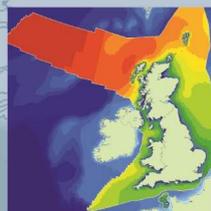
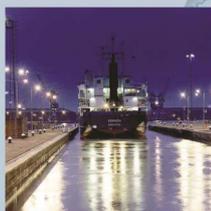


Noard-Fryslân Bûtendyks Managed Realignment Scheme (Holland)

Case Study

March 2011

Creating sustainable solutions for the marine environment



Basic Statistics

Location	Coordinates (long; lat)	Area (ha)	First Tidal Inundation Date	Years Embanked	Previous Land Use	Tidal Range
Mainland coast of Friesland (opposite Island of Ameland)	5.74507798299242; 53.336115550063	135	September 2001	84	Pasture	~1.5m

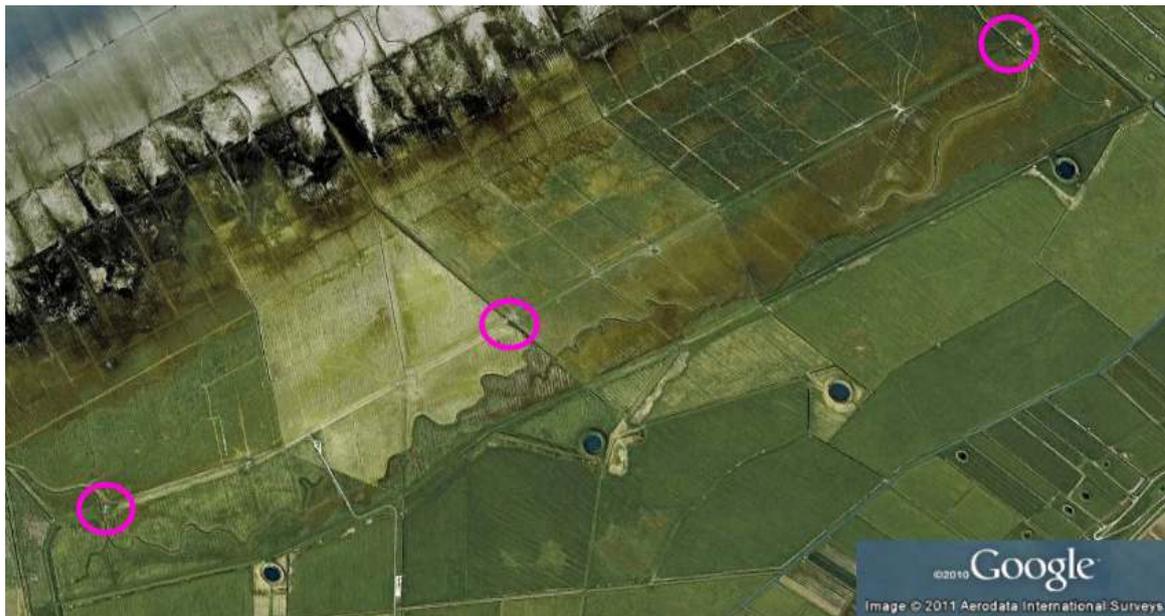


Plate 1. The managed realignment at Noard-Fryslân Bûtendyks (breaches circled in pink) - Google Earth derived aerial view

Design and Management

The 135ha Noorderleech (Noarderleech in Frisian) Polder within the 1,100ha summer polder¹ complex of Noard-Fryslân Bûtendyks was realigned by breaching the summer dike in three places (initial widths: 20-40m); and creeks were cut into those breaches (initial widths: 5-10m). The breach creeks, which were intentionally oversized, were connected with existing creeks in the fronting salt marsh. On site, artificial creeks were dug, amounting to 5km in length. The material won from this excavation was mostly used to heighten the landward summer dike to at least 3.1mNAP (NAP is the Dutch ordnance datum). A bridge was built over the westerly breach. The long site is fronted by wide extant foreland saltmarshes and mudflats, where accretion is encouraged by

¹ Summer polders are a feature of the German and Dutch Wadden Sea coasts. These pasture areas front the substantial main dikes and are protected by less substantial embankments which tend to prevent flooding from all but the most severe winter storms.

sedimentation fields. The polder was originally claimed from artificially created foreland saltmarshes.

The site is owned and managed by the NGO It Fryske Gea, who let livestock lightly graze the area.



(Taken by: S. Armstrong, ABPmer, 2006)

Plate 2. View west along old embankment and westerly breach

Promoters and Objectives

In order to implement this scheme, and buy the majority of the Noard-Fryslân Bûtendyks summer polder complex, the NGO It Fryske Gea obtained funding from the EU LIFE nature programme (some €4.5million), and match (and additional) funding from the Dutch Directorate-General for Public Works and Water Management, the Dutch Ministry of Agriculture, Nature and Food Quality and the Province of Friesland. WWF and It Fryske Gea raised €0.5million. The Dutch Ministry of Agriculture, Nature and Food Quality handled the land purchase. The objective was to transform a summer polder into a grazable saltmarsh – a semi-natural landscape with high vegetation diversity and as many (natural salt marsh) plant and animal species as possible. Most of the summer polder complex is to be realigned in stages over the 50 years or so (300ha are still in private hands, as the farmer did not want to sell). It Fryske Gea has decided on this staged approach as the summer polder complex is an important feeding ground for geese, and as a realigned polder takes a few years to develop goose-preferred vegetation; this approach will ensure relatively small amounts of feeding grounds are temporarily unavailable at any one time. The next stage, which will be implemented over the next 5 years, will amount to some 200ha (personal communication).

Funding

The Noorderleech realignment cost some €600,000 in total – €2,000 of which were spent on permits, and €20,000 on plan production. It Fryske Gea alone spent at least 5,000 man-hours on implementing the scheme.

Planning Requirements and Consultation

No details are known on the consents required; it is however known that implementation was delayed by one year due to difficulties with obtaining permits (due to objections from the local community). It Fryske Gea had to go to court to obtain the necessary permits (personal communication, It Fryske Gea).

Monitoring

An intensive monitoring programme investigated a range of factors, including salinisation, sedimentation, creek development, vegetation and birds (van Duin *et al.*, 2007).

Findings and Lessons

Van Duin *et al.* (2007) concluded that to date, the realignment had been successful, although the site was obviously still evolving. They attributed the relatively rapid success of the scheme to a number of (environmental and management) boundary conditions having been fulfilled at the same time – namely its appropriate position in the tidal frame, sediment availability, tidal exchange, drainage, closeness to target plant species, and grazing management.

Salinisation

The report firstly concluded that salinisation of the upper soil layer had been slower than expected. By the end of the monitoring period, salinity was still 30% below that of the reference saltmarsh (with increases most pronounced in the first year; plateauing in the third or following years after 'de-polderisation'). No increased saline influence could be measured in the adjoining summer polder (in some parts fresh water influence actually increased).

Accretion

Sediment accretion in the (higher) easterly part of the restoration site was greater than in the westerly part; average accretion at elevations above 1.5mNAP was 6mm/year and 14.8mm/year below, i.e. rates were higher at the lower levels. Whether this was solely due to the lower elevation or whether it was caused by other factors (e.g. a greater transport of sediment from the saltmarsh due to creek shape) was not clear. No evidence was found that the sediment accretion in the restoration site had been at the cost of adjacent saltmarshes. On the basis of the site's elevation, it was expected that saltmarsh vegetation would develop throughout the entire site. There were some localised issues with stagnated drainage resulting in infilling of the creeks or cessation of the connection with the excavated creek systems. The excavated, over-dimensioned, creeks had become shorter and shallower (due to sediment accretion), and some of the silted up sections had become colonised by pioneer species.

The accretion rates were approximately 38% lower where grazing occurred as compared to non-grazed reference areas. Other noted effects of grazing were that it led to higher biodiversity, the colonisation of sea couch (*Elytrigia atherica*); to a slightly drier, more compact and saline upper soil layer; and lastly to slight positive effects on chloride concentrations in the soil.

Vegetation

Halophytes quickly settled in the lower parts of the polder (~0.3m above MHT), whilst in the higher parts (~0.6m above MHT) changes were more gradual. In lower lying parts, salt marsh has developed well, dominated by *Suaeda maritima* and *Salicornia europea*. These pioneer species are slowly being replaced by more grassy vegetation (*Puccinellia maritima*).

Brent Geese

Autumnal geese grazing has to date been significantly lower than on existing salt marshes. In the first season following the realignment, there was however a substantial increase. The expectation is that through an increase of grassy vegetation in the polder, the number will slowly increase. The use of the farm land behind the main dike by geese stayed low, although there was a slight increase in brent geese, in line with an overall population increase (farmers had expressed fears that geese would be displaced and start grazing on their crops, due to generally lower grazing densities on saltmarshes when compared with summer polders (NB: summer polder would be classed as coastal grazing marsh in the UK)). No significant change in the breeding bird populations was observed.



(Taken by: H. de Vries, It Fryske Gea, 2007)

Plate 2. Brent Geese on site

Contacts

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