

Environ Monit Assess (2024) 196:216
<https://doi.org/10.1007/s10661-024-12348-0>

RESEARCH



The environmental impact of heavy metals in sediments of main valleys in the eastern side of Mosul City, Iraq

Abstract

Analyzing the geochemical changes in stream sediments can reveal important surface processes on Earth, like weathering, transportation, and cation exchange. The study area is located on the eastern side of Mosul, where valleys named Al-Rashediya, Al-Kharrazi, Al-Khosar, Al-Danffilli, and Al-Shor flow towards the Tigris River. These valleys' sediments contain diverse components like clay minerals, organic matter, iron oxides, carbonates, and heavy metals (H.M.s), either as part of these substances or adsorbed onto them. In this study, 36 sediment samples were gathered from these valleys. They underwent chemical analysis through X-ray fluorescence to ascertain their chemical constituents of major oxides. To understand the distribution of H.M.s in these sediments, correlation coefficient analysis and factor analysis were utilized. The study employed the geoaccumulation index (I_{geo}) and enrichment factor (E.F.) to evaluate sediment contamination. The results of I_{geo} ranged from Cr = 0.24 to 1.83, Ni = -0.92 to 0.77, Cu = -2.41 to 0.05, Zn = -1.83 to 0.89, Pb = -1.54 to 0.36, and As = -2.84 to 0.80. These findings suggest that the valley sediments are generally in the range of deficiency to minimal enrichment and moderate enrichment. However, Al-Danffilli Valley shows strong contamination levels for Cu, Zn, and Pb. The E.F. values for Cr = 3.63–12.50, Ni = 1.95–4.19, Cu = 0.69–12.36, Zn = 1.08–16.19, Pb = 1.25–62.16, and As = 0.60–1.79 indicate levels ranging from deficiency to minimal and moderate enrichment. Al-Danffilli Valley, in particular, was identified as ranging from moderate to extremely high enrichment, attributed to its location near industrial areas and its tributaries.