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COASTAL MANAGEMENT

Predicted sea level rise and higher storm surges will increase the risk of coastal erosion and flooding. In response to this challenge, flood and coastal erosion risk management is undergoing direction and policy change. This POSTnote examines past and present coastal management policy and the main issues arising for the future English coastline[i].

Background

Coastal change occurs through the action of waves, wind and tides. Soft and low lying coastlines are continually shaped by these factors, causing land to be removed and the material carried out to sea or deposited on a different part of the coast. These processes have created a diverse range of coastline environments and provided a variety of opportunities and risks for people. Coastal change poses a threat to some communities and habitats on the coast, and according to the UK Climate Projections 2009 (UKCP09, Box 1):

- climate change and natural land movements will cause rising sea levels and higher storm surge for UK coasts (POSTnote 315)
- this will increase the risk of coastal erosion and flooding.

Unless properly managed, future development pressure on the coast will further exacerbate the risks to people and property imposed by climate change.

Coastal Protection

Traditionally, coastal protection schemes have defended the coastline with 'hold the line' policies and 'hard' defences, such as sea walls and groynes. However, many of these historical and well-intentioned efforts have interrupted natural coastal processes resulting in the removal of protective sediment from the coastal zone, while also enabling development in England to take place in previously risky locations[1]. About half of England's coastline is currently protected by hard defences. However, alternative coastal management approaches focus on naturally functioning protection.

Managed Realignment

This involves the deliberate breaching of hard defences, or not renewing defences when they reach the end of their expected life, to allow the coastline to move inland. The main objectives are to create more intertidal habitats to provide a range of benefits, including buffering wave energy and reducing hard defence costs[2] (Box 2). However, managed realignment is still in an experimental phase with research showing many uncertainties in outcome. It is not fully understood how long it may take to create typical intertidal habitat that delivers the range of benefits discussed in Box 2[3]. Managed realignment can prove to be more economical than hard defences for some sites, although some research suggests that this may take at least 25 years[2]. The choice of site is important and it is generally accepted that it should take account of the economic, cultural and environmental assets affected, with appropriate consideration for social justice.

Box 1. Sea Level and Storm Surge Projections[4]

UKCP09 aims to provide UK planners and decision-makers with comprehensive and reliable information on how the climate will evolve. Key marine and coastal findings include:

- absolute sea level rise for the UK (excluding natural land movements) across the three emission scenarios (low, medium and high) is projected to be between 12 and 76cm by 2095 (compared with the 1980-1999 baseline). Taking land movements into account produces slightly larger projections.
- storm surge predictions are for only minor height increases but this does not include the changes in mean sea level.
- seasonal average and extreme waves are expected to increase in the South West of England, reduce in the North and experience little change in the southern North Sea. Changes in annual maxima are projected between -1.5m and +1m.
- a low probability, high impact scenario sea level range was developed to investigate contingency planning and limits to adaptation. Under this scenario absolute sea level rise is estimated between 93cm and 1.9m by 2100, with higher storm surge projections.

[i] Coastal management is a devolved issue

Box 2. Intertidal Habitat

Several EU Directives[5] require the loss of intertidal habitats to be compensated for by creating ones. These habitats, such as mudflat, sandflat and saltmarsh, could decline due to 'coastal squeeze' between rising sea levels and sea defences or roads, and unregulated land-use change. This increases the wave energy reaching sea walls and causes maintenance costs to escalate. Creating new intertidal habitat would:

- contribute to coastal defence by decreasing the effects of flooding and lowering maintenance costs
- provide important habitats for birds, specialised plants and commercially exploited fish and shellfish
- create recreational opportunities for walking, sailing and bird watching
- help to maintain water quality and avoid salt intrusion due to inappropriate land-use change
- act as a store for carbon dioxide and methane.

Assets at Risk

Significant economic assets are at risk in the coming decades because of coastal change, including:

- >£150 billion from coastal flooding around the UK[4], for example a 0.4m sea level rise would increase the number of properties at risk in eastern England from 270,000 to 404,000;
- £75 billion from flooding in London[4]
- £10 billion from coastal erosion across the UK[6]
- a range of goods and services provided by vulnerable coastal areas in England, including numerous natural habitats, cultural heritage sites, agricultural land and recreational opportunities.

It is predicted that future climate change could lead to even more significant losses to economic, social and environmental assets by the end of this century[6].

Current Policy Initiatives

Two key UK policy developments on coastal erosion and flooding are the:

- "Making Space for Water" (MSFW) programme[7] launched by the Department for Environment, Food and Rural Affairs (Defra) in 2005
- Draft Flood and Water Management Bill[8] which sets out the government's proposals to improve flood and coastal erosion risk management in England and Wales.

"Making Space for Water"

The MSFW programme takes on board recommendations from the 2004 Foresight Future Flooding report[6], reflecting on lessons learnt from past flood events and the likely changes to flood and coastal erosion risk in England over the next century. The programme aims to:

- implement a more integrated and risk-driven approach to manage flood and coastal erosion
- address the coastal challenges of climate change
- improve the planning guidance on development pressure, rising levels of coastal vulnerability and cost.

The MSFW programme represents a policy shift from hard defences and 'holding the line' policies to risk management. This recognises that risk can be reduced but not eliminated, and the advantages of natural protection through options such as managed realignment for some sites. These principles have been embodied in the new generation of Shoreline Management Plans (SMPs, Box 3)[9].

Draft Flood and Water Management Bill

The broad objective of the Bill is the management of water that addresses future climate change risks. It responds to key recommendations from the Pitt Review[10] and is the main means of implementing the objectives set out in the MSFW programme and an EU Directive on flood risk[11]. Together with MSFW, the Bill also aims to embody the principles of Integrated Coastal Zone Management (ICZM), a process that seeks to join up the different policies, and increase "stakeholder" influence in coastal management through effective dialogue[12]. ICZM is currently being promoted throughout the European Union.

Box 3. Shoreline Management Plans (SMPs)

SMPs are delivered by "Regional Coastal Groups"[13], in partnership with a lead authority (Environment Agency or local authority), on the basis of Defra guidance. SMPs cover 6,000km of the coast in England and Wales to assess the risks associated with current and future coastal processes and coastal development.

The first generation of SMPs (SMP1) focused mainly on historical defence practice. However, under the direction of the MSFW programme, the second generation (SMP2), due for completion by December 2010, has focused on policies that are technically feasible and work with natural processes, resulting in some coastlines no longer being defended.

The principal driver of SMPs are coastal processes, however the decision not to protect specific areas can be outweighed by other factors, such as cost-benefit analysis, requirement of new intertidal habitat (Box 2), key national infrastructure or the presence of important settlements. Changes in coastal management policies from SMP1 to SMP2 are contentious for some communities[1].

Issues

Coastal management needs to adapt to cope with coastal change and the increased risks of flooding and erosion. Through the MSFW programme the "Coastal Change Policy" has been launched. This is supported by a range of coastal adaptation activities, including:

- an £11 million Coastal Change Fund (available until March 2011) to support communities adapting to coastal change. Local authorities have been encouraged to bid to become 'Pathfinders' to pilot the fund and explore approaches for adapting to change, for example 'buy and lease back' schemes for properties at risk.
- a £5 million grant scheme aimed to help individual households to reduce flood risk and increase their resilience to flooding
- £1 million for three multi-benefit land management demonstration projects, such as showing how natural habitats can adapt alongside communities.

However, many organisations, communities and individuals hold a range of concerns and these are outlined below.

Uncertainty

It is difficult to predict how the coast will respond to management schemes, and this is further exacerbated because of the uncertainties in climate change impacts (Box 1). While sea level rise will be a major problem for the English coastline, the rate and amount of change are less clear. The risk of more frequent and intense storms due to climate change is even more uncertain.

For many coastal "stakeholders", uncertainty causes confusion, anxiety and scepticism. This can make people lose trust in coastal management policies and the science that underpins them, and look for alternative explanations[14]. Furthermore, uncertainty about future levels of (government or private) funding for flooding and coastal erosion risk management also contributes to the apprehension felt by many coastal communities.

Planning

Government and statutory organisations are being encouraged to make long-term planning decisions that fit broadly within the "principles of sustainable development". Planning for 50-100 years in the future is difficult as planners and policy makers not only do not know what will happen, but they must also take into consideration current local economic and development issues.

Integrated Coastal Planning

An integrated approach to coastal planning is key to the successful management of the coastline. An example of this approach is the Thames Estuary 2100 project outlined in Box 4. In such projects, a strategic range of responses is necessary to fully integrate social, economic and environmental aspects in coastal planning.

Box 4. Case Study: Thames Estuary 2100[4]

Rising sea level, increasing development and ageing defences mean flood risk is increasing for London and the Thames Estuary. The TE2100 project was set up by the Environment Agency to develop a flood risk management plan for London and the Thames Estuary for the next 100 years.

TE2100 aims to develop a plan to cope with the uncertainties climate change and different social and economic futures present. The plan includes decision pathways to identify various options for future flood risk management and to build-in adaptability. Future possibilities include a combination of measures including flood defences, resilient development, flood warning systems and emergency responses.

The project has already produced a set of options for the region that can be adapted to the actual rate of change experienced and then evaluated against a range of TE2100 future climate change scenarios.

The Department for Communities and Local Government (DCLG) recently produced a consultation paper setting out a planning framework for the economic and social viability of coastal communities[15]. It aims to strike a balance between economic prosperity and reducing the risks of coastal change, by restricting development in some areas. Following consultation, this new policy will supplement the current planning policy on flooding as a key component of a planning policy package on development, flooding and coastal change[15].

Integrated Coastal Governance

Management of the coast does not lie within the remit of a single authority or organisation. This can lead to confused roles and responsibilities and is particularly challenging with the recent changes in coastal policy. To address this, under the MSFW programme the Environment Agency was given the strategic overview role for coastal and flooding issues in England, to support coastal authorities, communities and other "stakeholders". Effective information transfer between local authorities, coastal groups and partnerships remains important.

Habitat and Land-Use Conflicts

Coastal land-use issues are expected to increase in the future. The requirement to compensate for loss of wetland habitat discussed in Box 2 potentially creates conflicts between freshwater and saltwater environments, and also between wetlands and valuable agricultural land and the conservation of historic sites. Food security will be a major issue for the future and experts stress a cautious approach should be taken when agricultural land is lost to compensatory habitat. Furthermore, land ownership needs to be considered with schemes such as managed realignment as it is likely that numerous landowners will be involved.

Community Impacts

Research has shown a blight effect can occur within a matter of months in communities affected by decisions about future coastal management, with house prices and investor confidence plummeting[1]. This can lead to financial hardship as well as stress related health problems. Awareness of 'blight' is essential for responsible planning. For instance, publication of the SMP (Box 3), led to blight in some areas of Norfolk. However, these plans are intended to stimulate long-term thinking on adaptation and planning.

Funding

Defra has estimated, on the basis of information from local authorities, that over the next 20 years, 200 homes are likely to be made unsafe due to coastal erosion, with a possible 2,000 more at risk. However, this estimate is highly uncertain. Financial support for coastal communities affected by erosion and flooding is a contentious subject. Although the direction of the MSFW programme is largely supported, achieving its coastal adaptation objectives will require more financial support.

The government maintains the position that under English law no-one has a statutory right to flood or coastal erosion protection and responsibility lies with the purchaser of the property. Furthermore, in the UK insurance is not available to protect property against coastal erosion. The government is currently consulting on a range of issues about how it can support coastal communities to adapt to coastal change. This includes the issue of support for people who lose their home because protective defences are no longer maintained[16]. This will consist of £4,000 being made available per property to assist with demolition and removal costs. The government favours this option because it provides some practical assistance to people who lose their homes, but does not set a long-term or costly precedent. Many stakeholders believe that this option does not reflect the scale of risk and hardship felt by communities, and until this issue is resolved, tension between communities and the government will continue.

The UK government's stance is unfavourably compared with the situation in the Netherlands (Box 5). After a severe flooding there in 1953, the independent Delta Committee was established to develop safer coastal

management standards. In recent years, where management schemes require people or businesses to move, financial assistance is available for individuals to purchase a new property.

Box 5. Strategy in the Netherlands

As part of the current 'Space for the River' Project, compensation works on the principle that after an independent valuation, the total value of the lost asset is compensated for by the project's funding.

The safety standards set by the original committee in 1953 were recently reviewed to consider climate change. Key recommendations from this recent study stated that the safety level of defences should be increased, and that under Dutch law between 1 and 1.5 billion Euro should be made available each year for the next 100 years to support flooding and erosion defence costs.

Netherlands and UK circumstances are clearly different, with significantly more Dutch assets at risk from sea level rise and flooding. However, the approach adopted in the Netherlands could inform an alternative UK strategy for combating future coastal erosion and flooding risk.

Public Acceptance of Adaptation

People in coastal communities hold strong views about how their surroundings should be managed and this can create a significant barrier to dealing with or adapting to change. For coastal adaptation to be successful in the long-term, consideration of public views and a responsive decision-making process is very important. Recent government policy consultations are an initial step in this process, but there also needs to be public agreement and acceptance by those who live or work in an area of concern. This will be key to the development of adaptable and resilient coastal zones that can offer new opportunities for leisure, nature conservation and economic activities.

Communication and Public Engagement

Underpinning all of the issues is the need for effective "stakeholder" engagement, communication and awareness-raising, to help communicate the scientific uncertainty about, and the justification for, adaptation to coastal change. Currently there is concern among coastal "stakeholders" that communities are not being properly informed, although some suggest it is difficult to engage individuals until they perceive their direct interests are affected.

Cost Benefit Analysis and Rural Communities

As noted in Box 3, cost benefit analysis is one of the main tools used in assessing which coastal areas will be protected. "Stakeholders" including coastal community groups object to the economic valuation of environmental and cultural assets to trade off the costs and benefits of their loss, as they believe that the loss of these assets is fundamentally unacceptable. They thus suggest this valuation system is inherently biased against rural communities. Social justice in decision-making is frequently mentioned by academics and practitioners who state that rural communities must be fairly treated as they are both at the forefront of the impacts on the coast and also bear the financial and emotional costs of change.

Overview

- Sea level rise and higher storm surges are expected to impact on many coastal regions in the UK because of future climate change.
- This will increase flood and coastal erosion risk for people, property, infrastructure and important habitats.
- Hard coastal defences increase risks to assets by interrupting natural coastal processes, adding to overall vulnerability and enabling development in high risk areas.
- Defra has implemented a national strategic approach to flood and coastal erosion risk management in England that has moved from hard defences to an adaptive and integrated management framework for the coast.
- There is broad agreement with the direction of this programme, though the issue of adaptation is still contested, and some experts and coastal "stakeholders" are concerned about the effects it may have on coastal communities.

Endnotes

[1] Nicholson-Cole, S. et al. *Coastal Governance in Transition: A Case Study of Adaptation to Coastal Change in North Norfolk, UK* (in press).

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[3] K. Turner, University of East Anglia, *pers. comm.*

[4] UK Climate Projections 2009, *Marine and Coastal Projections.* http://ukclimateprojections.defra.gov.uk/content/view/825/518/

[5] Council Directives 92/43/EEC, The Conservation of Natural Habitats and of Wild Fauna and Flora, and 79/409/EEC, The Conservation of Wild Birds.

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[7] Defra, 2005. *Making Space For Water: Taking Forward a New Government Strategy for Flood and Coastal Erosion Risk Management in England.*

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[16] http://www.defra.gov.uk/corporate/consult/coastal-change/index.htm

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