010 ($p < 0,05$)

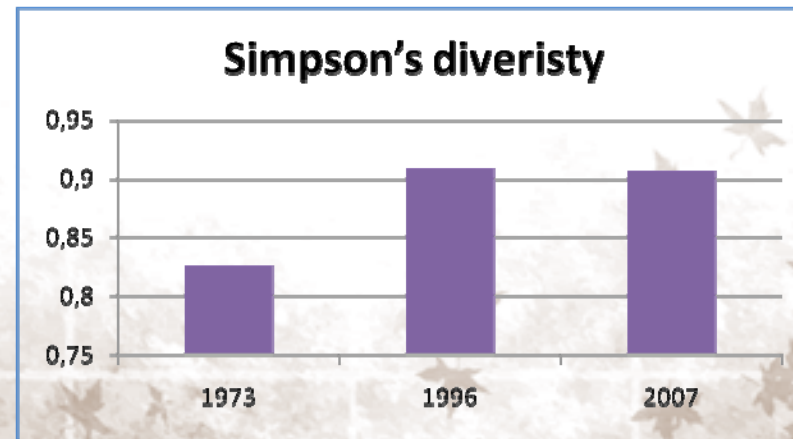
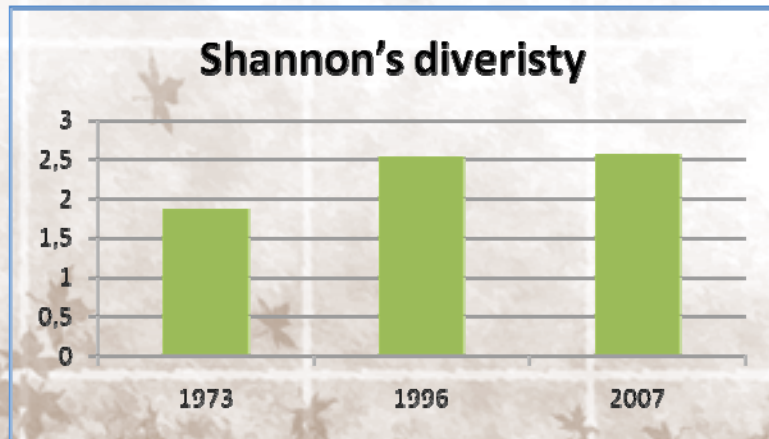
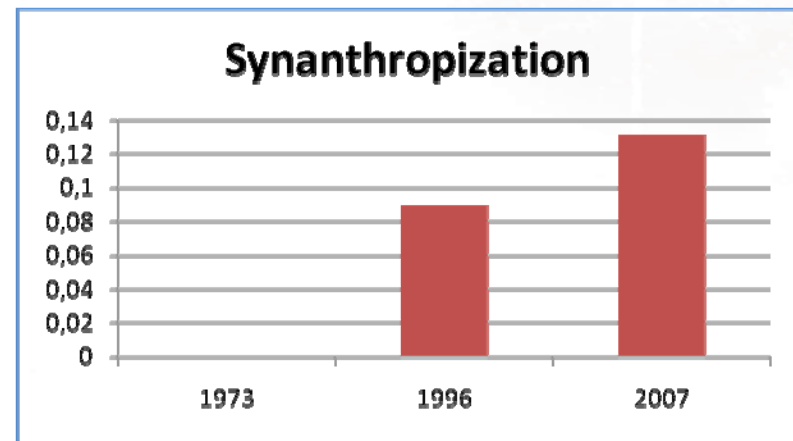
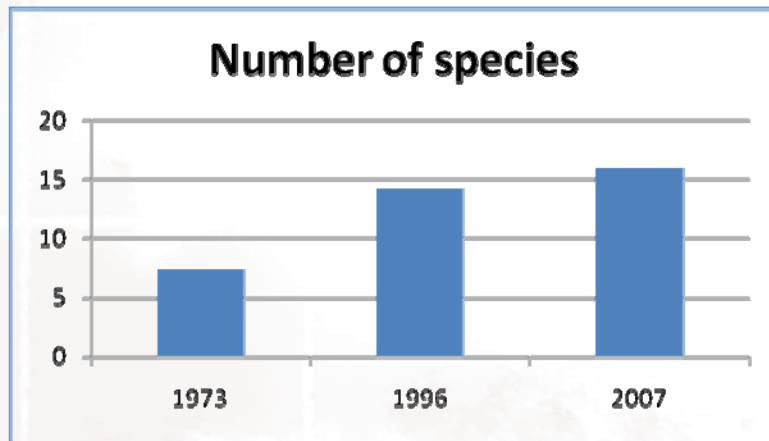
	1996	2010	p
Odczyn	5,9	5,8	0,823492
Azot ogólny [%]	1,04	0,368	0,096771
Potas ogólny [%]	0,101	16	0,000001*

Habitat changes – WATER

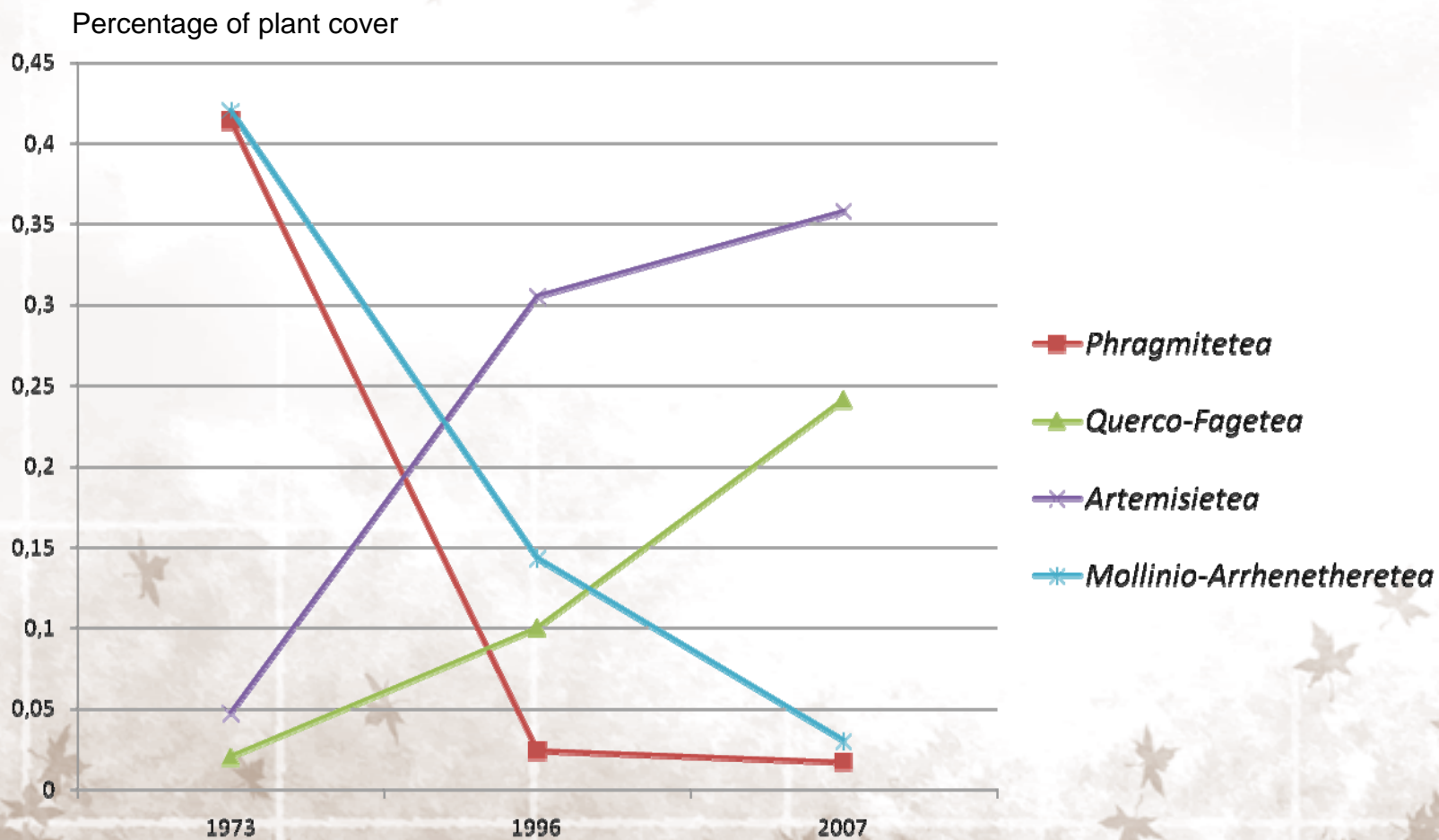
Mean physical and chemical surface water parameters in 1996 and 2010, ($p < 0,05$)

	1996	2007	p
pH	6,7	7,3	0,062332
color	28,00	124,13	0,057569
ammonium	0,34	0,51	0,312579
nitrites	0,0002	0,0511	0,273509
nitrates	0,0580	13,1738	0,364264
sulfates	18,67	309,30	0,000000*
orthophosphates	0,2167	0,3010	0,571110
alkalinity	4,2	6,2	0,000023*
hardness	440,00	649,21	0,000157*
suspended matter	620,00	62,94	0,105632
ash content	0,706	1096,000	0,000000*
iron	4,8000	1,7075	0,015003*

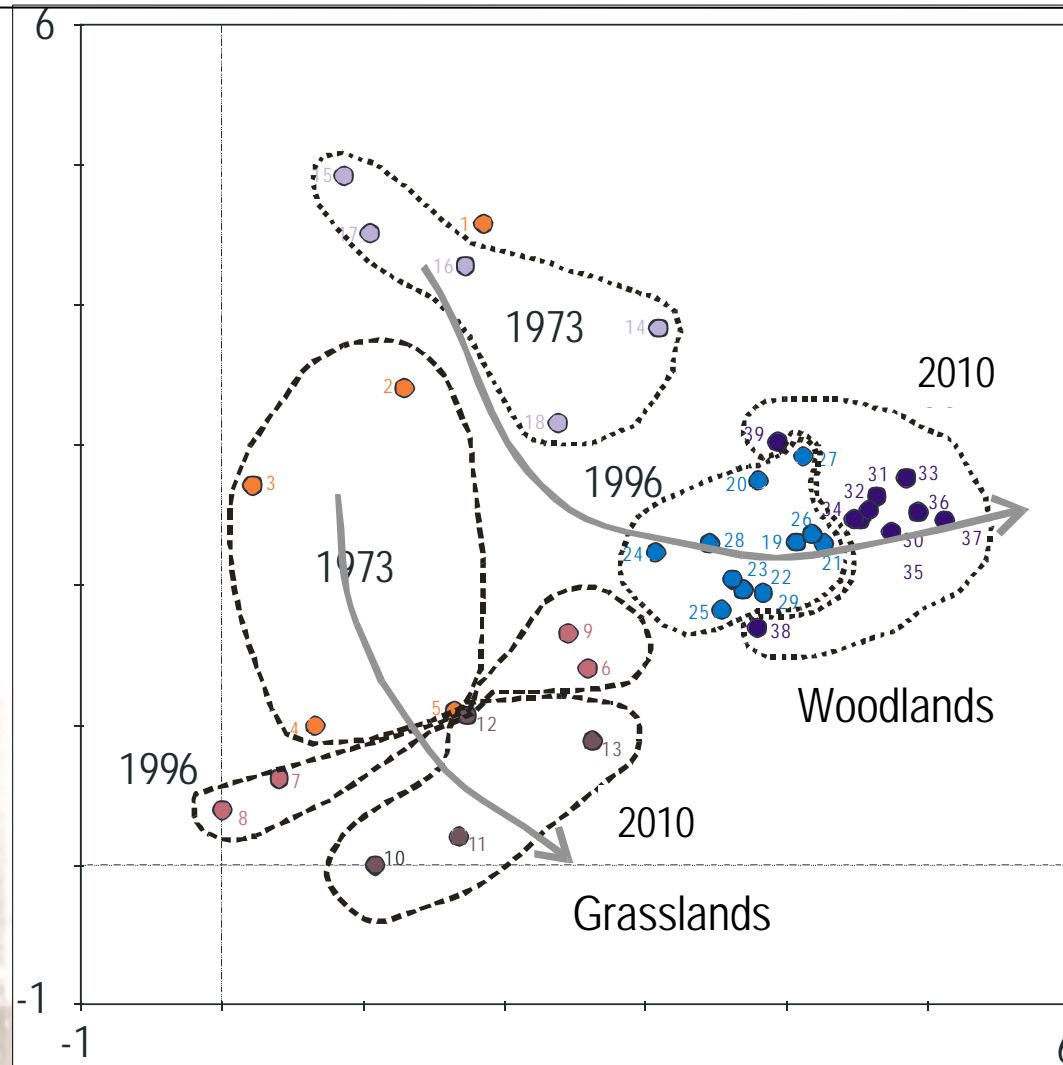
Vegetation changes



Vegetation changes

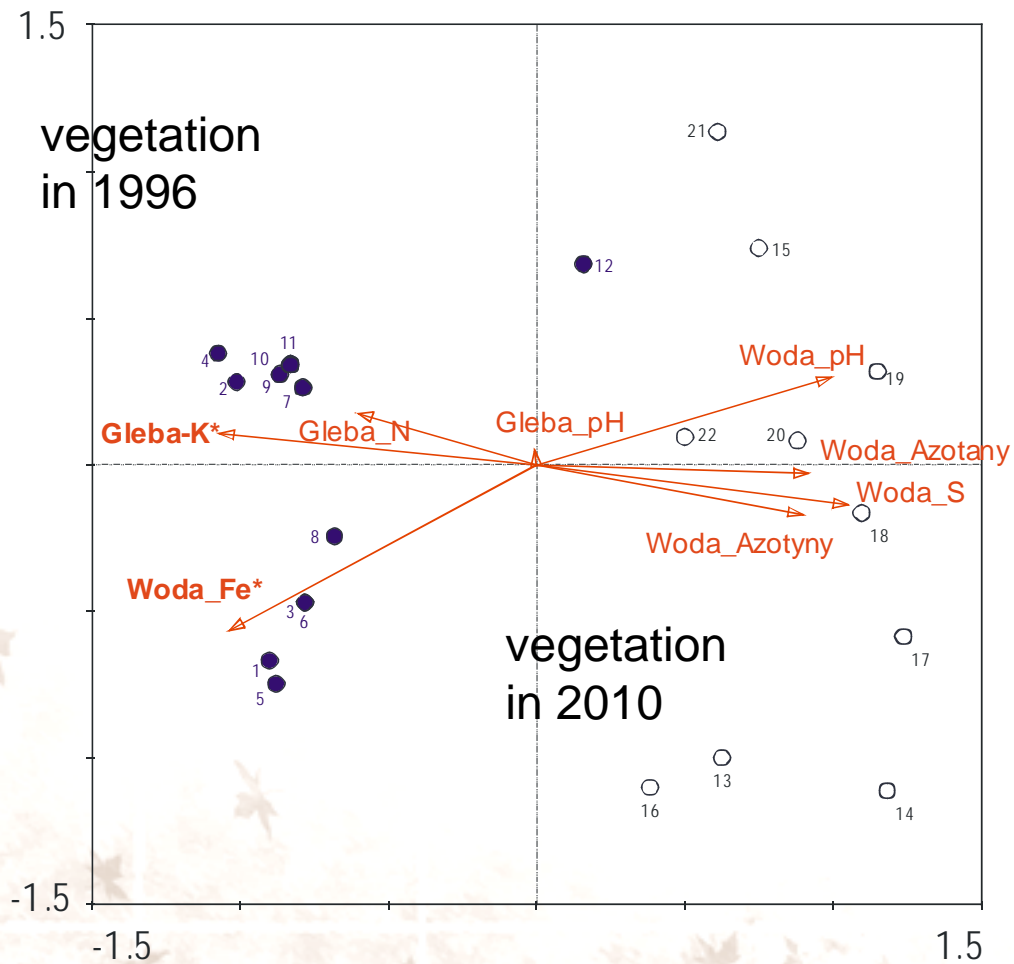


Tendencies of vegetation changes– DCA



Results

The effect of habitat changes on vegetation– CCA



- factors explain 36% of actual diversity

Conclusions

- Drainage of Natural Landscape Complex „Olszyna” strongly affected the habitat and its vegetation, resulting in long-term changes
- Loss of K in soil according to 1996, increase of sulfates and decrease of iron in water
- Woodlands are poorer in species of rushes and increase of species associated with meadows, forest and synantrophical plants
- The hydrotechnical system of ditches and reserviors is not suitable to sustain the habitat of alder-carr forest *Fraxino-Alnetum*

The background features a light beige grid pattern overlaid on a soft-focus image of falling leaves. The leaves are scattered throughout the frame, with a higher concentration at the top and bottom edges. The overall aesthetic is clean and professional.

THANK YOU FOR YOUR ATTENTION