EVALUATION OF REMEDIATION TECHNOLOGIES FOR CONTAMINATED MARINE SEDIMENTS THROUGH MULTI CRITERIA DECISION ANALYSIS

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Abstract

Remediation of contaminated marine sediments present a difficult challenge for environmental decision-makers. In socially relevant situations, as in the Mar Piccolo of Taranto case study (Southern Italy), the decision-maker needs to explain to the citizens why some remediation technologies are adopted compared to others. Multi criteria decision analysis (MCDA) is a scientifically sound decision tool for management of contaminated sites, not only to denote effective or technologically and economically feasible remediation alternatives, but also to point out the most sustainable remediation alternatives. The aim of this study was to develop and apply a MCDA approach allowing the identification of the best remediation technologies for the decontamination of contaminated marine sediments of the Mar Piccolo of Taranto, one of most polluted areas in Europe. The main methodological steps were: (i) preliminary screening of technologies potentially applicable, (ii) detailed analysis of the technologies according to several evaluation criteria, and (iii) identification of the optimum technologies by means of the construction of a composite indicator. The 13 criteria, identified based on a literature study, have been used for the assessment of the technologies; these were classified in applicability aspects ones (e.g., type of sediments and contaminants) and technological ones (e.g., residuals produced and development status). The results of the MCDA showed how the most performing technologies were (i) *in situ* remediation with amendments, (ii) vitrification and (iii) stabilization/solidification. These solutions were then validated based on the full-scale remediation technologies generally applied. The adopted approach has proved to be an excellent tool to support the decision-maker. Transparency is its strength and suggests its application in contexts similar to that of the case study.

Keywords: contaminated marine sediments, decision support system, multi criteria decision analysis, remediation technologies

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