Assessment of water quality of man-made lakes in Klang Valley (Malaysia) using chemometrics: the impact of mining

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ABSTRACT

Assessing water quality of the ex-mining ponds for its proper utilization is pertinent considering the metal pollutants and lack of proper environmental measures is associated with the mining operations. In this study, water samples from 13 man-made lakes including 8 ex-mining ponds in the Klang Valley, Malaysia were analyzed for dissolved oxygen, suspended solid, pH, electrical conductivity (EC), biological oxygen demand (BOD), ammoniacal nitrogen (AN), total dissolved solid (TDS), and metals including As, Cd, Pb, Mn, Fe, Na, Mg, and Ca. The variations in these parameters were evaluated with the chemometric techniques. The results from the principal component analysis and hierarchical cluster analysis suggested that in addition to the degree of contamination, the variations in heavy metal concentrations were mainly attributed to the ex-mining activities, whereas deviations in BOD, TDS, AN, and EC were subjected to the current domestic inputs. The linear discriminant analysis showed that water samples from the ex-mining ponds were highly associated with Mn, Cd, Ca, and As. The As and Cd levels recorded in most of the ex-mining ponds were 11.3 ± 0.4, 116 ± 2, and 42 ± 0.5 µg/L; and 12.9 ± 0.2, 12.23 ± 0.02, 12.19 ± 0.01, and 12.15 ± 0.01 µg/L, respectively. These values surpassed the reference limits, which make them unfit for domestic uses.

Keywords: Chemometric; Ex-mining; Lake; Metal; Water

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