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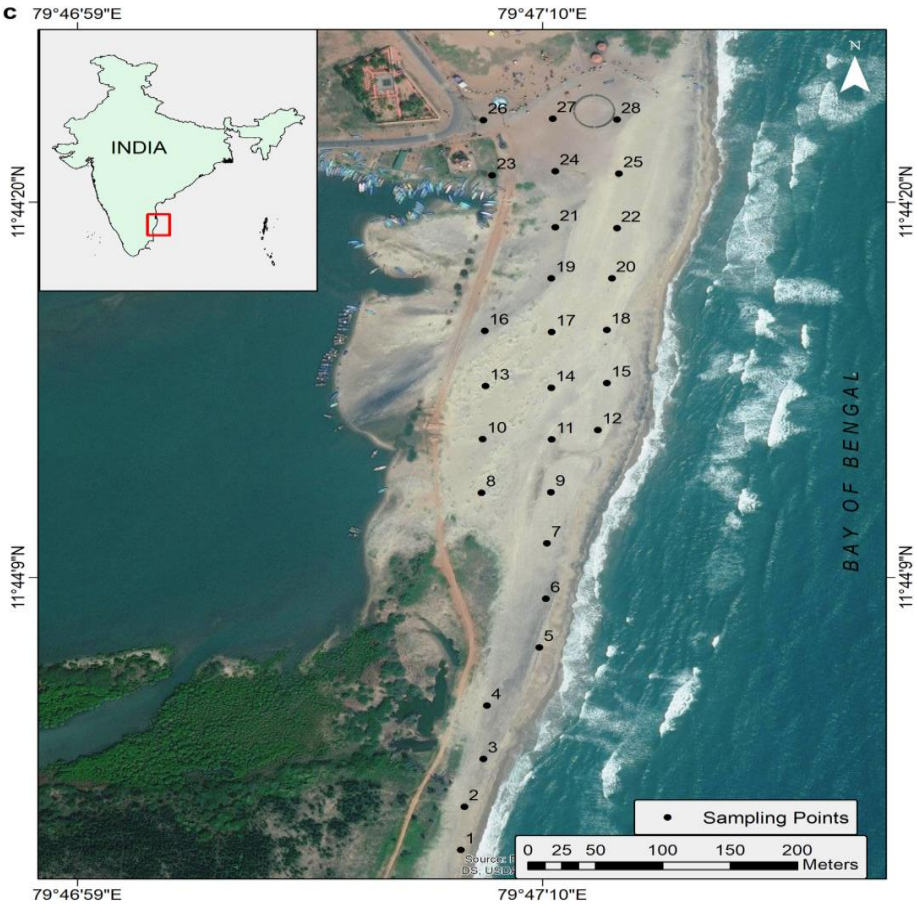
Heavy metals- new toxic danger to urban beaches

A study on the health of urbanized tourist beaches along the southeastern coastline of India has revealed that many of the popular urban beaches are now facing the threat of different environmental pollutions of which heavy metal pollution from both natural and anthropogenic sources is emerging as one of the potential threats to these beaches.

A team of researchers led by NCPOR conducted a study around three popular urban beaches, namely the Marina Beach, Edward Elliott Beach and Silver Beach, where they analyzed sediment samples for concentrations of heavy metals like iron (Fe), zinc (Zn), copper (Cu), manganese (Mn), nickel (Ni) and lead (Pb). Though the concentration level of these heavy metals were found to be under the safe limit defined by the Bureau of Indian Standards, the researchers believe that long term exposure to these heavy metals would have adverse effect on the marine biota. The research team suggested governmental intervention to strengthen and enforce stricter environmental laws to stop illegal anthropological activities to stop heavy metal intrusion into these beaches through different type of wastewater seepage.



The term "heavy metals" usually refers to naturally occurring elements with a density greater than 5.0 g cm^{-3}. Toxic heavy metals such as nickel (Ni), cadmium (Cd), mercury (Hg), lead (Pb), copper (Cu), manganese (Mn), arsenic (As), chromium (Cr), iron (Fe) and zinc (Zn) have the potential to cause serious marine ecosystem problems due to their persistent nature in the environment, toxicity and ability to enter the food chain. Even the presence of excessive amounts of essential metals/elements beyond their acceptable limit can have toxic effect interfering with the aquatic ecosystems.

When the heavy metals in water enter aquatic organisms, they are not easily decomposed and not eliminated from the bodies of the aquatic animals. They accumulate in the different organs of the aquatic animals like the liver, spleen, kidney and viscera etc. Heavy metal pollution of aquatic environment can be detrimental to human health also as people consuming contaminated sea foods would be suffering from the same ill effects of toxic heavy metals. This can lead to the damage of the multiple organs causing diseases or even death of the affected organisms.

Sediments in an aquatic environment provide foodstuff to the living organisms. The aquatic sediments with toxic heavy metal persistence results in absorbing of these heavy metals by the sediments to levels many fold higher than their concentration in aquatic environment and thus the sediments become a secondary source of marine water pollution contamination. When the benthic organisms comes in contact with them, finally these toxic elements intrude the entire benthic food chain. Therefore, eco-health of the aquatic sediments have always been considered as one of the precursors to understand pollution in aquatic ecosystem.

In the study conducted by Indian scientists at the southeastern coastline of India covering three prominent urban beaches, it was found that Ni, Co, Zn, Mn, Cu and Cd posed a lower ecological risk than Pb (Lead) at all the three locations. Pb was found to be present in the sediments with moderate level of ecological risk. In addition, scientists found that the trace amounts of metals are not sufficiently toxic to harm someone walking along the seashore, but the "accumulative stress" on the marine ecosystem cannot be ignored just because they are not in higher quantity. Their persistent presence may be an indication of industrial effluents, domestic sewage, and agricultural run-offs going into these beaches. For example, the results of the present study confirmed that arsenic (As), cadmium (Cd), copper (Cu), mercury (Hg) and zinc (Zn) are the five metals that entered the marine environment of these beaches from agricultural activity. However, other heavy metals such as nickel (Ni), chromium (Cr), and lead (Pb) found in the sediments of these beaches are primarily from industrial wastes through river mouths. Iron (Fe), manganese (Mn), and cobalt (Co) found in the beach sediments are however believed to be from natural weathering processes with mild anthropogenic influence. Use of leaded petrol and chromic anti-biofilling paints in beach environments

is believed to be mildly influencing in the increase in lead (Pb). The research authors emphasized the necessity of regular pollutant monitoring in the marine environment.

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