Bioavailability and Assessment of Heavy Metals Contamination in Surface Sediments off the Meliane River, Tunisia bay, Mediterranean Sea

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Coastal sediments were generally exposed to heavy metal pollution from urban and industrial activities, especially in river mouth. Trace metals in marine sediments may have natural and anthropogenic sources. With high geochemical availability, heavy metals easily migrate among waters, suspended matter, and sediments through many geochemical reactions between the water-sediment interfaces. Tunisia has about 1300 km of coastline on the Mediterranean Sea, which is of an important environmental, economic, and touristic value. Some of the Tunisian coastal areas, in particular in front of the large cities, receive different types of pollution sources, such as the coast Rades - Hamam lif, a part of Tunis bay, around the Meliane River, which is under the pressure of a rapidly growing population due to a major industrial concentration and port activity.

We try in this study to quantify and explain the spatial distribution of chemical fractions of metal (Pb, Cu, Cr, Zn, Ni, and Cd) in surface sediments of Rades - Hamam lif coast and to assess the degree of heavy metal pollution using different contamination indices (Igeo, CF, PLI and biological assessment of surface sediments).

The total concentration and the speciation of heavy metals (Pb, Cd, Cu, Zn, Ni, Cr) in surface sediments of Rades - Hamam Lif coast, were determined, with particular focus on the effect that urban and industrial waste in Meliane river has on the estuary and coastal surface sediments of the Rades - Hamam Lif Coast, off the Mediterranean Sea. Several geochemical indices were applied to assess the risk of contamination and the environmental risks of heavy metals on surface sediments. The total concentrations of these heavy metals are influenced by runoff, industrial, and urban wastewater. The Cd, Pb, Zn, and Ni are affected by anthropogenic sources especially at the mouth of the Meliane River. The speciation of Cd was presented dominantly in the exchangeable fraction and thus the high potential bioavailability. In contrast, Cr and Cu were mostly bound to the residual fraction indicating their low toxicity and bioavailability. The order of migration and transformation sequence was Cd > Pb > Ni > Zn > Cr > Cu and the degree of pollution was Cd > Pb > Ni > Zn > Cr > Cu.