CoastAdapt

Snapshot

Managed coastal realignment projects in the UK: 'working with nature'

Summary

One form of planned retreat is used successfully in several locations in the United Kingdom (UK). Known as 'managed realignment', this strategy aims to create space for coastal ecosystems to persist in the face of rising sea levels, generally by removing structures such as sea walls, to allow the rising waters to intrude. The benefits of this approach are that it allows coastal zones to retain their natural ecosystems and associated ecosystem services while also providing certainty to local human settlements. This case study describes three examples from the UK, highlighting their rationale, key project features and benefits.

Keywords

Managed realignment, planned retreat, flooding, UK, defences, sea walls

What is managed coastal realignment?

While planned retreat in coastal zones tends to be controversial, one type of planned retreat has been used successfully in several locations in the United Kingdom (UK) and increasingly in other countries. Known as 'managed realignment', this management strategy aims to create space for coastal ecosystems to persist in the face of rising sea levels by removing coastal defence structures to allow the rising waters to intrude (Figure 1). The benefits of this approach are that it allows coastal zones to retain their natural ecosystems and associated ecosystem services as well as providing certainty to local human settlements. It also allows redirection of resources from costly hard defences.

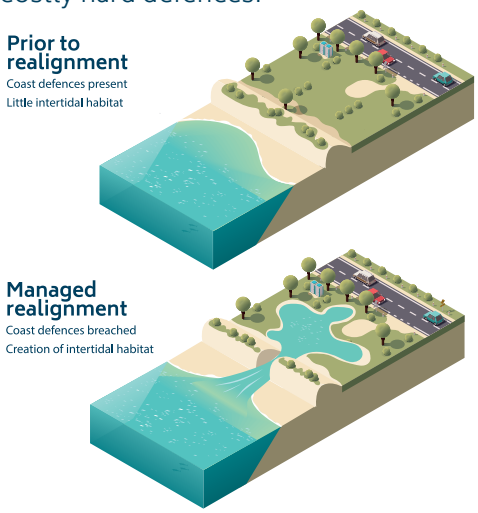

Figure 1: The process of managed realignment. Source: Adapted from ComCoast, 2006.

How does it work?

Implementing managed realignment involves a change in strategy from 'hard' to 'soft' engineering approaches and a change in thinking from 'hold the line' to let 'nature take its course'. Built defence structures, generally sea walls that may have been in place for decades, even centuries, are removed to allow the area to flood either sporadically or more permanently. These sea walls may be completely or partially removed or just allowed to be breached by the sea. Other structures may be built further inland where they provide some protection but are less exposed and so less at risk and less expensive to construct and maintain (McAlinden 2015c). Generally managed realignment is used for areas that are predominately natural ecosystems or lower density rather than high value urban zones.

The benefits for coastal ecosystems

Once the engineered structures are removed or downgraded, this enables a natural coastal ecosystem to be established which can then evolve and adjust to rising seas, acting as a buffer between the sea and settlements. Typical coastal habitats such as beaches or wetlands provide a natural barrier that can better accommodate erosion and flooding and help to dissipate wave energy (which in turn helps to reduce erosion). This approach can also help to address coastal 'squeeze' where natural ecosystems get trapped between rising waters and built up areas leaving them no room to move inland or along the shore.

The benefits for human settlements

For human settlements, managed realignment offers a more sustainable approach to flood management, giving increased certainty to urban areas. It also reduces the need for costly management of built defences that are no longer effective and require expensive fortification to persist. The resources saved in converting appropriate areas to managed realignment can be spent instead on protecting areas such as cities and ports that can't be moved in the short term.

Concerns about managed realignment

Although managed realignment has been tried in several locations since the 1980s it is a relatively recent management strategy and remains controversial. One of the critical success factors is effective stakeholder engagement. Research shows that while practitioners and researchers show strong support for this strategy, the community is more negative (Esteves 2014). People tend to assume that defensive structures offer more reliable protection and so removal of such structures raises community concern and conflict. Public opinion also depends on local context as well as who pays for managed realignment, perceived winners and losers from the strategy, and cultural values (Esteves 2014).

Although there is growing experience in, and examples of, managed realignment, this approach is still relatively new. Here we provide three examples of managed realignment projects in the UK (see Figure 2), from a pioneering case in 2002 to a more recent example in 2013. Each of these examples had multiple goals but were primarily focussed on addressing the cost of maintaining sea walls as well as increasing natural ecosystems.

Figure 2: Location of the three examples of managed realignment in the UK. Source: © NCCARF, 2017.

Example 1: Managed realignment at Abbotts Hall, Essex

The Abbotts Hall project demonstrates how managed realignment can take place alongside farming without requiring wholesale change, and can address both ecosystem and economic goals.

Rationale

In the 2000s there was growing concern amongst coastal managers in the UK about the practicality of maintaining sea wall defences. A review of salt marsh erosion in Essex identified that sea walls were not sustainable in the long term (Cooper et al. 2001). Managed realignment was subsequently pioneered in Essex including, in 2002, a site at Abbotts Hall, an area of farmland situated along a six kilometre tributary of the Blackwater Estuary. The project intended to help to restore saltmarsh habitat, which was in decline locally, as well as act as a test case for removal of built defences to address both social/economic and ecosystem goals.

The Abbotts Hall site is 287 ha of largely high-grade agricultural land that is also considered an area of international wildlife significance. The area has a rich cultural heritage as some sections of the farm are more than 1,000 years old. The site was protected by a 3.5 km stretch of sea wall built 300 to 400 years ago; the wall was ageing and required constant, costly maintenance. A cost-benefit analysis of the defence system identified that there was little economic reason to continue to maintain the sea wall. At the same time there was concern about the need to regenerate saltmarsh habitats in the region. Saltmarsh will only develop if the land to be inundated is neither too low (mudflats may develop) nor too high (it may not inundate and erosion can occur).The Abbotts Hall site was considered suitable because of its topography: the naturally sloping gradient was ideal for regeneration of saltmarsh.

This led to the design and implementation of a coastal realignment scheme which would help to regenerate habitat and create saltmarsh. The intention was to provide a soft engineering defence from flooding, with a better capacity to respond to future sea-level rise than the existing fixed, hard engineering structures. Also important for the project's instigation was the availability of funding: funds were provided by the Essex Wildlife Trust, the World Wildlife Fund (UK) and the English Heritage Lottery Fund.

Project implementation

The site was owned by the Essex Wildlife Trust, which undertook the scheme in partnership with the Environment Agency and Natural England. As part of the project, the sea defences were moved inland in order to create tidal wetlands. After detailed modelling, the defences were moved by breaching the sea wall in five places: one gap was 100 m and four gaps were 10 m wide. Other engineering works included development of feeder creeks to encourage saltmarsh to develop and construction of spur walls to protect neighbouring properties. As a result, 80 ha of arable land were restored to saltmarsh, mudflat, coastal grassland and transition habitat (Figure 3).

Important for the success of the project was the involvement of stakeholders from the very beginning of the project, particularly those groups considered to be most at risk. Stakeholders consulted included local residents, businesses, and key statutory bodies as well as anyone likely to be impacted by the planned breach in the coastline. Across the community there was considerable diversity of perspectives: from individuals' relationships with the sea, to concerns over the consultation process, to concerns over social and physical impacts of the retreat (Yozzo et al. 2000). There was considerable community concern over the project, especially given the lack of public understanding of the concepts and language of managed realignment.

Figure 3: Aerial view of Abbots Hall Farm nature reserve in Essex, site of coastal re-alignment. Photo: © Chris Gomersall Photography

Two groups had particular concerns about the impact of the potential changes in sediment flow on their businesses and lands. The West Mersea fishermen had significant oyster fisheries downstream of the site and the Royal Society for the Protection of Birds owns land on the other side of the estuary. The questions and concerns of these groups were addressed through numerical modelling which demonstrated that there would be negligible impact from the realignment scheme (McAlinden, 2015a).

Benefits

The new intertidal inundation zone forms a natural, sustainable coastal defence, and helps to reduce coastal squeeze around the region. With a land cost of £2.7 million and the managed realignment cost of £645,000, the scheme has proved to be a cost effective and sustainable solution for the needs of the area.

Example 2: Managed realignment at Medmerry, Sussex, UK

Medmerry is a nature reserve in West Sussex, England, now famous for its wetlands, birdlife and tourism. It is also the location of the most extensive managed realignment project on the open coast in Europe.

Rationale

Prior to the managed realignment project, Medmerry had long experienced coastal flooding with risks posed to two nearby towns, Selsey and Pagham. The intertidal habitat had been seriously reduced by erosion and sea-level rise and was unable to expand due to adjacent urban areas. The flood defence system was an ineffective shingle bank structure that was costly to maintain (£300,000 annually) and was regularly breached. Flooding in 2008 resulted in a damage bill of £5 million.

The project

In 2013, a realignment project was completed at a cost of £28 million, managed by the UK's Environment Agency. This included a 110 m breach of the shingle bank; this let in tidal water and led to the creation of 183 ha of new intertidal habitat. Seven kilometres of floodbank were constructed 2 km inland and formed a new low-cost flood defence system to protect the two local towns (Figure 4).

Benefits

The project promptly demonstrated its worth by protecting local communities from flooding during storms in the winter following construction. There has been a substantial change in risk to the area from a 1-in-1 year to 1-in-1,000 year risk of flooding. Protection has been provided to 348 properties, plus infrastructure such as sewage works, caravan parks and a main road. The scheme also offsets flooding in nearby high value urban areas by providing compensatory habitat.

Bringing the community along

A critical success factor for managed realignment is effective community engagement. Initially local residents were very concerned about a strategy that allowed the sea to reclaim previously protected land. Medmerry residents had concerns that the scheme would have a negative impact on the local economy (McAlinden 2015b).

A stakeholder group was set up to be a point of engagement with the community and engaged a broad cross section of community members including representatives from local authorities, parishes, businesses and residents. The group was involved in decision-making at all stages of the project, from agreeing to project objectives to designing how the new area would work to create attractions and services for tourists (e.g. access routes, viewpoints and parking infrastructure). A dedicated liaison officer was employed. Communication strategies included workshops, guided walks and public displays.

Figure 4: View of Medmerry showing the location of Selsey and features in the surrounding area. Source: © Environment Agency, UK.

Example 3: Managed realignment at Alkborough Flats, Lincolnshire

Alkborough Flats realignment scheme aimed to address urban flooding by storing water as well as creating a wildlife habitat.

Rationale

Alkborough Flats is located at the confluence of the rivers Trent and Ouse, on the south bank of the Humber Estuary. This area includes major towns and cities such as Hull, Cleethorpes and Grimsby as well as being an important wildlife habitat. There are 90,000 ha of land in the Humber area at or below the current level of the highest tides. The relative sea level in this area has been projected to rise by around 0.3 m and 1.2 m by 2050 and 2100 respectively. Any rise in sea levels would place at risk major industries, power stations, farmland, Humber Port (the country's biggest shipping complex) and the homes of 400,000 people (Maslen et al. 2011).

Frontline flood defences have existed along the estuary for many decades, including an embankment wall built in the 1950s. However, the standard of protection provided by these defences has significantly reduced over time (McAlinden 2015c). In addition, the natural habitats of the estuary are threatened by the predicted rise in sea level. A study in the area estimated that these habitats might be lost over the next 100 years as a result of sea-level rise. Therefore, the primary purpose of this scheme was to create a large capacity for water storage through managed breaches in the coastline. This would provide an opportunity to create new habitat, reduce tidal levels throughout the upper estuary and in turn delay the need to raise other flood defences.

Project implementation

The project is the largest managed realignment project on the Humber River and the fourth of these schemes created by the UK Environment Agency. It began in 1999 and was completed in 2006 at a cost of £10.2 million. The scheme features include a 20 m wide breach in the existing flood bank (Figure 5), a 1,500 m length of lowered embankment or spillway, new habitat areas, a pumping station and a new section of flood bank to protect assets (Maslen et al. 2011).

A range of stakeholders were consulted from the outset, including landowners, farmers, ramblers, parish councils and local residents. Working groups were set up to deal with specific issues. The community was kept informed through consultation events at local sites and a project newsletter posted to all householders in the three villages. One strategy that arose to address community concerns was to put in place a traffic management plan to ensure local roads were not overloaded with heavy vehicles. Similarly, the construction programme was adapted to align with farming cycles.

Figure 5: Alkborough Flats Managed Realignment — breach to the right. Source: © Environment Agency, UK.

Benefits

The scheme increases the level of flood protection to a large area near the Humber. The site's enormous capacity meant that it could reduce high tide levels in the upper estuary by as much as 150 mm. The flooding and sedimentation regimes have created a mosaic of habitats which is considerably more diverse than the surrounding mudflats (Manson and Pinnington 2012). There is now approximately 170 ha of mudflats and developing saltmarsh on the site: this new habitat will help to replace some of the mudflats and saltmarsh that will eventually be lost within the Humber estuary due to sea-level rise. The site has attracted a great many birds, particularly in winter. The scheme has also provided a new network of public footpaths, bird-watching hides and interpretation boards around the site and the local area.

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