

A comparison study between transects crossing oyster reefs and transects on the bare sediment of tidal flats of the Oosterschelde: The effects of ecosystem engineer (*Crassostrea gigas*) in the tidal flats of the Oosterschelde basin.

After the 1953 flood, the waters in Zeeland were partially closed from tidal and fluvial influences according to the delta plan.

The storm surge barrier and secondary dams changed the hydrodynamics and geomorphological characteristics of the Oosterschelde area. This caused a disequilibrium between erosion and sedimentation.

Nowadays there is a sand deficit resulting in the erosion of the tidal flats. 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. As ecosystem engineers, the oysters can influence flow, wave action, sedimentation and erosion patterns within and around the reef.

In our analysis we compared long term bathymetry data, measured by RWS between 1987-2009, for transects with and without oyster reefs. The transects were divided in sections of 25 cm in heights from -1.75 m to -0.50 m NAP (in reference to 2002) and based on height differences 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 m³ 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.

Therefore it is possible to conclude that stimulation of natural or creation of artificial *Crassostrea gigas* reefs could potentially be used in erosional tidal systems for sediment stabilization and wave attenuation.