

Anthropogenic impact on metal enrichment in urban beach sediment of Mumbai, India

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Coastal and estuarine sediments of industrial areas are the largest repository and potential source of metal pollutants in the marine environment. Mumbai is one of the most populated cities in the world and the business capital of India and provides home to about 12.5 million people. India is comprised of a large coast line about 5423 km along the mainland with 43% of it being sandy beaches. A total of 72 sediment samples from four beaches were analyzed for nine heavy metals bimonthly to assess the metal enrichment by anthropogenic influence. The average heavy metal concentrations exhibited the following order: Fe > Mn > Cr > Co > Ni > Pb > Zn > Cu > Cd for the four sampling sites. The findings pointed out the presence of high concentrations of Cd, Cr, Co and Pb due to high anthropogenic influences. Cd was the highest contaminated metal with a mean contamination factor of 93.75. Spatial variation of metals revealed that most of the metal contents are high in Dadar beach and low in Aksa beach. The increasing trend of metal pollution from the north to the south of the coast was determined by Pollution Load Index, which ranged from 1.63 to 1.91. The heavy metal content was increased in relation to the monsoon from July to September. However, highest concentrations of most heavy metals were recorded in November after the south-west monsoon. The statistical analysis revealed significant effect of the four study sites for all metals studied except for Fe. Furthermore, there was significant difference in trace metal concentrations in relation to season. Overall, temporal and spatial metal enrichment was found in Mumbai beaches in relation to anthropogenic activities.

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