Plant communities of created wetlands in Central Europe
diversity and species composition at local and regional level

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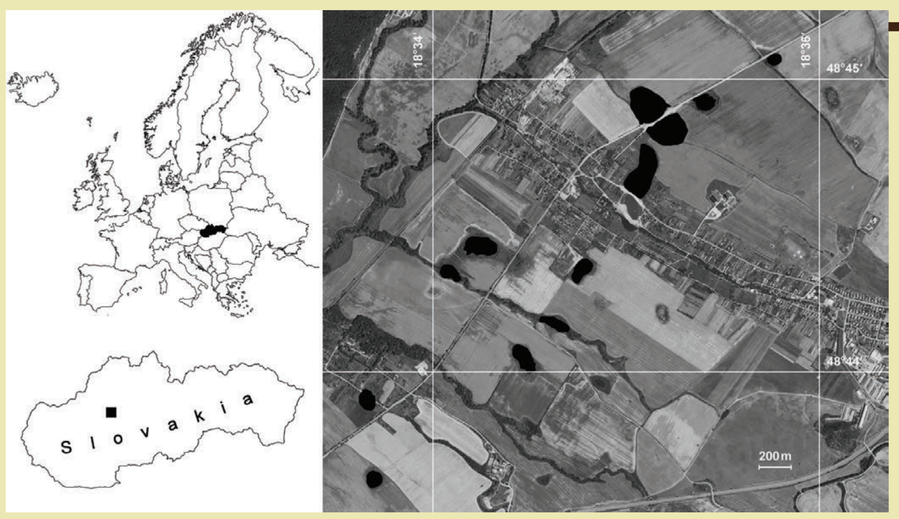
Agricultural and industial landscape

The upper Nitra River Basin (central Slovakia) is a region that has been critically affected by past economic activities and associated environmental negligence. After the Second World War, river regulation, intensive agriculture and industrial development all contributed to reducing the biological diversity of the landscape. Paradoxically, mining, which is the major industry of the region, has contributed greatly to recent increases in biodiversity. Extensive underground coal mining operations brought about changes to surface landforms and created a relatively dense pond system called Košské mokrade wetlands.

Mining induced biodiversity

The first flooded terrain depressions appeared in 1986 and quickly became a "hot spot" for regional biodiversity. Over a 100 plant species, more than 120 aquatic macroinvertebrates, 8 amphibian and more than 180 bird species were recorded from this area, many of them endangered or rare (e.g. *Bulboschoenus maritimus, Schoenoplectus mucronatus, Egretta alba, Himantopus himantopus*). Košské mokrade wetlands were recognised as regionally important wetlands.



What shapes plant diversity and composition?

These wetlands occur in homogenous geomorphic settings in which particular wetlands appeared in a chronosequence linked to mining activities, permitting the study of successional changes. Moreover, these wetlands span a relatively broad range of ecological gradients in terms of morphology, hydrological regime, and nutrient concentrations. This allows the study of associations between floristic characteristics and these gradients.

The relative importance of regional (spatial) and local processes was assessed. More specifically, two main hypotheses were evaluated: 1) The "local hypothesis" suggesting that locally specific variables are the primary factors shaping wetland communities; and 2) the "regional hypothesis" suggesting that limits to dispersal influence species composition in a naturally patchy system, and wetlands close to each other are more similar than distant ones.

Local hypothesis

Variables: *Age of wetland + Depth + Conductivity + Variability of wetland size + Nutrients + pH + Riparian vegetation cover + Size of wetland*

Best subsets:

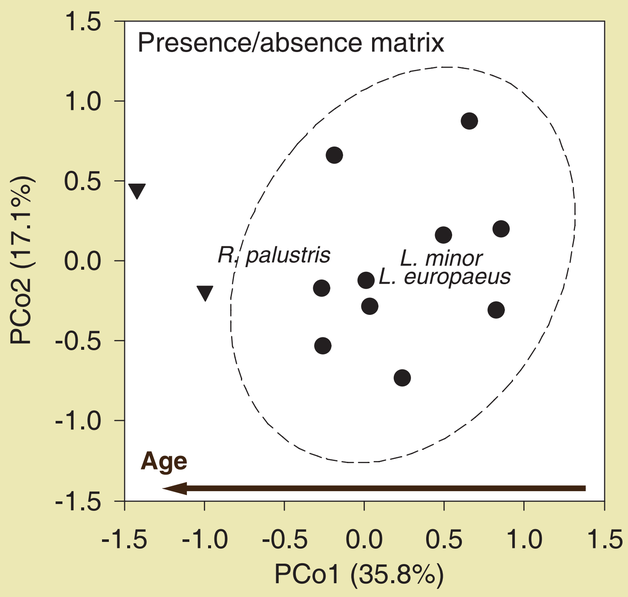
Species richness ~ log Conductivity	(GLM, $p < 0.05$, 34.4%)
Shannon diversity ~ log Conductivity	(GLM, $p < 0.05$, 31.9%)
Presence/Absence matrix ~ Age	(db-RDA, $p < 0.001$, 28.7%)
Abundance matrix ~ Age + Depth + Conductivity	(db-RDA, $p < 0.001$, 48%)

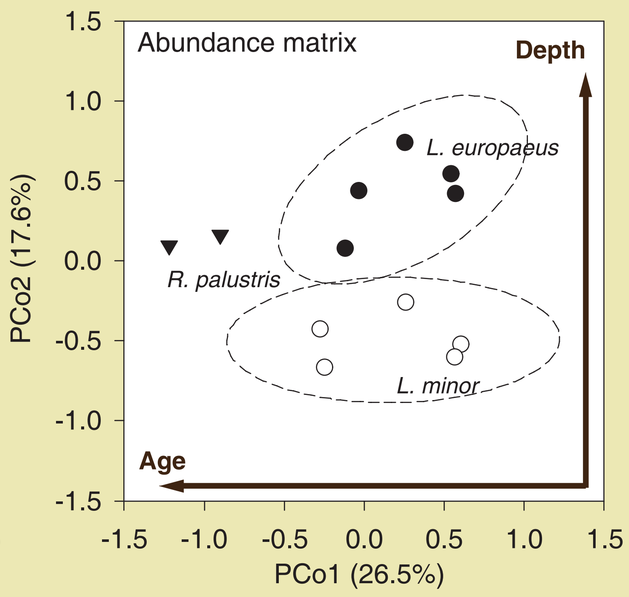
Regional hypothesis

Variables: *Distance to nearest wetland + Connectivity within 250, 500 and 1000 m + Distance to nearest stream*

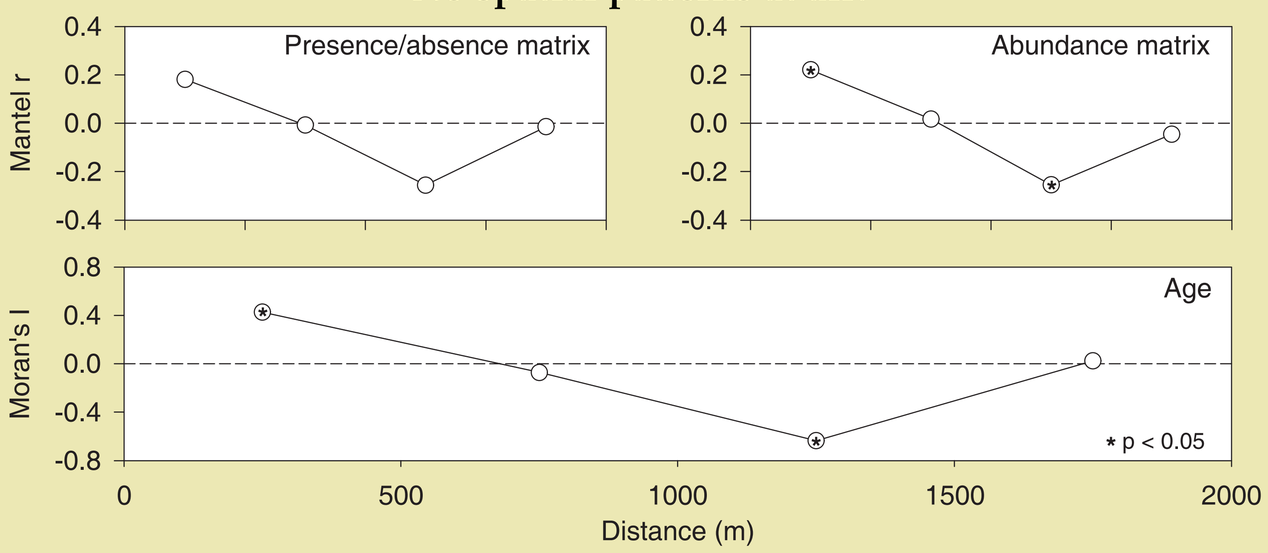
Best subsets:

Species richness ~ spatial variables	(GLM, p = n.s.)
Shannon diversity ~ spatial variables	(GLM, p = n.s.)
Presence/Absence matrix ~ spatial variables	(db-RDA, p = n.s.)
Abundance matrix ~ spatial variables	(db-RDA, p = n.s.)





No spatial patterns at all?



1) Vegetation in wetlands developed rapidly within an agricultural landscape.
2) Age, depth and conductivity were the most important factors shaping plant communities.
3) Species-for-time substitution approach could be misleading due to correlation of position and age in landscapes where new habitat patches form sequentially.

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