

Heavy Metal Contamination of a Dumpsite Environment as Assessed with Pollution Indices

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Abstract : Indiscriminate refuse dumping in and around Ado-Ekiti combined with improper management of few available dumpsites, such as Ilokun dumpsite, posed the threat of heavy metals pollution in the surrounding soils and underground water that needs assessment using pollution indices. Surface soils (0-15 cm) were taken from the centre of Ilokun dumpsite (0 m) and environs at different directions and distances during the dry and wet seasons, as well as a background sample at 1000 m away, adjacent to the dumpsite at Ilokun, Ado-Ekiti, Nigeria. The concentration of heavy metals used to calculate the pollution indices for the soils were determined using Atomic Adsorption Spectrophotometer. The soils recorded high concentrations of all the heavy metals above the background concentrations irrespective of the season with highest concentrations at the 0 m except Ni and Fe at 50 m during the dry and wet season, respectively. The heavy metals concentration were in the order of Ni > Mn > Pb > Cr > Cu > Cd > Fe during the dry season, and Fe > Cr > Cu > Pb > Ni > Cd > Mn during the wet season. Using the Contamination Factor (CF), the soils were classified to be moderately contaminated with Cd and Fe to very high contamination with other metals during the dry season and low Cd contamination (0.87), moderate contamination with Fe, Pb, Mn and Ni and very high contamination with Cr and Cu during the wet season. At both seasons, the Pollution Load Index (PLI) indicates the soils to be generally polluted with heavy metals and the Geoaccumulation Index (I_{geo}) calculated shown the soils to be in unpolluted to moderately polluted levels. Enrichment Factor (EF) implied the soils to be deficiently enriched with all the heavy metals except Cr (7.90) and Cu (6.42) that were at significantly enrichment levels during the wet season. Modified Degree of Contamination (mC_d) recorded, indicated the soils to be of very high to extremely high degree of contamination during the dry season and moderate degree of contamination during the wet season except 0 m with high degree of contamination. The concentration of heavy metals in the soils combined with some of the pollution indices indicated the soils in and around the Ilokun Dumpsite are being polluted with heavy metals from anthropogenic sources constituted by the indiscriminate refuse dumping.

Keywords : contamination factor, enrichment factor, geoaccumulation index, modified degree of contamination, pollution load index

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