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Assessment of heavy metal and organic pollution in Yamuna river at Etawah district of Uttar Pradesh

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Abstract

Rapid urbanization and industrialization has led to discharge of enormous quantity of heavy metals laden wastewater which has destroyed rivers ecosystems. The objective of study was to assess heavy metal and organic pollution of Yamuna river water vis a vis irrigation water quality standards in Etawah district of Uttar Pradesh. Four sampling sites viz., E1, E2, E3 and E4 were selected along Yamuna stretch in Etawah district and samples were collected in summer and post-rainy seasons during 2016. Six heavy metals (i.e., Pb, Cd, Fe, Cu, Cr and Zn), dissolved oxygen (DO) and biochemical oxygen demand (BOD) of river water were analysed. Heavy metal pollution index (HPI) was used to determine severity of heavy metal pollution in the river. The mean concentration of heavy metals followed the order of Fe > Pb > Zn > Cd > Cr > Cu in summer and Fe > Zn > Cr > Pb > Cd > Cu in post-rainy season. Pb, Fe, Zn and Cu were present within permissible limits as per irrigation water quality standards in both the seasons. The concentrations of Pb, Cd, Cr and Cu decreased by 82%, 73%, 34% and 76%, respectively, whereas that of Fe and Zn increased by 29% and 48%, respectively, during post-rainy season. Heavy metal pollution index (HPI) of each sampling site revealed highest pollution at E2 site. Mean HPI for Yamuna water in summer i.e., 1534 decreased to 412 in post-rainy season. The overall HPI of river water was recorded 973 which is much higher than critical limit of 100. In both the seasons, DO remained almost consistent at all the sampling sites but BOD decreased conspicuously at E2 and E3 sites.

Keywords: Biochemical oxygen demand (BOD), Dissolved oxygen (DO), Heavy metal pollution index (HPI), Yamuna river, Etawah