Broad Character: Coastal Infrastructure

Character Type: Flood and Erosion Defences

Regional Perspective: Southern England

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INTRODUCTION: DEFINING/DISTINGUISHING ATTRIBUTES

Sea and flood defences are expressed in different forms at almost all the coastal settlements and other vulnerable areas along the coast of Southern England.

Sea and flood defences in the region are characteristic for protecting agricultural land and coastal settlements such as Selsey where the coastline has been receding for hundreds of years, and settlements surrounding those rivers which are prone to flooding.

Wooden groynes are common on both sandy and shingle beaches, in particular at the main tourist resorts where they serve to retain the beach, though they have been claimed as the cause of sediment starvation further along the direction of longshore drift.

Wooden groynes at Felpham (© Maritime Archaeology Ltd)

HISTORICAL PROCESSES; COMPONENTS, FEATURES AND VARIABILITY

Coastal defences frequently occur on beaches associated with residential areas. Experts have estimated that since the mid-1980s Swanage beach has narrowed by 20m. In 2005 a £2 million project aimed at protecting the beach's sea wall from erosion was given the go-ahead. The plan involves replacing aged groynes with new timber groynes along the sand and raising the level of the beach to protect the wall. It was approved as being the most cost-effective long term solution to shoring up the Swanage coastline. (news.bbc.co.uk/1/hi/england/dorset/4194414.stm)

Further east along the coast at Christchurch Harbour many types of sea defence are present. On the coast outside the harbour there are 50 groynes and 4km of sea wall which protect about £100 million of property. Seaward of the formal defences, there are c.4km of beaches, most with high amenity value and, on the defences themselves, a heavy concentration of tourist attractions, such as beach huts, cafes, sailing and bathing stations. This illustrates the economic rationale for sea defences.

Groynes installed in the 1960s along the New Forest coastal plain have helped protect the area against erosion from the easterly longshore drift (Hampshire County Council, 2010). Barton-on-Sea in Hampshire is suffering from coastal recession rates averaging 1m per year The area is heavily settled with developments perched precariously near to the erosion zone: a 1850m long frontage of continuous residential development is at risk in the next few decades, with an estimated 15 properties to be 'probably lost in the next 20 years' (www.nfdc.gov.uk).

Since the mid 20th century, beach replenishment and redistribution has taken place annually around Hayling Island which has a naturally dynamic coastline. This is managed by sea defences from groynes in the south to sea walls in the east and west. (Hampshire County Council 2010).

Certain settlements within the Southern England region are extremely vulnerable, and severely affected by coastal erosion. This is ever-present in the town of Selsey in West Sussex where the coastline has been receding for hundreds of years. In addition to the erosion at Selsey, there are many lost villages and settlements all along the Sussex coast, such as Barpham south of Angmering, Kingston Church, parts of old Middleton-on Sea and Climping (www.westsussex.info/selsey-flood-defences.shtml). The most frequently used coastal protection in the area is wooden groynes, which are supplemented by sea walls and other concrete defences to protect the back shore. According to the Environment Agency, Selsey is the most vulnerable settlement in Southern England and would be the first to suffer as a result of rising sea levels and increased storms arising from climatic change.

Wooden groynes and concrete sea defences at Climping, Sussex (© Maritime Archaeology Ltd)

The beaches of many seaside resorts (particularly along the East and West Sussex coasts) are protected by groynes. For example, at Worthing beach erosion and long-shore drift have long been dealt with by the maintenance of wooden groynes built out from the top of the beach. In recent years rock armour, in the form of huge boulders of granite (from Norway) and limestone (from the Mendips) have been added, to reduce the likelihood of erosion undercutting the coastal road in various places. Similar groynes and rock armour can be seen at Bognor Regis, Eastbourne, Littlehampton and St. Leonards.

Concrete and wooden sea defences at St Leonards (© Maritime Archaeology Ltd)

The Pevensey Bay Sea Defence scheme is the first sea defence project anywhere in the world to be funded as a Public Private Partnership (PPP/PFI) (www.pevensey-bay.co.uk/). Its sea defences are 9 km long. In 2000 there were over 150 timber groynes along the frontage, many of which were in a relatively poor state of repair. As they fail, groynes are being removed so that ultimately only ten or so will remain. The sea defences provide protection from the permanent flooding of a 50 square km area including Pevensey Bay, Normans Bay, Langley, Westham and parts of Pevensey itself. Within this area there are more than 10,000 properties, important recreational and commercial complexes, transport links (main road and railway), wetlands of international importance and two important nature reserves (Hooe Flats and Pevensey Levels). Should there be a serious breach of the sea defences then all these areas could be flooded.

In 2008, Halcrow consultants undertook a Regional Flood Risk Appraisal of South East England on behalf of the then South East Regional Assembly. Areas of high flood risk in the region include South Hampshire and Shoreham Harbour. This appraisal will be used to inform development and flood defence policy (Halcrow 2008).

In February 2010 it was announced that three flood zones in the New Forest were to benefit from a £700,000 Environment Agency project designed to protect properties near the Danes Stream, Bartley Water and Lymington River (www.bournemouthecho.co.uk).

VALUES AND PERCEPTIONS

Sea and flood defences are generally seen as essential for the preservation of settlements along the Southern England coast. The protection of property by preventing erosion and also by providing flood protection conserves economic value and provides local residents with reassurance (DEFRA, 2010). Coastal defences may also maintain or increase local tourist trade by conserving or enhancing amenity values (DEFRA, 2010).

Sea defences at Felpham (© Maritime Archaeology Ltd)

There are conflicting pressures from local residents and visitors who are in favour of sea defences as they perceive them as saving their coastline and settlements, and pressure from conservationists who say that coastal defences and their maintenance can have significant collateral effects on habitats, including loss, reduction and replacement (DEFRA, 2010).

Sea level changes or changes in coastal processes as a result of climate change may also result in coastal squeeze. This is the process by which intertidal areas, which would normally move inland in response to changed coastal processes such as sea-level rise, are prevented from doing so as a result of immovable or maintained man-made infrastructure (seawalls, embankments, roads etc). Thus intertidal areas (e.g. beaches, saltmarsh, mudflats) are lost or reduced in extent, and ultimately may lead to the complete loss of a beach (Pilkey and Dixon, 1996). Coastal defences may also lead to accelerated erosion of the inter-tidal area in front of the defences (Cooper and Pontee, 2006). Given the intensive use of these beaches for the local economy and recreation this will be an important consideration for future Shoreline Management Plans. Any

reduction in beach area may add to conflict between uses or intensify to overcrowding issues.

Beach replenishment may also have implications for the historic environment. During a replenishment project on the beaches of Poole Bay several large pieces of wood were washed ashore. It has been suggested that some of these could have come from wrecked vessels (www.poolebay.net/PhaseI/archaeology.htm). Historic environment considerations, at all scales from small individual sites to the typical character of areas, are key factors in Shoreline Management Plan Review and are covered by an English Heritage Guidance Note: www.helm.org.uk/upload/pdf/Shoreline-Management-Plan-Review.pdf.

Beach replenishment has been seen as supporting employment, including associated industries such as marine aggregate dredging and environmental consultancy and advice. Material can be deposited from vessels by 'rainbowing' or using a pipeline to pump material on to the shore. These methods reduce transport and traffic issues. Alternatively, material may be trucked on to the shore and may require mechanical spreading. One drawback may be that by mitigating and/or preventing erosion, replenishment schemes may encourage coastal development with associated environmental impacts (DEFRA, 2010).

RESEARCH, AMENITY AND EDUCATION

Sea and flood defences have been used in England for many centuries and are an integral part of the historic environment. Some of the early coastal defence systems are the focus of much historical and archaeological interest (Fulford et al 1997).

These defences provide a stimulating and relevant focus for cross-curricular educational topics, offering excellent case studies looking at relationships between the environment, landscape, coastal change and sustainability. Case study resources related to flood defence schemes are freely available online, for example from Met Office Education (www.metoffice.gov.uk/education) and the Geographical Association. (www.geography.org.uk)

The components of this Character Type could be further explored as aspects contributing strongly to regional distinctiveness, with potential for developing wider education and raising public awareness of the region's links with the sea. Regional educational studies may also usefully focus on the complex issues surrounding coastal erosion at settlements within the region such as Selsey which affect the whole community.

Specific historic features can also be affected by development works as well as by the indirect impact of the defences. Consequently, when developing future sea defences, such features are necessary considerations as well as the effects the defences are likely to have on aesthetics and historic character. Fuller discussion of this aspect can be found in the English Heritage Guidance note on Shoreline Management Plan Review and the historic environment: www.helm.org.uk/upload/pdf/Shoreline-Management-Plan-Review.pdf .

CONDITION AND FORCES FOR CHANGE

The main forces for change in the region are the dynamic relationship of the sea with man's coastal activities. This is intensified by the effects of climate change, especially flooding and coastal erosion from sea level rise, and the potential increase in intensity, severity and frequency of coastal storms and heavy rainfall (DEFRA 2006).

The investment within this sector in England and Wales has doubled over the past ten years due to the vulnerability of the coast to potential flooding and coastal erosion associated with climate change (DEFRA 2010).

The responsibility for flood and coastal erosion risk management lies with Department of the Environment, Food and Rural Affairs (DEFRA) who provides funding through grants to the Environment Agency and local authorities. The Pitt Review (carried out in 2009 following devastating flooding a few years earlier) resulted in a series of recommendations for improving the way flood risk is managed in England. Defra is now taking forward the findings of the review to improve flood defences, and prevent unnecessary building in areas of high flood risk. The Flood and Water Management Act (2010) (ww2.defra.gov.uk/environment/flooding/legislation) aims to improve the way flood risk is managed, with the first parts implemented in September2010. In November 2010 Defra launched a consultation on 'Future Funding of Flood and Coastal Erosion Risk Management in England'. The consultation formed part of a wider consultation on a National Flood and Coastal Erosion Risk Management Strategy for England being conducted by the Environment Agency. Updates on legislation, policies and consultations can be found at ww2.defra.gov.uk/environment/flooding/

RARITY AND VULNERABILITY

Investments in coastal defence have doubled over the past ten years due to concerns over climate change impacts on the coast (DEFRA 2010). Projections are that spending on coastal defences will need to double by 2080 (DEFRA 2010). The need for coastal defences is dependent on the stability of beaches and the impacts of flooding and coastal erosion on human activities along the coast. Climate change, predicted to lead to a rise in sea levels, possible increased storminess and changes to wave conditions (MCCIP 2008), may alter erosion rates, the incidence and severity of flooding events, and increased steepening of intertidal profiles, resulting in increased demand for coastal defences (DEFRA, 2010), though inevitably these will be more clearly targeted to sustainable management within available resources.

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