HOUTRIB DIKE PILOT PROJECT
Guidelines for the management and maintenance of sandy foreshores

Abstract

Context
The stated aim of the foreshore pilot project for the Houtrib Dike was to establish a firmer basis for faster sandy dike-strengthening operations, in particular in the load conditions in the larger lakes. The results from the project have now been applied in both present and future projects covered by the Flood Protection Programme. One of those projects is the strengthening of the Markermeer dikes between Hoorn and Edam in the Netherlands, which includes a sandy reinforcement approach (the 'shore dike'). The knowledge generated by this pilot project was also used to determine the dimensions for the sandy reinforcement of the western section of the Houtrib Dike and the sandy outer edges of the Marker Wadden.

Overview of reports
In addition to the more technical basic reports, a number of guidelines were also drafted in the context of the pilot project. The guidelines for permits and construction had already been completed at an earlier stage. The final phase of the project involves the production of guidelines for Management and Maintenance, guidelines for the Design and Assessment of dike-foreshore systems and a memorandum covering the Sandy Foreshore Business Case.

This guideline document
The present report sets out guidelines for the Management and Maintenance of sandy foreshores for dikes in large non-tidal waters, an example being the new sandy reinforcement for the Houtrib Dike. This specific type of foreshore requires an approach to management and maintenance that is different from the approach for dikes with a hard revetment. The aim is to ensure that the sandy foreshore performs effectively as an element of a flood defence. Above all, this means that there must be enough sand in place to achieve the required wave reduction. The sand volume must be adequate as a buffer to offset erosion during a design storm, for example by including a wear layer and an extra storm buffer. This volume of sand can, as on coasts, be managed on the basis of the basic coastline concept, in which the level of periodical replenishment required is determined by monitoring the volume of sand in place. The management approach should also be designed to ensure that there is no drifting, particularly when a sandy foreshore is located alongside a road.

Role of vegetation and opportunities for nature
Vegetation also develops on sandy foreshores. It is found higher up on the slope, out of the reach of the waves, and near the shoreline if the wave impact is not too high. It is currently unclear to what extent it can play a role in wave reduction in design conditions on a sandy subsurface. At present, the approach to vegetation development is not geared towards wave reduction, nor are the management and maintenance of the vegetation. However, shoreline vegetation can reduce the level of maintenance required for sandy slopes by slowing down erosion and the drifting of sand.

A sandy foreshore also creates opportunities for nature and so nature is an important objective of management operations. The openings for nature development depend in part on other requirements for vegetation given the need to prevent drifting, the possible role in wave reduction and maintenance. In the case of the Houtrib Dike, drift prevention is a priority but there are no requirements for vegetation in terms of wave reduction. As a result, it is possible to introduce species-rich vegetation that can thrive on the sandy subsurface.

Coordinated management

It will be clear from all the above that management and maintenance are linked to the functions of the sandy foreshore and that the construction phase takes this factor into consideration. Because management and maintenance are not the same as for traditional dikes, open questions remain about the best approach.

In these guidelines, we describe how the management and maintenance of a sandy foreshore depends in part on the decisions made earlier in the design stage for this type of strengthening operation. For example, the profile and subsurface structure are also determined during the design stage. These can have a major impact on the morphological development of, and vegetation development on, the sandy foreshore. Accordingly, smart decisions during the design stage can be taken to anticipate the ultimate situation in the field. The approach to management and maintenance can then be developed to ensure it is appropriate for the desired situation.

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