

Heavy metal pollution in surface sediments collected from drainages receiving different anthropogenic sources from Peninsular Malaysia

Abstract

Surface drainage sediments were collected, between January and April in 2005, from 6 sampling sites in Peninsular Malaysia suspected to have received different anthropogenic sources. These drainages included sites near a petrochemical plant, an electronic factory, a metal factory and 2 townships in addition to a relatively unpolluted site (a reference site). Based on the aqua-regia method, the metal concentrations for all the sampling sites except for the agricultural site (reference site) at Sg. Benut were between 60.92-1 019 $\mu\text{g/g}$ dry weight for copper (Cu), 65.32-1 266.6 $\mu\text{g/g}$ dry weight for plumbum (Pb), 1.46-15.93 $\mu\text{g/g}$ dry weight for cadmium (Cd), 330.10-484.14 $\mu\text{g/g}$ dry weight for zinc (Zn) and 47.03-120.90 $\mu\text{g/g}$ dry weight for nickel (Ni). All of these ranges were significantly ($p < 0.05$) higher than those (Cu: 8.77 $\mu\text{g/g}$; Pb: 57.42 $\mu\text{g/g}$; Cd: 0.96 $\mu\text{g/g}$; Zn: 68.21 $\mu\text{g/g}$; and Ni: 17.87 $\mu\text{g/g}$) of the reference site at Sg. Benut that only received agricultural disposal. The concentrations for the 5 metals from all the sites (except for the reference site) were higher than the Sediment Quality Values for Hong Kong by Chapman et al (1999) for the 5 metals. Based on the sequential extraction technique, 3 geochemical fractions [easily, freely leachable and exchangeable (EFLE), acid-reducible and oxidisable-organic] were also useful in identifying these polluted sites. The elevated metal concentrations found in the sediments might be related to point sources of industrial effluent and urban waste. Hence, the results emphasized the necessity for the treatment of effluents into this drainage area. As part of the effort to control illegal discharges and dumping into drainages, public awareness should be enhanced.

Keyword: Anthropogenic sources, Heavy metal pollution, Surface sediment