
‘Dealing With Risk and Uncertainty in Coastal Environments’

**A one-day workshop
Cambridge, Wednesday 22nd March 2000**

PROCEEDINGS

CoastNET



The Coastal
N E T W O R K



Cambridge Coastal Research Unit

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1. Aims and Objectives

The future of our coast is highly uncertain: the dynamics of this unpredictable environment are not well known and future environmental, social and political changes are poorly predicted. While sea levels are rising and parts of the East Anglian coast (such as Happisburgh in Norfolk), for example, are eroding at a rate of several meters per year, other areas of the coast (such as the saltmarshes and some beaches of North Norfolk) are areas of sediment deposition. Unless we understand what drives these natural processes at both the local and regional scales and unless we learn to communicate and deal with the risks and uncertainties of coastal dynamics in the process, our efforts to plan and manage sustainable coastal development have little chance of succeeding.

Many of the social and economic problems caused by coastal hazards such as erosion or flooding result from a lack of communication between scientists, conservationists, engineers, planners, and local residents. The purpose of the meeting at Cambridge, organised by CoastNET and the Cambridge Coastal Research Unit (CCRU), was to ensure that knowledge is shared by a wide range of interested parties so that decision making and planning at the coast has a greater chance of leading to sustainable long-term solutions.

The workshop was attended by almost 50 delegates and provided a unique opportunity to re-establish communication channels between individual coastal stakeholders. The meeting focused on the ways in which scientists, engineers, coastal managers, and conservationists have been, and are dealing with risk and uncertainty on the East Anglian coast. Issues addressed in the keynote papers ranged from the current understanding of the southern North Sea and the expected impact of global environmental change to changing approaches to coastal management and policy development.

Case study workshops were held with the aim to illustrate the challenges of dealing with risk and uncertainty in the fields of coastal ‘Strategic Planning’ (example of Jaywick, Essex), ‘Nature Conservation’ (example of Brancaster, Norfolk), ‘Engineering and Natural Processes’ (example of Happisburgh, Norfolk), and ‘Industry and Infrastructure’ (example of Queen Elizabeth Dock Reclamation, Hull).

In particular, the workshop aimed to:

- Illustrate the main problems associated with decision-making at the coast in the face of the uncertain future evolution of the shoreline and of relevant socio-political forces.
- Give scientists, engineers, coastal managers, and conservationists the opportunity to share experiences of how they have been, and are dealing with risk and uncertainty on the East Anglian coast.
- Provide a background to the wave, tide, and sediment transport environment of the southern North Sea and the expected impact of global environmental change on the changing approaches to coastal management and the development of policy.
- Use the case study discussions to illustrate the challenges of dealing with risk and uncertainty in the fields of coastal ‘Strategic Planning’, ‘Nature Conservation’, ‘Engineering and Natural Processes’, and ‘Industry and Infrastructure’.

- Report through a plenary session and an issues paper (available to all delegates after the meeting)
- Consider key coastal issues from a range of different perspectives, enabling delegates to reassess their own approach to dealing with risk on the coast



2. CoastNET – the coastal network

CoastNET is a membership body linking together individuals and organisations involved in practical coastal management in the UK. Established in 1995 and funded by the Countryside Commission, English Nature and Scottish Natural Heritage it provides an active, forward-looking network dedicated to servicing the needs of coastal field staff. With over 400 members and affiliates and over 3000 individual contacts it represents the largest pool of practical experience in coastal management in the UK. CoastNET aims to: provide opportunities for coastal field staff and managers on the coast of the UK to network effectively; improve the ways in which the UK's coastal heritage is managed; and ensure that the practical experience of coastal managers and field staff contributes to the formulation of UK coastal zone policy.

Further information can be found at <http://csweb.bournemouth.ac.uk/consci/coastnet>

3. The Cambridge Coastal Research Unit



The CCRU carries out fundamental research on coastal, estuarine and near-shore processes, landforms and ecosystems; environmental monitoring in the coastal zone; and research consultancy for both governmental and non-governmental agencies. In addition, the Unit is actively involved in facilitating and promoting multi-disciplinary research into all aspects of shallow water marine science by bringing together natural and social scientists in Cambridge University and other governmental and non-governmental research institutions.

Further information can be found at <http://www.geog.cam.ac.uk/ccru/CCRU.html>

4. Presented Papers

4.1 Southern North Sea dynamics and future projections

John M. Huthnance

CCMS Proudman Oceanographic Laboratory

The North Sea has an area of 575,300 km² and contains a water volume of 40,300 km³. Its depth increases northwards from 20-40 m in the Southern Bight south of 54°N to 100 m near 58°N. Important features are the Norwegian Trench (maximum depth 700 m), many sandbanks rising to within 10 m of the surface in the Southern Bight, and Dogger Bank in 1-4°E/54-55°N rising to within 20 m of the surface.

Analysed meteorological data are available from meteorological centres. 50-year extreme winds (hourly mean) decrease southwards and inshore from 40 m/s in the north to about 32 m/s in Dover Strait.

Tides are predominantly semi-diurnal and progress anti-clockwise around the North Sea with (mean spring) range up to 5 m off the Humber-Wash, in Dover Strait and the German Bight. Tides cause the largest currents in many places, generally exceeding 0.5 m/s south of 54°N and exceeding 1.2 m/s locally off East Anglia and in Dover Strait. Models of tidal constituents are accurate to about 5%.

Average and extreme wave heights generally decrease southwards and inshore from over 16 m (50-year extreme significant wave height) in the north to less than 8 m (~ 1 m median) in Dover Strait.

Extreme (50-year) storm surge elevations are estimated at 0.7 m in the north to 4 m in the German Bight. Corresponding currents are generally 0.4-0.6 m/s, but locally exceed 1 m/s over Dogger Bank and in Dover Strait.

There is summer stratification in temperature north or offshore of 40 m depth, approximately. The water is generally coldest in February (7° in the north to below 3°C average in the German Bight) and has warmest surface temperatures in August (13° in the north-west to 18°C average in the German Bight). Interannual variability is typically 20% (maximum 50%), ie. 1°C or more in summer and winter.

Salinity decreases slightly from the Channel and North Atlantic inflows (> 35) to ~ 34.7 in the central North Sea and as low as 30 surface salinity along the continental coast from the Rhine northwards.

Circulation is generally cyclonic, with inflows about 1.7 Sv total from the north (Fair Isle current 0.2-0.4, 0.2-0.6 east of Shetland, 0.7-1.1 Sv along the west side of the Norwegian Trench) and 0.1 Sv through Dover Strait which is important to the continental coast. (1 Sv = 10⁶m³s⁻¹).

Most of the North Sea bed is sandy with gravel patches; several areas of mud include the Norwegian Trench and south-east / east of Dogger Bank. Sand-waves extend offshore from Holland. Currents in the Southern Bight are strong enough to move sand; storms (especially waves) are effective at raising material into suspension. There is a general west-to-east transport of suspended material across the southern North Sea.

Estimation of conditions or probabilities for design (decadal time scales, involving sea-level rise, land movement, climate, morphology) and forecasting (days, involving tides, surges, waves) are discussed.

For the 20th century, the estimated observed sea-level rise (minimum, central, maximum values, mm/year) is (1.0, 1.8, 2.5). Observations and models are not significantly different. The sum of estimated contributions to sea-level rise in the next century is in the range (0.20 m, 0.86 m) with a best estimate 0.49 m.

Sea-level trends (relative to land) at UK tide gauges range from -1.1 mm/y (Lerwick) to over 2 mm/y (Sheerness). They vary primarily because of land movements.

GPS and absolute gravity can provide useful independent monitoring of vertical land movements on the basis of accuracy ~ 0.01 m over an interval of 10 years.

There are small but not statistically significant trends in non-tidal sea-level variability. Modelled extreme levels in the North Sea, based on climate model scenarios with present and doubled CO₂, show some increase for doubled CO₂, but these increases are not clearly beyond present climate variability.

Increases in maximum annual significant wave height, as much as 0.05-0.10 m/y north of the North Sea, are consistent with longer-term natural variability. Trends in typical wave heights are less.

Reliable estimates of long return periods for extremes require a few years of observations. Models can contribute to these estimates.

Raised sea level with a given surge “climate” implies a rise in extreme levels and overtopping with increased probability. More calculations are merited combining updated estimates of sea-level rise, land movements, trends in tidal range, surge and wave statistics, based on climate-changed meteorology.

Typical root-mean-square errors in the operational surge model forecast are 0.08-0.15 m.

Waves are forecast routinely. Coastal predictions need specific data, models and bathymetry.

More study of wave interactions with tide and surge is merited, for extremes and forecast models.

Integration from better knowledge of sediment dynamics to morphological prediction remains a challenge.

4.2 Risk Quantification and Risk-Adjusted Valuation in the Coastal Zone

Robert Muir-Wood

Risk Management Solutions Ltd

Risk Quantification, as required for the flood insurance market, provides a means to determine the 'technical price' for property risk, and within catastrophe modelling, an environment for optimising risk diversification. Property risk has a direct impact on property value. Transparency in 'Risk-Adjusted Valuation' provides the means to encourage rational, market-driven economic decision-making in coastal zone management.

Coastal Flood Catastrophe Modelling

The scientific basis for solving the 'insurance problem' can be provided by building a stochastic catastrophe simulation model, in which a large population of potential flood events are simulated, each of which is associated with an annual rate of occurrence and which collectively sample the 'universe' of possible floods. Of all the various types of problems tackled by catastrophe modelling (such as modelling loss for hurricanes and earthquakes) storm-surge is one of the most complex (and difficult), because of the human intervention, in the form of sea-defences, between the event (the surge) and its consequences (the flood).

In 1998 scientists and engineers at Risk Management Solutions developed a storm-surge flood catastrophe simulation model for the UK East Coast flood plains. This model is linked to a pre-existing RMS European Windstorm stochastic model with around 17,500 stochastic windstorm events. The model takes surges generated in the western North Sea and includes the non-linear interaction with the tides to arrive at a total of around 2000 surge events characterised by the envelope of extreme water-levels along the coast. Vulnerability curves were developed for the different coastal defences, relative to their type, materials of construction and sill-elevation with respect to the extreme water-height of the surge plus tide and the associated wave exposure. A stratified simulation of potential defence breaches was undertaken to preserve the maximum diversity in flood outcomes. In most locations along the UK North Sea coast the 4-6m tidal range modulates the 2-3m surge and consequently the flood itself is relatively short lived (2-4 hours) within which time there is little chance for water-levels to equilibrate far inland. Transgression was time-stepped across a high-resolution Digital Elevation Model and flood depth output in each full postcode unit.

At the end of this process, for each stochastic flood event, a flood loss was output to each specific building (and contents). Based on the sum of the individual flood losses, each multiplied by their respective rate of occurrence, the 'average annualised loss' for flooding was obtained for that property at that location (also known as the 'technical premium' or 'expected loss').

Risk Adjusted Valuation

The technical premium is the theoretical unloaded insurance cost for the risk. However risk also affects the technical 'Risk-Adjusted Value' of a property. Two examples are provided

here of the application of risk-economics for a) property subject to flood risk and b) property at risk from rapid coastal erosion.

a) Flood-Plain Pricing

A property that would have a value of £100,000, if it had no flood risk, has a fully loaded (i.e. technical premium plus costs) flood insurance premium of £500 per year. (The annualised 'distress cost' of flooding is assessed at a further £500 per year.) To achieve economic equivalence, the owner of this property will need to pay £1000 less a year in borrowing costs than for a comparable home out of the flood plain. For a (notional!) mortgage rate of 5%, the house would therefore have a Risk Adjusted Value of £80,000: 20% less than if there was no flood risk.

Once this Risk-Adjusted Value is understood, it becomes the means to motivate flood protection schemes. A complete flood defence that reduced all significant risk of flooding, would restore the Risk-Adjusted Values of all the properties in a flood plain. If the cumulative appreciation in Risk-Adjusted Valuation for all affected properties is greater than the cost of the flood defences it would be worth all these homeowners taking out a second mortgage to fund the scheme.

b) Cliff-Edge Pricing

Consider a situation where a cliff is undergoing rapid erosion and annual retreat. If the erosion-rate is consistent, then a cliff-top property is implicitly owned on a 'erosional-leasehold' until such time as it should be deemed unsafe for further habitation. With no potential for compensation, the actual 'Risk-Adjusted Value' would reflect the classic leaseholder's value depreciation.

If the owners of these properties wanted to restore the 'Equivalent Risk-Free Value', they could collectively fund a coastal protection scheme. If it could be afforded out of borrowing against the value appreciation consequent on its completion such a scheme need cost them nothing. (The risk adjusted appreciation may not be quite as substantial as it might at first appear as a coastal protection scheme typically only has a temporary effect in resisting erosion.)

Conclusions

Inevitably it is politically unacceptable to the government or the local council to be the first to reveal the degree to which certain property locations are intrinsically devalued by risk. However once this information is revealed (ideally by some reliable independent agency), then it will be up to the mechanisms of the market to determine the most appropriate mitigation response. Of course the risk economics market is not going to sort out problems such as the potential loss of life in flooding, or the way in which an overall coastline needs to be managed holistically. However, whenever a property-owner on an eroding cliff, or in a floodplain, argues successfully that the government or a local authority should fund coastal protection, they are effectively being presented with a windfall appreciation in value at the expense of other tax-payers.

4.3 Public understanding and the building of trust

Peter JS Jones¹ and Darren Bhattachary²

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This paper aims to explore some of the complexities involved with the public understanding and the building of trust in decision-making processes for shoreline management. In the first part, drawing on illustrations from the local and national press, a range of public concerns relating to coastal defence are highlighted. These broad concerns are related to the threats posed to coastal resources by climate change, particularly the loss of farm land, houses/settlements, nature conservation sites and tourism/recreational areas, as well as the risks to major coastal installations such as nuclear power stations. A significant issue in this respect is the socio-cultural assumption, based on a deep rooted fear of flooding by the sea and recent disasters such as the east coast flood of 1953, that we are at war with the sea and that managed retreat would be defeatist. Attention is focused on the complex and multi-layered way that these concerns and their related values are articulated. Reflecting this range of competing values and priorities, it is unsurprising that public concerns are often framed as conflicting, both between each other and more broadly in relation to policy makers. Such tensions are of particular significance in relation to long-term strategic coastal planning within a short-term political horizon.

It is argued that decision-making processes within such arenas are fundamentally dependent upon trust. Rather than attempting to view shoreline management planning as a discreet set of issues to be overcome through the application of either science, or increased information, or monetary compensation; it should be viewed as a dynamic social process. Through this lens, a deficit model of public understanding is refuted and attention is focused more on the circulation of meanings within a decision process over time. In particular, participatory approaches to shoreline management are advocated. Such processes are believed to promote the responsiveness of all parties to each others concerns, to broaden the range of thinking upon the relevant issues, and to increase the purchase power of the decision so that it may be implemented with the minimum of conflict.

Drawing on a case study of the consultation process for the Cley-Kelling shoreline management scheme in North Norfolk, the difficulty of constructively involving the public in decision making within a traditional consultation framework is highlighted. The development of a participatory approach to management in response to some of these concerns was illustrated. The authors argue that the development of trust within these arenas is critical for their success in providing a basis for institutional and public concerns to be addressed and deliberated upon, and for negotiated outcomes which balance short and long-term priorities. This development may be augmented through processes of local knowledge, communication, social capital, deliberation, time, the scales between statutory requirement and voluntary relationships, and social learning. Within such approaches, the complexity of management across a variety of spatial and temporal scales may be more adequately dealt with within policy processes.

5. Case Studies

5.1 Industry & Infrastructure: Queen Elizabeth Dock Reclamation, Hull

5.1.1 Background information

Dr Sally Banham

ABP Research and Consultancy Ltd.

In 1989, ABP obtained Parliamentary Powers for the development of three riverside berths to respond to predicted increases in trade, changes in ship design and operating practice. A crucial aspect of these developments was the availability of sufficient land for the marshalling of trailers and other cargo and a proposal was put together to reclaim an area of intertidal land at Queen Elizabeth (QE) Dock in Hull. An application was made under the Food and Environmental Protection Act (FEPA) for a licence to construct a chalk bund and reclaim the area behind the bund. An application for DETR consent under Section 34 of the Coast Protection Act 1949 was also made.

The FEPA licence was initially granted by MAFF in September 1994, but was withdrawn by MAFF some two weeks later, having taken account of further representations from English Nature relating to the Wild Birds Directive (79/409/EC). RSPB also cited Directive 85/337/EC as requiring an EA if the proposal could have a significant environmental effect because of its size, nature or location. These representations also coincided with the need to take account of the Conservation (Natural Habitats & c.) Regulations 1994 (Habitats Regulations), as the area in question was adjacent to the Humber Flats, Marshes and Coast Special Protection Area (SPA).

There followed more than four years of consultation during which an Environmental Statement was completed, along with several studies evaluating cumulative impact and culminating in the purchase of an area of farmland at Kilnsea to be set aside for nature conservation. At the end of this time nearly all those involved were suffering from consultation fatigue! Work finally commenced on the Queen Elizabeth reclamation scheme in May 1999.

Main Uncertainties and Risks

During this time, the main uncertainties revolved around the issue of cumulative effects and our knowledge of bird behaviour and potential effects on geomorphology. There were also uncertainties related to the mechanism for attaching conditions to the development which stretched beyond the validity of the FEPA licence, such as those related to monitoring and management of land set aside for nature conservation.

The main risks from ABP's point of view were that the development would not go ahead due to changing economic circumstances or loss of potential customers due to unacceptable delays. The solution put forward following discussions with Yorkshire Wildlife Trust and English Nature, was to add a fourth project specifically related to nature conservation, to the three being promoted at the time by ABP, namely the QE, the Humber International Terminal (HIT) and Quay 2005 schemes. The purchase of the Kilnsea land in

September 1997 was intended to offset concerns related to potential, but unsubstantiated effects on the SPA. MAFF took the view following the drawn out discussions that provided a Regulation 16 agreement between ABP and English Nature was made prior to work commencing they would issue the FEPA licence for this scheme and the HIT scheme. The Regulation 16 agreement was subsequently completed in December 1998.

Evaluation of Solution

There is no doubt that the fact that this project came at the beginning of the implementation of the Habitats Regulations on top of an already complicated legislative framework did not help the consents process run smoothly. It does serve to show, however, that relatively small projects can generate large costs and be subject to long delays without commensurate gain to the environment. Valuable lessons have undoubtedly been learnt and it is hoped that those organisations concerned (including ABP) and other regulatory bodies will take those lessons on board. There is little doubt that an urgent review of regulatory procedures is required, particularly where multiple consents are concerned.

Relevant Issues

- The area of the proposed development is adjacent to the Humber Flats, Marshes and Coast Special Protection Area (SPA) and Ramsar site. Therefore, a judgement of the significance of the proposal and if necessary an appropriate assessment of the impacts of the development on the integrity of the SPA is required.
- The proposed development needs several consents and licences including Food and Environmental Protection Act licence from MAFF and Coast Protection Act consent from DETR.
- There are several competent authorities involved including DETR, MAFF and ABP. English Nature is the statutory nature conservation body.
- Several schemes are being promoted by a number of developers in the region. Cumulative effects to be considered.
- New Legislation is introduced during the preparation of the Environmental Statement. Environmental Assessment Directive (9711/EC)
- There are changes in the representatives from each of the organisations involved and organisational structure and policy. NRA becomes Environment Agency. DETR formed from Department of Transport and Department of Environment.

Uncertainties

- Whether the cumulative effects issue would be resolved.
- Mechanism for attaching conditions to the scheme to apply beyond the validity of the FEPA licence e.g. monitoring schemes and management of land set aside for nature conservation.

Risks

- The development would not go ahead due to changing economic circumstances or loss of potential customers due to delays.
- Land would not be available to put aside for nature conservation.
- Objectives for the SPA had not been written and could alter criteria; SPA condition could change during negotiations; SPA designation could be altered after agreement but before commencement of works; natural variation could cause change in bird populations

Key Questions/Problems

- It took almost 5 years for the consents required for this development to be determined. Was the cost and delay commensurate with the environmental gain?
- Is there a transparent way to ensure that the consultation process is co-ordinated and does not become drawn out?
- Should there be a Lead Competent Authority appointed at an early stage in the consents process to avoid duplication of effort when considering the Habitats Regulations? Alternatively, should the *developer* be given the authority to drive the consents process forward?
- Is strategic planning on an estuary wide basis an answer to the cumulative effects problem? Does the opportunity under the Habitat Regulations to set up a Single Scheme of Management for European sites offer a way forward?
- Can mitigation be provided in advance of need to minimise potential impacts on the SPA from future development proposals?
- How do we accommodate sea level rise?

The Way Ahead?

- Simplification of consents procedures in the coastal zone
- Clear well-documented decision making supported by clear scientific advice from English Nature i.e. is the proposal likely to be significant or not? Does the proposal affect integrity or not? Documented appropriate assessments?
- How to consider long term sustainability against predicted sea level rise
- Single Scheme of Management for the Humber
- Ports Strategy for the Humber to form component part of the Single Scheme of Management

Summary – Historic Milestones

Date	Milestone
July 1994	ABP propose a reclamation at Queen Elizabeth Dock in Hull. Application made to MAFF for a FEPA licence and DETR for Coast Protection Act consent
September 1994	FEPA licence granted following discussion with English Nature
October 1994	Conservation (Natural Habitats &c.) Regulations come into force
October 1994	FEPA licence withdrawn following further representations from EN and RSPB relating to need for environmental assessment
February 1995	Meeting of Competent Authorities to discuss scope of the assessment required under the Habitats Regulations
March 1995	Environmental Assessment commissioned to address issues raised
November 1995	Draft ES completed by ERM. Sent out for informal consultation
During 1996	ABP promoting QE, Immingham Riverside Developments and Quay 2000 schemes. Cumulative effects issue raised.
November 1996	ES completed by ERM
Early 1997	English Nature still have concerns over cumulative effects. Additional combined effects study to be carried out
March 1997	Modelling study completed by ABP Research. Joint statement by ABP Research and EN setting out conclusion that the three ABP schemes would only have a localised impact on tidal flow regime.
March 1997	Yorkshire Water commission their own cumulative impacts study (Waste Water Treatment Works, ABP schemes, Environment Agency flood defences and Entergy power station proposal)
Summer 1997	English Nature still have concerns over cumulative effects
September 1997	ABP purchase land at Kilnsea for nature conservation
Late 1997	English Nature require a mechanism to attach conditions agreed. MAFF do not view FEPA as the right mechanism. Regulation 16 of Habitats Regulations offers solution.
January 1998	MAFF issue FEPA licence. Regulation 16 agreement required.
March 1998	Regulation 16 agreement tabled.
August 1998	Details of monitoring schemes worked out.
December 1998	Regulation 16 agreement signed
January 1999	CPA licence outstanding. DETR take view that advertisement needed.
March 1999	English Nature document their opinion that the proposed reclamation is not likely to have a significant effect on the SPA.
March 1999	Application for CPA consent advertised in Hull Daily Mail along with invitation to view the completed Environmental Statement
April 1999	No objections received and CPA licence granted
May 1999	Work commences includes briefing on site for contractors setting out code of practice and agreed mitigation measures.

Papers are available on request setting out the complete Hull Case Study.

5.1.2 Summary of Workshop Discussion

Discussion recorded by: James Brown

Summarised by: Frank Thomalla

This case study demonstrates the complexity of the legislative framework and its implications for the consents process in the coastal zone. In order to obtain the necessary consents for the proposed reclamation at Queen Elizabeth Dock it took almost 5 years. This was in part due to the large number of stakeholders, each with different interests and goals, the recent implementation of the Habitats Directive and a number of uncertainties, such as how to deal with cumulative effects, our understanding of bird behaviour, geomorphology and responses to sea level rise.

The delay resulted in increased costs, long drawn out discussions and considerable effort to co-ordinate the responses to various consultees. This experience raised the question whether the cost and delay was commensurate with the environmental gain and highlights the need for effective and co-ordinated decision making to avoid developers becoming frustrated by the whole process and less likely to engage in constructive dialogue.

It seems apparent that a review of the regulatory procedures is required in order to better co-ordinate the consultation process, but the question is how can this be achieved? It is evident that a simplification of procedures is necessary and there may be scope, where more than one Competent Authority are involved, to appoint a leading authority at an early stage in the consents process and thus avoid duplication of effort. MAFF and DETR have gone some way towards this goal by reviewing existing mechanisms for processing FEPA licences and Coast Protection Act consents and considering closer co-ordination to avoid duplicate consultation when determining such applications.

Another potential solution discussed involves giving the developers themselves the authority to drive the consents process forward by drawing up a consents certificate which identifies the necessary consents at an early stage. This would allow the developer to inform Competent Authorities of the various consenting regimes which apply in each case and thus agree the extent of their consultation surrounding consents needed from other Competent Authorities. Other important points made identified the need for clear, well-documented decision making and scientific advice and thus for the resources to be made available to allow this to happen.

Key stakeholders range from Competent Authorities (e.g. MAFF, DETR), English Nature, NGOs (RSPB, Wildlife Trusts) and the general public to developers themselves and consultants. These stakeholders have differing motivations when responding to requests for their views and in taking account of such representations difficult decisions are sometimes required which can lead to delay while the arguments are considered.

In any environmental assessment there is a degree of judgement exercised and there remain gaps in our knowledge both in the prediction of natural processes and their future evolution. This uncertainty is inherent in our predictions of how climate change will affect the coastline. There are large scientific uncertainties in the prediction of sea level rise and the occurrence of extreme flood and erosion events and a risk-based approach may be a solution here. This is perhaps best summed up by a view that was expressed at the

workshop; science won't provide the whole solution. There will always be uncertainty and political pressures. What is needed therefore, is a balance to achieve effective and sensible decision making with the mechanisms and tools in place to give decision-makers the confidence and resources to make such difficult decisions.

Dealing with risk as part of the consents process against the backdrop of constantly changing natural and human circumstances was a recurring theme. For ABP, the main areas of risk were changing economic circumstances, loss of potential customers and delay, the introduction of new legislation, changes in criteria for assessment, personnel and institutional reorganisation. Identifying suitable land to link to the scheme for nature conservation purposes was fortuitous and there was always a risk that such land would not be available at the right time. Strategic planning on an estuary wide basis would offer a solution here and ABP have drawn up a strategy for the Humber that adopts such an approach while considering their development aspirations over the next 20-25 years.

The current consents process tends to focus on considering possible mitigation on a case by case basis and there is no mechanism for offering mitigation in advance of need. Strategic planning on an estuary wide basis may also provide a consistent framework when considering what mitigation is appropriate and possible and to take into account cumulative effects. Single Schemes of Management for European Sites, such as the Humber SPA, introduced by the Conservation (Natural Habitats &c.) Regulations may offer a framework for providing high quality mitigation. This framework could be developed into a mitigation banking system such as that already in place in the United States and thus provide an incentive for developers to be more proactive in their support for habitat creation and restoration schemes.

The issue of cumulative effects is still a challenge, particularly where several schemes are being promoted by a number of developers in the region possibly over differing time-scales and there are many as yet unanswered questions on which guidance is urgently needed. Currently the effects of a development are usually considered only locally rather than in the context of sustainable development. These effects may include far reaching benefits, particularly where the transport chain is intimately linked with the development.

Together the solutions considered here offer the potential to begin to tackle the very real difficulties that need to be addressed to achieve sustainable development in the coastal zone.

5.2 Nature Conservation: Brancaster, North Norfolk

5.2.1 Background Information

Mark Dixon
Environment Agency

The Problem

Recent erosion of the northern sandy foreshore has led to erosion of the armoured northern flank (due to sea-level rise and increased wave action) at Brancaster beach, North Norfolk. The fronting foreshore is designated as a SAC, the grazing marsh & golf course is designated as a SPA.

The infrastructure that is being threatened by erosion includes the golf club house, access road, and public footpath (N. Norfolk Coast Route) and the ‘Stakeholders’ include the Royal West Norfolk Golf Club, the tourism industry, National Trust, RSPB, English Nature, local landowners, the Parish Council, and MAFF (funding control).

Key Issues in the Decision-making Process

- Integrity of SPA and SAC sites (Natura 2000 Agenda)
- Illegal to prevent SAC from migrating landward or to allow SPA to become inter-tidal
- Environment Agency has to ensure economic viability, environmental acceptability and sustainability (50 years)
- Risk and uncertainty assessment is based on Environment Assessment. This can be subjective.
- Local socio-economic pressures need to be considered
- North Norfolk Council will not permit impact of large amounts of material on east road
- Separate Environmental Assessment needed for any excavation to win material within the site
- Poor quality soil within the site
- No access to site April to mid-August (English Nature restrictions)
- Public or contractors must not be put at any risk of injury (CDM Regulations)
- Navigation Rights to port of Brancaster have legal protection
- Hydrodynamic assessment demonstrates that the need for managed realignment is compatible with the SMP
- Environmental Assessment concludes that there would be a significant impact if the retreat option was adopted

Available Options

‘Do nothing’	illegal under Habitats Directive
‘Improve/maintain defence’	illegal under Habitats Directive uneconomic under MAFF regulations preferred by local interest groups
‘Full Realignment’	illegal under Habitats Directive cheapest to construct most expensive if SPA to be replaced preferred by coastal process experts
‘Partial Retreat’	Preferred by conservationists acceptable to local interest and coastal process groups lowest environmental perceived risk

Preferred Option

- Realigned new sea wall 300m landward
- Removal of 300m of existing wall, egress via piped creek
- Maintain eastern sea wall to protect built assets and access to Golf club house for surge tide situations
- Remove gabions and reprofile northern flank
- Excavate new reed bed landward of new retreat wall (winning area for spoil to construct new wall)

Key Discussion Points for Workshop

- A more holistic view is required (what is conservation gain/loss when impacted by natural coastal processes?)
- Is there a basic philosophical problem with the Natura 2000 Agenda?
- A wider geographical view may be required when considering coastal environmental impacts / risks
- Should greater importance be given to coastal hydrodynamics?
- Local interest groups and human uses **MUST** be considered (risk of public backlash against conservation)

5.2.2 Summary of Workshop Discussion

**Discussion recorded by: Sarah Damery
Summarised by: Frank Thomalla**

The main point made was that risk and uncertainty assessments are based on environmental appraisals. These can be subjective and have to be treated with caution. There was some concern amongst several members of the group regarding the interpretation of these appraisals by individuals outside English Nature, MAFF or the Environment Agency.

The second main point is a legal issue. The Habitats Directive has not been tested legally in the European court. The legal implications of the destruction of conservation areas by natural processes rather than through man-induced processes are unclear. Related to this are the problems associated with the Natura 2000 Agenda. It was suggested that there may be a basic philosophical problem with this agenda as it is based on the idea of ‘freezing’ in some kind of legislation the type and amount of habitat we are under legal obligation to preserve. How do we know now what the coast needs in ten years time? There is no overall consensus of opinion of what action should be taken when sea level rise is impacting on conservation areas. In terms of the replacement of lost habitat, where do gains have to be created in order to compensate for loss adequately? With this in mind it seems a more holistic view is required to solve these issues in the long-term. Associated with this is the issue of compensation: if private individuals are being asked to sacrifice their land for the greater good of society there must be a mechanism for providing an adequate compensatory mitigation payment of some sort. Even though there are mechanisms available at the moment, their implementation is bureaucratic.

The third aspect related to socio-economic considerations. It was felt that the exclusion of non-monetary items was inappropriate in the quest for a sustainable coastline. Socio-economic considerations must be supported by local people, and it is important to take into account values such as local culture, as the Jaywick case study demonstrates. It was acknowledged that this is controversial, though, and it might be difficult to reach a consensus on this matter.

The overlapping legislative framework currently in place was seen as another problem. Contradictory laws exist on public safety, public access and navigation rights, which employees of the Environment Agency have to comply with from within. It is important to recognise that the law needs to evolve with the developing coastline. A major uncertainty is the prediction of what will happen with the coast in the future (e.g. the next 50 years). However, this is precisely what the Environment Agency is asked to do. There must be a realisation that with the best will in the world and with the best science we have our predictions of the coastline do have a great deal of uncertainty associated with them and there are gaps in our knowledge. The question arises at this point whether a greater importance should be given to monitoring and assessing coastal hydrodynamics. This seems to be mainly a matter of lack of funding or a lack of integration of funding.

Within Europe, 60% of the gross national product of Europe is in agricultural support and money is not really an issue. But when we are looking at, e.g. replacing a freshwater wetland habitat at Brancaster, funding becomes a greater issue. There are mechanisms other than the MAFF or Environment Agency schemes which could perhaps facilitate such a scheme, but there is no integration of funds. All these various budgets being spent on the coast are not integrated and there is a great requirement for governments to realise that such integration is needed.

Finally, there is a lack of integration between organisations as well as a lack of balanced views across the whole country. Despite this unsatisfactory situation, calls for one coastal authority for the UK, which embraces CEFAS, MAFF, the Environment Agency and all other organisations involved in shoreline management have been rejected several times. Judging by the media's coverage of this topic, it appears that it is rejected mainly because of sectarian infighting between the main players themselves, including MAFF, DETR, English Nature, etc.

5.3 Coastal Processes: Happisburgh, North Norfolk

Mr P. Frew

North Norfolk District Council

5.3.1 Introduction and Background

The population of Happisburgh on the North East Norfolk coast is approximately 600. The village core dates back to medieval times and is located a few hundred meters inland from the shore. The more recent (early 20th century) cliff top chalet development, however, is under direct threat from damage through cliff erosion. The development is located on ca. 10 metre high cliffs composed of soft glacial sands, silts and clays overlying stiffer clays, grading into sand only to the South. The foreshore is composed of highly volatile sand overlying clay with a sand bar located 150 – 200 metre offshore. Nearshore net sediment movement is in a south-easterly direction.

Sea Defence History

1959/60	Construction of timber revetment and 90metre long steel groynes at 200 metre spacing
1965	Revetment breached over 60 metres. Reconstructed with longer piles
1968	Groynes reconstructed 45 metre long at 100 metre spacing
1980's	Reconstruction of timber revetment
1989	Council resolves to renew defences
1991	Revetment damaged and 300 metres of planking removed for safety reasons
1992	Halcrow £1.75million design for rock bund to protect developed section of coast. Four objections received
1995	Further design prepared for whole frontage. Failed to meet economic criteria
1995	Revetment structure demolished for safety reasons
1995	Second £4.5million scheme prepared covering the whole frontage. Does not meet economic criteria. Not advertised
1996	A further 400 metres of revetment lost through storm damage
1996	Halcrow prepare third £4million design option. Not accepted by MAFF even though it meets criteria. Objection from English Nature – reducing sediment input. Objection from Lord of the Manor – not doing enough
1997-2000	Remaining timber revetment maintained as far as practicable

Management and Political History

1990	NNDC Management Strategy published. Happisburgh third highest priority
1996	Visit to site by Minister, Tim Boswell
1996	Shoreline management Plan adopted. Policy is Hold the Line
1998	Visit to site by Minister, Elliot Morley
1998	Visit to site by House of Commons Agriculture Select Committee
1999	NNDC initiate study to review policy and management strategy

5.3.2 Summary of Workshop Discussion

Discussion recorded and summarised by: Hennie Schans

Coastal Processes

There is a lack of knowledge of coastal processes. The average erosion rate is 1m/yr. However, the erosion over the last 4 years was about 60m. How do we deal with this variability of dynamic coasts with respect to shoreline management and planning? In addition, the function of the cliffs in the wider system needs to be accessed. If the cliffs were allowed to erode there would be more sediment available for downdrift beaches. At the moment these beaches suffer from a lack of sediment. Furthermore, the function of the offshore sand bar about 200m offshore is unclear at the moment. Historic records only illustrate part of the problem. Erosion rates of the past do not in themselves enable future predictions to be made. Especially because the effect of recent human interference on the system is unclear.

Cost-benefit

The schemes proposed by the North Norfolk District Council have not met the MAFF cost-benefit criteria. There are several problems with the cost-benefit analysis as it stands at the moment. Firstly, there are uncertainties about the landward boundary of the coastal zone involved. Should the landward boundary be the 60-year line¹? This implies that the area behind the 60-year line is not at risk, which is not the case. Secondly, there are different ways in which to value property. Is property valued at its actual price (the price the owner would get if it was to sell its property today) or at the price without the problem (the price of a similar property without the threat of the sea). At the moment houses are valued according to the latter. Thirdly, it is unclear how to cost the value of nature. For example, at the moment the loss of sediment supply into the coastal system by defending the cliffs is not taken into account. Should it be? Finally, how should the potential and/or long-term risks be accounted for? In the case of Happisburgh the possible long-term risk to the Broads was not allowed to be incorporated in the cost-benefit analysis. Do we need to wait for the moment when the cliffs have eroded that far inland so the cost-benefit criteria will finally be met? Preferably not, and it may make more sense to put a soft defence scheme in place now instead of constructing a hard defence scheme when cost benefit criteria are met.

Possible Solutions

An important issue that has to be kept in mind is that the North Norfolk District Council is forced to look for solutions for both short-term and long-term problems. It is difficult to combine these two aims in one policy.

¹ The '60-year line' or the 'red line' is a line that indicates the boundary between land at risk from coastal erosion within the next 60 years. It is used as a tool both to make people aware of risk and to make decision with respect to shoreline management.

Compensation

Compensation was an issue discussed in every group. The general feeling was that there should be a way to compensate, although the practicalities are difficult. It does not seem right that there is a cost-benefit analysis in place without the ability to compensate. The cost-benefit analysis should be used as a tool to decide whether to pay for the defence scheme or to provide money for compensation. In the Happisburgh case, paying compensation to householders on the cliff top would cost about 50% of the cost of defending the cliffs. But at the moment the money allocated to sea defences can not be used to compensate people. Although the cost of compensation could be seen as part of the cost of the 'do nothing' or 'retreat the line' policy options. Equally, the cost of sea defence schemes could be interpreted as the cost of the 'hold the line' policy options. In some cases, 'do nothing' and 'retreat the line' options would be cheaper than the 'hold the line' option. There are 6 or 7 cases known in which some sort of compensation is paid under the habitat scheme (the so-called stewardships). The problems associated with determining levels of compensation are very much the same as those related to the costing of several elements in the cost-benefit analysis. The question remains as to whether an equitable method of compensation exist.

Land-use Planning Policy

The land-use planning policy should be tailored to the erosion problem. This policy should not allow people to settle on cliff tops or even seaward of the 60-year line without making them aware and accept the risk of doing so. At the moment the land-use planning policy will not allow any new settlements on the cliff top. But the problem has arisen over a period of time. The cliff top chalets were meant to be temporary buildings, or at least temporarily occupied. Some of the chalets are now permanently occupied. So where there was not a problem at the start, there is one now. A similar problem exists with the caravan site on the cliff top. Is relocation of the caravan park a solution? If so, should the relocation be gradual or immediate? What would be the economic impact? Should there be national guidelines in these cases?

Information and Education

Part of the solution needs to come from making people aware of the risk. Risk maps showing the risk of coastal erosion similar to existing flood risk maps should be developed. Living on the coast includes risk, but do we need to accept that risk? It was suggested that the 60-year line chosen by the District Council is not a good tool to make people aware of the risk. The 60-year line implies that property landward of this line is not at risk. Besides, the trust in the policy chosen by the District Council is not increased by the lack of MAFF funding.

Conclusions

A range of issues and problems were discussed in the workshops. The lack of knowledge on coastal processes is part of the problem in making sustainable decisions in shoreline management. The politically inspired shoreline management policy ('hold the line') for Happisburgh is not sustainable. But changing the policy has huge implications. Besides, who is going to propose this when they want to get re-elected? As the problem is social and political, there should be studies conducted looking into this. At the moment studies

focus on engineering and coastal process issues. Making people aware of the risks is very important, although the tools (risk maps, 60-year lines) need consideration.

In all workshops compensation was brought forward as part of the solution. Although there are problems with the practical implementation of compensation, there was general consensus that compensation should be seen as one of the possible outcomes of cost-benefit analysis. This would allow a soft defence scheme to be put in place, instead of waiting with the installation of a hard defence scheme until the cost-benefit criteria are finally met.

The problematic situation with properties on cliff tops such as in Happisburgh has arisen over a period of time. Long-term policy in both land-use planning and shoreline management should try to avoid such situations in the future. In order to accomplish this, both land-use planning should be cut loose from local political influences (the not-in-my-term-of-office effect) and shoreline management should be based on long term knowledge of coastal dynamics. The definition of “long-term” needs to take into account that erosion has been and will be going on for hundreds of years.

5.4 Strategic Planning: Jaywick, Essex

Mr A. Midlen

Colchester Borough Council

5.4.1 Background Information

Jaywick is a coastal community on the North East Essex coast, three miles from Clacton-on-Sea. It comprises two sections that have received reasonable investment and service support in the past (The Tudors Estate and the Village), and one that remains deprived of services and external support (Brooklands and Grasslands). The Village and the Brooklands/Grasslands areas are built on reclaimed saltmarsh. The marshes were originally protected from the sea by a long shingle bank, and this is now augmented by man-made defences consisting of a concrete wall, and 'fish-tail' groynes built of rock.

Brooklands and Grasslands was the first part of Jaywick to be developed, appearing in 1929-31 simply as beach chalets for holiday-makers from east London. Over the years, these were gradually settled, and a cohesive community emerged despite a lack of local authority planning approval. It now comprises a closely packed group of owner-occupied, private-rented and holiday-homes, made of wood and asbestos, some being weather-boarded and others pebble-dashed. Most are set on stilts to avoid flooding. As these properties in Jaywick were not intended to be occupied year round, the area has lacked proper water and waste services. Until the late 1970s, residents relied upon Elsan toilets, and standpipes for water.

In the 1970's, the Local Authority proposed that Brooklands and Grasslands should be demolished as the cost of upgrading the poor quality housing would be too great. They

were strongly opposed, however, by residents who felt it was their community and home, and who did not want to see it destroyed. Local residents won the day, and the local authority put in mains drainage. Nonetheless, deep distrust of external agencies persists, largely because of these earlier conflicts. This lack of trust is reciprocated by some external agencies continuing to believe that nothing can be done for Jaywick.

Today, although the majority of properties are occupied year round, many remain in a serious state of disrepair. There is little infrastructure with most roads unadopted and in a very poor state of repair. There is no provision for surface water drainage, leading to flooding during winter months. The occupants have few amenities and suffer considerably higher unemployment (30% male unemployment) and illness rates than is the norm for Essex as a whole.

Whilst there is a strong community spirit it is factional, with three distinct groups, based around the three separate elements of the community, the Tudor Estate, the Village, and Brooklands/Grasslands.

Uncertainties and risks

- How long can this coastline be protected?
- What are the impacts of that protection?
- Can we and should we change the way people live to take account of the flooding risk?

How has uncertainty and risk been dealt with?

- Late 1970s - Proposal to demolish, because of poor housing and high cost of upgrading
- Early 1990s - Designation as Rural Development Area, because of community opposition to demolition, and desire to see living standards improve
- Late 1990s - Strengthening of sea defences, to protect housing and caravan parks
- Late 1990s - New housing to improve living standards, and upgrading of existing housing stock

What other responses could there have been?

How does this relate to concepts of sustainable development ?

- The standard of sea defence for this section of coast has been strongly influenced by the decision to upgrade rather than demolish Brooklands and Grasslands
- Whilst the impacts might be acceptable now on longshore drift and Colne Point National Nature Reserve, will they be acceptable in 50 years time when an even higher standard of defence is needed?
- Will the rejuvenation of Brooklands and grasslands lead to more land allocated to housing in the future in what is a flood risk area?
- Looking at land use and availability, and at the needs of society in the Eastern Region what strategic responses could be developed to the Jaywick issue?

5.4.2 Summary of Workshop Discussion

**Discussion recorded by: Ilan Kelman
Summarised by: Frank Thomalla**

The historical context in which the development in Jaywick occurred is complex and it was suggested that Jaywick should not be considered a planning error but rather a planning oversight. The original purpose of the buildings was to serve as temporarily occupied holiday homes. A key question is whether the implementation of flood defences has encouraged inappropriate development in the area by providing a false sense of security. In addition, past approaches to dealing with risk and uncertainty in the area have been inconsequential and have led to the partial upgrading of existing housing stock as well as new development, the provision of some services such as mains drainage and a strengthening of the sea defences. Other services, such as roads, waste and adequate surface water drainage are lacking to this day. This raises important questions about the enforcement of planning regulations and the responsibility of the local council to avoid inappropriate development in flood-risk areas. Questions were raised about the way properties change hands: is there a housing market, are houses purchased or inherited or do people simply occupy derelict buildings?

We were told that there is a strong sense of community amongst the population of Jaywick and a suspicion of outside agencies. From a social point of view it would be interesting to understand the reasons for this. It may have to do with the fact that there is a higher percentage of less well off people, reflected in a high unemployment and illness rate, and the fact that the council has made several attempts to evict them from their homes. The considerable opposition to plans of demolition has led the council to tolerate the settlement and even provide some basic services. In this case, therefore, the decision to provide flood defences could not possibly have been based on a cost-benefit analysis but on a humanitarian basis. This raises an interesting question relating to the economical basis of providing flood defence: How can a value be placed on a non-monetary item such as a personal home, a life-style or culture or a sense of community? All of these factors seem to be extremely important to the people of Jaywick but would not be considered in the current economic evaluation.

Can and should these non-monetary values be incorporated into the strategic political framework for shoreline management? There seem to be two opposing arguments: One is to take the view that the people in Jaywick have somehow cheated the system and have occupied dwellings permanently which were intended for part-time occupation only during the summer months. Therefore they should not have the right to expect the level of flood defence and other services provided to other communities. On the other hand, if we decided against the protection of Jaywick, the accusation could be made that as a poor community we value it less than richer communities and that our first priority should be saving lives rather than property. Do the poor quality of housing and the economic characteristics of Jaywick imply less reason for protection?

This case also highlights the difficulties in long-term versus short-term planning of development in areas at risk from coastal flooding. In the case of Jaywick, strategic planning failed and the question is whether it is possible to rectify this error now or whether the focus now should be simply on damage limitation. One of the main points

discussed was that of decision making and the time-scale for that. When we talk about disasters and extreme events, we look at 50 years or 100 years. When we talk about flooding and infrastructure and we're electing governments it's 2 years to 4 years. With respect to risk, again this is a common theme. The NIMTO ('not in my term of office') factor, of course, relates to this area. And the final area in terms of time was the long-term. We predict that the environment will take over eventually, whether it's a 50 or 100 year time frame, so what do we do? And is it possible to manage in different time frames? For example, could one come up with a 50 year solution which incorporates interim measures: such as holding the line on a 5 year time frame, whilst raising awareness amongst the community regarding the need to adjust and to accept a new status quo within 5 years.

This case study demonstrates the need for an integrated approach to coastal management. The challenge is to integrate the needs of the local community and long-term strategic planning in the context of a dynamic physical and political environment in order to achieve a sustainable solution. Information regarding development issues in high-risk areas exist, but it was felt that more guidance was needed in order to find sustainable solutions. Quite often, legislation and guidance seem to be disparate and in conflict with local issues. The question was raised, therefore, how much responsibility should lie with local government. Currently the Environment Agency operates in an advisory capacity. Does this mean that the council needs to take the risk and financial responsibility because they make the final decision? There also seems to be a need for a more comprehensive consultation process, which integrates expert knowledge with local knowledge.

6. Plenary Discussion

6.1 Introduction by Session Chair

Dr Susan Owens

Department of Geography, University of Cambridge

I am going to use the privilege of the chair to make some observations before opening the forum for discussion. I have been struck, while listening to the workshops, by about 5 cross-cutting issues. Rather than trying to make any comments on the specific themes that emerged from the workshops, which the workshop leaders have done so excellently, I thought I might share with you these observations with the disclaimer that I was not here this morning, that I did not get to all the workshops, and that I certainly was not in all of them with everybody who participated. So I may have missed some points and if so, forgive me. I am deliberately going to be a bit provocative.

First of all it strikes me that we are applying the wrong disciplines to these issues or at least we are applying disciplines in the wrong order. As I moved around the workshops, I heard several calls, numerous calls in fact, for further technical or economic studies, whereas it struck me over and over again that the disciplines we needed to be calling into play were political science, anthropology, sociology and probably philosophy - particularly ethics, to which I shall return later. And these disciplines, it seems to me, ought not to be tagged on to the end of the issues but, from what everyone was saying, they are absolutely essential. It struck me then that on all of the things we looked at in the workshops, we were not talking about the single accepted definition of a problem to which we are offering different solutions, but people are dealing with different aspects of the problem. So it is not so much that science cannot provide an answer but it might not even be answering the right questions and I think I might say the same about economics as well. So my first observation is that it would be extremely useful, and may provide new insights, to include other approaches.

Secondly, I have to say, stop worrying about subjectivity and start celebrating it. It seems to me that the capacity to make judgements is one of the things that is distinctive about human beings. I find it difficult to understand why we have become so terrified of subjectivity and why we now find it so difficult to find any ground between something that is quantifiable on the one hand, which we regard as objective (though quite why escapes me), and something that on the other hand is regarded as capricious; it seems to me that in the huge field between those two extremes are whole areas of subjective judgement based on good argument and debate. And I suggest that many of these issues desperately need such judgements and we should abandon the restless search for some algorithm or "objective" solution and start to ask how we might apply our considerable capacity for making judgements about the difficult choices and decisions that we have to face. (Systematic treatment, of course, remains very useful). So that is a call for a rediscovery of the value of judgement.

Thirdly, I think all the discussions I heard raised philosophical issues, which makes it surprising that we do not ask philosophy more frequently for some of its perspectives on these difficult problems. I am now going to jump in with both feet and suggest that perhaps economists have had their say, they have had quite a lot to say (and look where that got us)

so perhaps we could try to turn to some other disciplinary perspective. Out of the philosophical issues which seem to be emerging from the workshops (and there are many) I will pick out a few. One was the 'nature' that we are trying to conserve when we talk about nature conservation and the issue arose often as to whether this referred to some particular end-state at a particular moment in time, or natural processes. Another issue was how appropriate environmental compensation could be. Sometimes, what it is that is valued about nature is the particular history of a system in a particular place. At other times it is not so clearly defined and there are circumstances where compensation might be appropriate and others where it might not be. I cannot leave the issue of compensation without mentioning the other kind - compensation of property owners which often raise all sorts of questions about rights and responsibilities and mitigation. The final issue which I think is philosophical is what constitutes 'overriding public interest', an extraordinarily elastic concept.

The fourth thing that struck me as I went around is that we need to talk less about 'educating the public' and more (and I did hear this in various workshops) about two-way processes of communication. Much of what we discussed over several decades about educating the public is based on an information deficit model and public responses to it. This model has been so powerfully criticised that I think it no longer has any serious future.

Finally, it occurred to me that we really do need to do something about boundaries. We have different administrative, legal, planning and regulatory boundaries, and a whole range of different systems for environmental regulation. Few of those systems relate terribly well to the boundaries of natural processes. None of them relate very well to each other either, and that presents us with a whole set of problems. If I may, I am going to put in a plug, wearing a slightly different hat as a member of the Royal Commission on Environmental Pollution. We are working on a major study of environmental planning in which we are addressing the way in which a whole set of environmental planning regimes has grown out of the different philosophies over time, and which may or may not address issues of sustainability very well. The protection of certain coastal areas provides a clear case where that set of problems is found. We are about to put out a call for evidence and I very much hope that people here, given the extremely interesting examples that were discussed, will feel moved to submit evidence on this issue. On that note I am going to open up the floor for general discussion.

6.2 Summary of Points made in Plenary Discussion

Dr Iris Möller

*Cambridge Coastal Research Unit
University of Cambridge*

The final discussion focussed on a range of issues. The main points raised are summarised below, without reference to specific contributions:

1. **Scientific Knowledge.** From a scientific perspective, it remains extremely difficult to predict coastal change over several years. One reason for this is that there is so little information and data available on long-term (5-50 year) coastal evolution. Especially in view of sea level rise, which is a very gradual and long-term process, it is crucial that long-term observations are made. Yet the information we have for making long-term planning decisions is predominantly short-term information. It is increasingly information that is collected or recorded as part of individual schemes such as those case-study schemes that were addressed in the workshops. But there is no information available for making long-term decisions because there has been no strategic overarching long-term approach to coastal monitoring.
2. **Problem of Inaccessible Information.** A related comment was made later in the discussion, regarding the great difficulty in trying to assess the impact of a flood defence or any sort of coastal structure due to the fact that the monitoring of coastal processes is very piecemeal and so often only studied either for a very specific scheme or a specific purpose. The general tendency is to start to collect data once a plan has been put into place and there is a need to start the design for a flood defence scheme or other coastal development. The resulting data is often held by commercial companies. This makes it very difficult for anyone to look at this data or to obtain this data in order to use it for a different or new study. It is very difficult to integrate process studies on a more regional basis as there is no national point of contact. If there was a national body, which was concerned with shoreline management on a national basis it might also improve the accessibility of information.
3. **Idea of National Coastal Organisation.** The comment on the lack of long-term scientific data and the existence of conflicting administrative and natural process boundaries prompted the suggestion of a national body for coastal management, research, information gathering etc. Concern was raised, however, about the idea of a national body approach and the question of how one would keep an open process if there was such a national body was posed. Although we might be rather bad at doing what we do and we have got several government agencies and non-governmental organisations representing their individual points of view, we are talking about a process of consultation and discussion. It was suggested that, whatever process we go to it is important to keep an open discussion. A national body should not make decisions in isolation and those decisions should not be hidden from the public. Information has to be available and discussed openly and decisions have to be reached as a result of open consultation.
4. **Better strategic and management approach needed.** The need for a better strategic and a better management approach was raised several times. National bodies need to be

accountable and there is a danger that, if we are not careful, we could have an organisation or organisations which make decisions in a way that is not transparent and open.

5. **Need for National Approaches instead of National Organisation.** Another suggestion was made that we perhaps do not need a national co-ordinator as such but that we need national approaches. Perhaps the current organisations themselves need to come up with strategic solutions to what is required nationally and what should be done in certain situations. Another comment related to the need to get the right mechanisms in place on the national, regional and local level in terms of coastal zone management to get a true kind of integration. It was suggested that a champion for this integration is needed with the task to get people together and to try and flesh out some of the dominant issues. In many ways, we may have the proper mechanisms in place but we need to make the existing mechanisms more active.
6. **Linking problems and solutions in a different way.** A suggestion was made that, in the case of problems that cannot be solved locally, we need to perhaps move up to another (regional, national) level. It was also suggested that the linear idea of problem and solution may not be helpful, in that often supposed solutions cause more problems, and often problems are very integrated at very different spatial and temporal scales and over many disciplines. Perhaps some new approach which integrates problem-definition and solution-finding should be developed, and perhaps such approaches already exist and only need to be identified.
7. **Need to take a historical perspective.** A comment was made that the first grand plans for parts of the UK coastline were drafted in the early twentieth century. These plans already recommended coastal management approaches such as ‘managed realignment’, ‘no development’ etc. There are plenty of parliamentary guidance notes recommending restricted or no development in floodplains. These were reinforced, for example, after the 1953 floods when the population of Canvey Island was of the order of 2000 people and it was recommended that development should cease on Canvey. There are now ca. 40,000 people on Canvey. It was suggested that there is no ‘good’ or ‘bad’ coastal change or development but that our way of thinking makes change or development ‘good’ or ‘bad’ – i.e. we are dealing with a philosophical issue. It was mentioned that every bit of property in this country is for sale every 50 years. This means that, in one generation, one could solve our coastal problems and would not need conferences like this because one could have a coastline that was allowed to move and ‘breathe’ and was left for nature to shape and act upon. The issue could be quite simple or it can be made very complex; it is purely related to how one views the problem.
8. **Ongoing Debate on Issues.** It was mentioned that the local governments have proposed a coastal strategy in recognition that there is a need to create better linkages and better communication between organisations and that it is likely that there is going to be a lot of debate on this issue in the next year or two. This could be potentially very interesting as many people have been talking about exactly the same issues that have come up at today’s meeting, but in a very different context, with common issues about integration and coordination. It may be necessary to find new ways for working in new ways. In that context, the formation of regional and local partnerships may be a way forward for starting to talk together about issues and about problems and solutions.

Over the long-term, what is needed is not just one attempt at communicating to solve a specific problem but a permanent approach to talking a lot more, involving the community more, and listening to what people have to say.

9. **Need for Involvement of Social Sciences.** Finally, the point that was raised by Dr Owens in the Introduction to the Plenary Discussions was reiterated. There was a call for social scientists (e.g. social psychologists and others) to be included in discussions of this nature.

10. **Need to Acknowledge Progress.** A call was made to acknowledge the progress that has already been made over the past years (e.g. with the introduction of shoreline management plans) and that this has led to some real steps forward in terms of managing the coast. But it was noted that there exists a gap between shoreline management planning and landuse planning and that there are many planners that are not aware of what shoreline management plans are. Although the shoreline management plans are starting to look long-term (effectively over up to 50 years) it is necessary to make the link between shoreline management plans and development plans. This would be a big step that can be made within the current system. There is thus a need to go a bit further in the context of the shoreline management plans. The shoreline management plans have also got a very narrow remit. It was suggested to look at coastal zone management more seriously in this context.

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8. List of Delegates

Title	Surname	First Name(s)	Organisation	Department
Ms	Parkinson	Katherine	Environment Agency (Anglian Region)	
Ms	Hodgson	Jenni	Environment Agency	
Mr	Lohar	Grant	National Trust (Orford)	
Dr	Hall	Jim	University of Bristol	Department of Civil Engineering
Mr	Flanders	Clive	Environment Agency (Anglian Region)	
Ms	Rawson	Jane	Environment Agency (Anglian Region)	
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