Sediment contamination mapping for dredging management in Sepetiba Bay, Brazil.

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Although the Brazilian coast is extensive, because of the presence of an already established infra-structure, the contaminated sediment areas are preferred for the installation of new ports and terminals. Sepetiba Bay (Rio de Janeiro - Brazil) is one of these areas, where Zn and Cd in the sediments present concentrations reaching 4,000 mg kg^{-1} and 8 mg kg^{-1}, respectively (largely above Brazilian Regulation limits). Mapping of metal concentrations and mobility should permit a rational planning of dredging activities with a minor impact in the environment. Based on previous surveys, we aimed to establish a detailed map of surface and subsurface sediment distribution of zinc and cadmium (the most important contaminants of the area) that permitted the zonation of areas that are suitable for future dredging, disposal of dredging residues, or confined disposal facilities. The aims were achieved with a thorough revision of the published works as well as Environmental Impact Assessments carried out in the Sepetiba Bay. The data was treated to be in a even format with "x" and "y" values corresponding to geographic coordinates and "zCd" or zZn corresponding to total concentrations of both metals. The data was plotted in contour maps where the legal limits of concentration were presented as curves. Contours allowed developing a model of attenuation of concentrations that roughly give the mobility of the metals within the Bay. Considering that for dredging services may attain deeper sediments, an evaluation of the concentrations in core sediments gave an idea of the zones where deeper sediments should also be surveyed. The resulting maps show that concentrations of zinc and cadmium area spread within the Sepetiba Bay, mainly on the northern portion. This high concentrations zone is where the harbours and maritime terminals are already installed, and where maintenance dredging should be carried out with environmentally friendly methods. Further installations should be avoided in these areas, but if necessary, the solution of disposal of dredging material in Underwater Confined Disposal Facilities was strongly advised. Areas with lower concentrations and rather coarse grained sediments are more suitable for the disposal of the residues in Underwater CDFs. In these areas, it is advised that the coarse sediment should be withdrawn, generating 10 to 12 meters deep holes where the contaminated sediment is to be disposed. A one meter uncontaminated sediment cap should be placed to isolate de contaminated material. The withdrawn sediment can be re-used for land filling.

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