

**Abstract 19 – Paper ID: 131****Evaluation of Lead (Pb) Contamination and Groundwater Quality Using HPI and WQI in Regions of Delhi NCR**

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**Abstract**

Lead (Pb) contamination in groundwater is increasing and poses a serious threat to human health and the environment due to its non-biodegradable nature. Prolonged exposure to lead through contaminated groundwater can result in severe health effects, including renal dysfunction, neurological disorders, and developmental issues, particularly in children. Rapid industrialisation, urbanisation, and the disposal of untreated waste contribute significantly to lead enrichment in groundwater through landfill leachate infiltration. In this context, the present study evaluates the concentration of lead and associated water quality indices in groundwater near major landfill sites of the Delhi National Capital Region (NCR), India. Seven groundwater samples were collected from landfill-impacted areas including Bhalsawa, Ghazipur, Kalindikunj, Abul Fazal, and Okhla, along with nearby locations. The samples were analysed using Inductively Coupled Plasma Mass Spectrometry (ICP–MS), enabling precise detection of Pb at parts-per-billion levels. The results indicate elevated lead concentrations ranging from 66 µg/L to 245 µg/L, which significantly exceed the permissible limit of 10 µg/L prescribed by the World Health Organization (WHO) and the Bureau of Indian Standards (BIS). The highest Pb concentration was observed near the Okhla Bird Sanctuary, suggesting a strong influence of landfill leachate on groundwater quality. To assess the overall groundwater quality status with respect to lead contamination, the Heavy Metal Pollution Index (HPI) and Water Quality Index (WQI) were calculated based primarily on Pb concentrations. The computed index values classify most groundwater samples as poor to unsuitable for drinking purposes, indicating substantial deterioration of groundwater quality in landfill-affected regions of Delhi NCR.

**Keywords:** Lead (Pb), Groundwater contamination, Water quality assessment, ICP–MS, Heavy Metal Pollution Index, Water Quality Index, Landfill leachate, Delhi NCR