

# Peatlands in Orawa-Nowy Targ Basin

State and research



Dr hab. inż. Ewelina Zająć, prof. URK

Department of Land Reclamation and Development

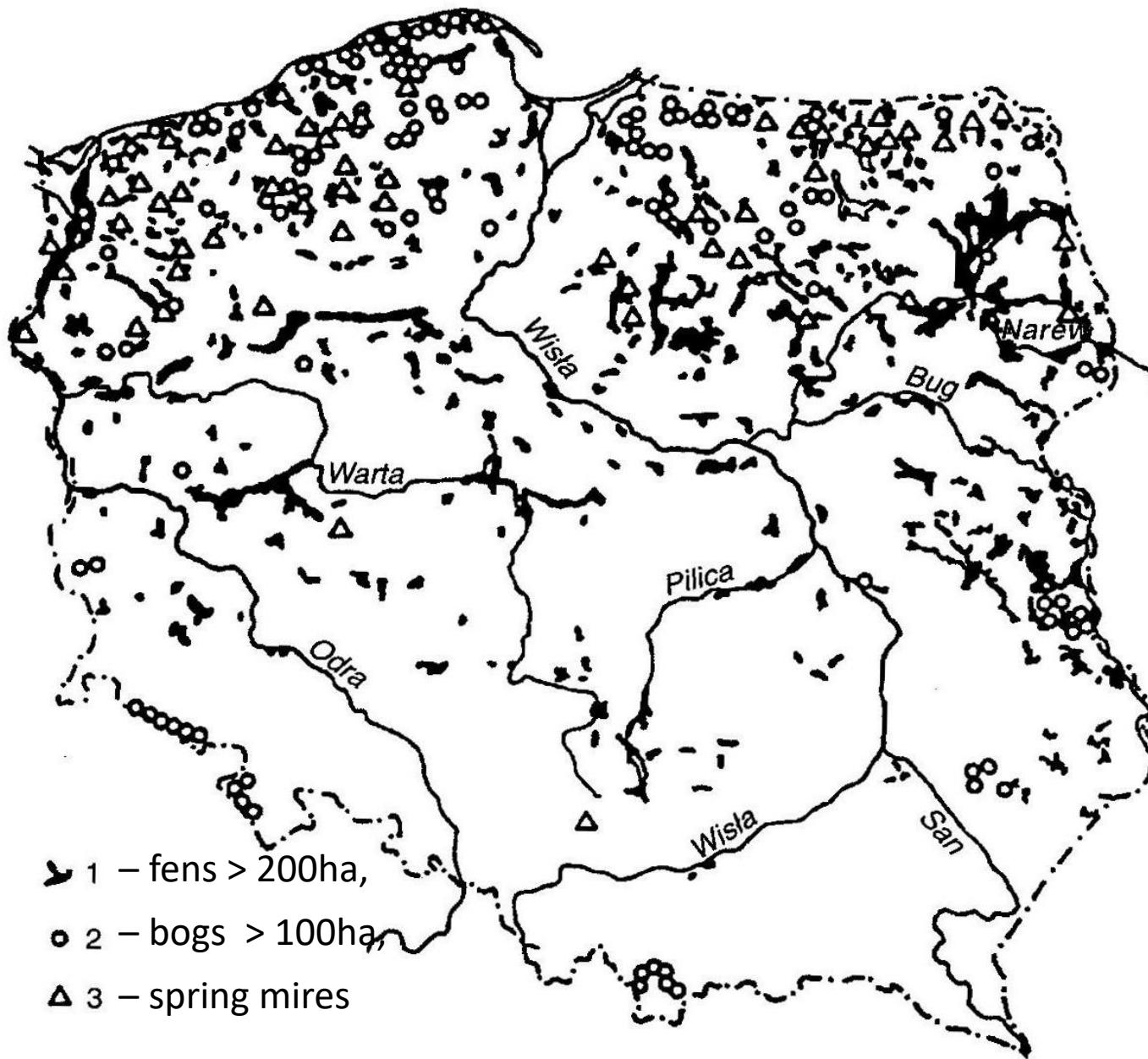
University of Agriculture in Krakow, Poland





# Peatlands in Poland





**Area of wetlands: 4 345 885 km<sup>2</sup>.**

**Area of peatlands: 1 254 758 km<sup>2</sup>**  
(28,9% of wetlands area).

**Percentage cover of peatlands types:**

- fens – 92.4%,
- bogs – 4.3%,
- transitional mires – 3.3%

Percenatge cover of peatland in Poland is 4%.



# Protection of peatlands in Poland



Poleski National Park (1990), 49,07 km<sup>2</sup>

Biebrzański National Park (1993), 592,23 km<sup>2</sup>

Narwiański National Park (1996), 73,50 km<sup>2</sup>

„Ujście Warty” National Park (2001), 80,38 km<sup>2</sup>

Nature Reserves: 167; total area 17,848 ha

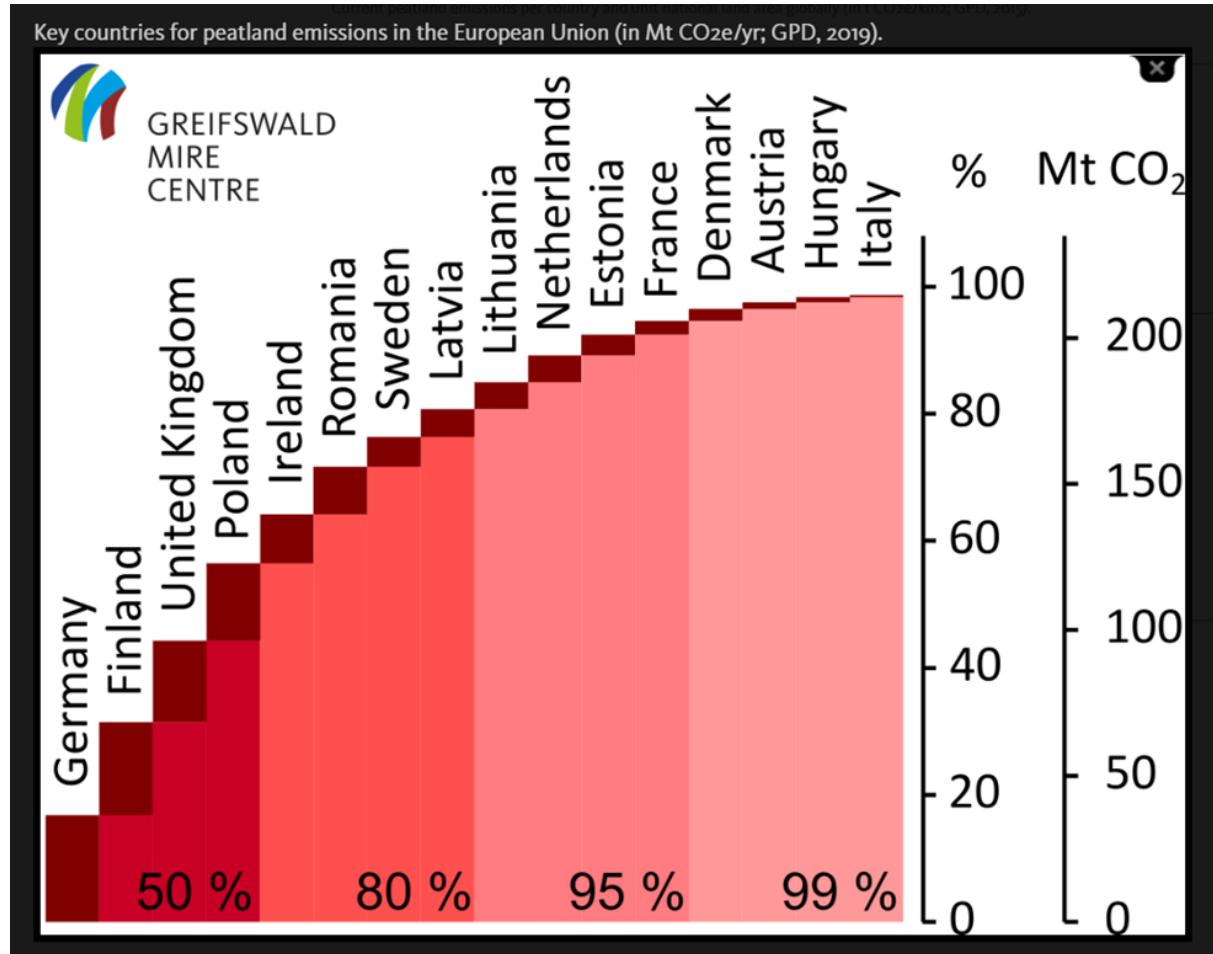
Natura 2000 area ca. 350 000 ha

19 Ramsar sites of the total area of 152,964 ha



# Peatlands degradation

- In Poland ca. 85% of peatlands are drained (50<sup>th</sup> and 70<sup>th</sup> of XX century).
- Most of them are used as grasslands and pastures (ca. 70%).
- Estimated emmision is ca. 34 t CO<sub>2</sub> eq per year.

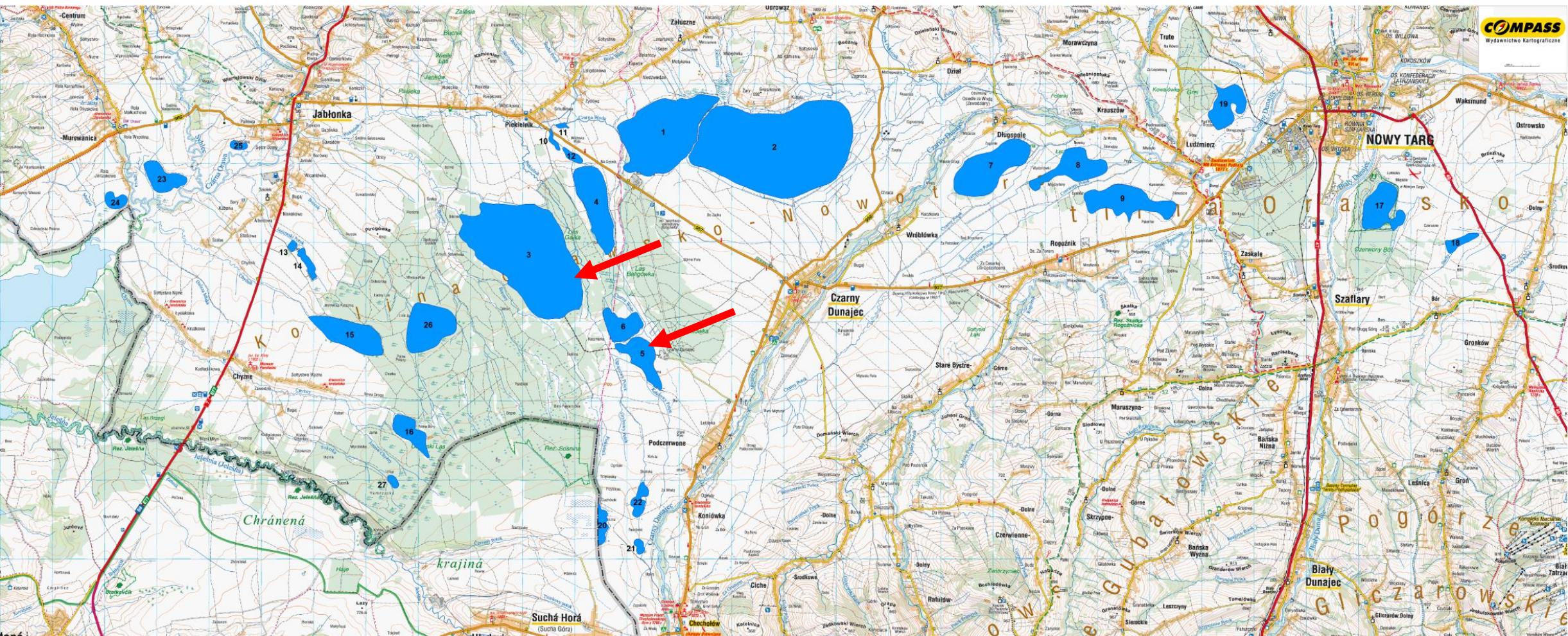




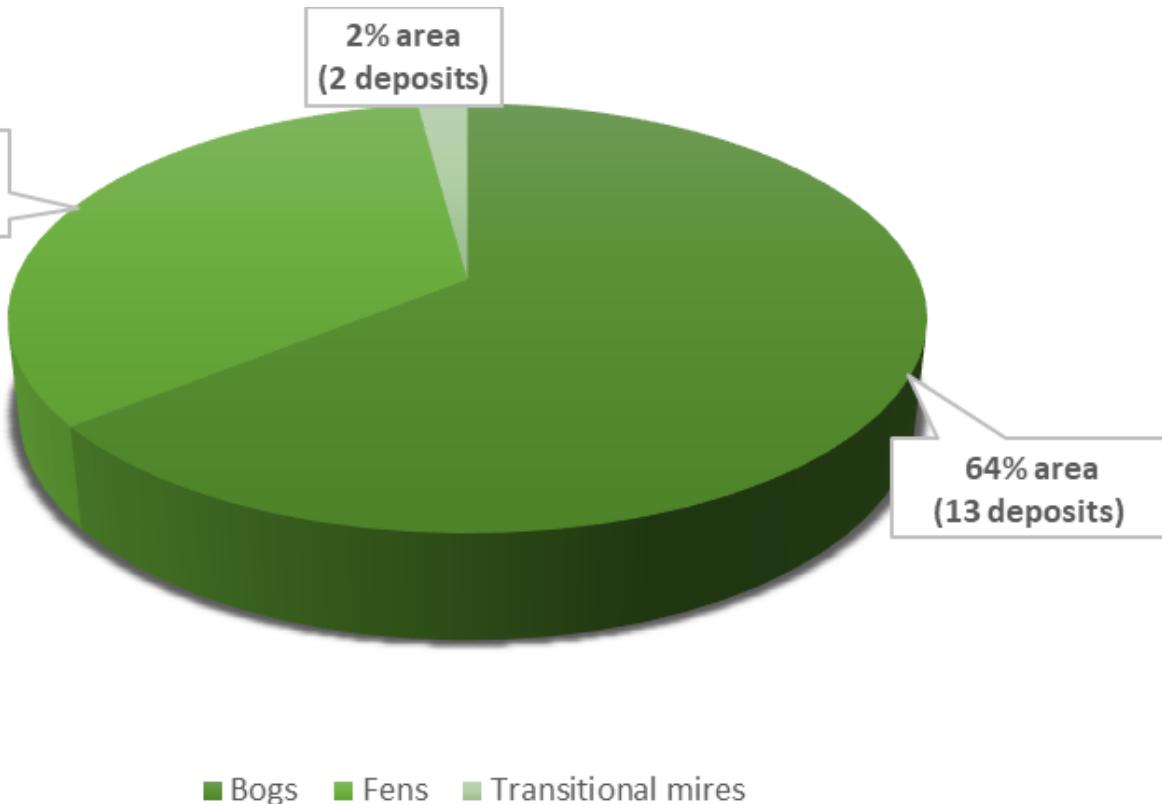
# **Peatlands in Orawa-Nowy Targ Basin**



# Distribution of peatlands in the Orawa-Nowy Targ Basin [Lipka and Zając 2014]



1 - Puścizna Rękowiańska (Baligówka), 2 - Bory Wylewiska, 3 - Puścizna Wielka, 4 - Puścizna Mała, 5 - Bór za Lasem, 6 - Kaczmarka, 7 - Długopole (Wędzirówka), 8 - Puścizna Franków, 9 - Przymiarki, 10 - Piekielnik A, 11 - Piekielnik B, 12 - Piekielnik C, 13 - Pustač Chýzne A, 14 - Pustač Chýzne B, 15 - Pustač Chýzne C, 16 - Urbarski Las, 17 - Bór na Czerwonem, 18 - Gronków, 19 - Ludźmierz (Do Grela), 20 - Koniówka, 21 - Kosarzyska, 22 - Bacuch, 23 - Otrębowskie Brzegi, 24 - Janowiackie, 25 - Otrębowa, 26 - Pustač pod Pustą Polaną, 27 - Urbar



- 27 peatlands
- bog pine forests (*Vaccinio uliginosi-Pinetum sylvestris*)
- total peatlands area: 2409,5 ha
- the biggest fen: 634 ha
- the biggest bog: 482 ha
- max depth: 8,70 m
- max mean depth: 3,40 m
- about 35% of petalands area is lost since XIX century
- Nature 2000, nature reserve „Bór na Czerwonem” (Ramsar site)



# Main threats

- Peat extraction (industrial and „wild”),
- Lowering of ground water level as a result of gravel and sand mining,
- *Pinus sylvestris* expansion na bog domes,
- Overgrowing of degraded areas (extracted, drained) by non-bog vegetation (ericaceous species, birch-pine tree stands),
- Wild fires,
- Difficulties in legal protection of peatlands.





# Our research projects

## I. Substrate quality and succession direction on abandoned post-extracted bog areas

1. Water table level
2. Depth, degree of decomposition and botanical type of peat
3. Peat substrate quality parameters of the top layer (pH, electrical conductivity, C, N, N-NH<sub>4</sub>, N-NO<sub>3</sub>, moisture content, bulk density, total and drainable porosity etc.)
4. Plant species diversity (mosses and vascular plants)

## II. Water quality and microclimatic conditions on natural, post-extracted and self-regenerated bog areas

1. Water table level
2. Soil moisture content (10, 20, 40, 60, 100 cm)
3. Water quality (DOC, pH, electrical conductivity, oxygen)
4. Peat temperature in top layer
5. Microclimatic conditions: precipitation, air temperature and humidity, insolation



# Reaserch sites



Bare peat



Succesion stage with ericaceaous species and *Eriophorum vaginatum*



# Reaserch sites



*Succession stage with pine-birch tree stand*



*Spontenaous regeneration with *Eriophorum vaginatum* and *Sphagnum* mosses*



# Reaserch sites



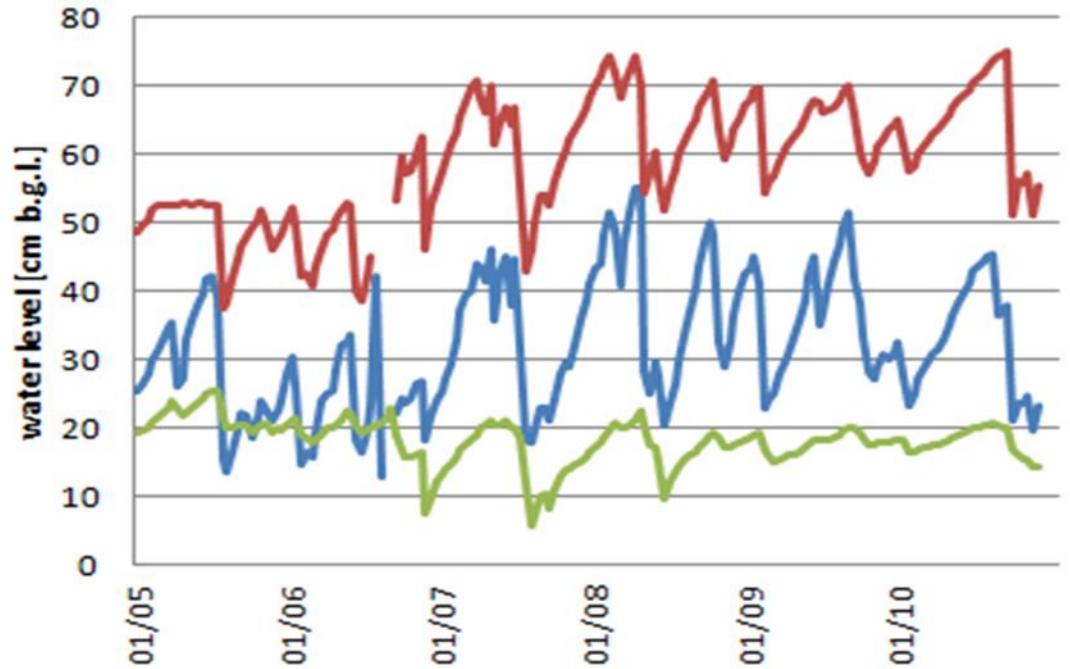
*Bog dome*



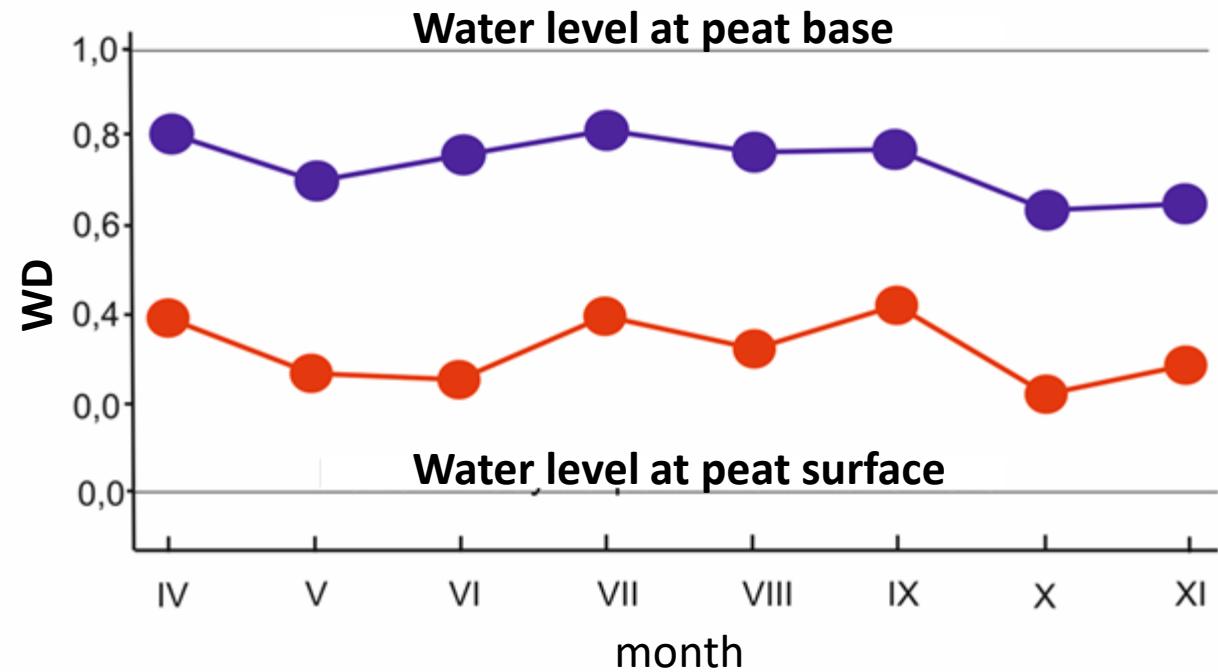
*Sphagnum carpet with *Rhynchospora alba**



# Research results



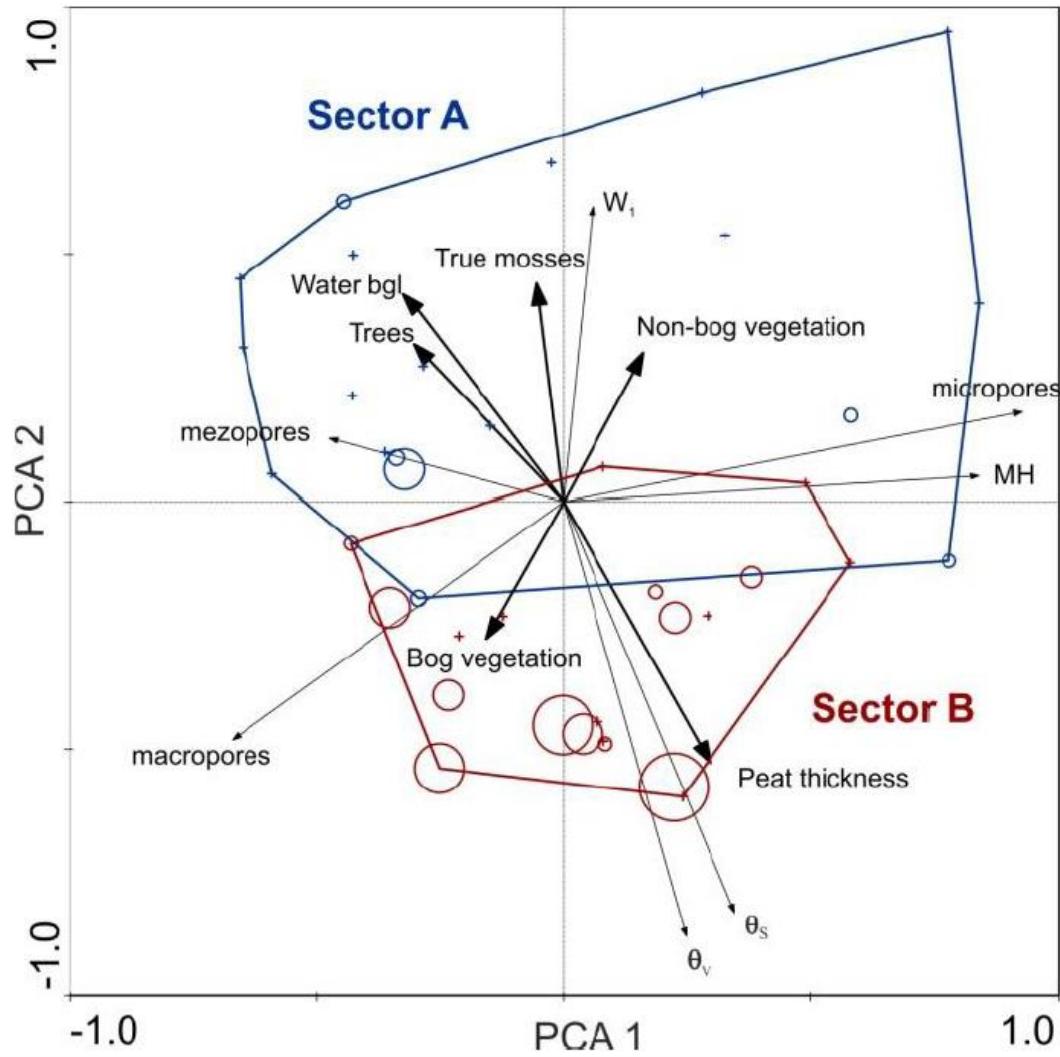
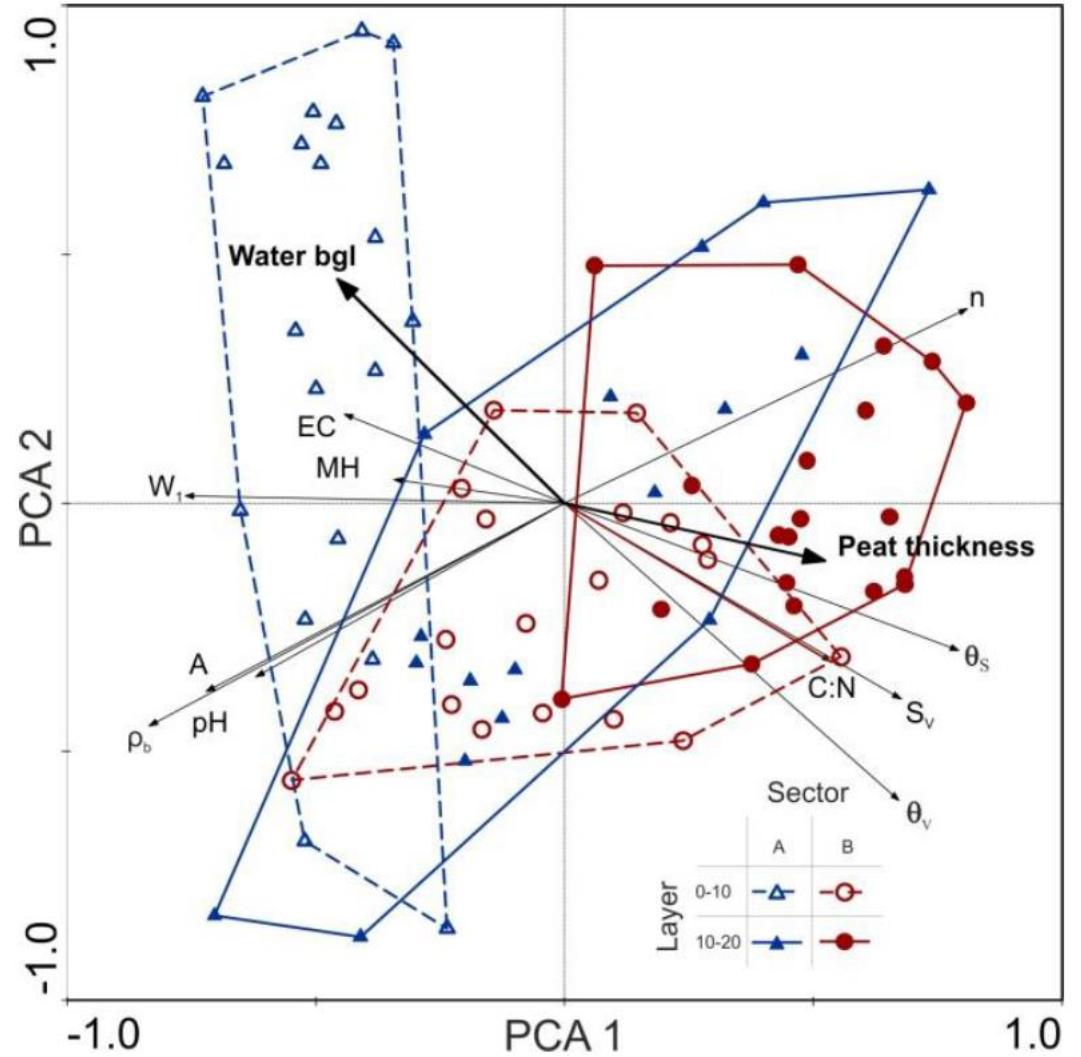
**Water table level fluctuations;** green: bog dome; blue: cotton-grass and ericaceous shrubs; red: pine and birch tree stand



*Variation of the water table coefficient WD (mean water table depth ÷ thickness of residual peat) for ericaceous shrubs (red) and tree stand (blue) succession stages. WD can be help to estimate the degree of drying of cutover peat layer.*



# Looking for patterns



# Main conclusions

- Restoration of a properly functioning hydrological system is crucial. The key importance for peat-forming bog re-vegetation on post extracted areas have water table depth, residual peat thickness and hydrophysical conditions of the cut-over peat.
- The effects of a residual peat layer that is too shallow may be sufficiently serious to prevent the restoration of a raised bog. Thus, leaving behind only a shallow peat layer at the end of peat extraction operations may be justified only if the recovery of peat-forming bog vegetation is not an objective for the peatland.
- Restoration strategy should consider implications of unfavourable physical properties of the cut-over peat surface on hydrological conditions, especially in case of areas abandoned for a long time. Restoration should start as soon as possible.
- Any solutions aimed at providing appropriate hydrological conditions must be site-specific due to huge diversity of local conditions





Thank you ☺

