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Assessment of potential ecological and health risk for inhabitants living near a former secondary lead smelter

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Bangladesh is the most densely populated countries in the world. High demand in the transport sector has triggered the use of Lead Acid Battery (LAB) driven vehicles. Thousands of exhausted LABs are recycled in the local markets to recover lead (Pb) by crude smelting process to manufacture new batteries. Smelting is a major source of environmental metal pollution and the effect of lead smelter on the surrounding environment and people living in the affected area were rarely studied. This study assessed the concentration of Pb, As, Cd and Zn in agricultural soils and in rice grains produced in the surrounding farmlands of a former secondary lead smelter in Khulna, Bangladesh. A total of 29 surface soil and rice samples were collected within 500 m of the smelter. The contamination factor (C_f) and total hazard quotient (THQ) was used to assess the ecological and human health risk. The mean concentrations of Pb, As and Zn in soils were 231, 6.4 and 503 mg/kg, respectively. Cd was not detected in any sample. The concentration of Pb in the surface soils near the Pb smelter was very high. Mean concentrations of Pb, As and Zn in rice grain were 7.48, 1.4 and 25 mg/kg fw, respectively. The mean concentrations of Pb and As were higher than the tolerance limits of 0.4 and 0.7 respectively, indicating a potential risk to human health. The mean value of C_f were 11.6, 2.1 and 7.4 for Pb, As and Zn, respectively. For Pb samples, 41% of the samples had C_f>6, which means very strong contamination. In relation to health risk, THQ values for Pb and As were greater than 1.0 demonstrating high health hazards of these metals. Measures should be taken to combat metal pollution from Pb smelter in the study area.

Biography

Md Atikul Islam has research experience in the field of environmental pollution and public health. He has completed his Doctor of Engineering in Systems Design and Engineering from Yamaguchi University, Japan. He has worked as a Visiting Scientist in Department of Soil Amelioration, University of Zagreb, Croatia. He had several national and international collaborative research projects which mainly focus on environmental pollution assessment and management. Presently he is working as a Professor under Environmental Science Discipline in Khulna University, Bangladesh.

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