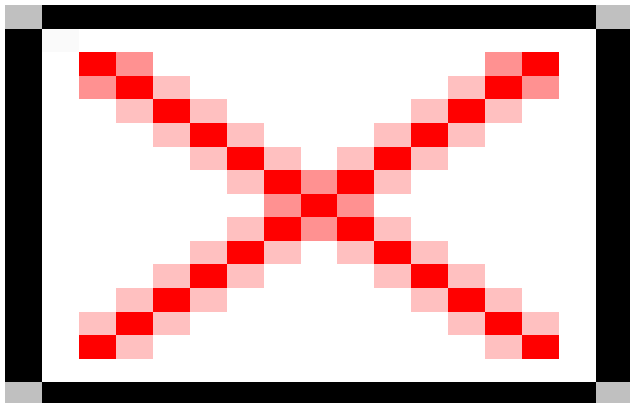


IMDC
Ground water / Ecological restoration
Environmental impact
Location:
Knokke-Heist, Belgium
Client:
Flemish Community-coastal department/Proses2010/Province of Zeeland



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Zwin - Conceptual design studies

The Zwin is a nature reserve on the Dutch- Belgian Coast. Ever since its creation during a storm flood in 1134, the inlet has been silting up, causing a reduction in the biological diversity of the area and threatening the existence of the Zwin as the inlet channel is closing off.

The main problems the area is facing now are twofold:

- Surf zone transport in an eastward direction, which is causing the migration and subsequent narrowing of the inlet channel. The tidal prism is too small compared to the longshore transport.
- Tidal asymmetry, resulting in a flood dominated tidal current. Lower outflow velocities cause a net transport into the area.

Possible solutions

In 2006 a multidisciplinary study was started to investigate the optimal and most sustainable way of preserving the Zwin nature reserve as a tidal inlet.

Several possible solutions for the preservation of the inlet have been studied. A hydrodynamic model of the area was set up; the results provided the base for the study of the morphological effects.

IMDC was responsible for the following:

- Definition of the scenarios and alternatives;
- set up and running the hydrodynamic model;
- design of the dikes , sluices and other structures;
- lay out of the new Zwin area.

Five possible basic configurations were studied, all but one of them based on an expansion of the Zwin with part of the polder located in the hinterland. In adding an additional area to the Zwin, the tidal prism will be increased, thus helping in the stabilization of the tidal inlet.

In addition to the basic configurations it was also studied how flushing, with water drained from the polders, could be used and optimized.

Model study and results

A hydrodynamic model of the area was set up using the Mike 21 software. On a number of cross sections the tidal prisms and the wet surface were calculated for the current state of the Zwin. Those were plotted against each other and the obtained relation was used to estimate the channel geometry that would be needed for the tidal prisms related to the different configurations.

Model output was used to assess the effects of the different solutions and to calculate the parameters needed for the morphological assessment of the different scenarios. Effects on long term sedimentation and morphological evolution were considered.

Design of structures

In a first phase, a preliminary design and cost calculation was carried out for all scenarios. In a later phase, the complete design for the definitive plan will also be carried out.

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