

**Ecological risk assessment of
potentially hazardous elements
(PHEs) in agriculture soils: A study
from Raichur industrial
development area, Karnataka, India**

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The soil is a multifarious assembly encompassing organic matter, air, water, mineral matter and living organisms. The presence of different kinds of metals in trace levels is a natural phenomenon, but their enhanced level is a cursor of contamination load in that particular area. In this context a study was undertaken to examine the presence and dispersal of potentially hazardous elements (PHEs); arsenic (As), chromium (Cr), copper (Cu), nickel (Ni), lead (Pb) and zinc (Zn) in Raichur industrial development area (IDA), Karnataka, India, an area of traditional agricultural based economy with majority rice processing industries and profuse natural resources like minerals, water resources, power etc. Soils were sampled from the industrialized region and were measured for their toxic metals. Concentrations ranged from 2.9 to 6.8 mg/kg for As, 49.9 to 96.6 mg/kg for Cr, 19.8 to 46.2 mg/kg for Cu, 1.40 to 27.5 mg/kg for Ni, 12.2 to 45.8 mg/kg for Pb and 77.4 to 128 mg/kg for Zn. Though, the values reveal a normal distribution, it is of environmental importance with reference to the presence of PHEs due to rapid industrialization and the wastes generated in large quantities especially from agro-based industries and the way these can be transported from soils to water and ecosphere demonstrating a hazard to human health. Presentation of Pearson's correlation, factor and cluster analysis of the data shows that the toxic metal contamination in soils of the study area originate from surrounding industrial activities with anthropogenic origin. Potential ecological risk indices (PERI, RI) were also calculated using equations from unified database of USEPA. Further, the evaluation of two routine techniques such as X-ray fluorescence (XRF) and High-resolution inductively coupled plasma mass spectrometer's (HR-ICP-MS) were employed for the determination of the PHEs in order to assess the impact on environment. These results are important for the advance of appropriate guiding and will provide basic information for the improvement of soil environment and toxic element pollution prevention and control in the study area.