

# **Appraisal and spatial distribution of Potential toxic elements in agricultural and non-agricultural land from alluvial plains of Punjab, India**

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Urban expansion, industrial activities and current agricultural methods have led accumulation of toxic metals in soils and these are common practices in alluvial plains of Punjab. Toxic metal pollution due to agricultural practices poses serious environmental risk and negative impact on human health. To assess the pollution level of heavy metal in the surface soils, metal concentration in samples were measured for agricultural (n=13) and uncultivated land (n=4). Combination of Kriging interpolation and Pollution indices (PI) were performed to evaluate the pollution characteristics of toxic metals. Concentrations of 11 toxic metals were analyzed using ICP-MS and the value lies in the range: 3.9 – 28.1, 29.2 - 90, 6.7 – 32.8, 4.2 – 65.6, 13019.5 – 43900, 95.7 – 553, 13.1 – 42.1, 16.5 – 25.2, 82 – 267, 25 – 78.6 and 25.4 – 131.8 mg/kg for As, Cr, Cu, Co, Fe, Mn, Ni, Pb, Sr, V and Zn respectively. Mean concentration of metals follow the order of Fe>Mn>Sr>Cr>Zn>V>Ni>Co>Pb>Cu>As. Cu, Pb, Mn and Zn concentration is found to exceed the Indian background value. Comparatively 2-fold higher values were found for agricultural samples than uncultivated land. Higher variability in spatial distribution for agricultural sites supports role of anthropogenic activities. Pollution indices indicate that soil of Barnala district is moderately contaminated with these metals. Continuous monitoring is crucial as area is under large consumptions of chemical fertilizers. The study declares, the area is under stress of toxic metal contamination due to agricultural activities, the findings will aid in the development of effective policies to prevent the long-term buildup of these hazardous metals in soil systems.