

Improving the dumping Octeville site monitoring in a dynamic environment (Bay of Seine, English Channel).

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Abstract :

Harbours need to maintain a sufficient water column to allow good navigation. Dredged sediment may be deposited at sea. Nevertheless, they may have different physical and chemical characteristics compared with the sediment in place which generate multiple effects on the benthic environment. Studies on the impacts of such eco-environmental disruptions are numerous and necessary. Unfortunately, no sampling schedule patterns have been proposed despite the OSPAR Convention (www.ospar.org) covering Northwest Europe, and the London Convention (<http://londonprotocol.imo.org>), neither of which impose a "uniform" design for monitoring programmes. What is the best way of measuring sediment cover around a site used for dumping to obtaining the best representation of the sediment coverage? In the eastern Bay of Seine (France), sediment management and dredging practices ("Grand Port Maritime" Rouen and Le Havre) constitute one of the main anthropic pressure and driving factors in the morphological evolution of the Seine estuary and its sedimentary hydrodynamics. This study is focused on the environment surrounding the Octeville dumping site (used by the "Grand Port Maritime du Havre"). Two sampled strategies are tested (regular grid or radial lines) to discuss of the best strategy and the necessity to collect sample replicates and their optimal number. The results show that the sampling strategy used to monitor the effects of dredged deposits on their surrounding environment can lead to different interpretations which remains problematical. It appears that sediment sample replicates may or may not necessary, depending on the studied area (offshore, coastal or dumping area), the prevailing environmental forcings before sediment sampling (flood, storm or tide) and the combination of these two factors. Concerning Octeville dumping site and when the monitoring of a dumping site implies the drawing up a sedimentological map, it is of crucial importance to use a regular grid sampling strategy. This is the only strategy that allows us to establish maps based on the currently used interpolation methods, thus, the interpolated surface-area between the sampled sites can be considered with greater confidence. The proposed *modus operandi* allows to optimize both the confidence on the obtained results and the cost of the sediment studies (sampling and laboratory analysis). These results are based on the sediment fine fraction, which is considered as a key environmental component due, for example, to its strong association with the structure of benthic faunal communities as well as its role in the build-up of pollutants.

Keywords: Dumping management, Sampling strategy, Sediment fine fraction, Sediment replicates, Geographical variability.