

Distribution of toxic heavy metals and metalloid in a rural non-industrialized area in West Bengal, India

Ishika Pal^{1,2}, Farhan Jamil^{1,2}, Upama Das^{1,2}, Swapnanil Mondal^{1,2}, Srinwanti Bandyopadhyay^{1,2}, Chayan Munshi^{2*}

¹Department of Zoology, Visva Bharati University, Santiniketan, 731235, India

²Ethophilia (An Autonomous Research Group), Santiniketan, 731235, India

*Corresponding Author: Chayan Munshi (chayanbio@gmail.com)

Abstract

Introduction: Heavy metal and metalloids are well-known environmental hazardous elements. These contaminants get distributed diversely in the ecosystem and eventually become bioaccumulated in the native habitants of that respective ecosystem. The aim of our research work is to evaluate the occurrence of toxic metal and metalloid contamination in the sediment/soil in a non-industrial area.

Methods: The concentration of occurred heavy metals and metalloid(s) were measured from sediment/soil samples in a rural area in West Bengal, India, by using Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES) method. Sediments from pond and adjacent (connected) agricultural soil were compared to assess the contamination difference between the ecologically linked sub-environments.

Results: Results strongly demonstrates the presence of arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), manganese (Mn), lead (Pb) and zinc (Zn) in both the sub-environments. The concentration of arsenic, manganese and lead are higher in the associated agricultural soil, which depicts that the agricultural runoff might have been the major sources of these contaminants in the pond. Whereas the concentration of cadmium, copper and zinc in both the sub-environments are almost same. Only the concentration of chromium is lesser in the agricultural soil.

Conclusion: The arsenic and lead concentration in the agricultural area is higher than the global geochemical background shale value and cadmium concentration in both the sub-environments is higher than the global geochemical background shale value. These three toxicants are already established as highly hazardous and incidentally, they are available in the sediment of a rural area where there is no trace of any urban-like industrial establishment.

Keywords: Toxic metals; Sediment; Geochemical toxicity; Heavy metals; Metalloids