Habitatspezifität der aquatischer Wirbellosengemeinschaften im Flussgerinne und in Auenseen des Pruth (Rumänien)

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Background

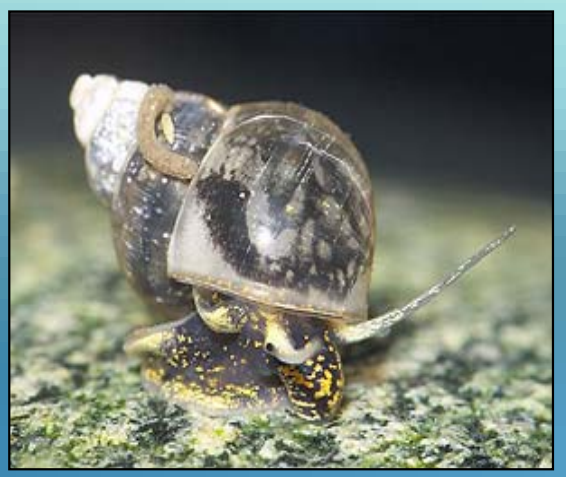
- Besides gravel-dominated and sand-dominated rivers, **clay-dominated rivers** consist one of the most widespread river types worldwide.
- **Clay-bed rivers** occur on all continents mainly in geologically relatively old landscapes.
- However, we are not aware of any existing study on the **ecology** of clay-dominated floodplains!

Clay dominated rivers

- **Hydromorphology**: Steep to vertical clay banks, central river bed partially covered by shifting sand.
- **Habitat features**: Clay surface offers habitat for some specialist invertebrate species.
- **Productivity**: Probably low primary productivity in the river channel due to high concentration of suspended inorganic solids in river water.
- **Ecological functioning**: Connectivity with floodplain only occurs at discharge levels that are higher than bankfull.

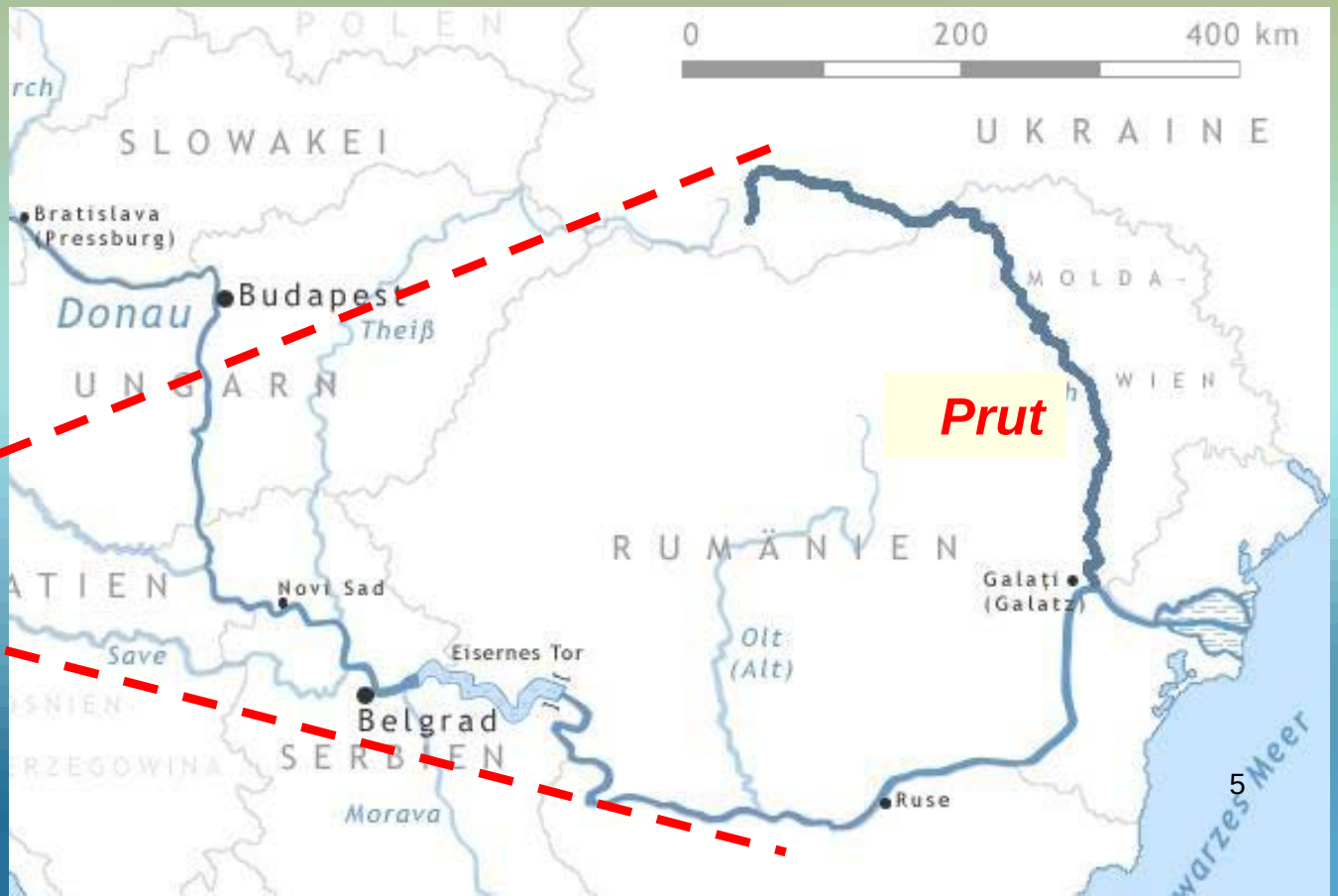
Research objectives

- Show patterns of aquatic benthic **invertebrate diversity** across a clay-bed river corridor.
- **Compare** benthic invertebrate communities between the **river** channel and **floodplain** lakes.
- Compare patterns of invertebrate diversity with other **types of river floodplains**.



Study river: the *Prut*

The Prut is the second longest (950 km) and the last tributary of the Danube, with its confluence located just upstream of the Danube Delta. Its source is in the forests of the Ukrainian Carpathians. Later the Prut forms the border between Romania and Moldova.



The Lower Prut Floodplain Natural Park















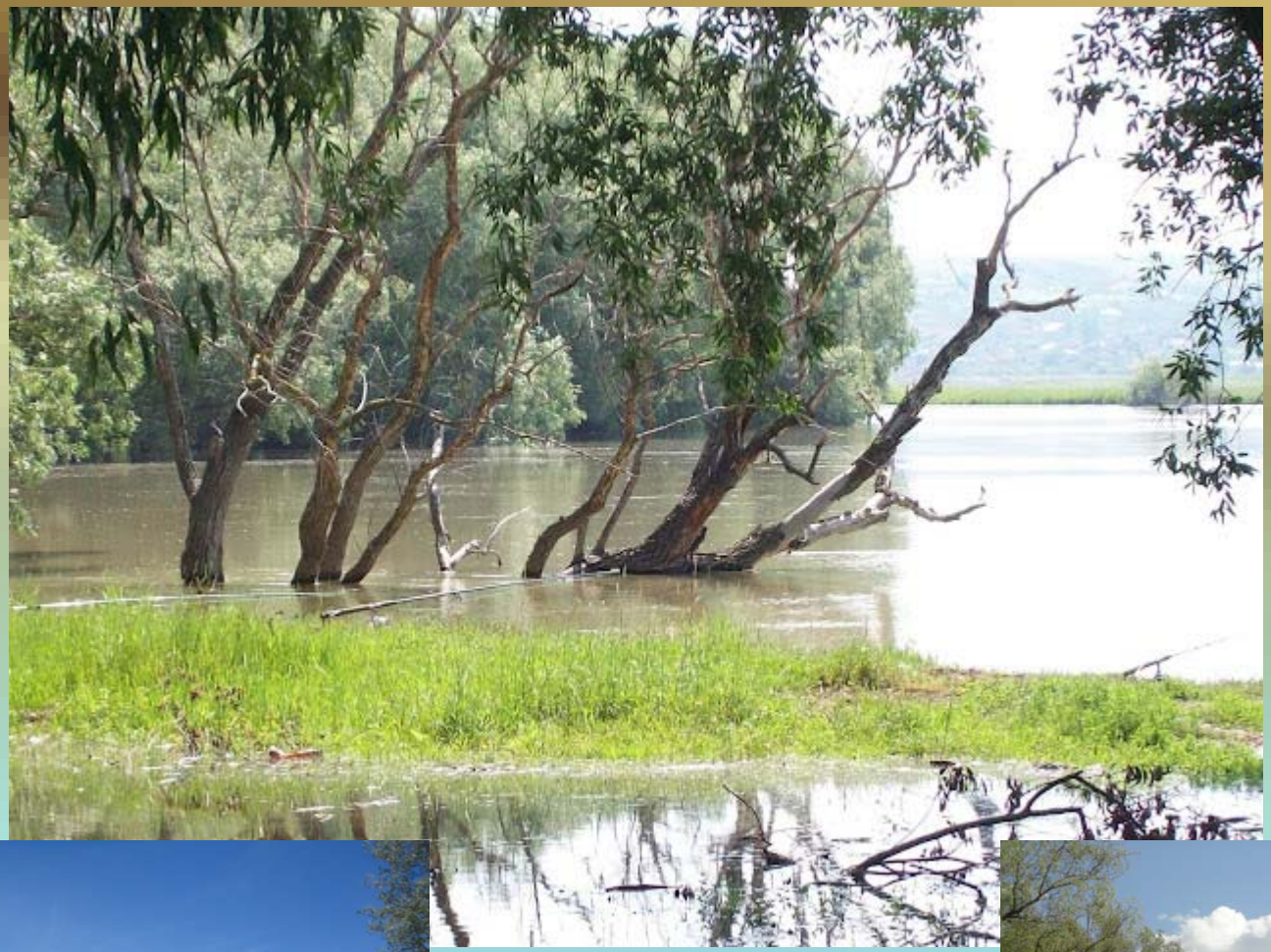

HABITATS TYPES:

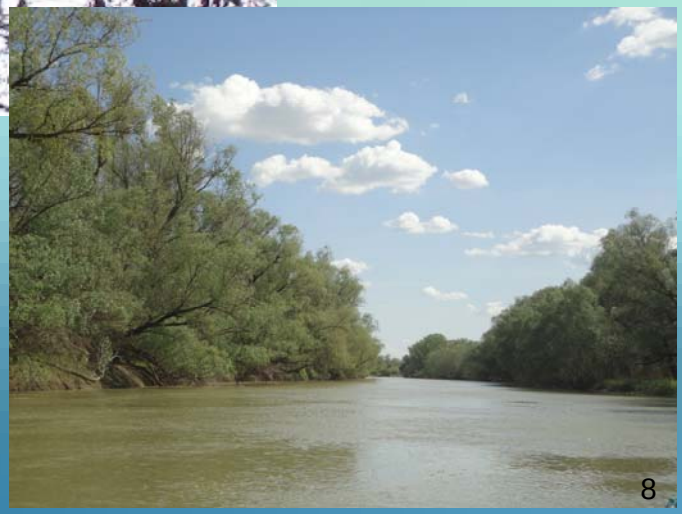
Natural eutrophic lakes
Dystrophic lakes and ponds
Rivers with muddy banks
Oligotrophic to mesotrophic standing waters
Plains with tall grass
Low altitude grasslands
Swamps with eutrophysed grass
Riparian mixed forests
Galleries of *Salix alba* and *Populus alba*

LPFNP map

Prut River channel

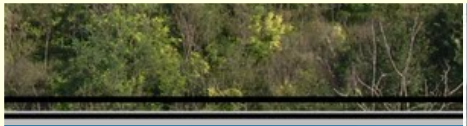
Prut River channel





Prut floodplain lakes

Hydrological connectivity of Prut river with floodplain lakes during floods



Sampling approach

- Macroinvertebrates were sampled in a quantitative way from all habitat types present at the respective sampling site.
- Sampling covered 5 sampling sites in the Prut River, and 11 sampling sites in 4 lakes.
- Two sampling campaigns were conducted in April/May and September/October 2012.

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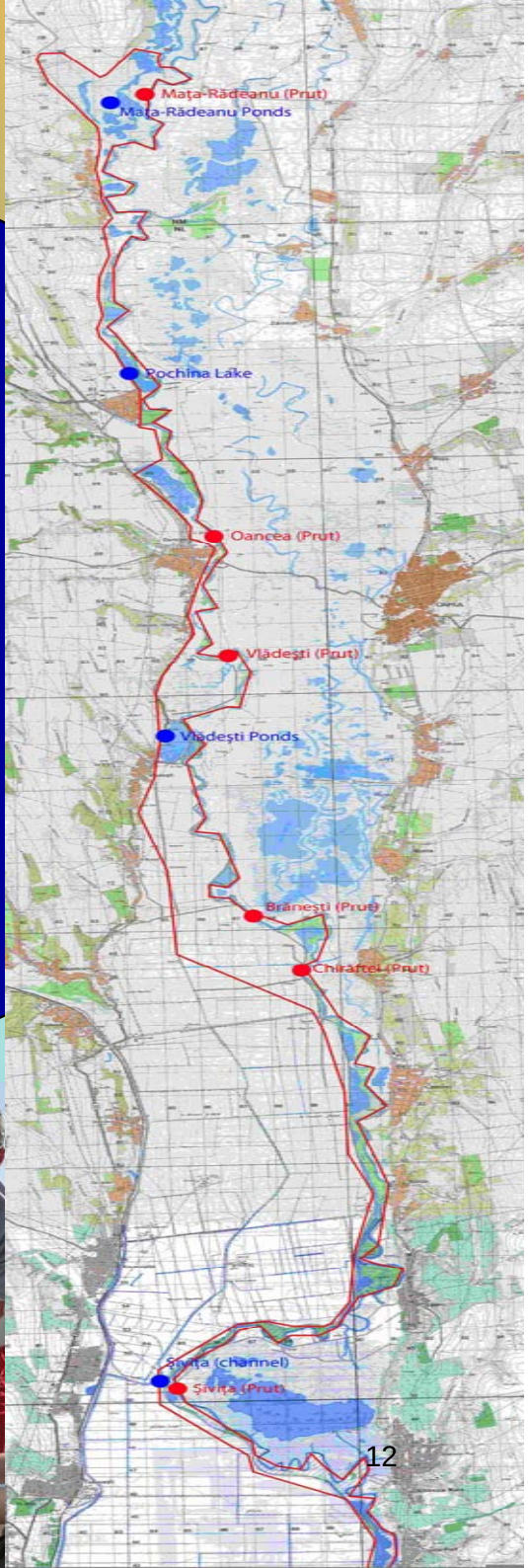


Sampled Habitats

Photo 1. **C.Maţa-Rădeanu** © Gabriela Patriche

Photo 2. **L. Vlădeşti** © Gabriela Patriche

Photo 3. **L.Pochina** © Gabriela Patriche

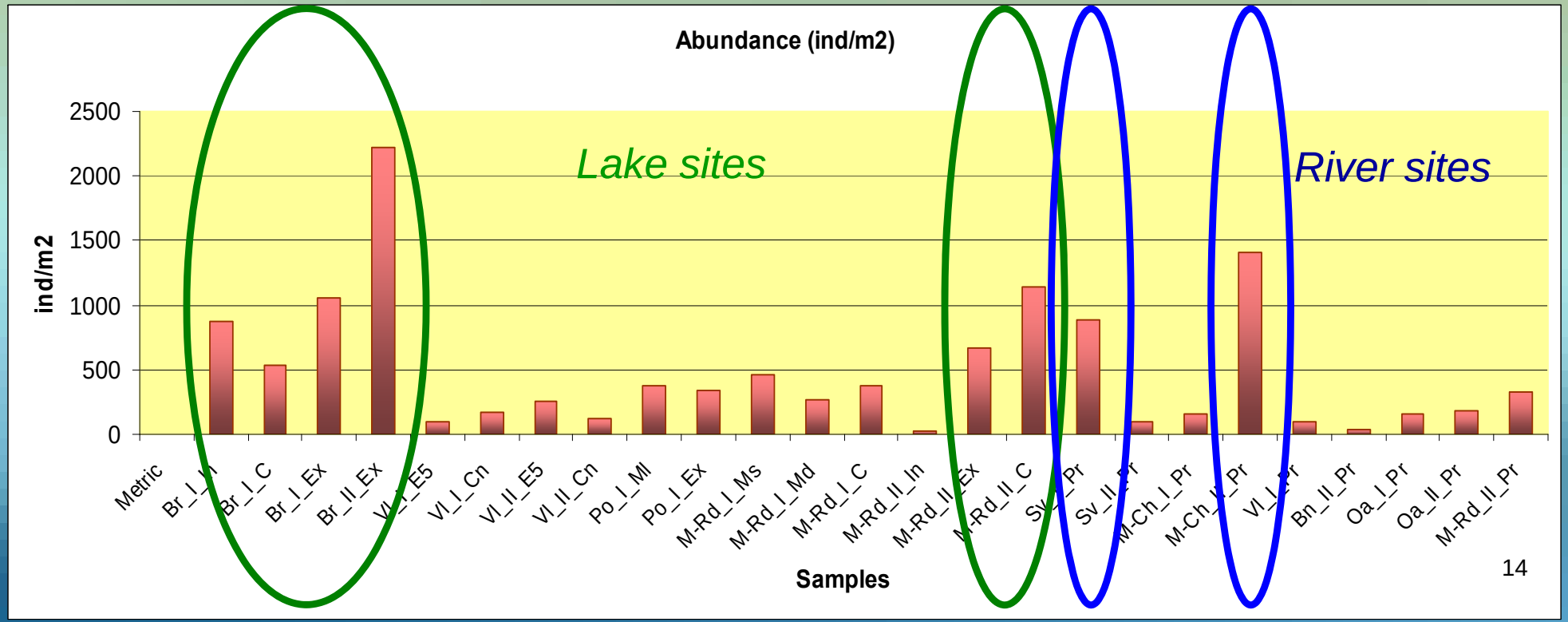
Photo 4. **Vlădeşti** © Gabriela Patriche

Photo 5. **L. Vlăşcuţa** © Gabriela Patriche

Photo 6. **Prut River at L. Pochina** © Gabriela Patriche

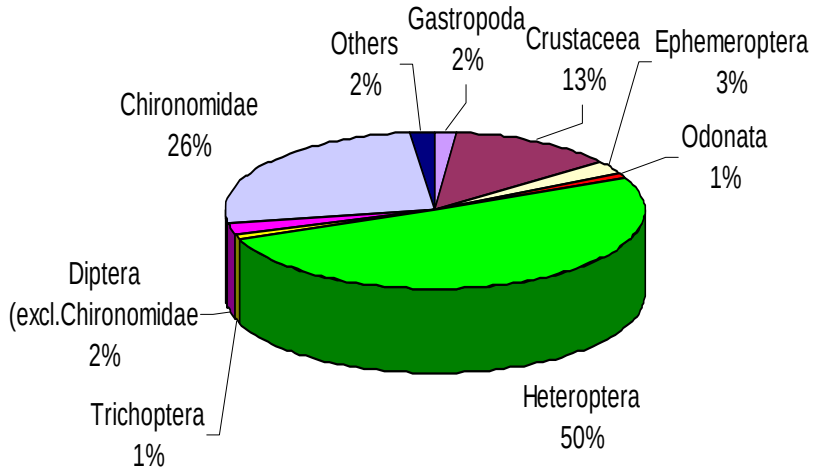
Results 1 - Community structure

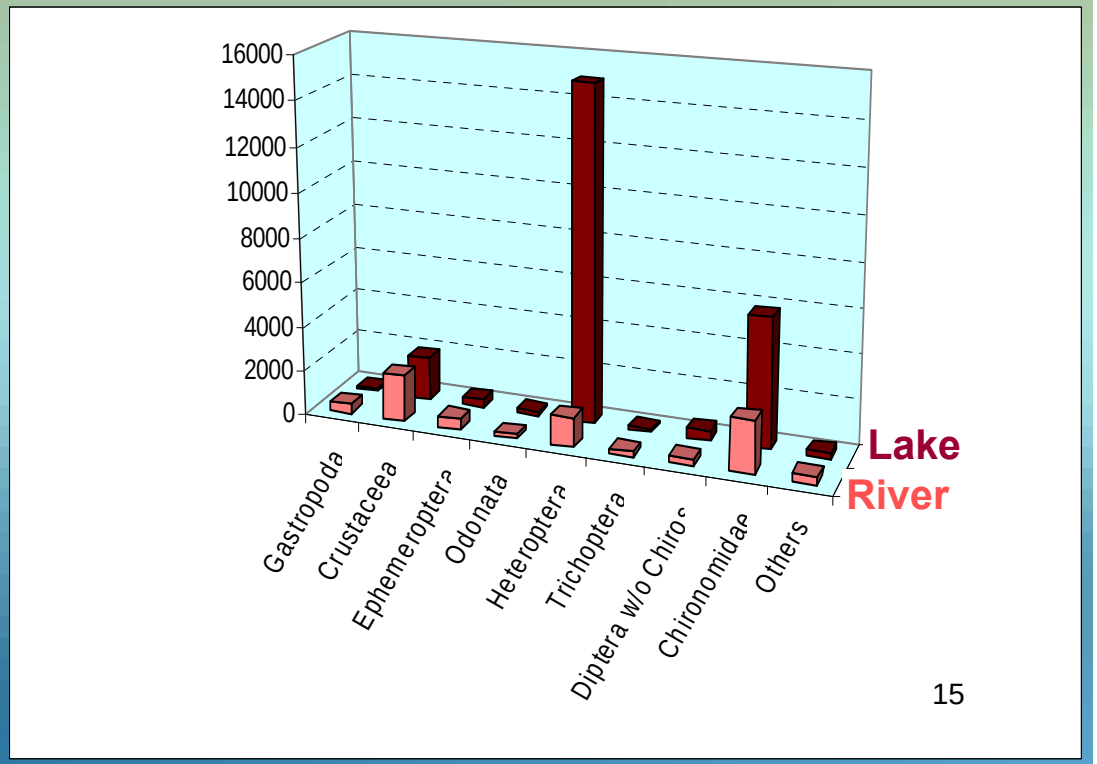
- Macroinvertebrate **abundance** was highest in two lake and two river sampling sites.
- The site with the **highest abundance in the river** is situated downstream of an outflow from a floodplain lake.



Results 2 - Community structure

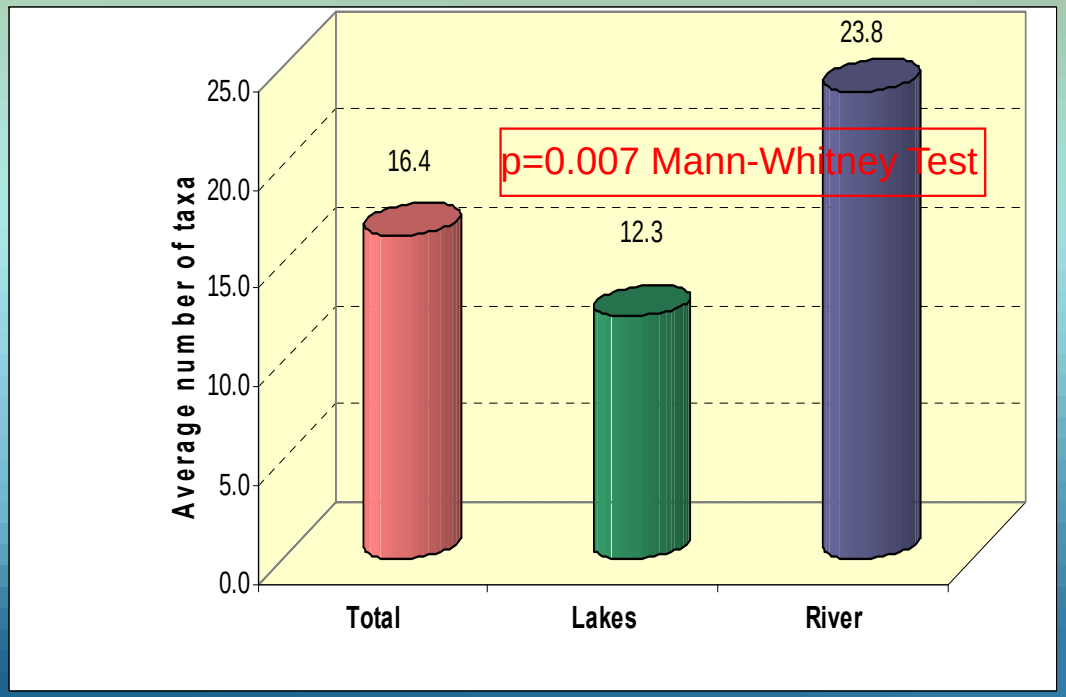
- Macroinvertebrate **communities** were generally dominated by heteropterans, chironomids and crustaceans.
- Highest **abundances** were reached in lakes by heteropterans, and in the river by chironomids.

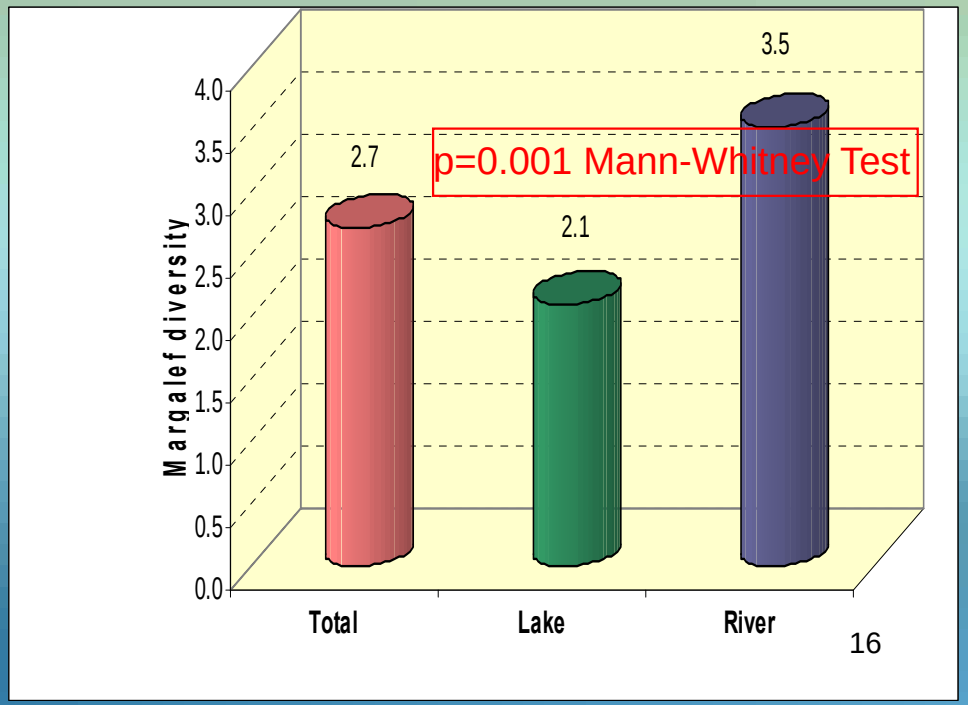




Results 3 - Community structure

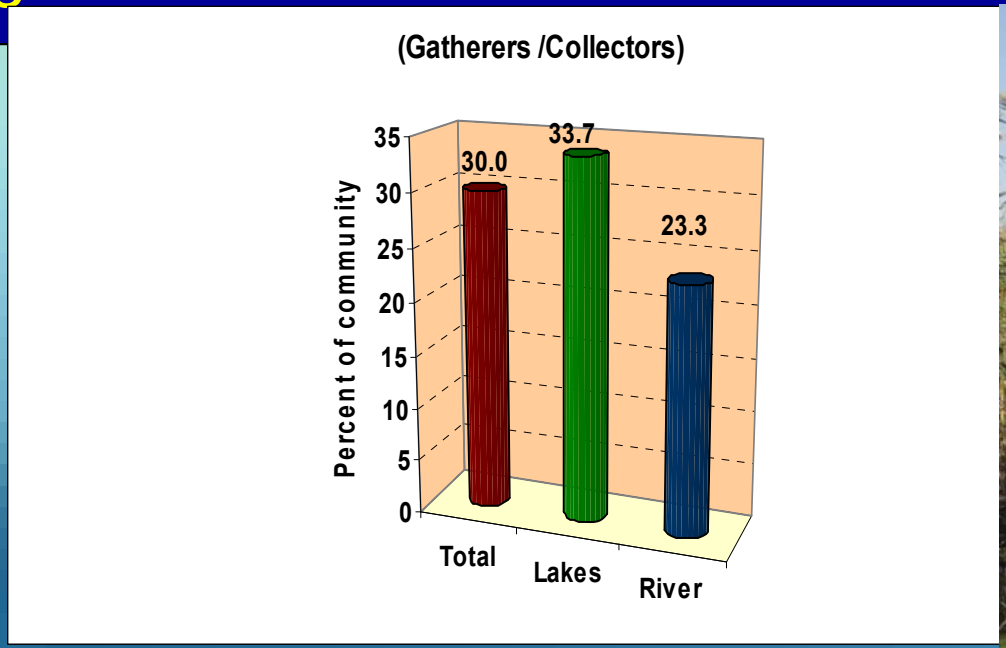
- In total 150 macroinvertebrate **taxa** were identified, of which 98 taxa occurred in the lakes and 91 in the river.
- 49 **taxa** were solely found in the lakes, and 44 in the river.
- **Taxa richness** and **Margalef Diversity Index** were consistently and significantly higher in the river sites than in the lakes sites.





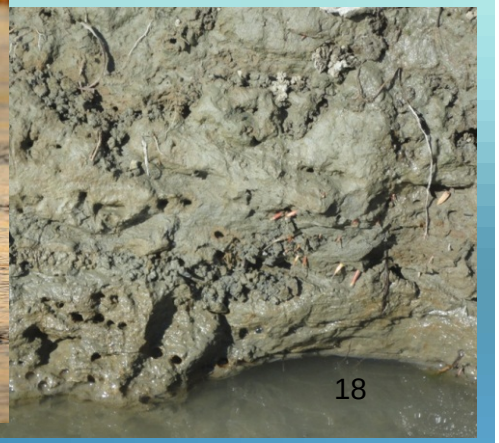
Results 4 - Structural and functional metrics

- The percentage of **gatherers/collectors** was somewhat higher in the lakes than in the River, probably due to elevated availability of fine particulate organic matter (FPOM) in the lakes.
- The percentage of Ephemeroptera, Plecoptera and Trichoptera (**%EPT**) in total taxa number peaked at some sites with presence of either coarse particulate organic matter CPOM or sand habitats.



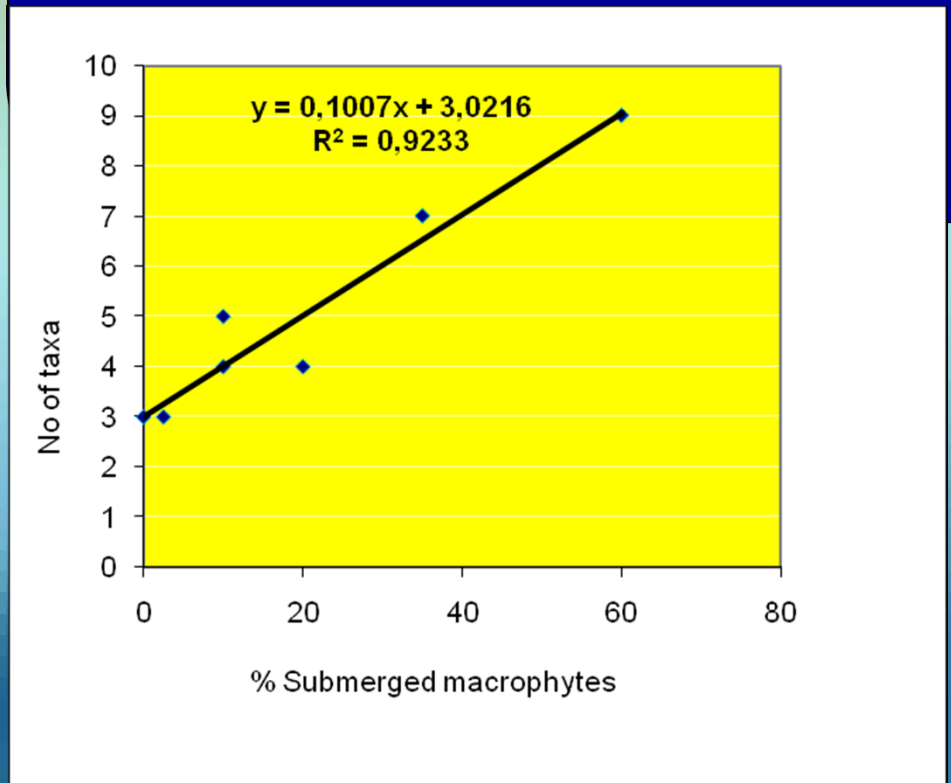
Results 5 - *Palingenia longicauda*

- In the Prut the mayfly ***Palingenia longicauda*** was found, which is Europe's largest mayflies species and at the same time the most endangered mayfly species of Europe (listed in Annex II of the Bern Convention).
- The results confirms the presence of a large population of *Palingenia longicauda* in a section of the Prut River with at least 122 km channel length.



Results 6 - Water beetles (Coleoptera)

- Water beetles in the lakes were closely linked to the abundance of submerged macrophytes.
- Viable population (54 specimen) found of the extremely rare (Red List category 'CR' = critically endangered) xylophagous Elmid beetle *Potamophilus acuminatus* (Fabricius, 1772).



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vom 29.07.2013, 11:02 Uhr — Natur — Update: 29.07.2013, 11:08 Uhr

Potamophilus acuminatus wiederentdeckt

Ausgestorben geglaubter Fluss-Krallenkäfer nahe Wien wiederentdeckt

Artikel | Lesenswert (4) | Drucken | Leserbrief

- Käferexperte des Naturhistorischen Museums wies Hunderte Exemplare im Russbach nach

Wien. Die Zerstörung naturnaher Tieflandflüsse hat den Fluss-Krallenkäfer in Europa praktisch ausgerottet. In Österreich galt das Insekt bis zur Jahrtausendwende als ausgestorben. 1999 wurden zwar dann noch ganz wenige Exemplare im Burgenland und in Oberösterreich gefunden, doch der Bestand galt als höchst gefährdet. Nun hat Manfred Jäch, Wasserkäfer-Experte am Naturhistorischen Museum (NHM) Wien, im Russbach (NÖ), nur wenige Kilometer von Wien entfernt, ein Vorkommen von Hunderten Exemplaren nachgewiesen.

Der Fluss-Krallenkäfer (Potamophilus acuminatus) galt früher als weitverbreitete Art.

© Foto: Archiv

Conclusions 1

- The aquatic macroinvertebrate community in the Prut **River** was governed by the availability of complex habitats, especially CPOM.
- The aquatic macroinvertebrate community in the floodplain **lakes** was governed by the trophic status of the lake, and by seasonal water level dynamics.
- In the Prut River **corridor** lotic and lentic aquatic habitats harbor about the same number of typical species.
- Including generalists, taxa richness and diversity were higher in the **river channel** compared with floodplain lakes.

Conclusions 2

- Due to low availability of coarse bed sediments, coarse particulate organic matter (**CPOM**) and aquatic **macrophytes** harbored the highest macroinvertebrate

- Floodplains of clay-dominated rivers probably differ from other river types by their sharp **contrast** between the low primary productivity in the river channel compared to high productivity in the large shallow floodplain lakes.

Anthropogenic impacts

- As other river types, also the Prut River is affected by the construction of a large hydropower **dam**.
- Dam construction led to river channel **incision**, and thus to partial drying-out of floodplain lakes.
- As clay dominated rivers are meandering in clay deposits, no **gravel** sedi-ments can enter in the river channel by side erosion.

'Stanca Costesti' dam, built in 1978

Anthropogenic impacts ?

- As clay dominated rivers are meandering in clay deposits, no **gravel** sediments can enter in the river channel by side erosion.

Floodplain Lake Poichina – dried up in summer 2012

Anthropogenic impacts

- Hence clay-dominated rivers are most severely affected by the **retention of the coarse sediments** in an upstream reservoir.
- Thus, **restoration** efforts are necessary in the Prut River to mitigate ongoing channel incision, and to secure the water level in the floodplain lakes.
- Such river restoration could also contribute to the restoration of spawning habitats for endangered **sturgeon** species.

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Any information on other existing or planned studies on a clay-dominated river would be highly appreciated!

E-mail to: gabrielacostea@yahoo.com

Thank you !