

ASSESSMENT AND MODELING OF HEAVY METAL POLLUTION IN SOIL WITHIN RECLAIMED AUTO REPAIR WORKSHOPS IN ORJI, IMO STATE NIGERIA

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Abstract. The presence and concentrations of toxic heavy metals within a reclaimed section of the Orji mechanic village in Imo State Nigeria were determined using energy dispersive X-ray fluorescence and atomic adsorption spectrophotometry. Multivariate and geostatistical models like contamination factor (C_f), degree of contamination (C_d), pollution load index (PLI) and index of geo-accumulation (I_{geo}) were used to analyze the data obtained. Preliminary soil analysis showed the relative abundance of the heavy metals in the order $Cd < Cr < As < Co < Mn < Ni < Cu < Pb < Zn < Fe$. The observed concentration ranges of these metals at the different sampling points were between 0-44 mg/kg (Ni), 50-363 mg/kg (Pb), 1-25 mg/kg (Cd), 55-102 mg/kg (Cr), 0-35 mg/kg (As), 19-54 mg/kg (Mn), 11-35 mg/kg (Mn), 9-203 mg/kg (Zn), 2-90 mg/kg (Cu) and 3654-5134 mg/kg (Fe). The degree of contamination model indicated that the area had a high degree of contamination by cadmium and arsenic. The index of geo-accumulation model showed that the soil was strongly to extremely contaminated by lead and cadmium at some of the points sampled. The activities at the mechanic village in this area significantly affected the accumulation of these heavy metals.

Keywords: Mechanic village, heavy metal, degree of contamination, index of geo-accumulation, cadmium, arsenic.