Assessment of Cu, Pb and Zn contamination in sediment of north western Peninsular Malaysia by using sediment quality values and different geochemical indices.

ABSTRACT

Surface sediments were collected from the north western aquatic area (13 intertidal sites and 5 river drainages) of Peninsular Malaysia, which were suspected to have received different anthropogenic sources. These sites included town areas, ports, fishing village, industrial areas, highway sides, jetties and some relatively unpolluted sites. The present study revealed that 4.79–32.91 μg/g dry weight for Cu, 15.85–61.56 μg/g dry weight for Pb, and 33.6–317.4 μg/g dry weight for Zn based on 13 intertidal surface sediments while those based on 5 river drainage surface sediments were 10.24–119.6 μg/g dry weight for Cu, 26.7–125.7 μg/g dry weight for Pb and 88.7–484.1 μg/g dry weight for Zn. In general, the metal levels in the drainage sediments are higher than in the intertidal sediments, suggesting dilution factor in the intertidal sediment and direct effluent from point sources in the drainage sediment. In particular, the total concentrations of Cu, Pb, and Zn for the sampling site at Kuala Kurau Town exceeded the Effect Range Median values for Cu, Pb, and Zn for assessments of sediment quality values for freshwater sediment as proposed by MacDonald et al. (Arch Environ Contam Toxicol 39:20–31, 2000), thus adverse biological effects would be observed above this level. Assessment using enrichment factor (using Fe as a normalizer) and geoaccumulation index showed that the three metals at Kuala Kurau Town and Juru Industry drainage were evidenced as having more enrichment and mostly due to non-natural sources. However, caution should be exercised that the interpretation can only become valid when the ratios, indices, and sediment quality values are combined. This is due to the fact that not all the established indices are applicable and, to a certain extent, some of them should be further revised and improved to suit a different metal for Malaysian sediment. Undoubtedly, sites near drainages at Kuala Kurau Town and Juru River Basin need greater attention to mitigate the heavy metal pollution in the future.

Keyword: Heavy metals; Peninsular Malaysia; Surface sediment; Geochemical indices.