Geophysical Research Abstracts
Vol. 18, EGU2016-499-1, 2016
EGU General Assembly 2016

The Assessment of Sediment Heavy Metal Pollution in Begej Canal (Serbia)

Dejan Krčmar, Jelena Trickovic, Nenad Grba, Milena Becelic Tomin, Vesna Pesic, Natasa Varga, and Bozo Dalmacija

Faculty of Sciences, University of Novi Sad,Novi Sad, Serbia (dejan.krcmar@dh.uns.ac.rs)

Accumulation of heavy metals in aquatic systems has received huge concern due to their toxicity, persistence and subsequent accumulation in aquatic sediments. One of the most crucial properties of the metals, which differentiate them from organic pollutants, is that they are not biodegradable in the environment. Metals are part of biogeochemical cycles with aquatic sediments acting as their ultimate sinks for longer periods of time. However, when environmental conditions change (pH, redox potential, etc.) sediments act as secondary sources of metal pollution. The toxicity and mobility of metals depend strongly on the way they are associated with sediments. Therefore, information on the total concentrations of metals in sediment alone should not be used to assess the environmental impact of polluted sediments.

The Begej Canal is navigation canal between Romania and Serbia and it is a part of Danube-Tisa-Danube hydrosystem in Vojvodina (Northern Province of Serbia). Approximately, 500,000 m3 of sediment is accumulated in Begej canal which currently prevents canal's primary function – navigability. The objective of the present study was to assess the chemical quality of Begej canal sediments regarding heavy metals content. The concentrations of heavy metals were as follows: Cd – 2.4–4.9 mg/kg, Cr – 125–349 mg/kg, Cu – 65–124 mg/kg, Pb – 47–113 mg/kg, Ni – 45–88 mg/kg and Zn – 362–602 mg/kg. According to Serbian legislation (Official gazette, no. 50/12), sediment of Begej canal is the third class sediment which means that special measures should be taken in case of its removal from watercourse and final disposal in order to prevent contamination of other environmental compartments (soil, ground waters, surface waters, wildlife). Therefore, determination of third class has important economic and social implications.

Additional tests to assess sediment quality included determination of contamination factor (CF), pollution load index (PLI) and enrichment factor (EF). In addition, identification of the main binding sites and phase associations of heavy metals in sediments is carried out by employment of sequential extraction procedure and determination of ratio of acid volatile sulfide and simultaneously extracted metals (AVS/SEM). Results of all of these additional chemical tests showed that risk is overestimated if sediment quality standards alone are used as pass/fail criteria. The obtained results are invaluable for future activities regarding dredging of Begej canal and future monitoring of sediment status.

This work was supported by the Ministry of Education, Science and Technological Development of the Republic of Serbia (Projects III43005 and TR37004). The authors would like to thank the Provincial Secretariat for Science and Technological Development of the Province of Vojvodina for their financial support in realization of COST Action ES1205.