Assessment of Spatial and Vertical Distribution of Heavy Metals in the Mid Sand Bars of Brahmaputra River in Assam, India

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Abstract : The environment has been getting contaminated by anthropogenic processes including those that discharge heavy metals to air, soil and water. The present work emphasizes the spatial distribution and vertical profile of six heavy metals (Cu, Zn, Mn, Ni, Fe, Cr) in three layers of mid sand bars (bed surface layer, 50 cm and 100 cm depth) at 42 sampling stations covering around 600 km stretch of the Brahmaputra River, India. Heavy metal analysis was conducted on the sample collected from mid-sand bars in the river stretch to examine the impact of dredging for various hydrological operations in the future. Sediment quality was assessed by calculating six different indices viz., EF, CF, CD, PLI, Igeo, and PERI. In all sediment layers, heavy metal concentrations have been observed to be the same as listed, Fe > Mn > Zn > Ni > Cr > Cu in µg/g. The average concentration of Cu, Mn, and Fe was found in the middle layer while Zn, Ni, and Cr were in the Surface layer. EF indicates higher enrichment in reach 2 which is likely to be due to anthropogenic sources of industrial and urbanized effluents. The sediment of the mid-sand bar was generally found moderately polluted possessing low risk to aquatic lives and the environment. Suggesting, Dredging can be possible in the future. An examination of correlation matrices, principal components analysis, and cluster analyses indicated that these heavy metals possess similar anthropogenic origins for their enrichment.

Keywords : heavy metal contamination, risk assessment, anthropogenic impacts, sediment
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