

## **Abstract**

The presented paper aims at the problems of fluvial lakes in middle course of the Elbe River which has been influenced by the human activity since the Middle Ages. The oxbow lakes which are extremely precious ecosystems contributing to the stability of the river ecosystem show not only the changes of the course of the Elbe River. With regard to sedimenting a great amount of pollutants, these lakes also tell about the industrial pollution to which the river was exposed mainly in the second half of the 20<sup>th</sup> century due to insufficient precautions on industrial sources causing contamination.

5 cut lakes between Hradec Králové and Mělník have been studied within this research. These lakes differ in the intensity of communication with the river, in the distance from significant sources of industrial pollution and in the use of nearby land. The research included morphometric and bathymetric measures, observation of hydrological regime, seasonal measures in the water column and regular analysis of surface water samples. Profiles of sediments in the length that the used technology allowed were sampled, so that older anthropogenic load could be found out. The amount of organic carbon and concentration of selected metal and arsenic (Ag, Cd, Cr, Cu, Fe, Hg, Mn, Pb and Zn) were stated apart from grain size analysis of single layers.

The evaluation of water surface samples has proved similarity of the cut lakes which have still been connected with the Elbe River regardless different usage of surrounding areas. With regard to the improvement of water in the river, the lowest levels of the defined parameters (conductivity, ANC, BOD<sub>5</sub>, COD<sub>Mn</sub>, concentration of calcium, etc.) have been measured in these cut lakes (lakes Lžovice and Poděbrady). In contrast to the river, certain differences in the development of levels of some parameters were observed during the monitored time. These differences correspond with the character of still water in fluvial lakes. On the contrary, cut lakes with a restricted surface communication with the Elbe River showed higher levels of the measured parameters and their chemistry showed certain specifications which equate mainly local sources of pollution. In the cut lake near Němčice, in the pool Václavka near Čelákovice and in the old meander near Obříství, the highest average levels of conductivity (III. - IV. class of water quality), BOD<sub>5</sub> (III. – IV. class of water quality), COD<sub>Mn</sub>, calcium and other measured substances were determined. From the point of view of nutrients, the biggest average concentration of N-NO<sub>3</sub> was measured in Lake Obříství, nevertheless these levels did not reach the levels of concentration in the Elber River. On the contrary, higher order amount of P<sub>tot</sub> (V. class of water quality), was measured in the cut lake near Němčice. These levels equated probably local contamination because larger areas of arable land were found in the radius of 3 kilometres around these lakes and there were a few villages without sewage drains systems and sewage treatment plants (sewage treatment plant in Obříství built in 2006).

From the point of view of sediments contamination in the surveyed cut lakes, the highest levels of measured elements were monitored mainly in Lake Lžovice. This old meander is connected by surface with the Elbe River and it was exposed to industrial pollution from Pardubice region in the past. The same situation has been monitored in Lake Obříství which lies near the company Spolana, Inc. in Neratovice which used to be the primary source of pollution of the Elbe River in the past. This old meander rejoins the river during larger flow regimes. The profiles measured in some places in these lakes proved different distribution of measured elements in the sediments where samples gained from the places near the river showed higher numbers. The sediment profile measured in such places in Lake Lžovice was very strongly polluted by Ag, strongly polluted by Cd and moderately to strongly contaminated by Hg and Zn according to indices of geoaccumulation. The profile measured near the Elbe River in Lake Obříství contained very strong pollution by Ag, moderate to strong contamination by Cd, Pb, Zn; and probably also Hg (only a few samples measured). The lowest concentrations of measured elements were found in the pool Václavka which was saved from contamination by having been split from the river in the 19<sup>th</sup> century. The level of sediments contamination in the fluvial lakes equates mainly the distance and importance of the industrial source of pollution as well as communication of the lake with the river.