

## 6. Summary and the conservational management proposals

JIŘÍ NEUSTUPA

- A) Biological soil crusts represent relatively rare and mostly small-scaled micro-ecosystems in the Central European landscape. Vascular plant competition excludes crust cryptogamic and micro-organismal communities from most soil surfaces. The only exceptions in non-synantropic conditions are represented by localities of high level disturbance (erosion gorges, bases of sandstone cliffs, etc.). In samples from these localities, we encountered species typical for semiarid crusts (e.g., nostocalean filamentous Cyanobacteria). However, pH obviously is a limiting factor for development of cyanobacteria-dominated crusts on natural localities, as on acidic, sandstone-based localities Cyanobacteria were almost absent and crusts were dominated by green algae and lichens.
- B) The biological soil crusts of ore and ash sedimentation basins appeared as species-rich, surprisingly stable and with abundant micro-communities on most of the investigated localities. Profound seasonal stability and resistance to disturbance of their species composition was detected mostly for groups that actually compose and dominate the crust biomass (algae, cyanobacteria, lichens).
- C) The effect of unrepeated disturbance was detected neither in species composition, nor in diversity values and in eco-physiological parameters. We propose that crust micro-ecosystems represent later succession, or near-climax stage, of biotic communities on toxic anthropogenic substrates as vascular plants are hampered by toxicity and extreme physico-chemical parameters (pH, conductivity). In the places that were represented e.g., by cca 100 ha of the ore sedimentation basin area at the Chvaletice locality or by the Radvanice ore sedimentation basin, biological soil crusts should be considered as principle contributors to primary production and stability of the ecosystem as a whole.

At these localities, we propose passive management, consisting of monitoring activities and of conservation of crust cover from repeated mechanical disturbance. Our management recommendations consist of following points:

- 1) As examples of near-climax type of biological soil crust on a sedimentation basin, we consider localities:
  - a) that have at least five years been abandoned from industrial activity;
  - b) whose physico-chemical parameters and concentrations of toxic elements exceed the risk values for non-agricultural soils (Decree No. 13/1994 of Ministry of the Environment of the Czech Republic);
  - c) the crust cover is in at least 25% composed of later colonizers – lichens or mosses;
  - d) vascular plant cover does not exceed 10% of the total area.
- 2) In such places we do not recommend planting vascular plants species as a part of any restoration attempt.
- 3) In these localities we recommend passive management concentrated on stabilization of crust cover, i.e., by prevention of repeated disturbance effects mainly caused by the off-road vehicles.