

Analysis of Heavy Metal Concentrations in the Surface Waters of Surami, Khashuri Municipality, via Microwave Plasma Atomic Emission Spectroscopy

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This study examines the surface waters of Surami town in Khashuri Municipality—including the headwaters, midstream, and downstream sections of the Suramula River; Gharibaghele therapeutic water; and local well, tap, spring, and iron-rich waters - to assess water quality, evaluate ecological risks, and identify major sources of heavy metal contamination (Cd, Pb, As, Zn, Cr, Cu, Ni, Sb, Mn, and Fe). Ten water samples were collected in autumn 2025, and heavy metal concentrations were measured using a microwave plasma atomic emission spectrometer (MP-AES 4210). Results were compared with maximum permissible concentrations set by the World Health Organization (WHO) and Georgian national standards.

The well, tap, and spring waters contained heavy metals within acceptable limits. However, the Suramula River showed elevated lead levels, with concentrations reaching 0.02 mg/L and in some cases up to 0.08 mg/L. Gharibaghele therapeutic water exhibited notable exceedances: cadmium at 0.01 mg/L (MPC = 0.003 mg/L), iron at 2.73 mg/L (MPC = 0.3 mg/L), nickel at 2.19 mg/L (MPC = 0.07 mg/L), and manganese at 18.46 mg/L (MPC = 0.4 mg/L). In Surami's iron-rich water, iron levels were high at 2.29 mg/L, and lead reached 0.02 mg/L—twice the permissible limit.

Potential sources of contamination include agricultural runoff, industrial discharges, and urban pollution. These findings highlight important implications for public health in Surami and underscore the need to address ecological risks in the region.

References

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