



The significance of sediment contamination in the Elbe River floodplain (Czech Republic)

Dagmar Chalupová (1), Bohumír Janský (1), Jakub Langhammer (1), Miroslav Šobr (1), Medek Jiří (2), Stanislav Král (2), Petr Jiřinec (3), Jana Kaiglova (3), Michal Černý (4), Miroslav Žáček (4), Drahomíra Leontovyčova (5), and Jarmila Halfřová (6)

(1) Charles University in Prague, Faculty of Science, department of Physical Geography and Geoecology, Prague, Czech Republic (dada@natur.cuni.cz), (2) Povodíl Labe, s.p., Hradec Králové, Czech Republic, (3) DHI, a.s., Prague, Czech Republic, (4) Geomin, s.r.o., Jihlava, Czech Republic, (5) Czech Hydrometeorological Institute, Prague, Czech Republic, (6) Czech Hydrometeorological Institute, Brno, Czech Republic

The abstract brings the information about the research that was focused on anthropogenic pollution of river and lake sediments in the middle course of the Elbe River (Czech Republic).

The main aim was to identify and to evaluate the significance of old polluted sediments in the river and its side structures (old meanders, cut lakes, oxbow lakes) between Hradec Králové and Mělník (confluence with the Moldau River) and to assess the risk coming from the remobilization of the contaminated matter. The Elbe River floodplain has been highly inhabited since the Middle Ages, and, especially in the 20th century, major industrial plants were founded here. Since that time, the anthropogenic load of the river and its floodplain has grown. Although the contaminants bound to the sediment particles are usually stable, the main risk is coming from the fact that under changes in hydrological regime and water quality (floods, changes in pH, redox-potential, presence of complex substances etc.), the pollution can be released and remobilized again.

The most endangered areas are: the surroundings of Pardubice (chemical factory Synthesia, Inc.; refinery PARAMO), and Neratovice (chemical factory Spolana, Inc.). The chemical factories situated close to these towns represented the most problematic polluters of the Elbe River especially during 2nd half of 20th century.

In the research, the main attention was aimed at subaquatic sediments of selected cut lakes situated in the vicinity of the above mentioned sources of pollution. To describe the outreach of contamination, several further fluvial lakes were taken into account too. Sediment sampling was carried out from boats on lakes and with the help of drilling rig in the floodplain. Gained sediment cores were divided into several parts which were analysed separately. Chemical analyses included substances identified by ICPER (International Commission for the Protection of the Elbe River) as well as chemicals considered as significant in the previous explorations (heavy metals, PCB, DDT, HCH, PAHs etc.). The results of grain structure analysis were used for modelling the remobilization of contaminated matter during floods. At the selected river sections, maps of overflow and discharge velocity (Q1, Q5, Q20, Q100) were created.

The results of the project provided information of the amount of polluted sediments in the most contaminated localities in the middle course of the Elbe River and described the possibility of remobilization of the polluted sediments during floods. On the basis of these outcomes, the risk management and environmental measures were suggested to protect the ecosystems from contamination stemming from these old pollution loads.