

Beach nourishment and the impact on Natura 2000

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The Belgian coastline is a dynamic environment where currents, waves and wind interact with the natural coastal defence system of beaches and dunes. In theory, the coastline should withstand a 1000 year storm event, but at its weakest links only a 100 year protection level is currently reached. In the past so-called 'hard' infrastructure (dykes, quay walls and groins) was constructed to protect the land from the impact of the sea. Pending the realization of the 'Master Plan for Coastal Safety', the weakest beaches are annually maintained with 'soft' measures, e.g. beach nourishments. Belgian beaches contain fine sand (200-250µm), whereas from a geotechnical point of view the nourished sand ideally has a grain size of at least 300µm creating more stable beaches. However, the ecological effects of beach nourishment can be directly related to changes in grain size (Speybroeck *et al.*, 2006). Impact research focuses on macrobenthos, the seafloor inhabiting benthic forms larger than one millimeter, as these organisms play a key role in the wider beach ecosystem. Locally, strong negative impact effects are expected during and immediately following nourishment since the chances of survival of the original beach fauna and flora are almost zero (Harte *et al.*, 2002; Speybroeck *et al.*, 2004). The speed and degree of ecological recovery largely depend on the physical characteristics of the beach habitat. Macrobenthic organisms tolerate only small modifications in beach slope and sediment grain size (150-300µm). In general, phased nourishment with natural sediment and beach slope during winter are recommended (Van Tomme, 2013; Vanden Eede, 2013), urging for an optimization of the technical nourishment aspects.

When considering beach nourishment in the neighbourhood of European protected sites, one must take into account the strict regulatory framework with respect to Natura 2000, which is included in the Habitats Directive (Directive 92/43/EEC). In particular, article 6, §§3-4 contains a development regime, setting out the criteria under which plans and projects with possible negative effects on Natura 2000 may or may not be allowed. A precautionary approach is required when assessing the possible effects of beach nourishment. In the Flemish Region this framework has been implemented in the Nature Conservation Decree in 2002, while the Royal Decree of 14 October 2005 contains the federal implementation for the Belgian part of the North Sea. Although the requirements of Article 6, §§3-4 of the Habitats Directive are quite straightforward, the application on beach nourishment proved to be quite burdensome the past years, partially due to the incorrect implementation of the Habitats Directive in the Flemish legislation (Schoukens *et al.*, 2007). The difficult and sometimes very incoherent application of the rules of nature conservation on beach nourishment, illustrates the need for a more coherent legal framework with an ecosystem based strategic approach, allowing for onsite mitigation and or offsite compensation.

To investigate whether intertidal beach nourishment has a significant negative impact on the global conservation status of nearby Natura 2000 areas, a fourfold assessment approach was created and followed in some Belgian case studies (IMDC, 2011; 2012).

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