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MARINE NATURE CONSERVATION

Nearly half of the UK's species are found in its seas. Despite this, it is widely accepted that protection of the marine environment has lagged behind that of the land. The Government has recently completed a review of marine nature conservation and has announced its intention to publish a marine bill to better manage and protect the marine environment. This POSTnote examines the current state of knowledge about UK marine wildlife, the methods available for its conservation, and issues surrounding effective conservation.

The state of the seas

It has been estimated that the UK's seas contain as many as 38,000 different species.[1] In addition a wide and expanding range of industrial activities take place at sea, including fishing, shipping, oil and gas extraction, wind farms and aggregates extraction. As technology improves, many of these industries are able to operate in deeper waters.

Recent studies have shown that there has been significant damage to UK marine habitats and species, for example:

- A 2002 English Nature report that noted that 'much *coastal habitat has been lost, and the sea bed has in places been highly modified, and so less capable of supporting a rich biodiversity*. It concluded that the '*marine ecosystem is showing signs of significant stress and low resilience to continuing pressure*'.[2]
- The International Council for the Exploration of the Seas says that cod stocks in the North Sea have declined to such a low level that no cod should be caught in 2005.[3]
- An assessment of the status of the North East Atlantic by the OSPAR Commission (see box) in 2000 found that fishing damages more than fish stocks: fishing gear has caused extensive damage to sea bed habitats in some areas.[4]

Nevertheless, there is debate about the extent and reversibility of some the damage to the marine environment. This is particularly true of areas further offshore, which have been relatively little studied. The Government will shortly publish the first integrated national analysis of the state of the UK marine environment (*The State of the Seas)*.

Box 1 Current regulatory framework

The United Kingdom's marine environment is currently regulated via a patchwork of many different national, EU and international laws and conventions. Regulations and agreements intended to protect wildlife and habitats include the:

- Wildlife and Countryside Act 1981
- EU Birds and Habitats Directives, which require Member States to designate special areas for the protection of certain important habitats and wild bird species, including some in marine environments
- 1992 OSPAR Convention, which provides the legal basis for international cooperation on the protection of the marine environment of the North-East Atlantic
- United Nations Convention on Biological Diversity, which aims to promote biodiversity and the sustainable use of its components
- The United Nations Convention on the Law of the Sea contains provisions on the protection of the marine environment.

Industrial activity and development at sea is generally regulated on a sector-by-sector basis.

Regulation of the marine environment

As outlined in the box above, a number of laws and conventions apply to the marine environment. Recent years have seen moves towards a more holistic approach

to managing the UK marine environment, and these are described below.

Recent developments in Government policy

One major recent development is the completion of a Review of Marine Nature Conservation (RMNC), set up by the Government in 1999. A Working Group of Government, marine industries and conservation bodies considered options for improving protection for marine sites and species. It reported in July 2004.[1]

A large part of the Review's work was a pilot project in the Irish Sea, which tested a conservation framework that was developed during the first phase of the review.

The 2003 Ministerial Meeting of the OSPAR Commission (see box) committed the Government to developing a network of marine protected areas (see below). It is not yet clear whether this will involve the designation of new sites or whether those protected under the Habitats and Birds Directives will effectively form the OSPAR network.

The Government has also recently concluded a consultation on extending the EU Habitats and Birds Directives (see box) offshore, that is out to the limit of UK waters (up to 200 nautical miles (370 km) from shore). In the past, the Government had considered that these Directives applied only to territorial waters (those within 12 nautical miles (22 km)).

For some time, environmental organisations and others have been pressing for a Marine Bill to rationalise and strengthen the mechanisms for protecting the marine environment. The Department for Environment, Food and Rural Affairs (Defra)'s Five Year Strategy, published in December 2004, says that it will '*introduce a Marine Bill to allow all uses of the sea to develop harmoniously*'.

The ecosystem approach

Criticism of successive Governments' marine conservation policies has focussed on their piecemeal nature, which has arisen as different regimes were adopted for particular industry sectors.[5] The current Government has now adopted the 'ecosystem approach' to managing human activities in the marine environment. Similar approaches have been adopted by signatories to the Convention on Biological Diversity (see box) and will underpin the European Marine Thematic Strategy being prepared by the European Commission.

While there is no single widely-accepted definition of the ecosystem approach, it implies a shift away from managing individual activities or conserving particular species or habitats towards considering marine ecosystems as a whole and setting management of individual sectors and protection of particular species within that context. The approach requires that clear environmental objectives are set and that policy decisions should take account of biodiversity and ensure sustainable development.

Nested within the approach are several techniques for managing the impact of human activities, some of which are considered below.

Spatial and strategic planning

On land, much of the regulation of development and activities that may have an impact on the environment is achieved through the planning system. At present, there is no analogous system for activities that take place at sea. The RMNC advocated the development of a marine spatial planning system. This would identify areas that are suitable for particular uses and those where certain activities should be avoided.

The RMNC pilot project in the Irish Sea examined options for a marine and coastal spatial planning framework.[6] The Government is following up the pilot by undertaking a marine spatial planning project in the Irish Sea. This will include all activities that take place in the Irish Sea and examine how best to resolve practical issues relating to the development and implementation of a plan. The project is due to conclude towards the end of 2005.

Currently, different marine industries are regulated separately and, with the exception of Strategic Environmental Assessment (SEA), there is no single procedure for examining their combined impact. The EU Strategic Environmental Assessment Directive requires authorities to take account of environmental impacts during the preparation of plans and programmes in a range of sectors including, at sea, oil and gas exploration and the development of offshore sources of renewable energy.[7] (See POSTnote 223 for a more detailed examination of this Directive.)

Although the Directive did not come into force until July 2004, since 2000 the Department of Trade and Industry (DTI) has been undertaking a series of SEAs for the offshore oil and gas sector, based on the requirements of the Directive. More recently, this work was extended to include offshore wind farms. The SEAs have required extensive survey work, the results of which are publicly available. The DTI expects to complete them by 2008.

Marine protected areas (MPAs)

Marine protected areas (MPAs) are areas of the sea that are afforded some level of special protection. This can vary from allowing a wide range of uses, albeit under controlled conditions, to banning all extractive or destructive uses such as fishing, drilling and dredging. Areas that are more highly protected are sometimes called marine reserves.

The RMNC recommended establishing an '*ecologically coherent network*' of MPAs. The Government has committed itself to the development of such a network in a number of international forums, including the OSPAR Convention, World Summit on Sustainable Development and the European Union (through the Habitats and Birds Directives).

In addition to the direct protection of wildlife and habitats, there is some evidence that MPAs can help to conserve and even increase commercial fish stocks. They may also serve as a baseline against which to measure impacts elsewhere.

Benefits to wildlife
In 2001, marine scientists produced a '*scientific consensus statement on marine reserves and marine protected areas*'.[8] It concluded that '*reserves result in long-lasting and often rapid increases in the abundance, diversity and productivity of marine organisms*' and that complete protection is critical to achieve the full range of benefits. MPAs can protect the whole ecosystem in a particular area from the disturbance and physical impacts of certain activities such as dredging for aggregates and trawling.

Benefits to fisheries
Marine reserves can benefit fisheries in two ways: the conservation of the stock via an increase in numbers within the reserve; and the improvement of catches outside the reserve via the 'spillover' of fish beyond reserve boundaries. These benefits are particularly effective for relatively sedentary species, but there is evidence that they can benefit more mobile species also, especially if the reserve is situated in an area where the fish congregate, such as a spawning ground.

However, there is some concern that closing certain areas to fishing simply results in displacing fishing activity so that more fish are taken elsewhere.

Baseline for comparison
Some scientists argue that it is important to create reserves where all human activities are excluded, to provide a baseline against which to measure the impacts of both long term changes such as climate change and activities such as fishing or energy extraction. However, the effects of many activities are not confined to their immediate vicinity so designation of MPAs will not necessarily exclude all human impacts. There is also an argument that since the creation of such reserves may entail economic losses, the desire to establish sites for research purposes may not be reason enough in itself to exclude human activities.

Design of an MPA network
There is debate about what MPAs should be intended to protect. At present, most protected areas in the UK are selected to protect rare or valuable species and habitats, such as those covered by the EU Habitats and Birds Directive. But some suggest that MPAs should be ecologically 'representative', that is, they should include examples of common habitats and species too.

Ecosystems are dynamic. Even without human actions, habitats and species will move over time and any individual site is vulnerable to accidental or deliberate damage. Species' ranges will also change in response to climate change (see below). It is likely that in time, many protected areas will no longer contain the species or habitats for which they were originally selected.

These considerations have led many marine scientists to call for marine reserves to be set up within a network. Such reserves would need to be close enough together to allow animals to move between them, and the network would need to cover an area large enough to continue to protect a species as its range shifts.

Issues

The policy mix
Although there is general consensus across Government, industry and environmental groups that marine environmental policy needs to be improved, there is still debate about what would be the most appropriate and effective mix of regulation and guidelines and to what extent the impact of particular industries can be managed through planning and licensing arrangements, rather than excluding them from certain areas altogether.

The Government views MPAs as an important component of marine environmental policy, but believes that the benefits of highly protected reserves have yet to be confirmed. At present, less than 2% of the UK's seas are in an MPA. Some scientists argue that the greatest benefits are gained when as much as 20-40% is protected. In the light of these studies, the Royal Commission on Environmental Pollution has recommended that 30% of the UK's seas should be closed to fishing and Greenpeace is campaigning for 40% of the Baltic and North Seas to be closed to 'extractive' industries such as fishing and aggregates dredging. However, some fishermen's organisations have expressed concern about the impact such large closed areas would have on their industry.

Shared responsibility
Responsibility for the marine environment and activities that go on within it does not always fall solely to the UK Government. For example, shipping is regulated by the International Maritime Organization and fishing is controlled through the EU's Common Fisheries Policy. Marine ecosystems also span national boundaries. Action taken by one Government, therefore, may be effective only if undertaken in cooperation with others.

Lack of knowledge
Although the seas around the UK are among the best-studied in the world, large gaps remain in our knowledge of both the species and habitats that are present in UK waters and the impacts of human activities upon them.

For most marine species, it is difficult to assess the size of their populations or any trends because, with the exception of plankton and commercial fish stocks, there are few systematic sampling programmes. The lack of information is particularly acute for deep waters far from shore because of the very high cost of conducting biological surveys there. Long-term changes, such as those of climate change, can best be understood using

long-term data sets, which can be costly and require long-term investment.

Some scientists argue that information about the geological, physical and chemical characteristics of areas of the sea can, to some extent, be used as a surrogate for more expensive biological data in spatial planning, including in identifying suitable areas for MPAs. This has been called the 'marine landscapes' approach and was tested in the RMNC pilot project in the Irish Sea.

The pilot concluded that it was both possible and practicable to identify and map a comprehensive series of marine landscape types using this approach and that the resulting classification gave a useful overview of the main ecosystem types in the marine environment.[9] Defra is now planning to produce freely available marine landscape maps for all UK waters by April 2006.

In comparison with terrestrial conservation, marine wildlife protection is relatively new and few methods have been in practice for long, so there is still uncertainty about their effectiveness. For example, there are difficulties in assessing how effective MPAs are. There are relatively few well-protected MPAs worldwide and many of the better-known examples are in tropical waters.

There is little experience of using other policy tools either. Apart from the pilot project in the Irish Sea, marine spatial planning has not yet been implemented in any large area of sea; the SEA Directive has only recently come into force; and the practical implementation of the ecosystem approach is still being developed.

Climate change

Climate change presents challenges for the design of any nature conservation measure. It is predicted to result in changes to species' ranges: species adapted to cold waters are expected to move north and species from more southerly warm water areas are expected to colonise British waters. Indeed there is already evidence of such changes from plankton and fish surveys. UK waters may thus have a different suite of 'native' species in the future.

Climate change may also alter the physical characteristics of marine habitats, particularly those close to the coast. Predicted changes in sea level and more frequent storms could change the coastline, with consequent impacts on any conservation efforts that are tied to a particular site.

An increase in carbon dioxide in the atmosphere is also likely to affect the ocean's chemistry. The top layer of seawater has a concentration of atmospheric gases, such as carbon dioxide, similar to that in the air above it. When carbon dioxide dissolves in water a weak acid is formed; an increase in the amount of carbon dioxide in the atmosphere is therefore predicted to increase the acidity of the ocean surface to some extent. An increase in seawater acidity may in turn affect marine organisms. The likely magnitude of any such effects and their impact on other features of the environment are not fully understood.

Adaptive management

It is impossible to have a perfect understanding of marine ecosystems and how to conserve them, because both ecosystems and the demands that people place on them change over time. It has been proposed that management for conservation should be 'adaptive', that is, it should explicitly be an iterative procedure, whereby the ecosystem's responses to changes in management are monitored and the management scheme is modified in the light of those responses.

Overview

- **The systems for marine environmental protection are less well developed than those on land.**
- **Many marine ecosystems are being damaged by some human activities.**
- **Defra and many environmental groups want to move from a sector-by-sector approach to one that considers marine ecosystems as a whole.**
- **Ways of doing this include marine spatial planning and designating marine protected areas.**
- **However, challenges remain, including how to manage activities in the face of uncertain information and how to ensure that any approach to conservation takes account of climate change.**

Endnotes

1 *Review of Marine Nature Conservation. Working Group Report to Government.* Defra. July 2004. Page 13.
2 *Maritime State of Nature Report for England: getting onto an even keel.* Covey & Laffoley, Peterborough, English Nature. 2002
3 http://www.ices.dk
4 *Quality Status Report 2000*, OSPAR Commission. 2000
5 Environment, Food and Rural Affairs Committee, Sixth Report of Session 2003–04, HC 76
6 *Irish Sea Pilot Project Coastal and Marine Spatial Planning Framework: report to the Joint Nature Conservation Committee.* David Tyldesley and Associates. 2004.
7 Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment.
8 http://www.nceas.ucsb.edu/consensus
9 http://www.jncc.gov.uk/ marine/irishsea_pilot/landscapes.htm

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