

Research Article

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Heavy metal contamination in soils surrounding Mandideep industrial area, Madhya Pradesh

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Summary

Soil contamination in vicinity of industrial establishments due to release and accumulation of heavy metals has been a major concern for last few decades. The main objective of present research was to study the status of heavy metal contamination in the industrial area of Mandideep. The Mandideep being the largest industrial area of Madhya Pradesh in India was selected for present investigation. Mandideep is located between N 23°04' longitude and E 077°31' latitude with an elevation of 1496 m above MSL. The representative soil samples were collected from ten different locations and subjected to laboratory analysis for determination of total and available concentration of seven important heavy metals viz., Pb, Zn, Cr, Cu, Ni, As and Cd. Four acid digestion and DTPA extraction methods were used to digest and extract the total and available form of heavy metal from sample, respectively. The heavy metal concentrations from digest and extractant were estimated by using ICP-OES instrument. In the present study it reveals that the heavy metals concentration is at the nearby maximum level. The results showed that all heavy metal viz., Pb, Zn, Cr, Cu, Ni, As and Cd concentrations in soils surrounding the industrial area of Mandideep found in higher concentrations at all the sampling locations. The concentrations of total lead, copper, chromium, zinc, cadmium, arsenic and nickel varied from 26.6 to 143.9 mg kg⁻¹, 81.0 to 361.0 mg kg⁻¹, 53.0 to 462.0 mg kg⁻¹, 80.1 to 1200.0 mg kg⁻¹, 3.0 to 23.2 mg kg⁻¹, 15.1 to 48.6 mg kg⁻¹ and 84.3 to 260.7 mg kg⁻¹, respectively whereas available lead level ranged between 1.2-4.9 mg kg⁻¹, copper varied from 2.7 to 25.5 mg kg⁻¹, chromium occurred in range from 0.018 to 0.052 mg kg⁻¹, whereas zinc found in range from 7.4 to 71.6 mg kg⁻¹, cadmium level ranged from 0.158 to 0.418 mg kg⁻¹, arsenic varied from 0.008 to 0.021 mg kg⁻¹ and nickel was found in a range from 0.275 to 5.952 mg kg⁻¹. In conclusion, the soil in the vicinity of Mandideep industrial area is severely contaminated with heavy metals released and accumulated from the industrial operations.

Key words : Heavy metal contamination, Soil pollution

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