The influence of the Sand Engine on the Delfland coastal cell

Roest, Lambertus W.M.

Publication date
2018

Document Version
Accepted author manuscript

Citation (APA)
Roest, L. W. M. (2018). *The influence of the Sand Engine on the Delfland coastal cell*. Abstract from NCK days 2018, Haarlem, Netherlands.

THE INFLUENCE OF THE SAND ENGINE ON THE DELFLAND COASTAL CELL

L.W.M. Roest[1]*, S. de Vries[1], M.A. de Schipper[1,2], S.G.J. Aarninkhof[1]
[1] TU Delft, Coastal Engineering, [2] Shore Monitoring and Research
* l.w.m.roest@tudelft.nl

The Sand Engine is an example of a feeder nourishment that is intended to nourish coastal systems. This strategy is based on placing sediments highly concentrated at one location, from which it is expected to spread alongshore over large distances on decadal timescales.
Here the morphological development of the Sand Engine mega feeder nourishment and the adjacent coastal sections is presented. This study is based on 37 high-resolution topographical surveys, spanning a coastal cell of 17 km alongshore. These data are explored to examine the alongshore spreading in the first five years after construction in 2011, as well as the response at different depth contours in the coastal profile.

The analysis shows that the highly concentrated nourishment supplies sediment to a stretch of coast that is several times the initial length of the nourishment, as the size of the Sand Engine peninsula increased from 2.2 to 5.8km alongshore. The plan-form shape of the peninsula is found to gradually extend alongshore, while reducing in cross-shore extent. This behaviour is found to vary strongly with depth contours. The strongest response was found around the mean sea level iso-bath in contrast to the deeper parts and Aeolian parts of the Sand Engine. This variability in response over depth results in different profile slope development in accretive and erosive areas. In coastal sections which are eroding the sub-tidal slope decreases, while accretive profiles experience a profile slope increment over time. The cross shore extent of the morphologic response shows limited morphodynamic activity below the -8m NAP depth contour and confirms earlier assessments of closure depth at this coast.

The current findings at the Sand Engine imply that mega feeder nourishments can be beneficial to the sediment budget of a larger coastal cell. However, volumes that are deposited around or below the depth of closure (around 15 % for the Sand Engine) may react on much longer time-scales than intended. Therefore, the feeding characteristics of mega feeder nourishments on time-scales of years should be assessed using the nourished volumes above the depth of closure rather than the total volume.

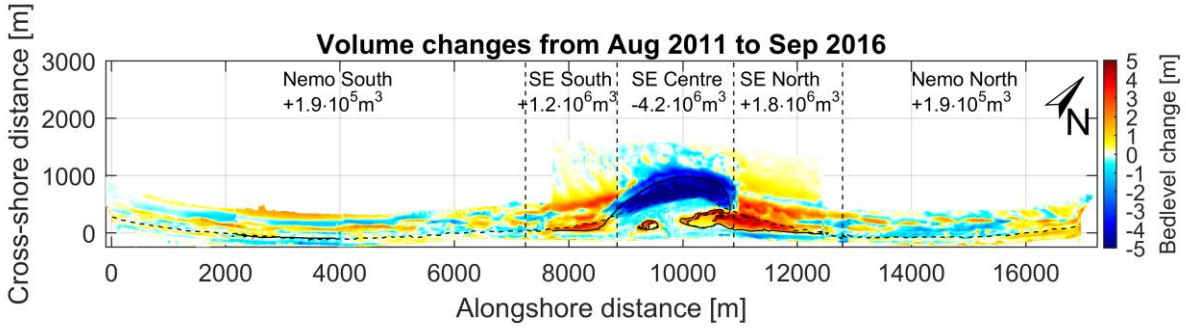

Figure 1 Volume changes in the different sub-sections of the Delfland coastal cell since 2011, Hoek van Holland to the left, Scheveningen to the right. Cold colours indicate erosion, warm colours accretion.