CHAPTER 329

RECENT DEVELOPMENTS IN COASTAL DEFENCE POLICY AND GUIDANCE IN ENGLAND

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SUMMARY

In recent years we have seen fundamental changes in the way that coastal defences are planned and implemented. Engineers have recognised the overwhelming public desire to see the environment taken more into account when designing major infrastructure projects and our understanding of coastal processes has improved, allowing the design of coastal defences to become more scientifically based. As a result we have seen attention turn to adapting and supplementing natural coastal processes with the aim of adopting a coastal policy which is both more environmentally acceptable and sustainable in engineering terms.

In England, to reflect these engineering changes, to secure better value for money for our investment in coastal defence and offer a more sustainable approach in the longer term, the Ministry of Agriculture, Fisheries and Food, which has policy responsibility for flood and coastal defences, has invested significant sums of money into research. This has resulted in a better understanding of coastal processes and significant changes to national policy.

INTRODUCTION

As one would expect of a historical maritime nation, England has significant centres of population and economic wealth all around its coastline. The result is that over 5% of the population live in areas which are at risk of coastal flooding, perhaps not significant proportion in international terms. In addition there is an associated risk of coastal erosion which has seen the loss of a significant number of villages and large areas of land over the last few hundred years. The potential economic loss resulting from flooding or erosion is therefore significant in terms of its impact on the GDP. Recognising these risks the UK government spends some $100m per annum on grant aiding capital improvement works in England to achieve its published overall policy aim which is "to reduce risks to people and the developed and natural environment from flooding and coastal erosion by encouraging the provision of technically, environmentally and economically sound and sustainable defence measures".

INSTITUTIONAL ARRANGEMENTS

Whilst the Ministry of Agriculture, Fisheries and Food has overall policy responsibility for flood and coastal defences decisions on where and when defences will be provided are left to the local community. Responsibility for the provision of defences

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against flooding are generally with the Environment Agency, which although a national body, makes such decisions on a regional basis with strong local input. Defences against coastal erosion are provided by Local Councils, some of whom also have additional powers with respect to provision of defences against coastal flooding. The boundaries of these bodies generally take no account of coastal processes being based on historical precedent and geography.

Historically these authorities have not generally cooperated in the provision of coastal defences tending to make their decisions on the basis of local needs and precedence.

STRATEGIC PLANNING

In the past defence measures were planned and implemented on a one-off site specific basis, not the most scientifically based approach. Indeed such site by site appraisal not only restricted engineering options but also ensured that not all costs and impacts were taken into account with the result that options were often limited to merely replacing on a like for like basis. This often perpetuated, previous sometimes, inappropriate solutions such as the replacement of hard reflective walls with more of the same. Improvements in the understanding of coastal processes clearly showed that by considering options over a wider area and a longer timescale more lateral thinking was possible, enabling the preparation of schemes that complemented natural processes rather than fighting against them. It was also felt that this more strategic approach would allow the Ministry to more easily meet its own policy objective.

As noted previously the boundaries of the authorities with primary responsibility for the delivery of coastal defences took no account of coastal processes. In addition these authorities had historically made decisions reflecting the needs and wishes of their own electorate and with little consultation with adjoining authorities. Therefore the first policy objective was to encourage these authorities to work together towards more strategic planning such that decisions taken on the basis of engineering knowledge could cross political boundaries. This was achieved by the establishment of voluntary Coastal Defence Groups, encouraged by MAFF, which took account of coastal process cells. To facilitate this a research study was commissioned from HR Wallingford to define logical boundaries of coastal process cells. Cells were defined as lengths of coastline within which the movement of coarse sediment is largely self-contained. Sub-cells within these were also defined on the basis of limited cross boundary influence due to coarse sediment transport.

Once formed these groups allowed authorities on adjoining lengths of coastline to meet and discuss similar problems and solutions and consider joint approaches to the gathering of data etc. Central government also encouraged collaboration between these groups by setting up the Coastal Defence Forum on which all groups in England and Wales are represented.

Central government then provided guidance and encouragement on the production of Shoreline Management Plans which aim to set out a strategy for coastal defences for a specified length of the coast taking account of the natural coastal processes and human and other environmental influences and needs.

The objective in developing these plans was to:

- improve understanding of the coastal processes operating within the sediment cells;
- predict the likely future evolution of the coast;
- identify all the assets within the area covered by the plan which are likely to be effected by coastal change;
- identify the need for regional or sites specific research investigations;

- facilitate consultation between those bodies with an interest in the coastline.

Once the plan was completed the authorities involved in its preparation would then have the means by which they could:

- assess a range of strategic coastal defence options and agree a preferred approach;
- outline future requirements for monitoring, management of data and research related to the shoreline;
- inform the strategic planning process and related coastal zone planning;
- identify opportunities for maintaining and enhancing the natural coastal environment taking account of any specific targets set by legislation or any locally set targets;
- set out arrangements for continued consultation within the group and other interested parties.

BEACH RECHARGE

The practice of recharging beaches as a form of coastal defence has been recognised worldwide for many years, although its use in England has been more limited than in many other countries in Europe. This is partly because of the greater difficulty of predicting beach behaviour due to the variability of beach material and partly because of the difficulty in gaining sufficient suitable material resulting in greatly increased costs.

Improved knowledge of coastal processes and an increasing public desire to take account of environmental effects when designing major infrastructure projects, increased pressure to use beach recharge as a form of coastal defence in England. Such forms of defence were also considered more sustainable in engineering terms. Initial research allowed improvements to modelling techniques which reduced the perceived financial risks and assisted in educating decision makers on the benefits of beach recharge. However, it was soon recognised that recharged beaches needed management if they were to provide a long term sustainable solution. Unfortunately such management works had not previously attracted Central government funding with the costs falling on the local community. Hence the possibility existed that the chosen solution might have more to do with the availability of funding than finding the right engineering solution.

The resulting policy change was to encourage authorities to produce long term beach management plans with the cost of implementing and monitoring for the first time attracting Central government grant. Thus the choice of solution could now more fully depend on science rather than the source of funds. As an additional benefit this change in policy allowed beach management on its own, without the benefit of an initial recharge, to be seen as an effective means of continuing coastal defences along parts of the coastline. With the possibility of Central government finance, operating authorities are now more willing to seek to understand the periodic movements of beach material and manage it for the benefit of improved coastal defences, thereby achieving better value for money and possibly reducing long term capital expenditure.

MANAGED SET-BACK

It was King Canute who first demonstrated to the English population the strength and power of the sea and the need for man to adapt to the wishes of Neptune rather than impose his will on nature. In the intervening years the lesson has been reinforced by the significant loss of land to the sea, recognising that it is not scientifically or economically sensible to protect all 4000 kilometres of our coastline. However, with the change to more naturally sustainable types of defence the option of doing nothing, or more importantly, allowing the

coastline to retreat had to be looked at in a different light. Whilst the retreating of defences did not require any major policy changes, since Mother Nature was doing that already, strategic planning now allowed more informed decisions and the opportunity for environmental enhancement. With improved long term planning it becomes possible to foresee the extent of likely retreat in future years thereby allowing landowners and developers to make more informed decisions but just as importantly the potential beneficial impact of such retreat on other areas of the coastline can be examined.

To compensate for the loss of valuable inter-tidal habitat resulting from coastal squeeze, and man's interference, government also took the opportunity of providing funds to recreate lost tidal wetlands in these setback areas. In areas where setback of the coastline is seen as a viable response mechanism and an opportunity for habitat creation exists, government can now offer payments to landowners for long term management to achieve environmental goals. Obviously merely setting back the coastline may not lead to environmental gain hence a research programme has commenced to determine suitable management regimes.

CARE OF THE ENVIRONMENT

There can be no doubt that flood and coastal defence measures can have a significant impact on the environment with the potential loss of important natural habitats. This is in addition to natural losses which may be exacerbated as a result of the coastline being unable to flexibly respond to natural changes due to man's intervention. These recent changes in coastal defence policy have made it possible to more easily establish the impact of our works on the natural environment and hence consider the possibility of mitigating measures. In addition it may also allow us in the future to understand and quantify some of the natural changes which may result in the loss of important wetland habitat thereby allowing the possibility of adjusting approaches in order to take mitigating measures to retain biodiversity.

FUTURE

As outlined in this paper cooperation between engineers and policymakers has in recent years allowed the scientific advances achieved by coastal engineers to result in consequential policy changes, however, these changes will not necessarily make life any easier for engineers. The move towards long term strategic planning of defences which encourages the maintenance of coastal processes will, without doubt, bring engineers' decisions under closer public scrutiny. Some of their recommendations may not be in accordance with the views of the local population, especially if these include realignment or even the abandonment of some existing defences. With longer term planning an increasing number of people will be involved in decisions affecting the coastline, hence engineers may have to seek consensus views from a wider range of people and interest groups.

The increasing move towards more environmentally friendly solutions to coastal problems will continue to result in change. Earlier in this paper I noted that beach recharge was not as widely used in England as elsewhere in Europe due largely to material supply problems. This is because the material suitable for recharging beaches is also sought by the construction industry. Many prefer to see the use of marine dredged material because of the perceived adverse environmental impact of extracting land based materials whilst the environmental impact of extraction from the sea bed is much less obvious to the general public. Unfortunately in many areas of the North Sea there is now insufficient coarse aggregate to satisfy the long term needs of both the construction industry and beach recharge. Therefore the next policy area that requires consideration is whether the use of marine

aggregate sources should be restricted to allow inereased use for beach recharge or to leave it to market forces, as at present.

No matter what the decision on any future restrictions in the use of marine aggregate by the construction industry, demand will, at some time, exceed supply. Engineers' response to this possibility is to seek improvements in the predictive tools for long term sediment movement and developments in coastal morphology. An integrated research project is at present underway which should show some interesting results within a few years. In addition estuaries which are an important but little understood part of the sediment chain are a matter for current review.

The continued move towards more natural forms of defence brings forward questions of risk assessment since decisions are now dependent on a greater number of variables. This has been demonstrated in recent years by the unexpected failure of some soft forms of defence as a result of storm series that were not taken into account in the design process. Our response will be improved techniques in risk assessment leading perhaps to greater use of probabilistic design in coastal defences. An interesting perspective for policymakers.

The move towards strategic planning of coastal defences has resulted in a change of public awareness and perception of coastal engineering problems and as a result the public now takes a fuller part in the decision making process, even questioning the advice of engineers, especially when the "do nothing" option is the preferred choice. This move will, without doubt, bring other areas of coastal use into the decision making process leading to more integrated decisions, although implementation of coastal zone planning in its truest sense is, in my opinion, still some way off.

CONCLUSIONS

It is too early to claim complete success for the recent policy changes in this country, but I have no doubt that we are moving in the right direction and with a speed that has surprised many. Clearly the impact and improvements of recent years has been a lesson to us all and the need for engineers and policymakers to work together remains with us. However, if we are to make the best use of our improved scientific knowledge then it should not always be the policymakers responding to new engineering concepts, but engineers should themselves recognise the pressure on policymakers and be ready to respond with help and advice. Not only should changes in engineering techniques help drive policy but changes in policy need should also feed into engineering research.

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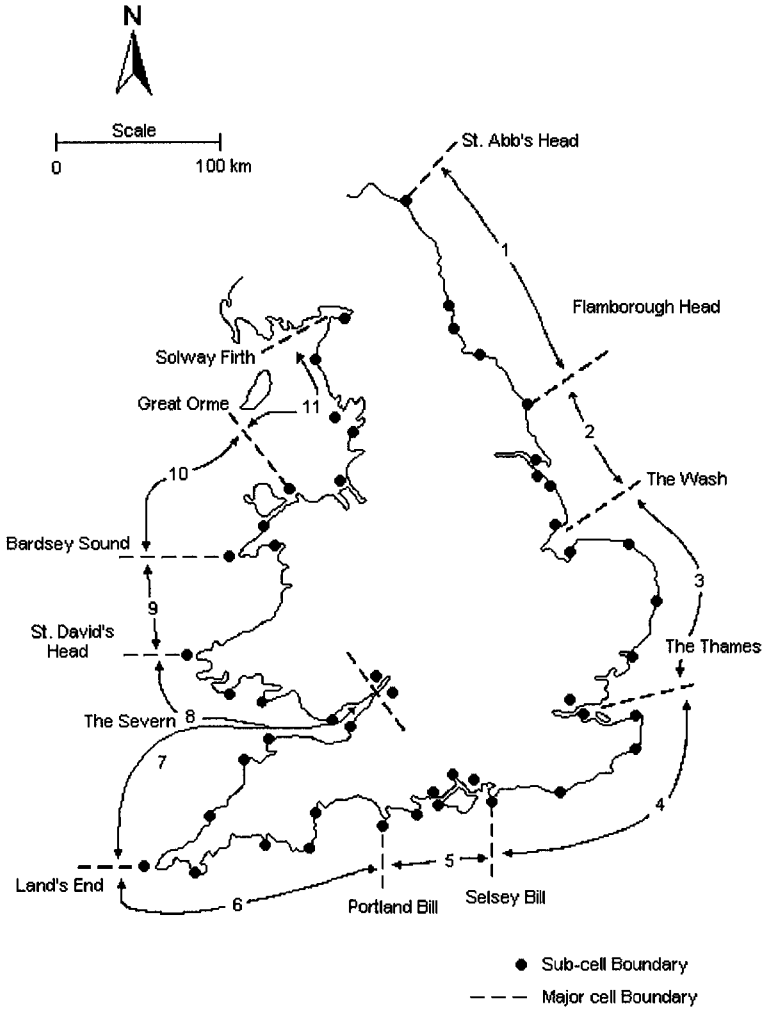

Figure 1: *Boundaries of major sediment cells*

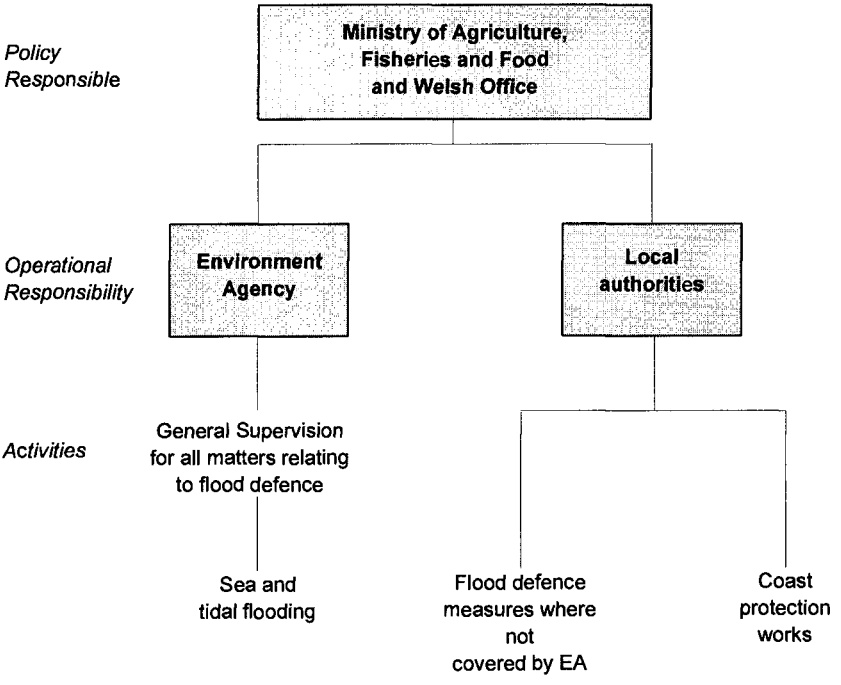

Figure 2 Flood and Coastal Defence: Organisation