

Long-term trends of priority and hazardous substances in the Morava River sediments (Danube River basin)

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The Morava river basin is one of the most important tributaries of the upper Danube and forms the second largest river basin in the Czech Republic. About 2.7 million people, more than the quarter of inhabitants of Czech Republic, live in the basin and many important towns and industrial agglomerations are sited along the main river – the Morava River. The article presents the results of an assessment of sediment contamination by heavy metals (Cd, Pb, Hg) and selected organic hazardous pollutants. Assessments were completed between 1997-2006 in the national project – “Project Morava I – IV”^[9] and in the project “Identification of anthropogenic pressures on the status of water quality and aquatic ecosystems in the area of the Morava River” between 2008 – 2010.^[9,10] One aim of these projects was to assess the current status and temporal change in hazardous substances pollution in different sections of the basin ecosystem.

Contamination of sediments by toxic or other hazardous pollutants is regarded as a major environmental problem, because of the effects on aquatic flora and fauna in and above the sediment.^[3] The European Parliament and Council 2008/105/EC directive on environmental quality standards^[2] required Member States to assess the long-term trends of priority substances and to ensure contamination levels of these substances in the sediments and biota did not increase. The requirements have been written into the Czech legislation^[1] and are used for the sediment quality assessment presented in the paper.

This paper presents the results of special monitoring and statistical evaluation of long-term trends of heavy metals content in the Morava River sediments between 1997 and 2010. Sediment contamination was also assessed by passive sampling methods including DGT samplers for heavy metals.^[4]

Study sites were situated in seven potentially critical sections of the Morava River downstream of the most important sources of municipal and industrial pollution: Šumperk (298 river km), Olomouc (226 river km), Kroměříž (189 river km), Otrokovice (171 river km), Uherské Hradiště (157 river km), Hodonín (110 river km) and Lanžhot (93 river km). The sampling network includes profiles of the monitoring programmes of the ICPDR.^[5–8]

The results suggest that concentrations of some contaminants in sediments have risen. The data provides background for longitudinal monitoring of the Morava River, and identify priority indicators and other hazardous substances. Lead and mercury have been identified as the most problematic sediment pollutants; both occur in sampling profile “Hodonín”, which is the last downstream site; and mercury occurs at “Šumperk”). Organic hazardous substances, including hexachlorobenzene, lindane, and some of PAHs, have been identified as the most problematic sediment pollutants. In some of the main tributaries of the Morava River.

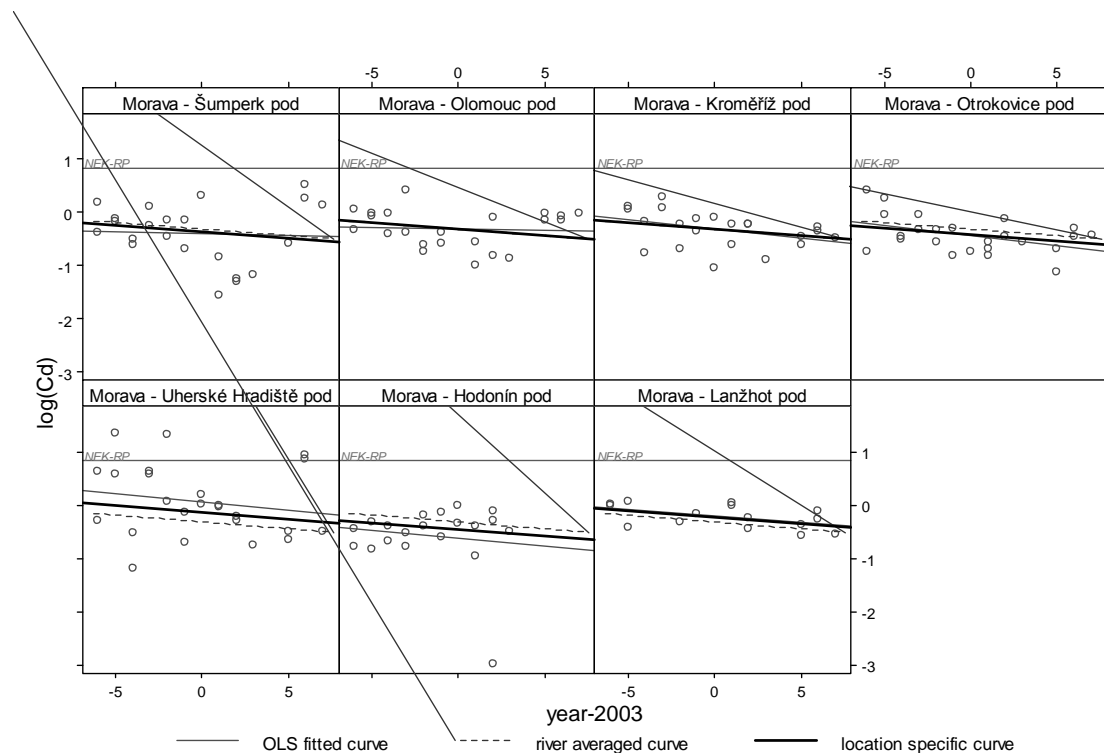


Figure 1.1 Statistical assessment of the sediment cadmium content time trend in 1997 – 2010

Data from 1997 – 2010 shows sediment cadmium content has decreased (Figure 1.1) and nickel and lead concentrations have increased. No trend was observed for mercury content during monitoring period.

References

- [1] Czech legislation – directive No. 23/2011
- [2] Directive of the European Parliament and of the Council 2008/105/EC of environmental quality standards
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