

REDUCING INUNDATION RISK AT BARRIER ISLANDS UNDER A RISING SEA LEVEL

Authors: Kroon A¹, Attema Y¹, Spaans L¹, Pak T¹, Leeuwen B. van¹, Giessen K. van der², Roelvink D³

¹ Svasek Hydraulics

² Wetterskip Fryslân

³ IHE Delft, Deltares

Abstract

At the Dutch Barrier Island Schiermonnikoog, the inundation risk is higher than allowed according to Dutch standards. The drafting of reinforcement plans, which aim to enhance both the present safety level and the long-term resilience of the island, started in 2022. As part of these plans, the (partial) removal of the first dune row (by creating blowouts) is under consideration in combination with a simultaneous reinforcement of the most landward dune arc with the removed sediments. The feasibility of constructing active blowouts is investigated considering the ambient morphological trends. This analysis leads to the conclusion that blowouts are most viable in the Stuifdijk, the most eastern and seaward dune row. A two-dimensional XBeach model setup is used to investigate the inundation risks of the island when constructing multiple blowouts and using the excavated sediments to reinforce the most landward dune arc (the Kooiduinen). The computations show that the system is significantly strengthened by relocating the sand from the Stuifdijk to the most landward dune arc. In this way, the short-term inundation risk is reduced without using external materials, while simultaneous construction of blowouts possibly increases the islands' resilience regarding sea level rise on the longterm. As such, these results show that (partial) removal of the first dune row by constructing blowouts can be effective at more vulnerable coastal sections if the right precautions against inundation are included in the plans.

Keywords

barrier island; dune reinforcement; blowout; XBeach 2D

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