

Development of “Sediment Washing” by Natural Organic Substances of Dredged Sediments of the Venice Lagoon, Italy

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The contamination of sediments in coastal areas and harbours is due to a wide range of organic pollutants and trace elements; in these areas sediments may be a significant sink and/or source of these pollutants. Remediation and environmental recovery of sediments are extremely important in harbour areas, considered the need to dredge sediments in order to keep channels of navigation open. The main goal of this project is to assess a novel washing procedure for dredged sediments, that is environment friendly and suitable for the variety of pollutants, by exploiting the surface-active and complexing properties of natural organic substances. Dredged sediments from the industrial area of the Venice lagoon were analysed to evaluate the concentrations of POPs and the total concentrations of several trace elements (such as Cr, Zn, Cd, As, Hg, etc.). Furthermore, we used a modified sequential extraction procedure in order to evaluate the concentration of the chemical fractions: the exchangeable, the carbonate bound, the Fe and Mn oxides bound, the sulphur and organic matter bound, the residual bound. In the second phase of this study, the washing process was assessed; different parameters were considered (such as pH, sediments/ washing solution volume ratio, length of washing, etc.). All the batch experiments were run in duplicate, to test the homogeneity and the repeatability of the procedure, by using commercially available natural organic substances (Sigma). After being washed, sediments showed an average decrease in the concentrations of organic and inorganic pollutants (40% and 30% respectively). These results are very promising, due to the holistic approach used for the different classes of pollutants. This study underlines the importance of speciation, since, according to the most recent frameworks on risk assessment, it is essential to know the bioavailability and bioaccessibility of pollutants in order to plan the most suitable remediation project.