

The aftermath of a managed realignment scheme, Freiston Shore - UK

1. Policy Objective & Theme

- ADAPTATION TO RISK: Managing impacts of climate change and safeguarding resilience of coasts/coastal systems
- SUSTAINABLE USE OF RESOURCES: Preserving coastal environment (its functioning and integrity) to share space

2. Key Approaches

- Integration
- Participation
- Ecosystems based approach
- Socio-economic
- Technical

3. Experiences that can be exchanged

An example of ecosystem restoration for the purpose of coastal flood risk reduction and habitat creation by managed realignment. This is the re-positioning of an existing hard sea defence to a more landward location allowing accommodation space by the creation of inter-tidal habitat. The resultant increase in the intertidal zone has allowed increased flood water storage and wave attenuation. It was conducted in 2002.

4. Overview of the case

Freiston Shore illustrates that managed realignment can be a viable and successful strategy to adapt to the impact of sea level rise and/or increased wave action on low-lying coasts. By providing additional flood storage capacity and inter-tidal surfaces that attenuate incident wave energy, flood risk is reduced, at least in the short to medium term, after the new intertidal surface has become stabilised and vegetated.

5. Context and Objectives

a) Context

Freiston Shore is located on the east coast of England, on the Lincolnshire coast of the Wash embayment, covering 615 km² below high water. The Wash itself is the most important area in the UK for wintering and migrating waterbirds; it attracts more than 300,000 birds a year and has multiple nature conservation designations (SSSI, SPA, cSAC, Ramsar). The area surrounding Freiston Shore experiences socio-economic issues distinct from many other parts of the UK, such as a dispersed population base and over-reliance on agriculture and land-based economics. Much of the Lincolnshire coast has been previously embanked and reclaimed, so land use within this region is predominantly agricultural, with 85% of the tidal flood plain area classed as rural. Shell fisheries (cockles, mussels and oysters) do contribute to the local economy. Tourism is also a vital component of the coastal area for activities such as walking and bird watching.

Managed realignment was originally proposed at Freiston Shore due to increased rates of erosion experienced at the base of the 1,750m long sea wall. It was a focus of erosion due to its construction too far seawards, compared to the surrounding artificial shoreline making it susceptible to wave attack. To repair and maintain this flood defence over a 50yr period was estimated at £2.47million. A managed realignment option was more cost effective at £1.98million.

Some 1,100m of the remnant landward sea wall were enforced, and a new 500m cross wall built. The material for these works was sourced on site (the borrow pit was later developed into a 15ha saline lagoon). Prior to breaching the sea wall, the vegetation on the 66ha site was cut, baled and removed, field drains were infilled (as far as fill material was available) and some 1,200m of artificial creek system were dug (two channels leading from each breach). Outside the site, some 50m of the external primary creek network were deepened. Finally, three 50m wide breaches were created in the outer sea wall (with channels initially 2m wide and 1m deep). In addition, to the full coastal realignment, a smaller (15 ha) saline lagoon was created, allowing regulated sluice-controlled exchange of tidal water on the highest spring tides of the year only.

The realignment created 66 ha of saltmarsh habitat and 15 ha of saline lagoon helping to protect more than 80,000 ha of low-lying land including many villages and the town of Boston (population ca. 35,000). An environmental monitoring programme of the site, and adjacent intertidal habitats, was set up. It investigated accretion/erosion rates; vegetation colonisation, establishment and succession; invertebrate colonisation; and fish utilisation.

b) Objectives

The purpose of the managed realignment was originally focused on issues of coastal defence. However, its importance in helping to meet national and international targets for the maintenance and creation of key coastal habitats was also recognised.

6. Implementation of the ICZM Approach (i.e. management, tools, resources)

a) Management

The Department of the Environment, Food and Rural Affairs (DEFRA) has the ultimate responsibility for coastal defence and management policy. The Environment Agency (EA) was responsible for the planning, execution, and maintenance of the scheme. English Nature (now Natural England) was involved in the planning process due to the potential for damage to protected areas. The site was purchased by the Royal Society for the Protection of Birds and is now managed as one of its reserves.

b) ICZM tools

Monitoring reports concluded that in the five years after breaching the sea wall, the realignment site had accreted sediment at similar rates to those of the adjacent salt marsh at the equivalent elevation range. The pattern of natural inter-annual variations inside the realignment also matched those outside. Vegetation establishment was more rapid than in other managed realignment sites and species abundance and community types would be equivalent to those outside the site within a further 5 years. The nature of the fauna (seasonal and weather-dependent activity of mobile organisms and large variation in numbers of small species) made it difficult to make comparisons between years, or between the realignment site and the adjacent marsh, from an annual survey. However, most species found outside were recorded in the site and many species have increased in abundance. The brief annual fish surveys showed that the realignment site acts as a fish nursery habitat for several commercially important species (such as bass, sprat, and herring) which were shown to be feeding in the realignment site. The site continues to provide nursery habitat throughout the entire tidal cycle (i.e. during neap tides when the site is disconnected from the sea). Whilst overall, the site appears to be draining well, some 5.6ha are not draining after the tide has receded, with subsequent implications for sediment stability and vegetation development. In contrast to some other realignment sites, creeks in the site are developing through the agricultural soil.

The re-alignment area now supports large numbers of wintering waterbirds, several species in nationally important (i.e. > 1% of the UK population) numbers. Whilst some bird numbers increased (such as skylarks and meadow pipits), others declined. Avocets bred for the first time in South Lincolnshire on the newly created lagoon islands. Furthermore, Freiston Shore now attracts 57,000 visitors a year, compared to 11,000 before realignment) and it is estimated that the reserve supports some four full-time equivalent jobs in local businesses.

7. Cost and resources

The capital costs of £1.98 million were raised from the Environmental Agency's flood defence budget, with contributions from DEFRA and the Lincolnshire Flood Defence Committee. The RSPB spent £150,000 to purchase the realignment site, and

15ha adjacent to it. Site maintenance is funded through the income from the DEFRA Countryside Stewardship scheme (£34,500 per annum for 20 years). £400,000 was allocated for monitoring (DEFRA contributed some 45%).

8. Effectiveness (i.e. were the foreseen goals/objectives of the work reached?)

Saltmarsh formed faster than expected: just 13 months after the breach, 61-71% of the realignment area had been colonised by 11 different species of saltmarsh plants; and eight species of fish were also recorded. As a result, birds such as dark-bellied brent geese, golden plover, lapwing, dunlin and oystercatcher have all increased in numbers. Avocets have also started to breed on the newly created lagoon islands for the first time.

Visitor attraction has been estimated to bring £150,000 into the local economy as well as supporting four full time jobs in the local area. The managed realignment is providing a longer-term solution to disaster risk reduction. Re-aligning to the secondary defence line was predicted to maintain the saltmarsh strip for more than 200 years compared to 12-25 years with the previous defence line.

9. Success and Fail factors

A flexible approach and consultation with a range of non-governmental organisations and stakeholders were key to the success of the scheme. A particular issue experienced at Freiston Shore was distrust of the authorities and organisations involved in the consultation, planning and funding processes.

The successful vegetation establishment was attributed mainly to the suitable site elevations and the abundant supply of seeds and tiller fragments from the extensive external salt marsh. The realignment site has had no adverse effects on the adjacent saltmarsh. The continued monitoring of site conditions before, during, and after implementation is critical.

Many of the obstacles to the success of the managed realignment were not due to the nature of coastal hazards but were rather linked to social and economic issues e.g. the negative perception of stakeholders (landowners, local groups) and the public towards realignment. In particular, stakeholders have a perception of a defeatist attitude that is 'giving in to the sea'. There is also an element of 'feeling safer' behind a large, engineered defence structure. Sea walls, for example may be perceived as a more effective coastal defence compared to a more natural managed realignment.

10. Unforeseen outcomes

The realignment site has provided an important nursery area for 12 species of fish, including economically important species e.g. European sea bass (*Dicentrarchus labrax*) and Atlantic herring (*Clupea harengus*). The changes in intertidal morphology made the area around an oyster farm, located to the south of the site, very unstable and ultimately led to the closure of the farm. There is a lack of knowledge about the impacts of realigned coastlines on the surrounding intertidal systems.

11. Prepared by

A.H. Pickaver, Coastal & Marine Union (EUCC), The Netherlands


12. Verified by

It has not been possible to verify this case.

13. Sources

- Changes in bird use following the managed realignment at Freiston Shore RSPB Reserve, Lincolnshire, England (2006) J. Badley & R.I. Allcorn, Royal Society for the Protection of Birds, The Lodge, Sandy, Bedfordshire SG19 2GL, UK in Conservation Evidence 3, 102-105
- Managed Realignment and the Re-establishment of Saltmarsh Habitat, Freiston Shore, Lincolnshire, United Kingdom (2008) D. Friess, I. Möller and T. Spencer, Cambridge Coastal Research Unit, Cambridge University.
- www.abpmer.net



Changes in bird use following the managed realignment (31.86 KB) 



Managed realignment and the establishment of saltmarsh (519.07 KB) 