Dredged material disposal: does it substantially affect the ecosystem?

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To counter the degradation of marine ecosystems, a variety of legislative measurements are being developed, mainly under the umbrella of the Marine Strategy Framework Directive (MSFD). The policy behind this is to ensure that human activities are performed in a sustainable way, which means that the impact of all human activities on the marine system has to be scrutinized. Which human activities have a substantial, not sustainable effect on our marine ecosystem? To avoid a subjective debate, the sustainability of those activities has to be scientifically evaluated from an ecological and socio-economic point of view.
In this study, we illustrate a sustainability assessment of one human activity, namely 'dredge disposal' on the Belgian Part of the North Sea (BPNS). Substantial dredging activities take place in the navigation channels and harbours throughout the year (ca. 10 million tonnes dry matter per year). This dredged material is disposed at 5 designated areas, in total 16 km² or 0.44% of the BPNS surface. The disposal of dredged material may have effects on the water surface, in the water column and on the seabed (MEMG, 2003). Several studies show that the fine sediment plumes that originate from dredge disposal have a noticeable effect outside of the disposal areas (Fettweis *et al.*, 2003; 2011). The sediment plumes influence the turbidity of the water column and results in an increase of the suspended sediment concentration near the bed suggesting the formation of fluid mud layers at the site and in its neighbourhood. The size of the seabed surface that is impacted by the disposal depends on the hydrodynamic conditions and the composition of the disposed material (Van Lancker *et al.*, 2011). Chemical contaminants can be released in the water and sediment through disposal of dredged material, leading to changes in the chemical environment. For the BPNS, however, the concentrations of heavy metals, PCBs and pesticides only slightly differed between control and impact sites, with a small increase noted at 2 disposal sites (Van Hoey *et al.*, 2011). Also, the accumulation of pollutants in marine organisms at the disposal sites seems to be minimal. The disposal activity results further in habitat modifications at certain sites and smothering of the benthic life. This is most visible at the frequently used disposal site Br&W S1, where the extent of the *Abra alba* habitat is slightly reduced and the benthic diversity and abundance is lower than expected (Van Hoey *et al.*, 2011). On the other hand, the disposal activity can invoke a slight increase in benthic diversity, as observed at the disposal site Br&W S2, but also in the far field of Br&W S1. The deposition of fine sediments (silt) in a naturally more sandy area (Vlakte van de Raan) seems to favour several 'mud loving' opportunistic species.
The research at the dredge disposal sites indicates some local and neighbouring effects on the ecosystem (Lauwaert *et al.*, 2011). However, from a socio-economical point of view, it is clear that the dredging and disposal activity on the BPNS cannot be halted. By combining both views and all available information we can judge the sustainability of dredge disposal. If this approach is applied to all human activities on the BPNS, we will have made a giant step towards sustainable management of our marine ecosystem.

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