



“Gheorghe Asachi” Technical University of Iasi, Romania



COMPARISON OF SOURCES AND SPATIAL DISTRIBUTION OF HEAVY METALS AT TWO PERI-URBAN AREAS IN SOUTHWEST SHENYANG, CHINA

Jin Wu¹, Yanguo Teng^{2*}, Binbin Wu², Jie Su², Jinsheng Wang²

¹College of Architecture and Civil Engineering, Beijing University of Technology, Beijing 100124, China

²College of Water Sciences, Beijing Normal University, 100875, China

Abstract

To investigate the sources and spatial distribution of heavy metals in soil, samples were collected at two scales from the alluvial plains of Shenyang, China. Statistical analysis at small scale showed average concentrations of Cu, Pb, Zn, Ni, Cr and As of 36.76, 33.33, 100.06, 37.98, 91.26, and 7.99 mg/kg, respectively. Corresponding large-scale concentrations were 34.11, 46.38, 82.44, 32.51, 83.77, and 24.06 mg/kg. At both scales, Ni and Cr were mainly controlled by parent materials and Pb by anthropogenic activities. The main sources of Cu, Zn and As varied with scale. To describe the spatial structure of heavy metals, geostatistical analysis and geographic information systems were used to visualize and compare levels in different areas at both scales. The samples at small scales were located in the region of strong variation at large scale, indicating that the sampling strategy is appropriate for obtaining more reliable interpolation results. Health risk assessment based on 95th percentile concentrations of total elemental concentrations indicated that noncancer effect and cancer effect of children and adults were acceptable at the two different scales.

Keywords: heavy metals, multivariate statistics, risk assessment, spatial distribution

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