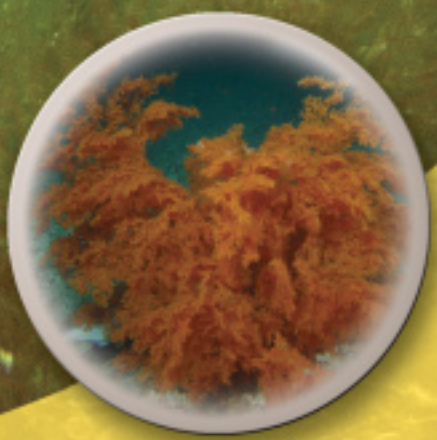
COAST LINE

Creating a Network of Marine Protected Areas in Europe



Marine Protected Areas

- European Marine Strategy
- European Regional Seas
- North East Atlantic
- High Seas

EUC Coastal Union

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Foreword

The Black Sea is one of the most conspicuous examples in the world of long-term, water-quality deterioration showing, at the same time, unexpected and relatively rapid recovery since 1995 due to the economic breakdown of the surrounding countries in a period of transition. The main challenge within the Black Sea basin is to increase economic prosperity without endangering the ecological recovery of the Sea i.e. securing the best outcomes for the human and natural environments together. However, there is always a risk that economic benefit will be prioritised ahead of environmental issues.

The list of protected areas in Black Sea countries is long and includes many wetlands, yet the nominated marine areas are few. Areas of outstanding beauty and value are still awaiting there to be recognised and prioritised for protection measures. In this respect, the recent decision of the Dutch Ministry of Agriculture, Nature and Food Quality to fund a project aimed at developing an indicative, ecologically coherent network of sub-tidal Marine Protected Areas in Bulgaria and Romania is to be lauded. It will be led by EUCC, with the Ministries of Environment of both countries and their foremost institutes, the Institute of Oceanology in Varna and the National Institute for Marine Research and Development in Constanta, together with ourselves at the Black Sea Commission as partners. We are hoping to build on the experience and information within the region, as well as harnessing the experience from the other regional seas, to significantly add this emerging important management tool for our limited marine resources.

The duty of all who care about nature and especially of decision-makers is to draw lines that cannot be crossed. In the case of Protected Areas, the lines are fairly literally meant. Within them specific measures need to be taken with a view to area and biodiversity conservation whilst recognising that many livelihoods such as fishing and tourism are dependent on the state of the marine environment. This valuable edition of Coastline provides useful information on all aspects of marine protected areas, presenting the latest information from the North Atlantic, Baltic, Mediterranean, Black and High Seas. Challenges for the future development in integrated management of protected areas are also outlined. The magazine is a guide to an imaginary journey in a world of splendour and diversity, taking protection as a personal responsibility and inspiring the implementation of guidelines in practice.

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Permanent Secretariat,
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www.blacksea-commission.org

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EUCC - The Coastal Union

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Photo front: Sea horse, *Hippocampus*, Romania (Photo: Dragos Micu)
Insets: jumping Bottlenose dolphin (Photo: Marijke de Boer), diver with underwater video camera (Photo: OSPAR); Red coral, *Leiopathes sp*, Porcupine Bank, Irish continental slope (Photo: © Jason Hall-Spencer /AWI IFREMER)
Background: Sea star, *Solaster endeca*, (Photo Anne Frijsinger & Mat Vestjens)
Photo back page: Kaliakra, Bulgaria (Photo: Valentina Todorova)

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landbouw, natuur en voedselkwaliteit

MPA Networks

Star ascidian, Botryllus schlosseri (Photo: Anne Frijsinger & Mat Vestjens)

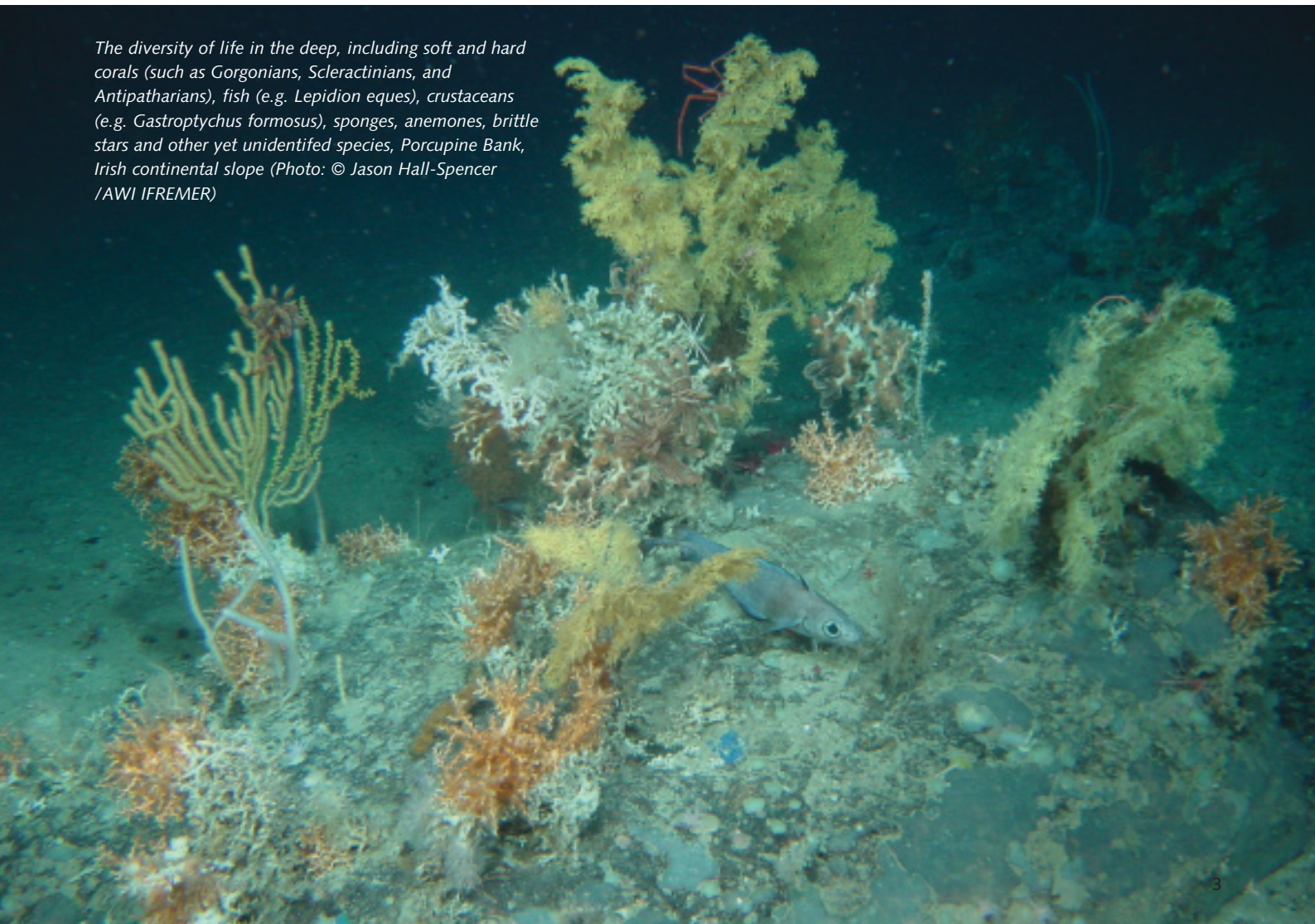
Marine protected areas (MPAs) have been established to meet a number of goals, including managing fisheries and other human activities in the marine, conserving biodiversity and habitat, increasing scientific knowledge, providing educational opportunities, enhancing recreational activities and supporting fish populations. Such areas can provide social and economic benefits by facilitating the sustainable recreational and commercial use of marine fisheries. Ecologically connected networks of marine protected areas could amplify the effectiveness and conservation benefits of each individual area in the network.

We are living at a time of incremental change to ocean ecosystems that is happening on time scales that make it hard for us to realise their nature, extent or magnitude. Marine protected areas (MPAs) and ecological networks have been identified as a critical component of a conservation strategy to halt the loss of biodiversity whilst still providing the opportunity to integrate human uses of the protected resources. Overfishing, damaging pollution, habitat destruction and other impacts of human activities in the sea and from land are causing increasing damage to coastal and marine environments. Current management systems are failing to sustain the productivity, biological diversity and ecosystem services of marine ecosystems.

The goal of an MPA is to protect a specified location from certain human impacts typically to achieve conservation objectives using more stringent regulations. The concept of establishing a network of MPAs is a step beyond the more traditional approach of establishing single, independent MPAs opportunistically. The network concept suggests that the whole is greater than the sum of the parts. Through interconnections and interdependencies, the individual elements of the network contribute positively to each other's integrity by distributing risk and decreasing overall vulnerability. Connections between MPAs may be ecological, socio-economic, or both. Tourism revenues from one easily accessible MPA with charismatic species can cross-subsidise the maintenance costs of another more remote MPA that does not have such values.

MPAs contain valuable economic resources important to local and national economies. Careful management can allow both protection of biodiversity and economic development. Economic benefits of marine protected areas (MPAs) include job creation through harvesting of renewable and non-renewable resources and through use for non-consumptive activities such as tourism and recreation.

With many fisheries on the brink of collapse, fishery managers are looking to MPAs as critical tools in their recovery because MPAs provide several basic benefits including support for stock management (*viz*. protection of specific life stages, such as nursery grounds; protection of critical functions, feeding grounds, spawning grounds; provision of spill-over of an exploited species and provision of dispersion centres for supply of larvae to a



The diversity of life in the deep, including soft and hard corals (such as Gorgonians, Scleractinians, and Antipatharians), fish (e.g. Lepidion eques), crustaceans (e.g. Gastroptychus formosus), sponges, anemones, brittle stars and other yet unidentifed species, Porcupine Bank, Irish continental slope (Photo: © Jason Hall-Spencer /AWI IFREMER)

Catch of a bottom-trawler in the Hatton Bank area of the North Atlantic (Photo © Greenpeace/Kate Davison)

fishery), improved socio-economics for local communities and, ultimately, fisheries stability.

Although MPAs are most often associated with tropical areas, like the Great barrier Reef or the warmer waters of the Caribbean and Mediterranean Seas, extremely fragile cold-water corals are found in more temperate climates at depths ranging from around 40 to more than 1,000 metres, and at temperatures as low as 4°C. Cold-water coral reefs can be very old. Parts of the world's largest reef discovered so far, the Røst Reef in Norway, exceed 8,500 years – dating back to the last Ice Age. They are particularly vulnerable to oil exploration and the rockhopper trawl which can crush a reef into oblivion in a few hours, leaving an empty scar. The Faroer Bank between Scotland and Iceland and the Rockall Bank, northeast of Ireland, are two isolated and self-contained reefs of mainly *Lophelia pertusa* supporting large fish populations and hosting about 300 associated animal groups. The Faroer Bank is an important fishing ground for the Faroer Islands, and although fishing is regulated to preserve stocks there is no management at the depths of the *Lophelia pertusa* communities.

The economic benefits from tourism are also well documented. In most cases, assessments are generally given for tropical and sub-tropical areas leading managers to question whether such benefits accrue in cooler waters. Such benefits, however, are present. The Breidafjordur Conservation Area in West Iceland is aiming to reach a balance between the needs of the natural environment and the needs of Icelanders for sustainable, long-term economic security. Breidafjordur is the spawning ground for some of Iceland's most important economic fish species and its role in conserving and sustaining viable populations of these species is one of the area's primary functions. Cooperation with the fishing industry has been fundamental to the success of these conservation efforts and throughout the designation process dialogue between conservation authorities and the fishing industry was given high priority. Tourism is a growing industry with generation of both local income and employment. For example, from 1993 to 1997 a single tour operator conducted 1,700 sightseeing boat trips and the number of passengers increased from 8,859 to 10,097. Whale watching is also being developed as a tourist attraction. Kelp extraction is widespread and about 10,000–12,000 tons of *Ascophyllum nodosum* is extracted annually to produce about 3,000 tons of kelp meal, and 4,000 tons of *Laminaria digitata* produces 400–500 tons of tangle meal.

Considering the broader benefits of MPAs on coastal and marine ecosystem goods and services as well as education, training, heritage, culture and research, it is difficult to argue against MPA designation as an important management tool.

Alan Pickaver
Head of Policy and Projects,
EUCC

Whale watching, Bottlenose dolphins (Photo: FIRMM)

The position of MPAs in the European Marine Strategy

The marine environment is faced with a number of increasingly severe threats. These include loss or degradation of biodiversity and changes in its structures, loss of habitats, contamination from dangerous substances, the impacts of climate change. In some parts of Europe, the very structures and functions of our seas are being jeopardised. For example, the Northeast Atlantic, the Mediterranean and the Black Sea are three of the world's seven "problem" regions where fish stocks are in greatest need of recovery. The ecology of the Baltic region is threatened by eutrophication. Marine habitats are being destroyed, degraded and disturbed across EU seas.

Captive bluefin tuna inside a transport cage, Mediterranean Sea (Photo © Greenpeace/Gavin Newman)

Europe's marine environment is deteriorating fast

These threats are caused by pressures from various sea-based activities like oil and gas exploration, dredging and extraction of sand and gravel, shipping, commercial fisheries and tourism. Meanwhile, land-based activities (such as agriculture and industry) account for 80% of marine pollution. These pressures are exacerbated by the increasing impact of climate change. For example, the commercial fish species that require colder waters are now being driven northwards as sea temperatures rise.

Urgent efforts are needed to protect Europe's seas and oceans. The aim is to safeguard the long-term productivity of economic and social activities such as fisheries, maritime transport, agriculture, industry, tourism, and coastal and regional development (see "Towards a strategy to protect and conserve the marine environment" COM (2002) 539).

The current institutional framework for managing Europe's marine environment is inadequate

Many of Europe's regional seas are the subject of international conventions - OSPAR for the Northeast Atlantic, HELCOM for the protection of the Baltic Sea, the Barcelona Convention for the Mediterranean and the Bucharest Convention for the Black Sea. These have made excellent contributions to marine protection, but they have few enforcement powers. This can compromise their effectiveness in achieving agreed goals.

At Member State level, progress has also been hampered by the fact that purely national measures cannot influence the activities of other countries bordering a given marine area, and at EU level, action to tackle human activities impacting on the maritime environment has been taken sector by sector rather than holistically.

Finally, there is a chronic lack of knowledge on the marine environment and on the impact and trends of the main uses, and the information that we do have is too fragmented. We need to develop a comprehensive knowledge base as a platform for informed policy-making at all levels of governance.

The EU is determined to protect Europe's marine environment more effectively

The marine environment is by its very nature a trans-boundary issue and so must be managed through co-operation and according to common principles.

On the basis of the EU's 6th Environmental Action Programme 2002-2012, the European Commission adopted in 2005 a Thematic Strategy on the Protection and Conservation of the marine environment including under a legal instrument – Marine Strategy Directive – presently being discussed by the EU Council of Ministers and the European Parliament ("Thematic strategy on the protection and conservation of the marine environment", COM(2005)504 and Proposal for directive establishing a framework for Community action in the field of marine environmental policy, COM(2005)505 final.
The ultimate objective of the EU Marine Strategy as proposed by the European Commission is to achieve "Good Environmental Status" of the marine environment by 2021.

Algae, nearby Karadagsky Nature Reserve, Ukraine (Photos: A. Vershinin)

Background photo: Wadden Sea, the Netherlands (Photo: Sytske Dijksen, Foto Fitis)

Slender seapen, Virgularia mirabilis
(Photo: Anne Frijsinger and Mat Vestjens)

The Marine Thematic Strategy will follow an ecosystem-based approach, considering all pressures and impacts and relying on the best available scientific knowledge about ecosystems and their dynamics. It will therefore bridge the current knowledge gap and result in measures specifically targeted at saving Europe's seas and oceans.

The Strategy combines a European with a regional approach, balancing the need for common approaches across Europe for similar issues with the need to devote dedicated regional attention to regional issues on the basis of Member States' experience in the regional seas conventions. In particular, the Strategy identifies Marine Regions Sub-Regions which are to be used as implementation units at regional level. The marine environment will therefore no longer be managed according to administrative borders, but at the level of environmentally homogeneous regions.

Within each region, Member States will be required to develop Marine Strategies for the waters under their sovereignty or jurisdiction, in close co-operation with one another, and with the non-EU countries concerned. EU Member States already co-operate with non-EU countries under regional conventions, and these can be natural vehicles for co-operation in implementing the EU Marine Strategy.

Marine Strategies to be devised will include programmes of measures to be based on a detailed assessment of the state of marine ecosystems and clearly defined environmental targets and monitoring programmes. The designation of Marine Protected Areas may be considered in the framework of these programmes of measures. Indeed, additional protected areas and even closed natural reserves may need to be established in order to achieve the objective of the proposed Directive. Marine Protected Areas should however only be established when they can make a direct contribution to achieving the objective of 'Good Environmental Status'. They should not be created for their own sake - they should be seen as a means, not an end.

Finally, the EU Marine Strategy will deliver the environmental pillar of the broader EU Maritime Policy. The objective of the future EU Maritime Policy is to develop a dynamic maritime economy in harmony with the marine environment. A Green Paper adopted in June 2006 defined the scope and main orientations of the future EU Maritime Policy and opened a one-year period of consultations with stakeholders on the way forward which will end in June 2007 and guide the further development of the future EU Maritime Policy (see http://ec.europa.eu/maritimeaffairs/policy_en.html#com).

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European Commission
Environment Directorate-General
Brussels

Crinoids, "sea lilies" or "feather-stars", are echinoderms that live both in shallow water and in depths as great as 6000 meters (©IFREMER)

The OSPAR Network of MPAs: present status and future challenges

Atlantic puffin with Sandeel, Fratercula arctica (Photo: Erik Wanders)

OSPAR is the mechanism by which fifteen gouvernements of the western coasts and catchments of Europe, together with the European Community (known collectively as Contracting Parties), cooperate to protect the marine environment of the North-East Atlantic. It began in 1972 with the Oslo Convention against dumping. It was broadened to cover land-based sources and the offshore industry by the Paris Convention of 1974. These two conventions were unified, up-dated and extended by the OSPAR (Oslo-Paris) Convention of 1992. The Annex V on biodiversity and ecosystems was adopted in 1998, which has allowed for a number of biodiversity related activities including the development of marine protected areas. However, OSPAR does not have direct regulatory authority over fisheries, and thus is only able to draw attention to possible fisheries issues.

Background

The ministers for the environment of the member states of the OSPAR and Helsinki conventions agreed in 2003 to identify the first set of Marine Protected Areas (MPAs) by 2006, establish what gaps then remain and complete by 2010 a joint network of well-managed marine protected areas that, together with the Natura 2000 network, is ecologically coherent. Earlier, the European Community decided to include the marine environment in its Natura 2000 protected area network and recently further agreed to include MPAs of the Exclusive Economical Zones (EEZs) of its member states by 2008, with management measures implemented by 2012. This meshes well with the global agreement of the World Summit of Sustainable Development (WSSD) at Johannesburg, 2002, that called for establishment of a worldwide network of protected areas by 2012.

OSPAR MPAs

It has been agreed that programmes would be developed with a view to:

1. controlling the human activities that have an adverse impact on species and habitats that need to be protected or conserved; or
2. restoring, where practicable, marine areas which have been adversely affected.

These programmes are now underway and include (i) guidance for the selection and the establishment of a system of specific areas and sites which need to be protected and (ii) the management of human activities in these areas and sites. To date, priority has been given to the drawing up of measures for the protection of marine species, habitats or ecological processes that appear to be under immediate threat or subject to rapid decline. OSPAR MPAs in national waters must be put forward by the Contracting Parties. However, not all national MPAs will necessarily become OSPAR MPAs. In the high seas, beyond national jurisdiction, it is understood that all Contracting Parties should agree to an MPA nomination. The first MPA status report was published last year and the second annual report (2006) has been drafted, and is under review. Some of its key findings are:-

OSPAR MPA Nominations: As of Feb. 2007, the following Contracting Parties have reported areas as components of the OSPAR network of MPAs: France, Germany, Norway, Portugal, Sweden, and UK. Contracting Parties that did not report any OSPAR MPAs are: Belgium, Denmark, Iceland, Ireland, the Netherlands, and Spain (Figure 1).

The vast majority of nominated sites fall within territorial waters. Only five sites of the 87 nominated fall within an EEZ (3 Norway, 1 Germany, 2 Sweden). No sites are in areas beyond national jurisdiction. One site (Portugal: Rainbow hydrothermal

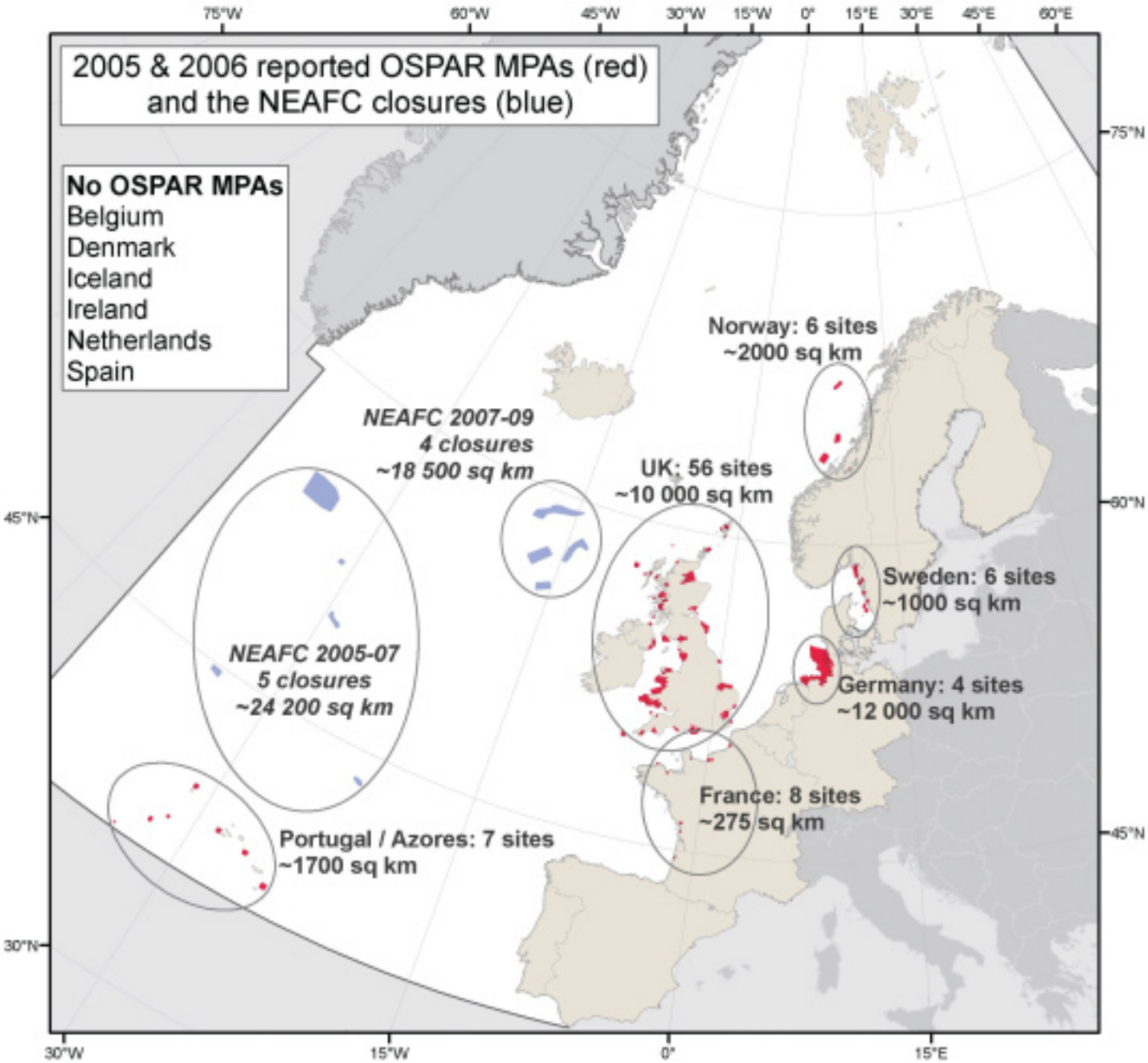
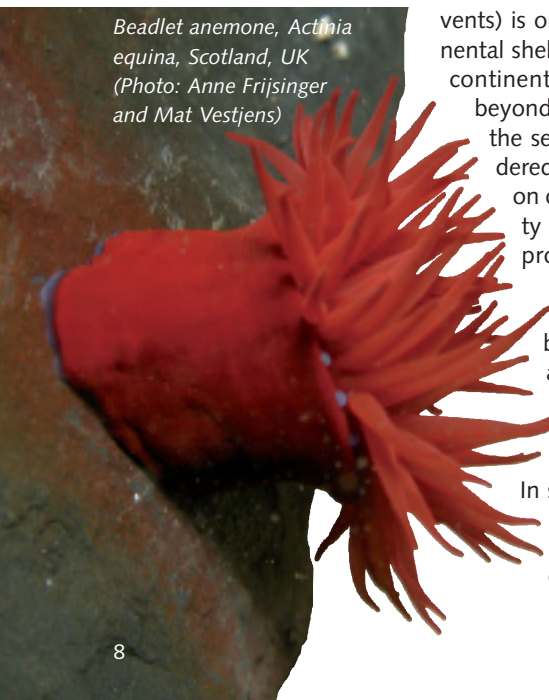


Figure 1: OSPAR MPAs and North East Atlantic fisheries Commission (NEAFC) closures up to Dec. 31 2006. *Notes: To increase visibility, the outlines of the reported OSPAR MPAs (in red) and NEAFC fisheries closures (blue) are outlined slightly larger than to scale. North East Atlantic Fisheries Commission fishery closures are not OSPAR MPAs. French data are © MNHN.*



Beadlet anemone, Actinia equina, Scotland, UK (Photo: Anne Frijsinger and Mat Vestjens)

vents) is on an extended continental shelf. In cases where the continental shelf extends beyond 200 nautical miles, the seafloor may be considered under the jurisdiction of the concerned party (up to 350 nm, as provided by the UN Convention on the Law of the Sea), but the water column above it will already be an area beyond national jurisdiction (ABNJ). In such cases, coordination and cooperation between OSPAR and the relevant Contracting Party(ies), as well as the relevant organisations with management authority over ABNJ in the OSPAR maritime area, is required.

Overall Area: These initial nominations represent about 26,000 square kilometres. In relation to the overall OSPAR maritime area, this is about one quarter of a percent, after icebound areas are removed.

Natura 2000: Of the 81 sites submitted by EU Member States, 78 of them are Natura 2000 sites. Generally, the boundaries are the same as the OSPAR sites; however, four Portuguese nominations have Natura sites that are contained within much larger OSPAR designations; conversely, for the Swedish nominations, the OSPAR sites were sometimes smaller. Of the EU Member States, only Portugal/the Azores has nominated sites that were not wholly Natura 2000 sites, which is an important development. This approach could be seriously considered by other Contracting Parties that are EU Member States.

Future Challenges

Moving beyond Natura 2000: Given that the geographical scope of the OSPAR network is much larger than that of Natura 2000 (including waters of Iceland, Norway, and areas beyond national jurisdiction), and that the ecological criteria for MPA selection within OSPAR are broader (including a different list of threatened and endangered species and habitats), it is expected that if nominations by EU states are limited to existing Natura 2000 sites, exclusively, then it is unlikely that the OSPAR network's ecological goals can be met.

MPAs in areas beyond national jurisdiction ("high seas"): Up to 40% of the OSPAR Maritime Area may be high seas. To date there have not been any MPA nominations by Contracting Parties in the high seas. However, the North East Atlantic Fisheries Commission has closed five seamount/ridge areas until the end of this year (renewal to be reviewed), as well as the Hatton Bank and parts of the Rockall Bank protecting corals until 2010 (Fig. 1). On the 6th of February this year, high seas and deep sea scientists were invited to a special meeting of the OSPAR inter-sessional correspondence group on MPAs to discuss how to begin to look at MPA designations on the high seas. This meeting was an important first step in bringing the scientific community into closer contact with OSPAR regarding activities on marine biodiversity protection and especially MPAs.

Evaluating Ecological Coherence: As the MPA network grows, so will the need to better assess it using agreed criteria. Such criteria already exist in the literature on MPA selection, and four are currently under discussion by OSPAR and HELCOM: adequacy/viability, representativity, replication, and connectivity. Initial assessments should cast light on how well these criteria are being met. Three approaches are being explored by OSPAR, each focussing on different sources of information:

1. *Self-assessment based on expert knowledge.* In this approach, those involved in the design of the particular reserves report subjectively on how well they feel certain criteria were considered in the MPA selection. It is comprised of a checklist and an additive scoring system.
2. *Species-habitat assessment based on reporting.* In this approach, the species and habitats reported to be contained within the reserves are cross-tabulated against biogeographic regions. This involves a spreadsheet approach, where species and habitats may be further grouped according to their ecological characteristics.
3. *Spatial assessment based on GIS data.* In this approach, the overall network is examined based on a set of spatial tests to provide an indication if it is meeting the criteria of ecological coherence.

Each of the above approaches is an attempt to make use of available sources of information, balancing scientific rigour with political and administrative realities. They should be viewed as different tools in a toolbox. All approaches must be realistic in their data requirements and achievable in their execution. As such, any individual guideline might be seen as rather too simplistic to stand on its own; but, when considered altogether, a suite of guidelines can nevertheless produce a valid overall picture of various aspects of reserve design.

Henning von Nordheim, Chair, OSPAR working group on MPAs, Species and Habitats (MASH) & Jeff Ardron, OSPAR Intersessional Correspondence Group on MPAs (ICG-MPA)
German Federal Agency for Nature Conservation, Germany

Common seal, Phoca vitulina vitulina (Photo: OSPAR)

Diver with underwater video camera (Photo: OSPAR)

Cold water corals: Leiopathes sp. (big red coral), Lophelia pertusa and Madrepora oculata (bottom), Porcupine Bank, Irish continental slope (Photo: © Jason Hall-Spencer /AWI IFREMER)

A Network of Baltic Sea Protected Areas

In 1994, the Baltic Marine Environment Protection Commission, HELCOM, adopted a recommendation on a system of coastal and marine Baltic Sea protected areas (HELCOM Recommendation 15/5). It advised the Contracting Parties not only "to take all appropriate measures to establish such a system of BSPAs" but listed 62 marine areas as a first step in establishing such a system.

Plaice, Pleuronects platessa (Photo: RIKZ, NL)

According to the Recommendation (see: www.helcom.fi/Recommendations/en_GB/rec15_5/), a Baltic Sea Protected Area (BSPA) should be a representative, ecological, functional entity for a Baltic Sea region or sub-region or for a Baltic Sea state. In a BSPA, particular protection should be given to the species and natural habitats and nature types of the marine and coastal ecosystems of the Baltic Sea area to conserve biological and genetic diversity and to protect ecological processes. These include areas with high biodiversity, nursery and spawning areas, habitats of endemic, rare or threatened species and communities of fauna and flora as well as habitats of migratory species. In addition, rare or unique or representative geological or geomorphological structures or processes are among the objectives for establishment of a BSPA. By building up a network of BSPAs, HELCOM will ensure that ecological functions are maintained and natural resources are used sustainably.

In 2003, the joint HELCOM/OSPAR Ministerial Meeting decided on a work programme on the creation of a network of marine protected areas in order to ensure that by 2010 there is an ecologically coherent network of well-managed marine protected areas for the maritime areas of both HELCOM and OSPAR (see www.helcom.fi/stc/files/BremenDocs/Joint_MPA_Work_ Programme.pdf).

Since all Members of HELCOM, except Russia, are also EU Member States, HELCOM decided in 2005 that the obligations, which arise from the Birds and Habitats Directives of the European Union or, e.g., the Emerald Network of the Council of Europe, are accepted by HELCOM as adequate implementation measures of HELCOM Recommendation 15/5.

Ecological coherence

The concept of "ecological coherence" is quite widely used nowadays and has been adopted under various fora, e.g. the EC Habitats Directive (1992), the Convention on Biological Diversity (1992) and several regional seas organisations such as the HELCOM and OSPAR. Nevertheless there are very few practical and theoretical examples on the assessment and analyses of the ecological coherence of a network of marine protected areas.

HELCOM has adopted a set of criteria offering theoretical guidance to evaluate the ecological coherence of the BSPA network. Some of the criteria are closely related to the selection criteria mentioned above. In addition, a criterion for an ecologically coherent network is replication of features. Replication refers to the occurrence of the same features (i.e. species, habitats, biotopes) in different sites. Connectivity is also a criterion for ecological coherence. The BSPA network should guarantee sufficient opportunities for the dispersal and migration of species between the protected sites.

Evaluation of the ecological coherence

The evaluation of the ecological coherence of an MPA network is an ambitious task and the lack of information, especially on the distribution of underwater species and habitats as well as on ecological processes, makes such an evaluation particularly difficult. Practically, it is also much easier to say when some network is not ecologically coherent than when it is.

In order to fulfil the 2003 work programme, HELCOM has collected a comprehensive database on the BSPA network. The database is accessible via the Internet (http://bspa.helcom.fi). Its structure is compatible with the NATURA 2000 database

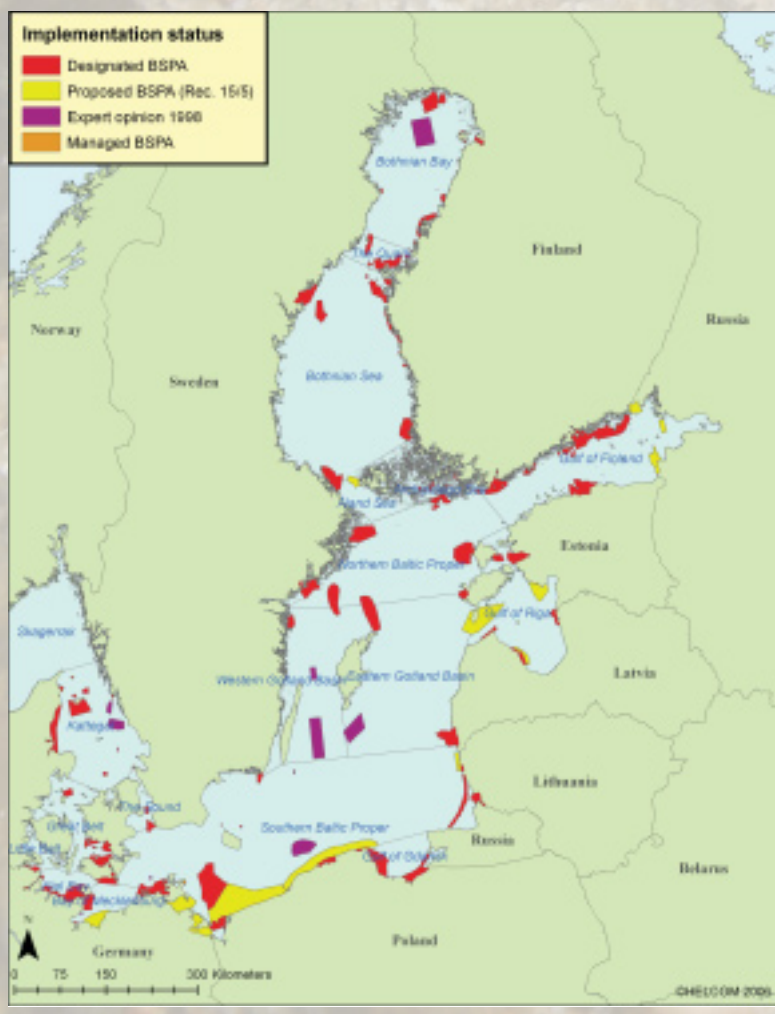


Figure 1. Implementation status of the BSPAs in the HELCOM BSPA Database. Only Designated BSPAs and Managed BSPAs are officially notified by the Contracting Parties as BSPAs.

Background photo: Sandy bottom with shells, Metsähallitus, Finland (Photo: Jan Ekebom)

Young cod, Gadus morhua, hiding on the seabed behind floating seaweed. Baltic Sea (© Greenpeace/Sari Tolvanen)

giving the EU Member States possibility for direct upload of data thus avoiding double reporting. Currently the database includes information on 105 sites of which 76 are officially notified as HELCOM BSPAs. These cover slightly over 6 % of the Baltic Sea area. (Figure 1)

The BSPA network can form a network of areas protecting representative ecosystems, biotopes, habitats and species. Currently the network is predominantly terrestrial and coastal lacking especially offshore sites.

The requirement of "sustainable use of natural resources as an important contribution to ensure ample provident protection of environment and biodiversity" requires clear management of the sites. Currently only one third of the officially notified BSPAs have management plans and an other third has a management plan under preparation. (Figure 1)

The selection criteria for the BSPAs cover well the requirements of a "coherent network" although information, especially on submerged species, habitats and biotopes, do not support the selection criteria.

Management of the BSPAs

The recommendation urges the Contracting States to establish and implement management plans for each BSPA to ensure the sustainable use of the natural resources and also to evaluate and review its effectiveness on a regular basis. The commitment to well-managed MPAs was reaffirmed by the joint 2003 HELCOM/OSPAR Ministerial Meeting.

The 1994 HELCOM Recommendation includes concise guidelines (www.helcom.fi/Recommendations/guidelines/en_GB/guidel_15_5_mgt/) for management of Baltic Sea Protected Areas with an outline for a management plan. In addition, HELCOM has adopted a more comprehensive guidance, "BSAP Planning and Management: Guidelines and Tools", to give practical guidance on the development and implementation of such plans. This publication is currently been finalised.

As stated above, roughly one third of the 76 officially notified BSPAs has a management plan implemented (Figure 1).

Almost 70% of the current management plans cover both marine and terrestrial areas of the BSPA. From the rest of the sites there is either no information (17%) or the management plan covers only the terrestrial part of the site (17%). Management is reviewed periodically for one third of the existing management plans. For one third of the sites management plans are reviewed when necessary and for one third of the existing management plans there is no information on renewal.

The status of BSPAs in Finland

An international team of experts carried out a comprehensive national management efficiency evaluation of the Finnish network of protected areas. This evaluation showed that the management of marine protected areas is poorly developed in Finland, compared to terrestrial protected areas.

The BSPA site "Tammisaari and Hanko Archipelago and Pohjanpitäjänlahti Bay Marine Protection Area" (IUCN Category II and IV) provides a good example of management of a BSPA in Finland. The area is a marine and coastal site. It covers 52630 ha of which 2870 ha is land and the rest marine waters. A large part of the site is a national park, established in 1989, and the area outside the park is protected by the Finnish nature conservation act, or belongs to the government. The vicinity to the Tvärminne Zoological Station has resulted in an abundance of research and monitoring in the area since the beginning of the last century. In some cases surveys have been carried out for the national park specifically. A survey report of the national park's bird fauna was published in 1996, and a survey report of the terrestrial flora in 1997. Survey reports of the marine biodiversity in the national park were published, in 1993 and 1995. Several specific studies for the benefit of the management of the area has been carried out over the years, e.g. a study on the effects of boat anchoring in one of the natural harbours in the area.

The area gained international recognition in 2000 and 2005 by receiving the European Diploma of Protected Areas by the European Council. A part of the marine area also belongs to the

Metsähallitus, Finland (Photos: Jan Ekebom)

Project Aqua network (the Pohjanpitäjänlahti Bay area). Generally, the management of this BSPA is better than for many other BSPAs in Finland. However, when giving the diploma in 2005 the European Council pointed out several matters that need immediate attention.
The management plan for the national park is now in the process of being updated, as are the other issues mentioned above. The new management plan will acknowledge the updated HELCOM BSPA Guidelines for management.

Future trends in the management of BSPAs in Finland?

Despite the new HELCOM guidelines for management of BSPAs, the renewal of the BSPA management plans is not straight-forward. One problem is the lack of survey data from the marine areas. To tackle this problem a national marine biodiversity survey programme "VELMU" was initiated in 2004 to map marine biodiversity mainly by using GIS modelling. A likely scenario is therefore that the general management plans for the BSPAs in Finland will rely more heavily on marine habitat and species maps obtained by GIS modelling while more detailed and accurate maps can be produced for smaller parts of the BSPA sites using data from field surveys. Based on the marine and coastal biodiversity maps, the management, including the protection, of the BSPAs can be:

- more precisely planned,
- more thoroughly justified and, if need be,
- more effectively regulated, and hopefully also
- more easily accepted by the users of the BSPA.

In the future detailed spatial planning of the marine areas is likely to increase as a consequence of implementing the HELCOM Recommendations on ICZM, the HELCOM Baltic Sea Action Plan, and the proposed European Marine Strategy Directive. Zoning of marine areas will probably be more widely used than now and not be restricted to only the BSPA and adjacent marine and coastal areas, as was often the case previously, but instead be a part of larger spatial units, e.g. a sub-region of the Baltic Sea or the entire Baltic Sea. One of HELCOM's goals is to improve the connectivity and representativeness of the BSPAs in order to make these into a genuine network of well managed marine protected areas.

Hanna Paulomäki, Juha-Markku Leppänen, HELCOM, Helsinki, www.helcom.fi;
Jan Ekebom, HELCOM, Metsähallitus, Vantaa

Discarded fishing nets (Photo: Marijke de Boer)

Marine Protected Areas in the Black Sea

In June 2002, the parties to the Bucharest Convention adopted a Protocol on Black Sea Biodiversity and Landscape Conservation (including the Sea of Azov). The six coastal countries (Bulgaria, Georgia, Romania, the Russian Federation, Turkey and Ukraine) aim to maintain the Black Sea ecosystem in a good ecological state and its landscape in a favourable condition; they should protect, preserve and sustainably manage its biological and landscape diversity.

The Black Sea would appear to have all the features required to support a healthy fishing and tourist industry and to fascinate people with its biodiversity and extraordinary landscapes. The reality, however, is somewhat different. The ecosystems are highly sensitive to anthropogenic impact, especially pollution and eutrophication. During the early 1980s, the Black Sea was included in a list of the most ecologically threatened water bodies on Earth. For decades, the coastal zone was heavily polluted with hazardous wastes and excessive nutrient loads gradually destroying its beauty and healthy state. Despite recent improvements, the Black Sea remains in a low energy state.

One way to safeguard the sea and give it the needed time to fully recover is the designation of marine protected areas. Protected areas have already been nominated in all national waters of the bordering states. These areas will increase in time and, with integrated management, a fully developed, functional and efficiently controlled network of specially protected areas in the Black Sea will become a reality.

Black Sea Marine Protected Areas by country

BULGARIA: coastline 378 km.

In Bulgaria, the marine and coast includes 42 designated protected areas, mainly coastal wetlands. Cape Kaliakra was one of the first protected areas in Bulgaria, declared a national park as early as 1941. In 1966 it was designated as a strict nature reserve (53 ha). In 1980 the reserve was extended to its present size of 687.5 ha (400 ha of marine - a stretch of sea 500 m wide and 8 km long - and 287.5 ha of land). In 1983 a buffer zone of 109 ha was included. It is the only Bulgarian reserve protecting a marine area. It is situated at the end of a long and narrow peninsula. The site is famous historically and for its nature and pristine condition.

Limestone cliffs up to 70 m high are crimson–red due to iron oxides. One third of the coastal area comprises natural pastures, steppes, woodlands, bushes and coastal wetlands in a strip along the coast. The entire terrestrial part of the reserve is uncultivated land with natural habitats. The flora encompasses over 450 vascular plants, among which 45 are rare, threatened or endemic species. Kaliakra stands on the autumn migration route of over 220 species birds, 39 of which breed in the reserve.

The marine habitats comprise rocky bottoms overgrown by brown, red and green algae, mussels (*Mytilus* and *Mytilaster*), sponges, colonial ascidians, bryozoans and hydroids. Sandy and

Kaliakra, Bulgaria (Photos: Valentina Todorova)

Sea horse, Hippocampus, Romania (Photo: Dragos Micu)

muddy soft bottoms are dominated by different bivalves. 78 fish species are encountered of which 44 are resident. The limestone is punctured with caves: former refuges of the monk seal, now extinct from the Bulgarian coast.

Regulations in the reserve prohibit fishing, hunting, killing, collecting and harvesting of any fauna and flora, disturbing the wild fauna, destroying bird nests and animal lairs, mining, extraction and excavation, building constructions of any kind, pollution with chemicals and litter, camping and fire making, trampling outside the indicated pathways.

The local human pressures on the area are currently negligible due to a small population, lack of industry, absence of large harbours and minor tourist coastal development. Moderate eutrophication from the Danube has been documented. Tourism is expected to expand significantly in the near future and could significantly increase the human pressure on the coastal and marine environments.

ROMANIA: coastline 244 km.

The Danube Delta Biosphere Reserve hosts an amazing range of habitats and life forms in a relative small area and is a natural genetic bank of biodiversity of incalculable value. It was created in 1990 and now has an administration, management plan and rules for human activities.

The Marine Reserve 2 Mai - Vama Veche was designated in 1980 and confirmed as a protected area in 2000 as part of the National territory arrangement plan. In June 2004, the reserve was put under the custody of the "Grigore Antipa" National Institute for Marine Research and Development, for an initial period of five years to develop a series of activities for appropriate management of the area. The reserve now has a custodian team, a Management Plan and working rules which have been approved by the Ministry of Environment and Water Management.

UKRAINE: coastline 1802 km.

Ukraine has 11 marine protected areas encompassing over 260,000 ha. These are the Danube Biosphere Reserve (46,403 ha), the Black Sea (Chornomorski) Biosphere Reserve (> 100,000 ha), the Dniester-Turunchuk cross river Area – Lower Dniester local reserve (7,600 ha), the Tyligulsky Liman – regio-

Hydroids (Photo: A. Vershinin)

nal landscape park (26,000 ha), the Kinburnska Spit – regional landscape park (18,000 ha), Martyan Cape (240 ha), Karadagsky Nature Reserve (2,874 ha), Opuksky Nature Reserve (1,592 ha), Kazantypsky Nature Reserve (450 ha), Azov-Syvash National Nature Park (57,400 ha) and Zmeiny Island Zoological Reserve of national importance (20.5 ha). The protected aquatic area is about 61% of the total area. These areas are extremely important for biodiversity. The Danube Biosphere Reserve harbours 950 species of plants and more than 5000 species of animals, the Black Sea Biosphere Reserve hosts 851 plant and 4832 animals species, the Azov-Syvash National Nature Park 308 plant and > 5000 animals species and Karadagsky Nature Reserve 2782 plant and 3816 animal species.

Further, 19 wetland sites that belong to Ukrainian Black and Azov Sea coasts, have international importance (Ramsar sites).

RUSSIAN FEDERATION: coastline 1050 km including the Azov Sea.

There are a number of protected areas in the Russian Azov and Black Sea coasts, the most important being the Caucasus biosphere reserve (280,000 ha). Sochi National Park (190,000 ha), natural reserves Krasnaya Gorka (12,000 ha) and Sochinskiy (6,200 ha) on the Black Sea coast and Priazovskiy (42,000 ha), Tamano-Zaporozhskiy (30,000 ha) natural reserves on the Azov Sea coast are of national significance.

Marine Reserve 2 Mai-Vama Veche, Romania

Common jellyfish, Aurelia aurita, Romania

Underwater investigator, Romania

Rocky reef with mussels, Romania (Photos: Dragos Micu).

Common dolphin (Photo: Sergey Krivokhizhin)

Sea horse, Hippocampus (Photo: Oleg Kovtun)

There is only one state reserve on the Black Sea coast that includes a marine part: "Bolshoy Utrish". This was created in 1994 (5112 ha: 2582 ha of land and 2530 ha marine). Designation was aimed at conservation, reproduction and rehabilitation of its relic endemic and rare species and landscapes, maintenance of ecological balance and regulated recreational use of its natural resources.

The coastal flora is represented by relic pistachio and juniper trees, in forests of incredible beauty and diversity. There are about 15 taxa of rare and protected species of vertebrates. The reserve is highly important for reptile conservation. The Mediterranean tortoise is represented by the relic, endemic subspecies *Testudo graeca nikolskii* (Nikolskiy Tortoise).

The marine part of the reserve consists of waters with depths of up to 40 m and extends to 2 km offshore. The sea bottom comprises rocks and caves, valleys, canyons, terraces and a heterogeneous composition of sediments. About 230 species of algae, communities of mussels, crabs and *Rapana sp*. and a great variety of plankton and fish species are registered. It is an area of pristine nature with a special healing potential.

GEORGIA: coastline 316.7 km.

The Kolkheti National Park contains wetlands and marine habitats and is a designated marine protected area among 38 other conservation areas in Georgia. Two more regions (including the marine) are to be specially protected in future.

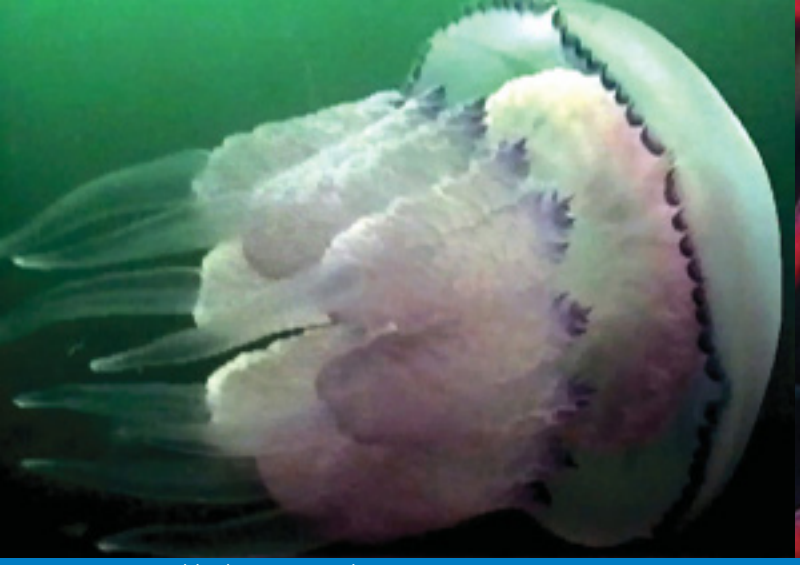
Recognized as an important natural area early in the 20th century, the Kolkheti Nature Reserve was established in 1935. It is a special landscape found nowhere else within Georgia – swampy forests and natural levees dominated by alder (Alnus barbata), coastal sand dunes, fresh and marine waters, wetlands and living peat bogs or mires. It covers almost 29,000 ha land and over 15,000 ha marine with more than 194 species of birds observed, being on the Eurasia/Africa migration route.

TURKEY: coastline 1447 km.

There are several terrestrial protected sites (national parks, nature protection sites etc.) along the Turkish Black Sea Coast. However, no officially recognized marine protected areas are available in Turkish waters. There are two candidate sites to be established as marine protected areas: Kizilirmak Delta and Yesilirmak Delta.

Basin management and ecosystem approach can be easily applied for both sites. Both areas contain freshwater, terrestrial and marine habitats. Therefore, the status of present wetlands and protected areas which have a marine coastline is planned to

Karadagsky Nature Reserve, Ukraine (Photo: A. Vershinin)



Marigold, Rhizostoma pulmo

Sea slater, Idotea sp. (Photos: Oleg Kovtun)

be expanded to include Black Sea coastal waters and to provide the Turkish coast with real integrated coastal zone management for its sustainable development.

Programmes and funds

The Global Environment Fund (GEF), in conjunction with the United Nations Development Programme (UNDP), has been supporting environmental projects on the Black Sea for approximately 15 years. In addition to the Black Sea Ecosystem Recovery Project (BSERP), GEF-UNDP projects also fullfil similar roles for the Danube and Dnipro rivers.

A driving force for the enhancement of the conservation areas along the Black Sea coast of Georgia, for example, was the regional obligations adopted by Georgia after co-signing the international Strategic Action Plan for the Rehabilitation and Protection of the Black Sea. GEF and the World Bank-funded Integrated Coastal Management Project was particularly important in providing the groundwork assistance to Georgia in the establishment of the Kolkheti Protected Areas and the safeguarding of these vast environments for current and hopefully future generations.

The GEF-UNDP approach is aimed at improving the environmental status of targeted water bodies. In the Black Sea this is being done through a variety of means including a Strategic Action Programme (SAP), the first of which was funded/produced by GEF-UNDP in 1996. It represents an agreement between the coastal countries, with a 'programme of measures' focusing on direct discharges and river loads to the Sea. Once the SAP has been agreed upon (scheduled to occur before end 2007), each of the countries will develop national action programmes, taking account of their existing individual investment plans, national legislation and international legislation/agreements to which they are a party (e.g. EU legislation in Bulgaria and Romania).

BSERP also has a funding stream available to support negotiations between Bulgaria and Romania over the establishment of a cross-border Varna-Vecchia MPA. Inventories and mapping exercises of fish spawning, nursery, feeding and over-wintering areas are currently underway, with similar exercises being undertaken for rare invertebrate species.

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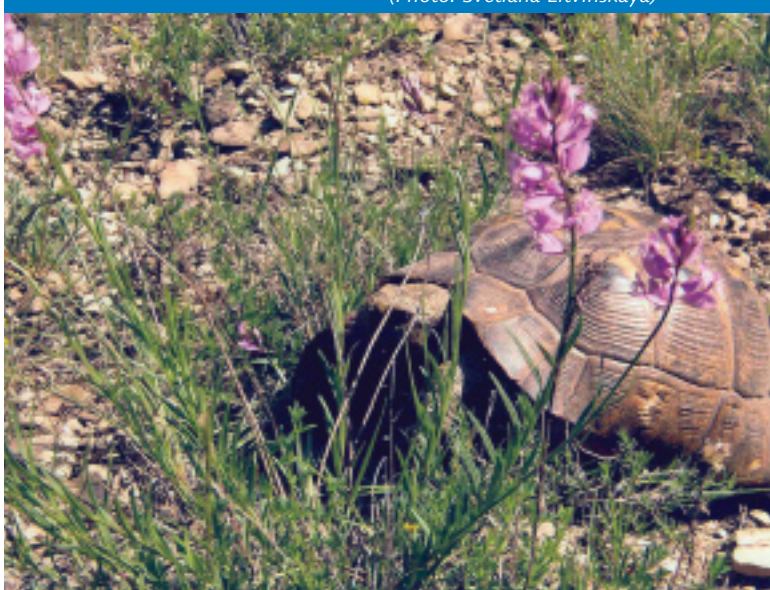
Tania Zaharia & Laura Boicenco, National Institute of Marine Research and Development 'Grigore Antipa', Constanta, Romania;
Boris Alexandrov, Biology Institute of Southern Seas, Odessa, Ukraine;
Katya Antonidze, UNDP-GEF Black Sea Ecosystem Recovery Project Country Team, Russian Federation;
Nino Tskhadadze, Ministry of Environmental Protection, Georgia;
Arda Tonay, Marine Research Foundation, Turkey;
Bill Parr & Yegor Volovik, UNDP-GEF Black Sea Ecosystem Recovery Project, Turkey, Aybars Altiparmak, Ministry of Environment and Forestry of Turkey.
Violeta Velikova, Black Sea Permanent Secretariat.

The rare endemic Sweetvetch, Hedysarum candidum, grows in Georgia, Ukraine and Russia; Russian Federation (Photo: Svetlana Litvinskaya)

Relic, endemic subspecies of the Mediterranean turtle Nikolskiy Tortoise, Testudo graeca nikolskii, Russian Federation (Photo: Svetlana Litvinskaya)



Well managed MPAs will require Ecological Quality Objectives

Once MPAs have been designated, it is important to ensure the long-term sustainability and thus the socio-economic activities that depend on them. For optimal results, MPAs will need to be managed according to the Ecosystem Appoach in order to protect the marine environment. A major aspect of this approach is the use of Ecological Quality Objectives (EcoQOs).

The Ecosystem Approach forms an integral part of the Marine Strategy Directive, which is currently under elaboration by the European Commission. However, applying these principles require operational tools.

What are EcoQOs?

Ecological Quality Objectives are a tool to support the application of the 'Ecosystem Approach' to the management of human activities affecting the marine environment. Both OSPAR and HELCOM are working on their application with respect to aspects of marine pollution in the North and Baltic Seas.
Some EcoQOs are linked to a single human activity and enable the evaluation of the management actions taken to regulate the activity. Other EcoQOs may indicate a change in the environmental conditions that may not be a result of a single human activity. Seal populations, for example, may change due to virus infections or habitat changes.
Where EcoQO values are met, the marine ecosystem is considered to be in a healthy condition. Where they are not met, the responsible authorities should take appropriate steps, as better enforcement of regulations or research to identify causes and encourage preventive actions.
An overview of the currently available EcoQOs which are specific to the North Sea is given in the table.

An example of the application of the EcoQO method on Oiled Guillemots

The Ecological Quality Objective is: The average proportion of oiled Common-Guillemots in all winter months (November to April) should be 10% or less of the total found dead or dying in each of 15 areas of the North Sea over a period of at least 5 years.
When oil slicks occur at sea, seabirds may become oiled, die and get washed ashore. Common Guillemots have been selected as an indicator species because they are highly vulnerable to oil pollution and are sufficiently abundant and widespread in the North Sea to allow large enough sample sizes to be measured each winter in all participating countries. Systematic beached bird surveys (BBS) provide information regarding species composition and the percentage of birds that have died as a result of oiling. In most countries bordering the North Sea, BBS have been conducted since the early 1960s.
Over 50% of the Guillemots found dead on beaches are oiled. Stricter enforcement of current regulations, in combination with further measures to minimise chronic oil pollution at sea (prevention, education and effective oil recovery) will be required to reduce oil related mortality among guillemots and other sea birds.

Peter Heslenfeld, Ministry of Transport, Public Works and Water Management, North Sea Directorate, Netherlands.

Oil victim, common guillemot, Uria aalge
(Photo: J.A. van Franeker)

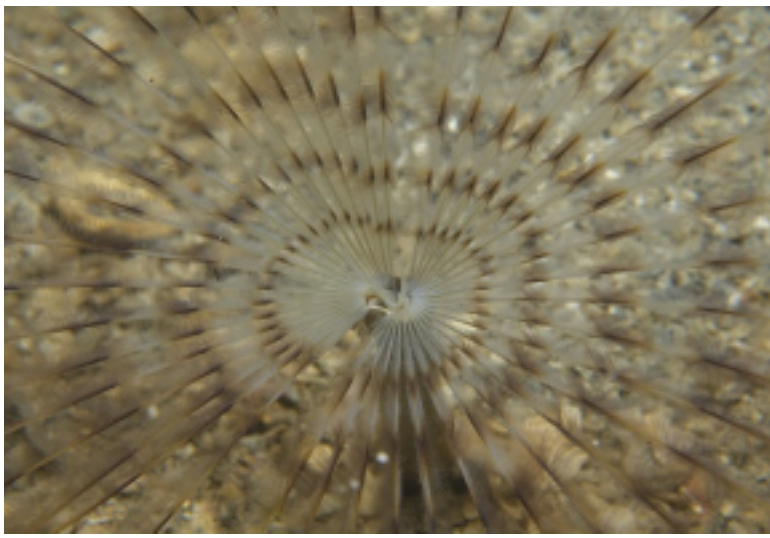
Stranded harbour porpoise, Phocoena phocoena
(Photo: Jan Haelters)

Overview of current EcoQOs for the North Sea (OSPAR)

Ecological Quality Issue	Ecological Quality Objective
Commercial fish species	Maintain the spawning stock biomass above precautionary reference points for commercial fish stocks agreed by the competent authority for fisheries management.
Marine mammals	Seal Population Trends (a) There should be no decline in harbour seal population size of ≥10% within any of nine sub-units of the North Sea. (b) There should be no decline in pup production of grey seals of ≥10% within any of nine sub-units of the North Sea.
	Annual by-catch of harbour porpoises should be reduced to below 1.7% of the best population estimate.
Seabirds	The proportion of oiled common guillemots should be 10% or less of the total found dead or dying in all areas of the North Sea.
	Additional seabird EcoQOs are under development for contaminant concentrations in seabird eggs, and plastic particles in seabird stomachs and local sand eel availability for black legged kittiwakes.
Fish communities	Under development
Benthic communities	The average level of imposex (development of male characteristics by females) in female dog whelks or other selected gastropods should be consistent with specified levels.
Plankton community	See Eutrophication EcoQOs
Threatened and/or declining species	Under development
Threatened and/or declining habitats	Under development
Eutrophication	All parts of the North Sea should have the status of non-problem areas with regard to eutrophication by 2010
	Winter concentrations of dissolved inorganic nitrogen and phosphate should remain below specified limits.
	Maximum and mean phytoplankton chlorophyll a concentrations during the growing season should remain below specified limits
	Area-specific phytoplankton species that are indicators of eutrophication should remain below specified limits
	Oxygen concentration should remain above specified limits.
	There should be no kills in benthic animal species as a result of oxygen deficiency and/or toxic phytoplankton species.

Prioritising the protection of under-represented habitats in the Mediterranean

In the Mediterranean, identifying sites to be protected should prioritise areas and habitats that are ecologically representative and are of special Mediterranean importance as approximately 26% of Mediterranean species are endemic. However, issues of multi-jurisdictional governance are politically complex as territorial waters in many Mediterranean countries extend only 12nm because traditional Exclusive Economic Zone (EEZ) boundaries would prove intractable. Nonetheless, some marine protected areas have successfully been established, with the first, the Mljet Island National Park in ex-Yugoslavia, as early as 1960. According to the most accurate and recent estimate, there are 70 marine areas under some type of protection or management of which all but one are coastal. The majority (56) are located in the northern Mediterranean, ten are in the eastern Mediterranean countries of Turkey, Syria, Lebanon, Cyprus, and Israel while only 4 marine protected areas are located in the Southern Mediterranean region and are found in Morocco, Algeria, and Tunisia. Throughout the Mediterranean deep sea habitats are conspicuously under-represented.



Peacock worm, Sabella pavonina
(Photo: Anne Frijsinger and Mat Vestjens)

Mediterranean challenges

The Southern and Eastern Mediterranean coasts are both ecologically and socially unique within the region and therefore merit distinct representation and protection. Particular oceanographic conditions (temperature, salinity, bathymetry, and topography) and low levels of human development cause species diversity and habitats of the eastern and southern Mediterranean to be different to those in the Western and Northern Mediterranean. For example, between the Gulf of Gabes (Tunisia) and the Gulf of Sirte (Libya) lies more than 1,500 km^2 of sea grass meadows, the largest in the Mediterranean, providing food and shelter to a multitude of species. All major nesting sites for the sea turtles *Caretta caretta* and *Chelonia mydas* are in the eastern basin - Cyprus, Greece, Turkey, Egypt and Libya - where remote and unexploited sandy beaches are found. However, relatively underdeveloped areas (and human associated impacts) of the Southern and Eastern Mediterranean are set to grow at an unprecedented pace in the next decades. For instance, the number of international tourists visiting these areas may well reach 100 million per year by 2025, constituting 25% of international tourism and 50% of national tourism in the Mediterranean.

Apart from the Pelagos Marine Sanctuary, high seas MPAs do not exist in the Mediterranean. Protection in the high seas should first focus on deep sea communities because they contain a high level of endemic species and unique but extremely vulnerable habitat. Deep sea species mainly inhabit continental slopes, submarine canyons, and seamounts. The low food input to the deep sea results in scarce food resources, high food partitioning, highly diversified diets, and very complex trophic webs. Assemblages in water deeper than 200m exhibit extremely low productivity and as such may be particularly vulnerable to human influences such as:

- removal of top predators through fishing, and removal of habitat forming species such as gorgonian (e.g. *Isidella elongate*) and cold water coral species (e.g. *Lophelia pertusa* and *Madrepora oculata*) through deep sea trawling,

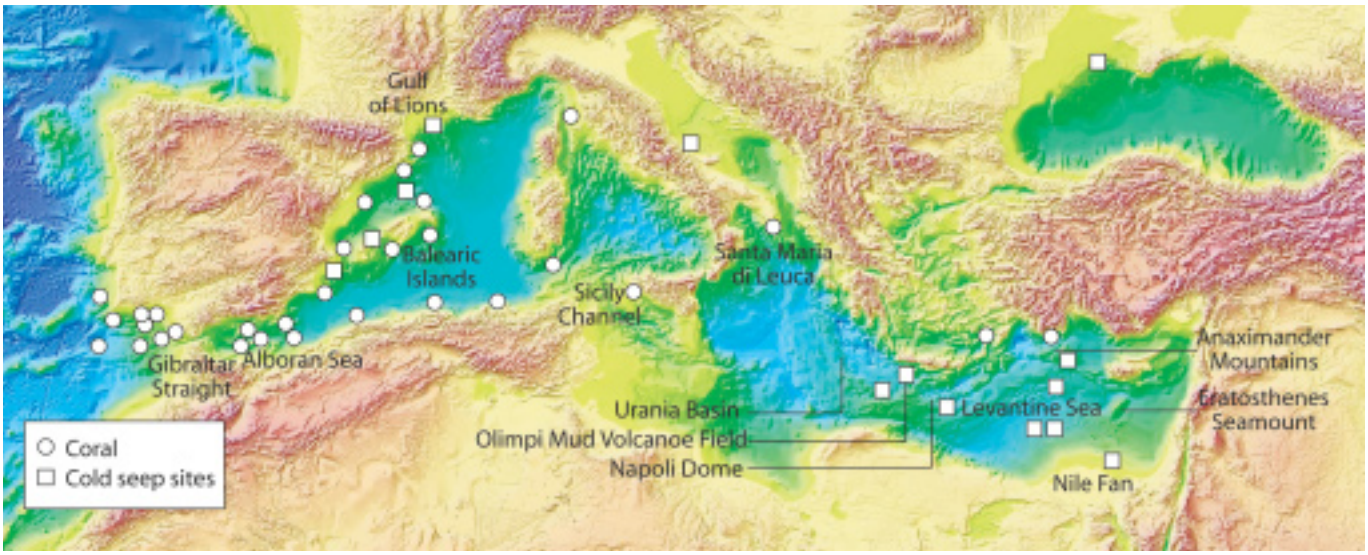


Figure 1. Deep sea sites that represent unique ecological communities.

Yellow gorgonian, Eunicella cavolinii, Adriatic Sea
(Photo: Anne Frijsinger and Mat Vestjens)

- modification of trophic links between species in food webs through the discarding of bycatch and subsequent and unorthodox use by species, accumulation of heavy metals and toxins in specific areas of deep sea due to marine pollution that is channelled by submarine canyons, and lastly,
- global climate change will affect the quality and quantity of food that reaches deep sea communities.

The way forward

The need to increase the number of protected habitats and the quality of protection in underrepresented Mediterranean areas is apparent. Although more than twenty sites have been identified by countries of the Southern and Eastern Mediterranean as unique and important habitats in need of protection, little progress in protection has occurred in the last 15 years. There is an urgent need to understand the potential causal factors for the discrepancy in protection between European and non-European MPAs that may include aspects of governance, institutional structures, wealth distribution, social capital, and the knowledge environment. Complementary studies of marine biodiversity must also be initiated in these areas to ensure sound design of marine reserves. These challenges must be addressed in order to enhance the level of protection in southern and eastern Mediterranean coasts. On the high seas much remains to be done.

Although a ban on trawling beneath 1000 meters has been introduced by the General Fisheries Commission for the Mediterranean (GFCM), protection of specific vulnerable sites has not been rapid. A 2004 study by the World Conservation Union (IUCN) and WWF has identified the most important known deep sea sites that need to be addressed (Figure 1). The study proposes a system of deep sea marine protected areas that is representative of these unique habitats and based on a distribution of 35 unique, deep-sea communities in the Mediterranean. In 2005, the GFCM banned trawling on three sites (shallower than 1000 meters) which include the *Lophelia* reef off Capo Santa Maria di Leuca, the Nile delta cold hydrocarbon seeps, and the Erastothemes seamount. More deep sea sites will be proposed for protection to the GFCM with the most unique high and deep sea ecosystems associated with cold seeps, brine pools, cold water coral mounds, and sea mounts. An important criterion in the identification of potential MPAs in the deep sea will be the type and number of endemic species in an area.

Without more and better managed MPAs in the deep sea, Southern and Eastern Mediterranean, the current assemblage of MPAs can not ensure that all representative ecological components continue to contribute to the overall health of the Mediterranean ecosystem.

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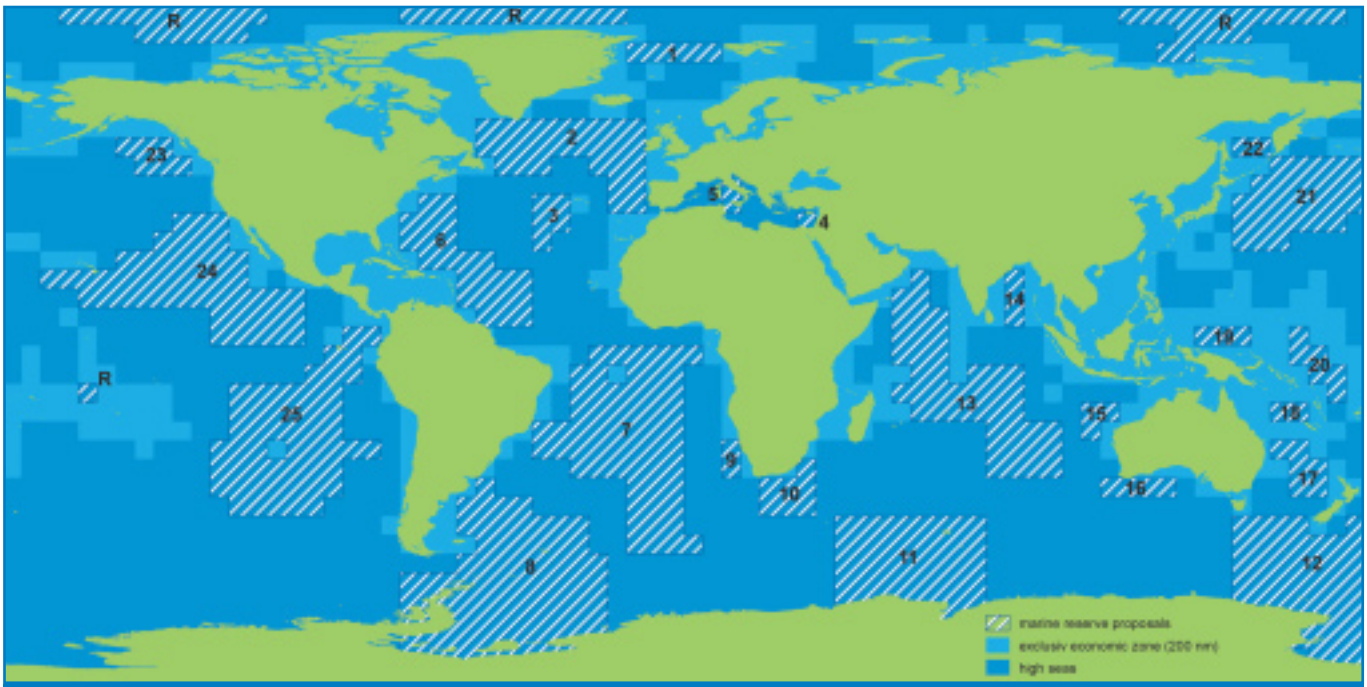
Typical marine habitat of the Northwestern Coast of Egypt
(Photo: Ameer Abdulla)

A Marine Reserve Network for the High Seas

A school of Jacks, Philippines (© Greenpeace/Gavin Newman)

Greenpeace has proposed a network of twenty-nine separate marine reserves for the high seas that together represent the full range of biodiversity living in the open oceans. Establishing a global network is eminently feasible but would require a new mechanism under the existing international framework provided by the UN Convention on the Law Of the Sea.

The world's oceans, once thought inexhaustible, are under increasing threat. In recent years, scientific study after scientific study has pointed to the fact that human activities and fishing in particular have been putting extreme pressure on marine ecosystems to the point that profound ecosystem changes are being experienced in many parts of the world, such as the blooms of jellyfish that have occurred in the once fish-rich waters off Namibia. Last November an international group of ecologists and economists, led by Boris Worm of Dalhousie University, published a study that brought the extent of this degradation into stark relief. Looking at marine biodiversity on a global scale, the study shows that loss of marine biodiversity is drastically reducing the ocean's ability to produce seafood, resist diseases, filter pollutants and rebound from stresses such as over-fishing and climate change. The team's projection that all commercial and seafood species will collapse by 2048 was shocking enough to make news headlines across the world.
The study however was not all doom and gloom, for it also showed that closing areas to fisheries and establishing marine reserves increases the species found in these areas and boosts catch per unit effort in adjacent waters. The study should be a warning bell to us all. If we take action now, the oceans possess



Roadmap to recovery: a proposal for a global network of marine reserves

(1) Greenland Sea (2) North Atlantic (3) Azores/Mid-Atlantic Ridge (4) Eastern Mediterranean (5) Central Mediterranean (6) Sargasso Sea/Western Atlantic (7) South-Central Atlantic (8) Antarctic-Patagonia (9) Vema Seamount-Benguela (10) South Africa - Agulhas Current (11) Southern Ocean (12) Southern Ocean - Australia/New Zealand (13) Central Indian Ocean - Arabian Sea (14) Bay of Bengal (15) Northwestern Australia (16) South Australia (17) Lord Howe Rise and Norfolk Ridge (18) Coral Sea (19) Northern New Guinea (20) Western Pacific (21) Kuroshi-Oyashio Confluence (22) Sea of Okhotsk (23) Gulf of Alaska (24) Northeastern Pacific (25) Southeastern Pacific (R) Representative Areas.

Polar bear on ice flow United States of America (USA) (© Greenpeace/Daniel Beltrá)

Walrus on ice flow. United States of Ame

the potential to rebound. If we do nothing then we will witness further fisheries collapses until there is nothing left to fish, except perhaps jellyfish.

The scientific evidence that marine reserves i.e. highly protected areas that are off limits to all extractive and destructive uses, including fishing, may provide a range of conservation and fisheries benefits is growing all the time. They are the most powerful tool available for the conservation of ocean wildlife and may also benefit fisheries by promoting the recovery and reproduction of exploited species. They are also equally applicable to all ocean ecosystems. For these reasons Greenpeace is campaigning for the establishment of a global network of marine reserves and has put forward proposals for regional networks in the North, Baltic and Mediterranean Seas.

While the concept of putting areas off-limits in the form of National Parks etc. is well established on land, there are very few marine protected areas (MPAs) of any kind, let alone fully-protected marine reserves. Those that do exist are in country EEZs while the high seas, which cover 64% of the area of the oceans and nearly half the surface of the planet, are devoid of protection. This is despite the fact that the high seas are a global commons, under the stewardship of the United Nations Convention on the Law of the Sea (UNCLOS) for the benefit of all nations, and in need of urgent protection. For as coastal resources have been wiped out and technology has advanced, areas that were once unreachable and provided natural sanctuaries for marine life are now open to exploitation.

In late 2005, Greenpeace commissioned Professor Callum Roberts and his team at York University to design a marine reserve network for the high seas that would protect the full variety of life that they contain. In particular, the proposed network would aim to protect both those areas that are biologically rich, supporting outstanding concentrations of animals and plants and those places that are particularly threatened or vulnerable to present or possible future human impacts, like fishing or seabed mining.

To achieve these aims, the team brought together a mass of different kinds of biological, physical and oceanographic data. Data on oceanographic features like water temperature gradients and upwelling areas, together with fishery and tracking data on oceanic megafauna, enabled the team to identify places that are hotspots of activity on the high seas for large-bodied and vulnerable species. They included tunas and billfish, albatrosses, turtles, pinnipeds (seals and sealions) and penguins, animal groups whose ranges cover the seas from pole to pole. To this the team added maps of cetacean diversity. To ensure that the network is representative, data on the distribution of different biogeographic areas, depth zones, seabed sediment types and ocean trenches was used to represent the variety of habitats and their variation across the globe. Particular attention was paid to highly sensitive deepwater habitats, using maps of seamount distribution and bathymetry to identify places vulnerable to harm by bottom fishing. The team also used bathymetric data to calculate seabed complexity, which helps in identifying biologically rich places in the deep sea. All data were mapped using a geographic information system and gridded into 5° latitude by 5° longitude cells, the size of the smallest marine reserves that the experts considered to be viable in the high seas.

Dauin Marine Reserve, Philippines (© Greenpeace/Gavin Newman)

Sea star Hacelia attenuata and algae, Montecristo Island, Italy (© Greenpeace/Roger Grace)

Orcas, Orcinus orca

rica (USA) (© Greenpeace/Daniel Beltrá)

Wandering albatross, Southern Ocean, New Zealand (© Greenpeace / Roger Grace)

The eventual network design (see fig 1.) was designed with both the help of more than 60 experts and the computer programme Marxan which derives different network designs that will meet required conservation targets while minimising costs. The map and accompanying report were released in March 2006 at the meeting of the Convention of Biological Diversity (CBD) which has a goal of establishing a comprehensive global network of protected areas by 2012.

The proposed network includes twenty-nine separate marine reserves that together encompass 40.8% of the area of the world's oceans and represent the full range of high seas biodiversity. However as more data becomes available it may be necessary to refine the boundaries.

One key as aspect of the reserve network is its scale. For a reserve network to be effective it must be large enough to sustain species and ecological processes over time. Research indicates that protecting between twenty and fifty percent of the sea will maximise benefits to fisheries. Taking these factors into account, Greenpeace is calling for 40% of the oceans to be designated as fully-protected marine reserves. This demand is in line with that recommended by the World Parks Congress in Durban 2003 - i.e. that "networks should be extensive and include strictly protected areas that amount to at least 20-30% of each habitat." The term 'at least' is important as the World Parks Congress clearly recognised that some habitats will need a greater proportion protected than others. For isolated and regionally rare habitats it will be necessary to ensure that a greater proportion of those habitats are given protection as they will need to be self-sustaining.

Urgent action is needed from the global community if we are to reverse current trends and safeguard life on the high seas for the sake of our own and future generations. Although the value of establishing a global network of marine reserves is widely recognised and we now have a vision of what such a network might look like, there is currently no mechanism under the existing international framework provided by UNCLOS and the CBD for implementing such reserves on the high seas. It is Greenpeace's view that the time is now ripe for developing a new implementing agreement under UNCLOS relating to the duties of states to cooperate in protection of the marine environment on the high seas. Such an implementing agreement would be legally binding and, as well as harmonising institutional mandates and improving coordination, could provide the framework for establishing high seas marine reserves. Establishing a global network is no small task but eminently feasible, providing of course that there is the political will to make it happen. Greenpeace is actively campaigning around the world to make such a network a reality because our children and our children's children deserve nothing less than clean and healthy oceans, oceans full of whales and fish and all the other myriad of incredible marine life.

Richard Page,
Oceans Campaigner,
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Unique coral reefs, Red Sea, Egypt (© Greenpeace/Marco Care)

Dauin Marine Reserve, Philippines (© Greenpeace/Gavin Newman)

Common dolphins, Delphinus delphis (Photos Marijke de Boer)

EUCC-led project discovers new marine reef habitat in the Bulgarian Black Sea

"21st June, 2007 dawn: We loaded our heavy diving equipment on the boat and headed off from Primorsko to cape Maslen Nos. We dived 15m deep and there appeared to our sight from the green-blue dusk – huge shadows of irregular shape, edgy, serrated and tunnelled, somewhat frightening like an open toothed maw of a sea monster. From the moment we saw them we were in no doubt that those were not mineral rocks but biogenic reefs. We approached in suspense of what we were going to discover at closer look. Reefs were overgrown by blue mussels, sponges and the red alga, laminated by the olive-green, plate-like talus of brown alga. Crabs, blennies, gobies and scorpion fishes were lurking in the crevices, wrasses and mullets were swimming around. We confirmed that reefs were built of oyster shells (*Ostrea edulis*) and cemented by tubes of serpulid polychaetes. The reef was riddled with the boreholes of the bivalve *Petricola lithophaga*, which thrives there."

"Excited from our finding, we hunted for information. "Ostrak" is how those reefs are called by the fishermen who think the name comes from the Bulgarian word "ostar" meaning sharp and associate it with the edges of oyster shells sticking out from the "rock" below; sharp enough to cut the hands or the neoprene suit of a careless diver. However, the name may originate from "Ostrakon" meaning oyster shell, possibly given by the ancient Greeks."

"Two days later we dived again to be overwhelmed by massive reefs 7m in height, 30m in length and 10m wide extended from 7 - 23m depth. Hovering above the bottom, dwarfed by these colossal biogenic structures which have been built, bit by tiny bit, by Ostrea, for thousands of years, you could not help being impressed."

"The 'Ostrak reef' observed along the Bulgarian Black Sea coast has never been documented and seems to be a unique marine habitat which is not known to occur elsewhere in Europe, or the world, and therefore a habitat of high natural heritage value and conservation importance."

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This expedition was carried out in the framework of the project "Marine Protected Areas in Bulgaria & Romania", led by EUCC - The Coastal Union and supported by the BBI-Matra Action Plan Support Scheme 2005-2008 of the Dutch Ministry of Agriculture, Nature and Food Quality.