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Acid volatile sulphide (AVS) and simultaneously extracted metals (SEM) procedure compared to attenuation model to assess heavy metal mobility in sediments from Sepetiba Bay, Rio de Janeiro, Brazil

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Sepetiba bay, located about 60 km west of the metropolitan region of Rio de Janeiro city, has undergone notable development in the last decades, with the establishment of industrial plants in its basin, which release its industrial waste either straight into the bay or through local rivers. The Sepetiba harbor also brought up a lot of industrial investment in that area. This urban and industrial expansion caused several environmental impacts, mainly due to the presence of heavy metals and other potentially toxic substances present in the effluents sent out into the bay. This work aimed to assess heavy metal (Cd, Cu, Ni, Pb e Zn) contamination in Sepetiba bay. The Σ [SEM]/ [AVS] model were applied in 65 sediment samples from Sepetiba bay, representing the whole area. The results obtained showed that Cd, Cu, Pb and Zn presented higher concentrations in the northeastern area (mainly in the mouth of Guandu and Canal de São Francisco rivers), while the highest concentration of Ni were observed in the western region of the bay. The relation

 Σ [SEM]/[AVS] was below 1 in the northeastern region, indicating that, in spite of the high concentration of the analyzed metals in this area, they are trapped in the sediment, as sulfides. The total metal concentrations in the sediments were also determined and the same distribution patterns obtained for the SEM were observed, with high concentrations in the northeastern region of the bay. Further, a geostatiscal approach is presented, the attenuation of concentrations model, which aims to estimate metal mobility in sediments. The proposed model showed the highest attenuation values for Zn, Cd, Cu and Pb in the northeastern region, indicating that the mobility of these metals is low in this region, suggesting low availability, which is in good agreement with the results obtained by the Σ [SEM]/ [AVS] model. These results indicate good possibilities of applying this model in metal contamination studies in estuarine ecosystems.

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