



Sources And Pathways of Extreme Coastal Floods

- A "Pre/Post-Event" Perspective of the Storm Surge of 1962, German Bight Coast -

General Types of Failure For Sea Dikes

•Wave overtopping: high waves running up at the seaward side waves are higher than the dike



Figure 1: Wave overtopping

•Overflowing: waterlevel at the seaward side higher than the dike, water flows over the dike



Figure 2: Overflowing

•Breaching – from seaward side: due to wave impact the seaward slope is eroded, creating holes and cliffs that lead to breaching



Figure 3: Dike breaching from seaward side

•Breaching – from landward side: due to overflowing and infiltrating water the landward slope is eroded, followed by sliding of the clay cover and breaching



Figure 4: Dike breaching from landward side

(Pre) Event Conditions of Dikes

The significant failure processes during the storm surges in 1962 and 1976 were wave overtopping and overflowing that led to damage to the landward slope and regressive erosion.

Due to a high preceding tide in 1962 the dikes were already soaked when the actual event occurred. Furthermore the dikes were too low and the slope angle too steep, so that water spilling over the dike led to erosion. 70 km dike out of 560 km were destroyed and 80 km significantly damaged.

Situation on Eiderstedt Peninsula



Figure 5: Removed dunes near St. Peter Ording

During the flood event in 1962 the sea dikes between Brunsbüttel-koog and Husum were affected in an extremely hard way. Besides many other places, where people had to be evacuated, the dikes of the Köge in the north of the peninsula Eiderstedt were damaged extremely severely. The dunes in front of St. Peter Ording were partly removed.

Conclusion

Dikes alone cannot prevent storm surges from destroying the assets along a coast. A well-balanced pool of measurements is essential.

General Arrangement Plan of December 1963

In December 1963 the General Arrangement Plan for dike enhancement, dike shortening and coastal protection was proclaimed in Schleswig-Holstein.

•Dike shortening – Damming the Eider



Figure 6: Eider Barrage

The storm flood in 1962 lent urgency to a dam at the Eider river. From 1967 to 1973 the Eider barrage was erected. The Eider dam is close to the mouth of the river between Hundeknöll and Vollerwiek. Each of the five 40-m-wide openings has two radial floodgates. One for protecting the hinterland from tidal waves and one to hold back water on the river. The Eider barrier, used as a secondary coastal defence line, is a reduction of the length of the dike from 60 km to 4.8 km.

•Dike enhancement: Higher dikes with slight slope angles

•Coastal Protection: Construction of dike defence ways



Figure 7: Dike defence ways



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 Die Sturmflut vom 3. und 21. Januar 1976 an den Küsten Schleswig-Holsteins
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