

## **The UK LIFE project on shoreline management: 'Living with the Sea'**

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### **Abstract**

Climate change and sea level rise is posing ever-greater challenges to the sustainable management of our coasts. 'Living with the Sea' was a four-year partnership project benefiting from European Commission LIFE Nature funding. The project focused on coastal areas of England, in particular on coastlines with complexes of sites designated under European Habitats and Birds Directives. Research has indicated that climate change and sea level rise will drive significant habitat change on these coastlines, with implications for how we deliver flood risk management. This paper provides information about the overall project aims and successes, the Coastal Habitat Management Plan concept, and other specific elements of the study including the review of how we have incorporated the Habitats and Birds Directives into UK law. The paper also considers the recommendation's arising from this visionary project in the wider context of how we need to manage our coastlines, the communities, natural features and wider land use, so that we can survive climate change and sea level rise in the long term. We must anticipate change, plan for it and provide space within our coastal zones; zones that will become more extensive and influential with the continued rise in sea levels and pressures to find new development opportunities.

Keywords: Sea level rise; Habitats and birds directives; Flood risk management; Coastal zones; Long-term planning.

### **Introduction**

The last six centuries have seen massive changes to the UK coastline through coastal defence works and land management. Local communities have become more demanding of the environment, exploiting the natural resources to provide food, wealth and now leisure.

This human intervention has also changed the natural biodiversity. Ironically it is the last century growth in leisure activities that has highlighted the seriousness of this loss of biodiversity. If it was not for the growing human interest in watching birds, the first private nature reserves would not have been established, and in turn the first environmental legislation would not have been passed! We now have extensive national and international legislation and agreements to conserve our natural environment, but at times this only seems to make it more difficult to do!

## ***Legislation***

The Habitats Directive was transposed into United Kingdom law under The Conservation (Natural Habitats, & c.) Regulations 1994. These regulations establish procedures for selection of Special Areas of Conservation [SAC] and make provision for establishing 'management agreements' to protect the European sites (including Special Protection Areas [SPA]) and regulate potentially damaging activities. The regulations also require an appropriate assessment to be carried out on projects or plans that are likely to have a significant effect on a European site. A project or plan can only go ahead if it can be ascertained that it will not adversely affect the integrity of the European site, unless there are no reasonable alternatives and there are imperative reasons of overriding public interest (OPI). In the latter situation, compensatory measures will be secured.

In the UK, Natura 2000 sites are generally underpinned by designation as 'Sites of Special Scientific Interest' (SSSIs). Because the roots of UK conservation started on 'terra firma', site delineation and selection criteria have in the past tended to reflect the more predictable behaviour of terrestrial features. For example site boundaries are drawn tightly around the habitat or species interest; measures such as existing area or numbers of species are set at time of designation; and natural change is not defined.

This has presented some interesting situations when coastal intertidal and freshwater sites are incorporated in the UK Natura 2000 series. Intertidal habitats do not conform to set boundaries or conventional condition measures. Because of their dynamic nature wind, tide and wave drive and form intertidal ecosystems.

## ***Flood risk management***

The single most intrusive human activity in this intertidal zone is sea defence and coastal protection. Because the UK is an island, keeping the sea back has been a preoccupation since the 15<sup>th</sup> century. Engineering works traditionally aim to fix the coastline, prevent erosion and claim land where possible. This has caused a phenomenon known as coastal squeeze. This is where the intertidal Natura 2000 sites are caught in an eroding environment, with the forces of nature (tide, wind and wave) driving in from the seaward side and man's coastal defences (seawalls or high ground) fixed on the landward side. This leaves intertidal habitats nowhere to retreat in the face of sea level rise.

How can the United Kingdom, or any other coastal member state, meet its obligations to protect habitats under the Habitats Directive whilst also protecting from the sea its important urban and freshwater coastal areas? This is the subject that has been studied through the 'Living with the Sea' project.

## **The 'Living with the Sea' project**

In 1998 the UK successfully submitted a project to the European Commission, under the LIFE Nature fund, to trial a number of solutions to these challenges. The 'Living with the Sea' project started in December 1999 and produced its final report in July 2003. Four UK partners supported it: English Nature, the Environment Agency, the

Department for Environment, Food and Rural Affairs (DEFRA) and the Natural Environment Research Council. The key European partner was the European Commission. The project aims were as follows:

To promote:

- understanding of long-term coastal change resulting from sea level rise;
- sustainable integrated coastal management policies;
- ownership of shared issues and common solutions.

To develop:

- mechanisms for delivering Habitats Directive compliant flood and coastal defence schemes;
- practical ways of demonstrating habitat creation at work;
- working partnerships between engineers, conservationists and landowners.

Four aspects of coastal planning and management were studied and developed:

### ***Coastal Habitat Management Plans (CHaMPs)***

CHaMPs support the UK's strategic approach to flood and coastal defence management by informing Shoreline Management Plans (SMPs) which decide flood defence policy for coastal cells. Lets consider the past, present and future context for this approach:

#### ***Past***

The first SMPs were completed approximately eight years ago, and are now approaching their first review. These early plans did not fully address the requirements of the Habitats Directive, in many cases recommending a 'hold the line' policy until further research is completed on the effects of this option. They continued to promote 'hard engineering' solutions in the face of growing understanding that this was not a sustainable defence option. To resolve this issue the concept of a CHaMP was developed from experiences on the North Norfolk coast where coastal squeeze was threatening important SPA and SAC features. The first project objective was therefore to publish guidance, 'Coastal Habitat Management Plans: An Interim Guide to Content and Structure' with a foreword by Elliot Morley, then Minister for Fisheries and the Countryside.

CHaMPs help where the conservation of all the existing interests in situ is not possible due to changing coastlines. Their two primary functions are to act as an accounting system to record and predict losses and gains to habitat from flood management works, and to set the direction for habitat compensation measures to address these net losses. This ensures that damage to Natura 2000 sites from the coastal defence response to sealevel rise is avoided or compensated for. The plans therefore contribute to maintaining the overall coherence of the Natura 2000 network.

### *Present*

The project developed seven CHaMPs covering the east and south east of England. Using an analysis of coastal geomorphology, over an entire coastal process cell. CHaMPs evaluate the combined effect of the existing defence policies over the next 30 to 100 years. Where there is a damaging impact, then, unless there are assets of overriding public interest, the CHaMP suggests alternative options such as ‘managed realignment’ of the defence or removal of the existing structure, to promote more natural coastal process and habitat response. Where it is an urban defence, which must be defended, ways of creating compensatory habitat are considered. These plans rely on understanding and forecasting coastal geomorphology. They recognise and promote the great effectiveness of mudflats, saltmarsh and sand dunes in providing a natural coastal defence. These features take the energy out of winter storms and surge tides, recovering their form and capacity through the summer. They are more effective in this than concrete and steel, and are self sustaining, provided we do not cut off sediment supplies by preventing erosion or arresting transport pathways. CHaMPs support the principle that we must plan our coastlines to work with nature, not to fight her!

CHaMPs also consider situations where both intertidal SACs and freshwater SPAs occupy an eroding coastline. Build or maintain a seawall to protect a coastal freshwater SPA from saltwater flooding and you can damage the integrity of the adjacent intertidal SAC. Remove a sea defence to allow the intertidal SAC to evolve and you destroy the freshwater SPA interest. Either option presents problems under the Conservation Regulations, and possibly under the Habitats Directive. The UK government has also given an undertaking to protect Natura 2000 features *in situ* where it is sustainable to do so.

The solution to this conundrum needs to be site specific because some SPAs contain habitats or species that are unique on the coast, for example brackish features. However, in principle we should be following nature’s own steer. Intertidal features cannot exist anywhere other than the land/sea interface. Freshwater features may develop in this zone but they will naturally be transitory. Stable freshwater habitats occur in the river flood plains, but often these have also been drained to facilitate intensive farming practices, preventing the natural development of new fluvial wetlands. Where can these habitats go?

### *Future*

It is clear that the solutions to coastal squeeze are not easy. The principles of integrated coastal zone management will need to be enshrined into the wider local planning and land use framework if we are to meet our international obligations for habitats and birds, provide sustainable flood and coastal defences and achieve best value from tax payer’s investment in our coastlines. SMPs and their resultant strategies, will use CHaMPs as part of their decision making process when reviewing the current sea defence and coastal protection policy. CHaMPs alone cannot decide on policy, they are evaluating the potential to comply with the Habitats and Birds Directive and advice on how to work with nature, to restore the natural form and function of our coastlines. However to ignore their guidance will compromise delivery of UK and European environmental law.

Failing to work with nature will also mean we are stepping back into the past, when we thought concrete and steel could do a better job of defending our island, and we could preserve our natural environment artificially, within a line on a map!

### **Practical habitat creation on the North Norfolk coast**

To examine practical solutions to the SPA/SAC conundrum, two Environment Agency schemes were promoted at Brancaster and the Cley Salthouse frontages. Both sites rely on a SAC feature as the formal sea defence structure. At Brancaster the sand dune was stabilised and revetted to form the sea defence, and between Cley and Salthouse the shingle ridge is regularly dozed into an unnatural steep bank to form a sea defence. Both structures were unsustainable in engineering, financial and environmental terms. The constant engineering management prevented them from being effective energy absorbers, and from naturally recovering their capacity after storms. The pressure of coastal change forced a flood defence review, the simplest solution would have been to abandon managing the existing defence, but both defences directly protect important freshwater or brackish marshes and reed beds designated SPA; to abandon the defence would therefore have an impact on the SPA interest.

One solution was to construct a new set back seawall through 'managed realignment', adopting a 'non intervention' policy for the sand dune or shingle ridge. This would protect part of the SPA and any properties at flood risk for a limited time. The SAC features can then be restored to a natural form where they can continue to roll landward in response to coastal processes.

But this approach does not provide a once-and-for-all solution; it will not be long before coastal squeeze is forcing a further critical rethink of the new seawall position due to unstoppable coastal processes. At Brancaster we have constructed a set back wall and continue to monitor the effectiveness of the solution; at Cley/Salthouse the preferred scheme is still under review. If the criteria for sustainability in coastal planning solutions are applied it is clear we should be realigning back to rising ground and compensating for the loss of freshwater interest by recreating this within fluvial flood plains. In these rural locations this represents the best value for money for tax payer's investment, and the best outcome for nature conservation. Natural habitats arise and are sustained by natural processes. This applies to freshwater sites as much as intertidal sites. The criteria for sustaining SPAs are therefore the same as for SACs, support form and function and not isolate the site by artificial walls and boundaries! In reviewing these North Norfolk schemes, we must consider how effective they have been in meeting the requirements of flood risk reduction, the Habitats and Birds Directive and furthering wider biodiversity targets.

### **Good Practice Guide to Habitat Replacement and Restoration**

To help engineers, conservationists and landowners create compensatory habitat where it is necessary, the project prepared a guide to the existing case studies on good practice habitat creation and restoration, (including studies carried out by the project) with links

or directions to the original author's material. Dr Pat Doody developed and produced the model under contract to the Project, and researched the extensive material that he has included.

It is an interactive guide that helps you identify your habitat creation objectives based upon various 'habitat condition states'. This novel approach is essential in a dynamic environment. Habitats evolve and mature, supporting different species at different times. It is therefore essential to understand what you are trying to achieve by your management, and to predict how successful you are likely to be! The guide provides links to practical examples and authoritative case studies and manuals.

The Good Practice Guide is published on the Internet so that it is available to anyone, and can be kept up to date by English Nature. Where limited knowledge exists on a particular feature, interim guidance will be given until new research data is available and the guide can be updated. You can access the guide via the project website address given below.

### **European framework: options for maintaining features of European importance in dynamic situations**

The development of CHaMPs in the UK was a direct response to challenges arising from trying to plan for compliance with the Habitats and Birds Directives. This work has highlighted many practical conservation issues arising from the UK's interpretation of the Directives and the way this is applied to dynamic sites.

Through an analysis of the circumstances of these issues, close examination of the objectives of the Habitats Directive, and discussions with other coastal member states, the project prepared a framework report and guidance towards addressing coastal squeeze in the UK, and shared this with practitioners throughout the EU.

Three key themes were developed which addressed the issues arising in the UK and which are of relevance to other member states when reviewing their own procedures:

#### ***Favourable conservation status***

Favourable conservation status is all about the health of natural features across the Natura 2000 network of sites, and the wider environment, not just the individual site condition. To gain this understanding we must in future measure the natural form and function of habitats, the effects of dynamic change on features, as well as the existing individual site based qualitative assessment of habitats. This will require new site management objectives to be set, and extended long-term strategic condition monitoring, systematically applied.

### ***An ecologically coherent network***

To achieve favourable conservation status we must manage the European Natura 2000 sites as an ecologically 'coherent network' ... this is one of the key aims of the Directive. To understand this we must effectively monitor how the entire network is operating, covering the interaction of habitats and species, and the ecological and physical factors affecting them. Where necessary we may have to update the designated sites to ensure the network retains its capacity to respond to climate change. This may require a new UK approach to how we identify and designate and manage sites in future.

### ***Designated site boundaries***

Currently we have benefited from using the existing UK legislation covering Sites of Special Scientific Interest and their boundaries to quickly establish the Natura 2000 series in the UK. However this process establishes fixed site boundaries which are too cumbersome to respond to the evolution of a dynamic network on rapidly changing coastlines. We need to consider including buffer zones, wildlife corridors and transition zones where habitats need to migrate over time. Many of these sites are also covered by other national and international designations. Maybe we do not need multi-tier designations in the UK; the highest single tier of designation should be enough!

More detail on the specific studies covered by the project, and downloads for the reports can be obtained from the website: [www.english-nature.org.uk/livingwiththesea](http://www.english-nature.org.uk/livingwiththesea)

### **An action plan**

Encapsulating all of the learning and experience gained over the four years the project prepared an England Action Plan. This identifies the future actions required by project partners to realise the long-term potential of the studies, and to deliver certain future actions that were beyond the remit of the project. Now 18 months on from project completion, the partners have incorporated the actions in their individual corporate strategies. CHaMPs are included in DEFRA guidance on shoreline management planning; the principles of an ecologically coherent network are included in English Nature's Maritime Strategy; and the Environment Agency is establishing a National Habitat Replacement Framework to deliver strategic compensation where required as part of Shoreline Management Plans and coastal strategies. Maintaining the momentum is vital when a project is completed. A successful project produces future actions, and should fuel future debate, leading to better understanding by all.

### **An integrated vision for the 21<sup>st</sup> century**

It is clear to the author, that future sustainable coastal management can only be built around a long-term integrated vision. This vision must be based upon realism in the face of coastal change and must work with natural geomorphologic processes. We should seek to develop only in areas not subject to flood risk. We must restore the natural operation of flood plains, wash lands and intertidal areas to reduce the flood risk to

existing development, and we must focus on an vision three generations ahead, but deliver the actions now!

This vision must embrace the developed and natural environment. There must be a place for people and communities, wildlife and ecosystems. It should be about creating space as much as it is about using that space. With increasing extremes in weather we must 'make space for water', a theme adopted by DEFRA in the 2004/5 review of their flood risk management strategy. Coastal (and riverine) zones will develop more extensive wash lands to dissipate the increased natural energies of the 21<sup>st</sup> century climate, and beyond. These will be new areas of wilderness, but not wasteland. We will better understand the value of these dynamic and exciting areas to our own rural communities and livelihoods, as to the natural environment. We must actively promote this outcome and not try and restrain change; these areas will provide the natural breath of life for our future generations!

## **Conclusions**

Coastlines have been and will continue to be places of change, driven by nature. Man settled on the coast, built ports and claimed land for farming and industry. Future human expansion will place even greater pressure on what is now a fragile environment. If we do not understand the future effects of our policies on the natural environment we stand to lose the last of our coastal wildernesses. Coastal planning decisions can no longer be taken in isolation, without thought for the long-term consequences. An integrated coastal vision is essential for the 21<sup>st</sup> century, where we stand side by side with nature and learn to live with the sea.

Through our partners, the 'Living with the Sea' project delivered practical tools for engineers, conservationists and government agencies. It demonstrated that by adopting a pragmatic approach to coastal form and function it is possible to deliver cost effective and sustainable flood risk management whilst conserving the natural environment. Now each of us must look to the future, share our vision and act now; we decide the next generation's environment!

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