

A methodological proposal for the ecotoxicological characterization of continental and marine sediments for recovery

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Introduction: In France, the beneficial reuse of sediments is conditioned upon a demonstration of environmental acceptability for each scenario [1]. Such evidence has to be provided in application of the methodology describe in the standard NF EN 12920+A1. Nevertheless, before the application of risk assessment methodology, the HP14 property must be measured using specific bioassays in order to check the hazardousness criteria [2]. However, sediments may have ecotoxicological impacts despite a non-hazardous classification.

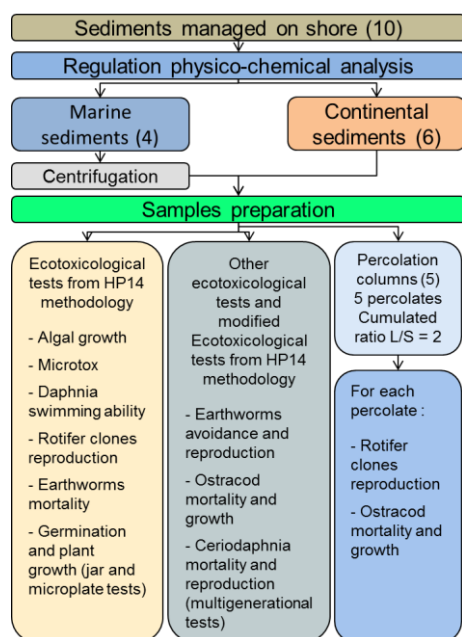


Fig. 1: Ecotoxicological approach used.

An ecotoxicological characterization of non-hazardous sediments prior to reuse scenario selection could be interesting to eliminate sediment samples displaying an ecotoxicological potential. The aim of this study is to select ecotoxicological tests which are able to detect potential ecotoxicological effects of non-dangerous sediments. In this methodological study, 4 marine sediments, 4 freshwater sediments, dam sediment and lake sediment are tested.

Methods: First, HP14 methodologies were applied on the studied sediments. These sediments had to be managed on shore according to French legislation [3]. Then, following recommendations from a

previous study [4], other ecological tests and modified ecotoxicological tests from HP14 methodology were selected. Ostracod mortality and growth test was selected as a complement because its sensitivity to sediment toxicity is known [5]. To take into account the effect of extraction method and liquid/solid ratio on ecotoxicological impact of sediments, ecotoxicological tests has been achieved on percolates. They have been obtained from up-flow percolation tests following the standard NF EN 14405. The cumulative liquid/solid ratio ranged from 0.1 to 2 according to results from a previous study [4]. For each percolates, the rotifer clones reproduction test and the ostracod mortality and growth test were performed. The general methodology of this study is summarized by a logic diagram in Fig. 1.

Results and discussion: After testing, series of biotests were proposed to detect potential ecotoxicological effects of non-hazardous sediments prior to their reuse in various fields. Although, the proposed methodology is insufficient to reflect the ecological relevance of a sediment-based material, it allows measuring more specifically potential ecotoxicity effects which could be used as an indicator for selecting sediment samples displaying relatively low ecotoxicological risks for environment.

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References: [1] Circular of 4 July 2008; [2] Mouvet (2012) BRGM report n° RP-60835; [3] Order of 9 August 2006; [4] Bazin and Vernus (2015) Final report, CD2E, PROVADEMSE; [5] Belgis et al. (2003) *Chemosphere* **52(1)**:95-10.