

Managing sediments in the Wadden Sea and the role of the research programme BenO Wadden Sea

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Introduction:

The Wadden Sea. The largest connected tidal flat in the world with a unique ecosystem, thanks to the largely undisturbed hydro- and morphological processes that continuously (re)shape the landscape [1]. This UNESCO world heritage ecosystem is highly valued worldwide and is (jointly) protected and managed by the Netherlands, Germany and Denmark. The Wadden Sea is also of great value for its ecosystem services such as flood protection, fisheries, recreation and navigation. In the Netherlands, Rijkswaterstaat (the executive agency of the ministry of infrastructure and water management) is responsible for the management of the shipping lanes from the mainland to the islands as well as for the protection of nature [2].



Fig. 1: Area of the Wadden Sea World Heritage site (source: Common Wadden Sea Secretariat).

The dynamics of the system do not only form its key value, it is also a challenge for management as shipping lanes silt up while on the long term the tidal flats may drown due to accelerated sea level rise.

As such, Rijkswaterstaat needs a thorough understanding of the sediment system. For this reason, a small research programme on morphology and sediment management started in 2016, which now fulfills an important role. This paper highlights some of the work done over the years, and the lessons-learned for management practices.

Results: Research programme BenO Wadden Sea focuses and invests in five research pillars:

1. Bring/keep system knowledge up to date
2. Invest structurally in knowledge & tools
3. Investigate approaches to sediment management & sustainable dredging
4. Develop knowledge for nature conservation
5. Share knowledge & create common language

The abiotic dynamics of each basin is summarized for practitioners and managers, building upon existing research and data. These reports and accompanying [website](#) aid in addressing management problems (1&5). Furthermore, long-term investments in system knowledge and tools are necessary to assess future scenarios and developments, such as developing a Delft3D model and studying the role of mud and better estimating dredging volumes (2&3).

Besides this knowledge 'foundation', two pillars (3&4) focus on direct management questions. It is the interplay between the knowledge foundation and application to management problems that is of great added value. All studies of the research programme are made publicly available [here](#).

Conclusions: the BenO Wadden Sea research programme contributes to Rijkswaterstaat's management practices by having become a central point in the organization (and beyond) where knowledge is available on the complex sediment dynamics of the Wadden Sea, providing evidence-based advice for navigability and nature conservation, while also thinking ahead. We experience that it needs time and commitment to consolidate the knowledge foundation, connect to colleagues and gradually develop and improve our management practices.

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References: [1] Wadden Sea Quality Status Report-geomorphology, Oost et al. (2017) [link](#) ;[2] Natura 2000-beheerplan Waddenzee periode 2016-2022, Rijkswaterstaat, (2016), [link](#)

