

Modeling and Monitoring Methods to prevent Salt Water Intrusion caused by Artificial Dune Construction

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ABSTRACT

Due to climate change, countermeasures are necessary to protect coastal zones from the effects of sea level rise. One measure is the construction of high artificial dunes. This solution is more natural and flexible compared to conventional dikes. A mixture of sand and salt water is put on the beach by a hopper dredger through a floating pipeline or using the ‘rainbowing’ technique. In both cases a vast amount of sea water is deposited as well.

Hence, during construction there is a risk of salt water intrusion and short term rise of the groundwater table inland. Using a density dependent model that was calibrated on tidal fluctuations, we estimated the risks, and proposed different solutions:

- 1) Concerning the timing and progress of the construction
- 2) Remove water from the beach using a drain
- 3) Remove water from the groundwater using pumping wells

One of the surprising results was that there is less salt water intrusion when the dune is constructed at once, instead of gradually. For a specific case (an island in the Netherlands) a sensitivity analysis was done that resulted in recommendations for the monitoring of the intrusion and the compensating measures. Pumping tests will be done to obtain the parameters that were important in the sensitivity analysis. The new data will be used to improve the models, resulting in an improved design and monitoring system of the compensating measures.