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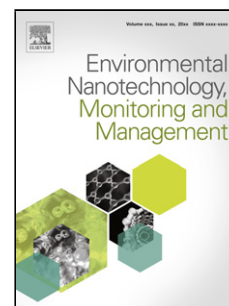
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Multivariate statistical analysis of metal contamination in surface water around Dhaka export processing industrial zone, Bangladesh

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Highlights

- Metal distributions were not seasonally influenced.
- Spatial gradients of metal concentrations were recorded.
- Metals sourced from anthropogenic factors.
- Effective measures should be taken to protect surface water.

Abstract

Deterioration of water quality by anthropogenic heavy metal pollution is a critical issue, especially in the least developed countries. This study, therefore, utilizes multivariate statistical approaches to report on the sources of heavy metals contamination in water bodies close to Dhaka Export Processing Zone industrial area in Bangladesh. Correlation matrix showed a number of significant associations ($p < 0.01$ and $p < 0.05$) among the metals, with no major seasonal influence on metal associations. Spatial variability of metal concentrations, however, was observed with lowering of concentration as distance increased from the pollution sources. Principal component and cluster analysis identified three major sources of metal pollution including untreated industrial effluents, municipal wastes, and atmospheric deposition of metals from burning of fossil fuels. These three sources were responsible for the data structure explaining 79.97% of total variance. Hierarchical cluster analysis demonstrated

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