

# COMPARATIVE STUDY OF FLUVIAL LAKES IN FLOODPLAINS OF THE ELBE, LUŽNICE AND SVRATKA RIVERS

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## ABSTRACT

The aim of the thesis was to specify key differences in chemistry and biota (zooplankton communities) among fluvial lakes in three regions of Czech Republic: “střední Polabí” (central part of the Elbe River on the territory of Bohemia), “Horní Lužnice” (the upper part of the Lužnice River on the territory of Bohemia), and the Svatka River near Milovy (upper part of the Svatka River). The 10 studied lakes of the three regions differ in size, geology, shading, the influence of the river, and the level of anthropogenic impact.

The following hypotheses were tested: 1) The chemical composition of the water in fluvial lakes is significantly different in different areas (floodplains). In the central Elbe River floodplain, there are the highest values of conductivity and concentrations of organic matter and nutrients. Fluvial lakes of the Svatka River floodplain near Milovy show the lowest level of these parameters, and fluvial lakes of the upper Lužnice River occur between the two previous regions. 2) The chemistry of fluvial lakes that have contact with the river through surface connection is significantly influenced by the river, and differs from the chemistry in fluvial lakes without any direct connection with their parent river. 3) The structure of zooplankton differs in different lakes due to the geographical distance between locations, their different altitude and chemical characteristics.

In the period from the autumn of 2004 to the winter of 2007, the following parameters were investigated in the 10 studied lakes: lake morphology, water level fluctuation, physical parameters of the water (temperature and dissolved oxygen – measured *in situ*; transparency), water chemistry (in 9 dates – pH, conductivity, alkalinity, chemical oxygen demand, ammonium and nitrate nitrogen, total phosphorus; in 4 dates – biochemical oxygen demand, nitrite and total nitrogen, phosphates, dissolved organic carbon, main ions), chlorophyll-*a*, zooplankton species composition, and zooplankton relative quantitative composition (in 9 samples). The data were analyzed using multidimensional statistical methods in the CANOCO for Windows 4.5 software.

The thesis concludes that the fluvial lakes are significantly variable in both time and space, especially in their hydrological regime and the water chemistry. This is because factors influencing these parameters are also highly variable.

Based on the selected parameters of the water chemistry, the samples were divided into two groups along the first ordination axis in the ordination diagram of the PCA analysis, according to the first hypothesis. In one group, there were locations in the central Elbe River floodplain with high values of pH, conductivity, and nitrate nitrogen. The second group represented locations of the upper Lužnice River and the Svatka River that showed low levels of the mentioned parameters. The differences between samples from the Lužnice River and the Svatka River lakes were minor. However, the amount of organic matter, nitrogen (with the exception of nitrates), and phosphorus was independent on the region. These parameters are related mainly to autonomous processes in lakes.

The relationship between the extent of the lake-river connection and the water chemistry was significant only in the autumn of 2004 (the initial hypothesis was not statistically verified). Nevertheless, when considering only locations in the central Elbe River region, there were significant

differences between river-connected and disconnected lakes in conductivity, alkalinity, nitrate nitrogen, and total phosphorus. The influence of the parent river is increased in this region by the lake water back and forth flowing, depending on the river water level fluctuations.

The hypothesis that the zooplankton differ in different lakes was not confirmed – the species composition was similar in all the lakes. Based on the relative occurrence of the groups of zooplankton (Rotatoria, Cladocera, Copepoda), the lakes were divided into two types: 1) lakes with Rotatoria dominating in the zooplankton, which had a permanent fish stock, 2) lakes with large zooplankton species, which were temporarily or permanently fishless.