

Heavy Metal Contamination of Mining-Impacted Mangrove Sediments and Its Correlation with Vegetation and Sediment Attributes

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Abstract : This study investigated the concentration of heavy metals (HM) in mangrove sediments of Lake Uacon, Zambales, Philippines. The relationship among the studied HM (Cr, Ni, Pb, Cu, Cd, Fe) and the mangrove vegetation and sediment characteristics were assessed. Fourteen sampling plots were designated across the lake (10 vegetated and 4 un-vegetated) based on distance from the mining effluents. In each plot, three sediment cores were collected at 20 cm depth. Among the dominant mangrove species recorded were (in order of dominance): *Sonneratia alba*, *Rhizophora stylosa*, *Avicennia marina*, *Excoecaria agallocha* and *Bruguiera gymnorrhiza*. Sediment samples were digested with aqua regia, and the HM concentrations were quantified using Atomic Absorption Spectroscopy (AAS). Results showed that HM concentrations were higher in the vegetated plots as compared to the un-vegetated sites. Vegetated sites had high Ni (mean: 881.71 mg/kg) and Cr (mean: 776.36 mg/kg) that exceeded the threshold values (cf. by the United States Environmental Protection Agency; USEPA). Fe, Pb, Cu and Cd had a mean concentration of 2597.92 mg/kg, 40.94 mg/kg, 36.81 mg/kg and 2.22 mg/kg respectively. Vegetation variables were not significantly correlated with HM concentration. However, the HM concentration was significantly correlated with sediment variables particularly pH, redox, particle size, nitrogen, phosphorus, moisture and organic matter contents. The Pollution Load Index (PLI) indicated moderate to high pollution in the lake. Risk assessment and management should be designed in order to mitigate the ecological risk posed by HM. The need of a regular monitoring scheme for lake and mangrove rehabilitation programs and management should be designed.

Keywords : heavy metals, mangrove vegetation, mining, Philippines, sediment

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