Project no. **GOCE-CT-2003-505540**

Project acronym: **Euro-limpacs**

Project full name: **Integrated Project to evaluate the Impacts of Global Change on European Freshwater Ecosystems**

Instrument type: **Integrated Project**

Priority name: **Sustainable Development**

**Deliverable No. 225**

**Report - Habitat preferences of phytobenthos**

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Start date of project: **1 February 2004**

Duration: **5 Years**

Organisation name of lead contractor for this deliverable: **Masaryk University**

DRAFT version

**Project co-funded by the European Commission within the Sixth Framework Programme (2002-2006)**

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After catastrophic floods in 1997 at selected river segments bank stabilization were not reconstructed. One of these passively restored section near to Cernotin village was selected as a key site in Euro-limpacs project. Variable flow regimes intensified channel-forming processes resulting in development of specific hydromorphological patterns and habitats. Relationships between habitat characteristics and distributional patterns of aquatic organisms were studied on several biotic components of fluvial ecosystem. Algal communities were investigated in relation to lateral habitats degraded by river channelization and also relation to substrate type was evaluated.

Algal communities of running waters are primarily studied as indicators of water chemistry, mainly nutrient concentrations. However also current velocity, substrate type, light conditions and stability of environmental conditions are interacting to drive structure of algal communities.

Algal communities were investigated at Becva River with focus on following topics:

- differences between communities of side pools
- differences between communities of artificial and natural substrates
**Differences between communities of side pools and main habitats**

The study focused on comparison of algal communities structure within lateral habitats of Becva River was done as diploma thesis of Stepanka Dvorakova (Dvorakova, 2007a).

There was 27 samples taken from five pools in four sampling dates in period from 25/5/2005 to 3/10/2005. The total number of recorded taxa was 105, predominantly represented by 73 taxa of diatoms. Based on previous field surveys the side arms pools were selected to represent both conditions with and without distinct effect of groundwater release.

Additionally to analyses of structure and seasonal dynamics of algal communities in different types of lateral habitats the diploma thesis aimed to create didactic cards together with metodic sheets for teachers provided for lectures of biology on the second level of basic school.

Lateral river habitats form specific conditions in relation to their connectivity with main channel, temporal dynamics of discharge, bank structure and modifications. Main aspects potentially different from main channel conditions were:

- hydraulics
- substrates
- temperature
- ice cover
- water chemistry
- surface-groundwater

**Study sites**

During study period lateral habitats were dynamicaly changed as high flows modified channel morphology. Following description is based on status at 25/5/2005.
Site L1
Approximately 2m wide, 8 m long and 0.5 deep side pool (Fig. 1), partly shaded by riparian vegetation. Pool was without surface connection to other aquatic habitats during majority of year (except high flows period). Water temperature and water chemistry was affected by groundwater releases.

Site L2
Side arm pool has similar characteristics as L1 site except surface isolation.

Site L3
Approximately 9 m wide and 25 m long pool comprising deep parts (1.2 m) and shallow parts exposed to light. Site exhibited less influence of groundwater.

Site L4
Flowing water site connecting sites L3 and L5, exposed to light.

Site L5
Most downstream site connecting side arm with main channel (Fig. 2A). Samples were collected in shallow parts being minimally influenced by groundwater releases.

**Sampling methods**
Benthic algae were sampled from stony substrate by tooth brush brushed into dish with water, filamentous algae were collected directly by woody stem. Pelagic algae were collected to container.

*Fig. 1. Location of sampling points within key site Cernotin at Becva River.*
Fig. 2. Side arms habitats (A, B, C) and main channel habitat (D)

Fig. 3. Cluster analysis based on Bray-Curtis dissimilarity among samples.
Fig. 4. Multidimensional scaling analyses plot with marked pools and sampling dates.
Seasonal trends in community structure are more distinct than homogeneous patterns within individual pools across studied period (Fig. 3, 4).
Periphyton assemblages of natural and artificial substrates in the lower part of Becva River

This study was partly based on results of diploma thesis of Jana Dvorakova (Dvorakova, 2007b).

At regulated river stretch (Fig. X) the phytobenthos samples were collected from gravel (microlithal; 2-6 cm in diameter), cobbles (6-20 cm) and large artificial stones used for stabilization of banks (>40 cm). Within each size category 3 particles were randomly selected. Epilithic communities were brushed by iron brush into container.

Fig. 5. Restored (left) and regulated (right) stretches of Becva River near Cernotin village.

Fig. 6. Hydrological and thermal regimes around sampling dates.
Within studied period occurred several minor elevated flow episodes and one mid-magnitude floods in August. Since sampling following that episode was done in the beginning of October – effects on phytobentos was not evident. Only that August episode had power for moving substrate.

![Fig. 7. Photos of substrate types](image)

**Tab. 1. Number of phytobenthic taxa found at individual substrate types and in sampling dates**

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<td>46</td>
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<tr>
<td><strong>total</strong></td>
<td>41</td>
<td>39</td>
<td>46</td>
<td>42</td>
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The most distinct pattern obtained from quantitative data on community composition is seasonal separation of samples taken in October (Fig. X). Size category and associated substrate stability affected in relation to flow variation the succession dynamics of phytobenthos communities. Habitat patches at Becva River can play role in recolonization processes after extreme flows episodes.
Fig. 8. Multidimensional scaling plot based on Bray-Curtis dissimilarity matrix of phytobenthic communities.

Total number of taxa was slightly lower at technolithic, but difference is not significant.

References