Marsh development in Saeftinghe and impact on storage of storm water

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The Saeftinghe marshes have developed since the 1930's from large intertidal flats to high elevated marsh. A huge amount of sediment is captured in this area and this volume is lost for water storage during storm tides. With a 2D hydrodynamic Telemac model different scenarios for the Saeftinghe area were analysed: from huge tidal flat as it was in 1931 to an intermediate situation in 1967 and the situation as it is today. The impact of the storage area today was tested by excluding the area from the model.

The model was calibrated extensively on water levels and was validated even for a storm tide. Changes in the Saeftinghe area affected water levels from Terneuzen till the sluices at Merelbeke. When Saeftinghe was excluded from the model water levels at Antwerp were 15cm higher for spring tide and 20cm for a storm tide (return period of 2,5 year). When more storage area was provided, i.e. when Saeftinghe was more like a huge intertidal flat like in 1931, water levels at Antwerp were 18cm lower for spring tide, but for storm tide the differences were smaller, only 5cm. The latter shows that, for a storm tide, the presence of the marsh as a storage area is more important than its elevation. The water level of the storm tide grows far above the marsh level so the difference in storage area at lower levels becomes less important. This shows that even old marshes can play an important role in the water level and flood risk management of the estuary.

The effect of plants on the filling of Saeftinghe was investigated using a different friction coefficient in the model for the Saeftinghe area. A Manning coefficient of 0.1 was used to mimic marsh vegetation compared to the 0.025 of the tidal flat situation. The plants slow down the filling of the area considerably. At a certain moment the water level in the main navigation channel is 40cm higher than at the marsh at the back of the Saeftinghe area near the dike. The effect however on the water levels in the navigation channel was limited.

This study clearly shows that large marsh areas like Saeftinghe not only have a great ecological function, but function also as large storage areas for storm tide water. The fixed morphology of Saeftinghe at this moment, caused by the fixation of the position of the navigation channel, prevents rejuvenation of the marsh and so extra storage area. For a storm tide the elevation of the marsh is of less importance compared to its presence. For a normal spring tide the elevation of the marsh has large effects on the water level up- and downstream of Saeftinghe.