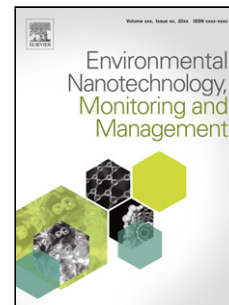


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Assessment of heavy metal pollution in the main Pra River and its tributaries in the Pra Basin of Ghana

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ABSTRACT

The Pra Basin is one of the Basins in Ghana with a high level of illegal mining activities. Heavy metal pollution in water bodies is common in areas where illegal mining is practiced. This study focused on the assessment of heavy metal pollution in the Pra Basin. The study was based on 216 water samples collected from 27 sampling points from the Pra River and two of its tributaries during the dry and wet seasons in 2017. Nine heavy metals namely arsenic (As), chromium (Cr), cadmium (Cd), copper (Cu), lead (Pb), manganese (Mn), nickel (Ni), zinc (Zn), and iron (Fe) were assessed in this study. The metal concentrations (mgL^{-1}) in the water were as follows: Fe > Pb > Ni > Cu > Cr > Cd > Zn > Mn > As and in the dry season as Fe > Zn > Cu > Cr > Pb > Mn > Ni > Cd > As. Five metals exceed the safe drinking water guidelines making the water generally not safe for domestic activities like drinking and cooking. According to the Nemerow's Pollution Index (NPI) results, six metals namely Pb, Cd, Cr, Ni, Fe, Zn were the principal metal pollutants in both the dry and wet seasons whereas Mn, As, and Cu, were found not to contribute to the pollution effect. The water quality index confirms that the water quality is marginal to fair in the dry season and poor for 26 out of the 27 sites in the wet season. Generally the studied rivers (Pra, Offin and Oda) are polluted which is a serious threat to the health of inhabitants in villages which still use the water for cooking activities. The study recommends continuous monitoring of the polluting metals and the assessment of the river sediments to inform effective remediation measures.

Keywords: Heavy metals; River; Pollution; illegal mining; Pra Basin; Ghana

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