

Seaward Solutions Geise Leitdamm



The Geise-Leitdamm is a 10 km long training wall (jetty) in Lower Saxony, situated southwest of Nesserland. It separates the Emders Fahrwasser from the Dollard area. As such it also hinders the transports of water and mud between both. Such walls might be effective to manage mud but have a large impact on the hydrodynamic and morphological system.

At the same time as the development of the port in Emden, the Emders Fairway (Emders Fahrwasser) has been adapted to the increased shipping. The first Geiseleitwerk for the improvement of the waterway dates from 1872-1875 and consisted of a training wall with a system of groins. This work was constructed on the Wybelsumer plate to fixate this plate. The shoal formed the western offshoot of the Geise: an intertidal flat continuing to Pogum. The works at the Geise Leitdamm were extended in order to prevent the infill of the shipping lane. With the heightening and addition of the system of groins on the Geise in the years 1896-1900, the Geiseplaat became increasingly higher. Due to these works the Emders Fairway was largely separated from the Dollard.

Research

Measurements in 1949 and 1952 showed that there was a flood surplus of approx. $6 \cdot 10^6 \text{ m}^3$ (=126-120 $\cdot 10^6 \text{ m}^3$) flowing in via the Mouth of the Dollard, whereas an ebb surplus of $6 \cdot 10^6 \text{ m}^3$ (7-13 $\cdot 10^6 \text{ m}^3$) flowed out via the Emders Fahrwasser. This is likely to have resulted in a net mud supply from the Dollard area towards the Fahrwasser.

The training wall separates the Dollard from the Emders Fairway and tides determine the exchange between the Dollard and the Ems and thus the transport of mud. At present, the Ems tidal river is characterized by very high sludge concentrations. Any tidal exchange between Emders Fahrwasser and the Dollard might likely result in a net transport of mud from the tidal river to the Dollard. As an example: around 1992 mud transport was thought to occur from the Emders Fahrwasser towards the Dollard, because the Geise-Leitdamm was damaged at several locations and thus permeable (De Jonge, 1992). Reparations have been made and gaps are absent nowadays. However, recent research indicates that mud from the Dollard is currently entering the Ems tidal river via the Geise-Leitdamm.

Discussion points

The Ems estuary is a degraded ecological system, mainly because of a strongly artificial morphology, high levels of turbidity, limited quality and quantity of estuarine habitats and local extended periods of anoxic conditions. Thus, an Integral Management Plan is being undertaken as a coordinated initiative by Germany and The Netherlands. Among others, current options focus on trapping part of the mud to lower turbidity, improve light penetration, primary production and fish migration.

Training walls might separate areas with high mud concentrations from areas with low mud concentrations. As such they might alleviate the environmental stress at some parts and heighten it at other parts. Is this a good solution to be used in estuaries? Or should compartmentalization be avoided?

Literature

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Taal, M.D.; Schmidt, C.A.; Brinkman, A.G.; Stolte, W.; Van Maren, D.S., 2015: Slib en primaire productie in het Eems-estuarium. *Een samenvatting van vier jaar meten, modelleren, kennis bundelen en verwerven* Deltares, Imares & Rijkswaterstaat report, 43 pp. Underlying reports (to be found on: <http://kennisonline.deltares.nl>):

- 1 Mud dynamics in the Het Eems estuarium, research phase 1: literature review mud and primary production
- 2 Mud dynamics in the Eems - Dollard, research phase 1: working plan phase 2 and 3
- 3 Mud dynamics in the Ems - Dollard, research phase 2: analysis existing data
- 4 Mud dynamics in the Ems- Dollard, phase 2: setup hydrodynamic models
- 5 Mud dynamics in the Eems - Dollard, phase 2: setup sediment transport models
- 6 Mud dynamics in the Ems estuary: set-up of primary production model
- 7 Mud dynamics in the Ems Estuary, phase 2: model analysis
- 8 Mud dynamics in the Ems - Dollard, phase 2: analysis soil samples
- 9 Ems -Dollard primary production research (datarapport to be found on <http://library.wur.nl/WebQuery/wurpubs/489709> en samenvattend rapport op <http://library.wur.nl/WebQuery/wurpubs/489710>)
- 10 Memo on scenario definition
- 11 Mud dynamics in the Ems- Dollard, phase 3: scenarios for improvement

Wasser- und Schiffsamt Emden & Rijkswaterstaat - directie Groningen, 1986: Duits-Nederlandse Eemscommissie; Rapport Hydrologisch Onderzoek Benedeneems en Dollard 1952 - 1985 DEEL III, 87 pp.