



## Effects of natural oyster reefs (*Crassostrea gigas*) on the sediment balance of Oosterschelde tidal flats

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The realization of the storm surge barrier and the two secondary dams not only changed the hydrodynamics, but also the geomorphological characteristics of the Oosterschelde estuary (SW Netherlands) creating a disequilibrium between erosion and sedimentation. This has led in the last 25 years to a sand deficit in the Oosterschelde resulting in the erosion of the tidal flats (Smaal & Nienhuis, 1992; Nienhuis & Smaal 1994).

Due to these phenomena the habitat for intertidal soft-bottom benthic fauna is slowly disappearing, and with it food sources for estuarine birds that use these areas as foraging grounds (Mulder & Louters, 1994). Erosion of tidal flats also locally exposes deeper peat layers, potentially resulting in reduced water clarity and primary production (Nienhuis & Smaal 1994). Adding to these problems an increased risk of dike failures and flooding during storm surges is expected, as the dikes gradually become more exposed to wave action.

In this research the effect of oysters (*Crassostrea gigas*) as ecosystem engineers, on the sediment balance in the Oosterschelde was studied.

In our analysis we compared long term bathymetry data for transects with and without oyster reefs. Based on height differences, the transects sedimentation/erosion rates were calculated and used to determine if there was a difference between transects without oyster reefs and transects crossing oyster reefs.

From the long term analysis, the overall erosional trend of the Oosterschelde tidal flats is clear. The mean observed erosion was - 0,012 m per year. When considering the sections crossing oyster reefs, a mean accumulation of sediment of + 0,007 m per year was observed.

The results suggest that these ecosystem engineers, that cover large areas in the Oosterschelde slow down the erosion of the tidal flats in the Oosterschelde, as they act as sediment accumulators and stabilizers. We estimate at least 70000 m<sup>3</sup> of sediment per year is accreted on tidal flats due to the effect of oyster reefs. Moreover there is also potential of applying this species in artificial oyster reefs to stabilize and prevent erosion in the intertidal flats.