

# PREVENTING EROSION OF TIDAL FLATS: A LARGE SCALE EXPERIMENT

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The largest Dutch National Park, the Eastern Scheldt, is an inter-tidal area with a dynamic equilibrium between the tidal flats and the dimensions of the tidal channels. This dynamic equilibrium depends on the tidal range and the current velocities in the estuary. In 1987 the Eastern Scheldt Works have been completed. The Eastern Scheldt Storm Surge barrier ensures safety, but also has a downside. Soon after completion it was found that the barrier has a detrimental effect on the development of inter-tidal flats in the area. The current velocities and the tidal prism decreased and the dynamic equilibrium between the flats and the gullies has been disturbed. The disturbance induces a deficit of sediment in the gullies and causes erosion of the tidal flats. The erosion of the tidal flats results in a decrease of the areal of tidal flats of approximately 50 hectares per year. It is expected that in 2050 half of the tidal flats will be lost due to erosion and that in 2100 merely 1,500 of the present 10,000 hectares will remain.

The loss of area of inter-tidal flats has negative impacts on dike safety and nature. Dike safety is affected, because the wave attenuation effect of the shoals disappears. Nature is affected because major forage sites for protected bird species disappear. Moreover, resting and nursing places for seals disappear. Preservation of these food and resting places in the best way possible, is one of the most important Natura 2000 conservation in the Netherlands.

Preservation of the tidal areal requires tremendous nourishment quantities. The Dutch Ministry of Infrastructure and the Environment investigates, under the program 'MIRT 2010-2014 Sand Demand' alternatives for conserving the tidal flats. One of the possible alternatives is the construction of sand retaining structures at the edge of the flats which possibly reduce the erosion speed and therefore reduce the required nourishment quantities.

The erosion of tidal flats (with or without sand retaining structures) is a complex process and difficult to predict. Knowledge about effectiveness (in terms of decreasing erosion rate), constructability, lifetime and the costs of retaining structures is limited. To understand the mechanisms and effects on nature a large scale experiment is set up in the Schelphoek, a bay on the northern shore of the Eastern Scheldt. The large scale experiment comprises a surface of 13ha, which is divided into an area with replenishment only and an area including the construction of sand traps.

The main goal of the experiment is to determine whether or not the sand retaining structures are effective in decreasing the erosion rate and therefore are capable of extending the lifetime of the tidal flat. Other intended results of the experiment are to determine the time of recolonisation of benthos and the development of the shape of the tidal flat due to the sand retaining structures.



The pilot was constructed October till December 2011 and the morphological, hydraulic and ecological development has been monitored closely since. The first results of the experiment are expected soon.

The costs for conservation are high and therefore new solutions have to be found. The Schelphoek experiment is an example of a search for an effective solution for conserving nature in coastal areas in an efficient and practical manner.