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Assessment of potentially toxic element contamination and biohazard threats in the Bengaluru metropolis, India.

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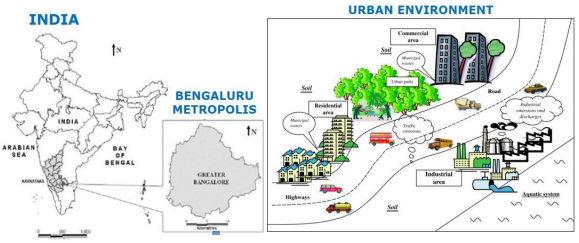

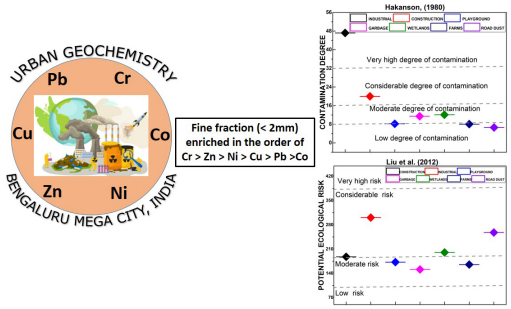

In this work, the potentially toxic elements (PTEs) chromium (Cr), cobalt (Co), copper (Cu), lead (Pb), nickel (Ni), and zinc (Zn) are examined in 200 top soils in Bengaluru, India, gathered from various land uses. The aim of this research is to understand the origins, distribution, and environmental concerns associated with PTEs.

The average Co, Cr, Cu, Ni, Pb, and Zn at construction sites are 12, 141, 233, 59, 62, and 618 (ppm); at industrial sites are 30, 2556, 197, 514, 119, and 358 (ppm); at garbage dumps are 15, 162, 173, 57, 54, and 165 (ppm); in wetlands are 16, 238, 90, 89, 48, and 257 (ppm); in playgrounds are 15, 244, 47, 93, 40, and 95 (ppm); in farmland are 18, 217, 53, 82, 36, and 101 (ppm) and in road dust are 7,103, 109, 34, 46, and 138 (ppm) respectively.

For risk assessment, contamination degree (CD; Hakanson, 1980) and potential ecological risks (PER; Liu et al., 2012) were computed. The average CD ranges from 7 to 12 for playground, wetland, garbage, road dust, and agriculture site samples, indicating low to moderate contamination; 20 for construction site samples, indicating considerable contamination; and 47 for industrial site samples, indicating very high contamination. The average PER ranges from 151 to 172 for garbage, agriculture and playground site samples, indicating a moderate ecological risk; 188 to 301 for construction, wetland, road dust and industrial site samples, indicating considerable ecological risk.

A strong correlation (0.82 to 0.97) and high content of Co, Cr, and Ni at industrial sites, and a moderate correlation (0.58 to 0.68) and high content of Cu, Pb, and Zn at construction sites indicates industrial and construction activities are the major sources of pollution. The Pennya industrial region in northwestern Bengaluru (known for electronic, electrical, metallic, textile, rubber, plastic, pharmaceutical and paint industries), as well as construction and automobile sources throughout the city, show that PTEs pollution should be considered while creating urban environmental management strategies. PTE-related pollution is beginning to affect urban biosphere. A geochemical baseline for PTE pollution prevention and control is established by this research.