



Changes in availability of heavy metals following upland disposal of sediments

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Contaminated sediments can be disposed on river banks purposely (by dredging) or unintentionally by flooding. The change from an aquatic environment to a terrestrial environment may result in a drastic alteration in the mobility of contaminants, and may have a negative impact on groundwater quality or the ecosystem. To study the effect of deposition of dredged material on river banks, experiments were conducted both under laboratory and field conditions. The laboratory column experiments showed that under continuous drying of freshwater sediments, oxidation of the sediments resulted in shifts of metal fractions as determined by the BCR sequential extraction procedure. The sudden increase in mobility followed the consumption of the sulfide and carbonate pool of the sediment, and concomittant pH drop. In the field experiment three sediment types were dredged and disposed on river banks. The oxidation of the sediments was followed during a complete year under natural climatological conditions. Increased leaching of metals was observed in two of the three sediments after the sulfide pool (measured as AVS) was depleted. A significant decrease in pH was observed due to the dissolution of the carbonate fraction. In one sediment, concentrations in solution decreased after a short time, possibly due to resorption on newly formed iron oxides. The changes in mobility were also reflected by changes in ecological effects. Critical parameters to be evaluated when disposing sediments in this regard are sulfide and carbonate content of the sediment, and sorption characteristics of the river bank soil.