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Anthropogenic impact on fluvial lakes in the Czech Elbe River section

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From the year 2000 to 2007, the environmental state and the impact of human activities on fluvial lakes in the central part of the Czech section of the Elbe River were evaluated. The paper presents the results from the research of following oxbow lakes: Lake Labiště (east of Pardubice), Lake Doleháj (near Kolín), and Lake Obříství (near Mělník) and also newly selected lakes Němčice (near Pardubice), Lžovice (near Kolín), Kluk (near Poděbrady) and Václavka (near Lysá nad Labem), that were studied from 2005. The lakes differ from each other in time of their origin, size, intensity of communication with the river, closeness of possible industrial or agricultural source of pollution, utilization and state of nearby floodplain etc. The research included bathymetric measurements, studying of hydrological regime, physical measurements of water column, chemical analyses of surface water samples, grain structure and chemical analyses of sediment cores focused particularly on heavy metal content as a result of anthropogenic activities in the catchment area.

The water level fluctuation of the lakes was in accordance with the discharge in the river. In the deepest lake Lžovice (7, 7 m), the temperature stratification was observed. pH corresponded with the character of the lakes. As for other parameters of water (transparency, conductivity, oxygen saturation, BOD5, COD Mn, total alkalinity 4,5, water hardness, Ca, Cl, Fe, Mn, ammonium-N, nitrite-N, nitrate-N, phosphate-P), remarkable differences were indicated among the selected lakes. Enhanced oxygen concentrations occurred in some lakes (e.g. Lžovice) owing to the activity of photosynthetic algae and anabaenas in summer (water blossom). Values of BOD5, COD Mn,

ammonium-N, nitrite-N, nitrate-N, phosphate-P and Cl were predetermined with intensity of communication with the river and landuse (intensive agriculture, absence of sewage treatment plant etc.). Industrial load was proclaimed with higher values of determined heavy metals in sediments (Ag, As, Cd, Co, Cr, Cu, Fe, Hg, Mn, Ni, Pb and Zn) according to the distance of the source of pollution and to the connection with the river. The highest concentrations were determined in the samples from Obříství, Lžovice and Opočínek. The contamination was assessed to the indices of geoaccumulation, the Elbe River background values, LAVA and ARGE Elbe system. For statistical assessment the PCA method was used.