

## ABSTRACT

Water, soils, and sediments contaminated with hazardous elements are of increasing concern because they greatly affect human health and ecological systems. In Mozambique, coal mining and processing operations are important industries; however, they could potentially contaminate the surrounding environment. This study investigates contamination of surface soils, river sediments, river water and groundwater around coal mines in Moatize district, Tete province, Mozambique. Three water pollution indices, water quality index (WQI), heavy metal evaluation index (HEI) and heavy metal pollution index (HPI) and five soil/sediment pollution indices, enrichment factor (EF), geo-accumulation index (Igeo), contamination factor (CF), contamination degree (CD) and pollution load index (PLI) were used to assess the levels of contamination in the area. All water samples were found to be “uncontaminated” to “moderately contaminated” with hazardous metals. The heavy metal concentrations found in waters varied from: As (0.3–10.9 µg/L), Ba (9.8–69.6 µg/L), Cr (2.1–60.2 µg/L), Cu (1.7–62.3 µg/L), Ni (1.2–71.9 µg/L), Mn (5.9–58.1 µg/L), Pb (1.3–10.8 µg/L) and Zn (2.1–40.2 µg/L). Most of these values exceeded the drinking water standards set by WHO. Meanwhile, surface soils and sediments from Moatize and Murrongoze Rivers were “highly polluted” (PLI = 1.11–1.85). Leaching experiments of soil and sediments suggest that hazardous elements from soils and sediments were strongly affected by the type of leaching solution (deionized 18 MΩ cm water and 1M HCl) and several of them were highly bio-accessible that could pose serious ecological and health risks in the area.