

Ajith U K Ethugala 2013: Seasonal Variability of Heavy Metal in Riverbank Sediments from Lower Chao Phraya River, Thailand. Master of Engineering (Environmental Engineering), Major Field: Environmental Engineering, Department of Environmental Engineering. Thesis Advisor: Mr. Suchat Leungprasert, Ph.D. 78 pages.

This study presents the results of seasonal (summer, rainy and winter) variations of heavy metals and their speciation in riverbank sediment from the lower Chao Phraya River, Thailand. Surface sediment (between 0-5cm) samples were collected from both left and right bank of the river. The total concentration of ten element (Zn, Ni, Cd, Cr, Pb, Cu, Mn, Fe, As and Hg) and the chemical speciation of eight elements (except As and Hg) were analyzed by following the USEPA standard method and by following the slightly modified sequential extraction technique suggested by Tessier et al. (1979), respectively. For the Chemical speciation four fractions were analyzed including; exchangeable, carbonate bound, oxide bound and organic bound. The results showed that the physicochemical parameters, such as Electric Conductivity (EC) and total organic carbon (TOC) of the sediments were negatively correlated with distance from the river mouth. The representation of Cd dominated all three seasons in exchangeable fraction while Cr dominated in the same in summer only. The high environmental risk of Cd, Cr, Mn, Zn, and Ni is observed due to their higher availability in bioavailable fractions. These toxic chemicals, the availability of Ni, Pb, Mn, Zn, Cu and Cd in carbonate bound fraction also showed the variations in three seasons probably due to their special affinity towards carbonate and their co-precipitations with its minerals. Dominating representation of Fe and Mn may provide colloids of Fe-Mn oxides which can be act as the scavengers of other heavy metals such as Pb, Zn, Cr, Ni and Cu in oxide bound fraction. Thus, the proportions of the concentration of heavy metal in each fraction differ with metal type and have seasonal variations in their dominating order. Toxic chemicals such as Cr, Cd, Pb, Cu and Ni have been concerned due to the threshold levels of sediment Quality Guidelines(SQG) and severity levels differ with each season.

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