Recycling harbour dredgings for new habitat: foreshore recharge, Horsey Is. - UK

1. Policy Objective & Theme

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

2. Key Approaches

- Integration
- Socio-economic
- Technical

3. Experiences that can be exchanged

Habitat creation by foreshore recharge using dredged materials. Recharging is the placement of sediment such as sands, gravels and muds in front of existing sea defences. It can be used on its own or with other coastal flood management techniques. It is suitable at a variety of sites, on both sheltered and exposed coasts. It is appropriate where loss of foreshore is increasing risk of defence failure and where it is not economically justifiable to construct hard engineering defences at a higher cost. It is also beneficial as a technique to improve the quality of degraded habitats.

4. Overview of the case

Dredged harbour materials were used to recharge the foreshore of a defended island to give added flood protection, create new habitat and improve and reduce the cost of flood maintenance.

5. Context and Objectives

a) Context

Horsey Island, ca. 340 hectares, is located within the inlet of Hamford Water as part of the Walton backwater an embayed estuary in north Essex in the east of England. The island is strategically important to provide protection against wave action to the Backwaters, thereby reducing erosion. However, between 1925 and 1983 some 75 ha. of salt marsh and 218 ha. of foreshore have been lost from the inlets of Hamford Water. Horsey Island is nationally and internationally important, being designated as a national nature Reserve (NNR), Special protection (SPA) and a Ramsar Site, with wet (freshwater) grasslands and areas of salt marsh and muddy inter-tidal flats providing important breeding and feeding grounds for many species of birds. Farming is still practiced. Without protection, the foreshore will continue to be eroded and the wall protecting the north face of the island would be breached. As the NNR/SPA site is 2 metres below mean sea level, it would be flooded.

The scheme forms part of an overall strategy for sustainable flood defences set out by the Environment Agency to the Essex Local Flood Defence Committee in April 2000. The project area is approx. 1.5 hectares and includes foreshore recharge onto inter-tidal mudflats and degraded salt marsh. The area encompasses several different types of habitat with commercial fishing (cultivation of native oysters and small scale herring, sprat and sole). The waters are also used by recreational sailors.

b) Objectives

The aim of this project was to create an improved coastal defence which would be more economical and more sustainable. It was also the intention to increase the overall extent and quality of salt marsh habitat.

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

a) Management

The Environmental Agency were responsible for the recharging. Other partners involved were the University of East Anglia, Essex Wildlife Trust, Natural England, Harwich Haven Authority, Assoc. of British Ports MER & Queen Mary University of London.

b) ICZM tools

A cost-benefit analysis identified that the preferred option, based on financial considerations was to recharge the designated area using dredged material from the Harwich Haven Estuary.

The work was conducted in phases between 2000 and 2007. Foreshore recharging was initially done onto inter-tidal mudflats using 50,000m3 of coarser, dredged materials from the Felixstowe port development. This raised the level of the foreshore such that around 40% of the area would remain as inter-tidal mudflat while the remaining 60%, adjacent to the sea wall, would be colonised with salt marsh vegetation. This gave extra protection to the adjacent seawall and the neighbouring salt marsh from extreme wave action. In the final phase six hectares of degraded salt marsh were recharged using 150,000m3 material from annual maintenance dredgings from Harwich haven authority. These sediments are usually dredged and dumped at sea depriving the coast of a valuable sediment resource given the current net loss of marshes locally. The materials were fine muds pumped under pressure and placed at the highest tide level on degraded marsh. The innovative use of flexible piping reduced damage to existing marsh areas and allowed greater flexibility for recharging less accessible areas. . Careful monitoring pre- and post the placement of material was carried out due to the presence of local shellfisheries. Brush wood and geo-textile fences were erected across creeks to prevent migration of the deposited material away from the site into the surrounding estuary. Through careful management of the silts no wider impacts were demonstrated. Deposition of the dredged material took place at high tide twice a day, to maximise water depths to accommodate the dredger and took around 12 days to complete. The timing of the works was carried out to minimise bird disturbance. The existing salt marsh has been raised through the recharge process to help it cope with increasing sea level rise and the quality of the marsh has also greatly improved returning it to favourable condition status..

7. Cost and resources

Harwich Haven Authority contributed £169,500 in dredged materials and the Environment Agency paid for works and materials at the Sum of £77,110 which included EA retaining ownership of 200m of flexible, 410mm hose and connectors.

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

This work has improved the level of flood defence in an economically viable and environmentally sustainable manner. After only nine months, considerable salt marsh growth (Salicornia sp.) had occurred over parts of the recharged area. The abundance of the ragworm Nereis, supports a thriving sea bass fishery and bird populations. A new marsh habitat also formed behind the recharged material. Now, the erosion of the foreshore has been arrested and the wetland is being restored. Not only has new habitat been created but the flood defence maintenance costs have been reduced. The new beaches, mudflats and salt marsh created from this approach act as natural flood defences reducing tidal currents and breaking up wave activity from the North Sea. The sediments used in the recharge would otherwise have been taken out to sea and dumped. This technique is therefore important in helping to restore natural estuary sediment balance given the increased erosion of inter-tidal areas as a result of climate change and sea level rise. The Horsey Island recharge scheme is considered to be one of the most successful projects of its type carried out in the UK in terms of providing the coastal defence function for which is was designed.

9. Success and Fail factors

It was felt that the chief landowner was particularly receptive to new ideas. The fact that there is no public access was also beneficial. Cooperation with the local stakeholders – the fishers and recreational sailors – was also deemed to be important. The port were a critical partner in providing sediment and dredger. The cost of the sediments and dredger were derived from the additional cost of sailing into Hamford twice a day for 2 days in a shallow berth dredger compared to the routine dredger trips to the offshore dumping ground in a larger dredger.

10. Unforeseen outcomes

So far no unforeseen outcomes have been observed. The site is being regularly monitored. Pre- and post-monitoring surveys have shown changes to the fauna as a result of using coarser materials but these are as predicted. There has been a switch in dominance from species associated with muds to those associated with coarser material. Nereis virens has increased significantly in abundance. Pollution surveys have revealed no increase in sediment contaminant levels.

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13. Sources

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- ComCoast flood risk management schemes Final Report (2007) Rijkswaterstaat, Netherlands.
- http://www.saltmarshmanagementmanual.co.uk/Management/ManCaseStudiesIntRecharge1.htm
- http://www.cefas.co.uk/projects/determination-of-the-ecological-consequences-of-dredged-material-emplacement-(decode)/beneficial-use-of-fine-grained-maintenance-dredged-material.asp

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ComCoast - Abbottshall and Horsey Island- (789.74 KB)

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