Metal pollution and health risk assessment of an urban wastewater site, southwest Nigeria

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Geochemical assessment of soil at urban wastewater in Agbara Industrial Estate, south-western Nigeria was determined. 30 samples were analysed with the Inductively Couple Plasma-Mass Spectroscopy to determine 36 major and trace elements.

All the contamination indices showed that soil samples were deficient in major elements except Fe and S which fell within background to extremely high contamination.

Enrichment Factor showed that soil samples were within background to minimal enrichment with Cu, Mn, Cd, Cr, Sb, background to moderate enrichment with Pb, Ag, Mo, As, background to significant enrichment with Zn, Bi and background to very high enrichment with Se and Sc.

Results of the contamination factor showed that soil were within low to moderate contamination with Cu, Mn, Cr, Mo, Ag, As, Cd and Bi, low to considerable contamination with Pb, Th and low to very high contamination with Zn, Sc, Se and Sb. Contamination Degree ranged between 2.18 to 243.28 which indicate low to very high degree of contamination.

Geo-accumulation index showed that soil samples were practically uncontaminated with Mo, Cu, Mn, As, Cd, Cr, Sc and Ag, practically uncontaminated to moderately contaminated with Pb, Th, Bi, practically uncontaminated to highly contaminated with Zn, Sb and practically uncontaminated to very strongly contaminated with Se.

Potential ecological risk factor (RI) ranged between 22.62 and 119.4 which indicated low to very high risk. The total chronic hazard quotient index of oral exposure to soil contamination in the study area (THI) ranged between 1.77 and 26.65 for child and 0.32 and 4.76 for adult. Most samples were above 1, depicted great hazard for both young and old. The critical factor for THI in both adult and children of the study area were the exposure to Cr, Zn and Mn.