


Abstract

Geospatial Deposition of Toxic Heavy Metals and Metalloids between a Pond and the Associated Agricultural Ecosystem in a Non-Industrialized Rural Area in West Bengal, India [†]

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[†] Presented at the 1st International Electronic Conference on Toxics, 20–22 March 2024; Available online: <https://sciforum.net/event/IECTO2024>.

Keywords: toxic metals; sediment; soil; geochemical toxicity; heavy metals; metalloids

Introduction: Toxic heavy metals and metalloids are biohazards, which are known to contaminate the environment. These environmental contaminants are geologically distributed in several ecosystems and are eventually bioaccumulated in native habitats of the respective biomes. The aim of our research is to evaluate the deposition of toxic heavy metals and metalloids in the sediment/soil of a non-industrial rural area.

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

Results: Our results reveal the considerable occurrence of the top listed toxic metalloid arsenic (As), and heavy metals lead (Pb) and cadmium (Cd) in both sub-environments. The data are analyzed in respect to the comparative concentration of these elements in the sub-environments along with the calculations of contamination factor, geo-accumulation index, pollution load index and the potential ecological risk of these elements in the soils. Our findings indicate the serious contamination of cadmium in both sub-environments; however, cadmium levels are higher in the agricultural soil.

Conclusions: Metal contamination in soil is an issue of concern for geologists, environmental biologists and ecotoxicologists. Our work concentrates on the heavy metal/metalloid contamination in the soil of a non-industrialized rural area. The experiment establishes the fact that a significant deposition of hazardous elements can not only occur in industrialized urban areas, but also that remote countryside areas are equally prone to toxic contamination. In fact, contaminated soil in the agricultural fields can create notable safety issues related to farming products. The pollution profile of non-industrial environments or apparently safe areas should be given adequate attention by researchers regarding biohazard concerns.

Author Contributions: Conceptualization, writing, and supervision, C.M.; Methodology and data curation, I.P., F.J., U.D., S.M. and S.B.; Formal analysis, C.M. and I.P. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.



Citation: Pal, I.; Jamil, F.; Das, U.; Mondal, S.; Bandyopadhyay, S.; Munshi, C. Geospatial Deposition of Toxic Heavy Metals and Metalloids between a Pond and the Associated Agricultural Ecosystem in a Non-Industrialized Rural Area in West Bengal, India. *Proceedings* **2024**, *102*, 29. <https://doi.org/10.3390/proceedings2024102029>

Academic Editor: Virginia Cruz Fernandes

Published: 3 April 2024



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Data Availability Statement: Experimental data is not shown due to ethical restrictions.

Conflicts of Interest: The authors declare no conflict of interest.

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