

SEAS FOR LIFE

PROTECTED – SUSTAINABLE – SHARED EUROPEAN SEAS BY 2020



environment

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FOREWORD



Janez POTOČNIK
European
Commissioner
for Environment

Europe's seas and oceans are wild and wonderful places. They act as trade routes, they supply food and energy, they are abundant with biodiversity and they perform a vital role in keeping our climate stable. Human activity at sea and in coastal zones is essential to our economic stability. Industries that depend on the sea, such as shipbuilding, fisheries and tourism, contribute billions of euros to the European economy. Emerging sectors such as offshore wind energy and blue biotechnology will play a key role in the future. "Blue Growth" can be one of the EU's primary ambitions for the coming years.

But our activities at sea and on land are disrupting the vulnerable balance of the marine environment. Our seas and oceans are under pressure from pollution, such as oil spills or marine litter, from over-fishing and from climate change. Only a limited number of marine species are now found in favourable conservation status. In other words – for many, too many in fact, future existence is far from certain. As marine resources are depleting, both the natural environment and our economy are affected. We have to protect our ecosystems and their biodiversity now, not only to conserve nature, but also to support the livelihoods of those that depend on them. Long-term sustainability will not happen by itself, it needs the right measures. That is why the European Union has adopted a vital legal instrument, the Marine Strategy Framework Directive, that aims to protect and manage our seas and oceans in a sustainable way. The Directive sets an ambitious objective: it requires Member States to achieve and maintain the good environmental status of European seas and oceans by 2020.

Meeting this objective will entail a wide range of measures: conservation, e.g. by establishing a network of Marine Protected Areas, the sustainable use and integrated management of marine resources, and tools such as Integrated Coastal Zone Management or Maritime Spatial Planning. Close cooperation between all stakeholders will be a crucial factor for success. The seas and oceans are still mysterious and largely unexplored and many knowledge gaps on marine processes and the impact of our activities on the complex marine environment persist. We need to deepen our knowledge to provide the scientific basis for protecting it effectively. Productive, clean and healthy seas by 2020 - this is an ambitious goal and a tough challenge. But our seas and oceans, our ecosystems, our marine-dependent economies, and our citizens, deserve nothing less.



INTRODUCTION

SEAS AND OCEANS: A PRECIOUS RESOURCE...

We all benefit from our seas and oceans. In addition to the more traditional uses like transport, fishing, aquaculture, tourism and recreation, we now have the extraction of minerals, oil and gas, and the use of the sea as a site for wind farms and communication cables. We also enjoy the beauty of open seascapes and distant horizons, the fresh air and the clean coastal and marine environments. Finally, seas support a wealth of wildlife and perform a vital function in keeping our climate stable.



KEY FACTS



TOURISM The sea is the most popular holiday destination for Europeans. According to the World Tourism Organisation, the Mediterranean is the region that receives most tourists in the world.



FISHERIES AND AQUACULTURE In 2007, fisheries and aquaculture production in the EU amounted to over 6.4 million tonnes, or 4.6% of the global total, making the EU the fourth largest producer in the world. In 2009, there were 204 fisheries and aquaculture producers' organisations across the EU, creating the best possible conditions for marketing their products.¹



TRANSPORT Almost 90% of EU foreign trade is seaborne: in 2007, 1 720 million tonnes of cargo were moved by sea. Each year, more than 400 million passengers embark and disembark in European ports. There are about 400 maritime passenger ports and about 1000 freight ports in EU coastal regions.²



ENERGY Offshore wind turbines produce almost 5% of the EU's electricity. In 2010, the offshore wind power sector was a €2.6 billion industry. Offshore capacity has been increasing annually since 2000 and in 2010 it represented 9.5% of all new wind power installations (in MW). Offshore production is forecast to triple from 2010 to 2020.³



ENVIRONMENT Meadows of seagrass around the Mediterranean sequester carbon and produce large quantities of oxygen. They also protect the coast from erosion and act as nursery areas for many crustaceans, molluscs and fish.



OUR SEAS

- The total maritime area under the jurisdiction of EU Member States is larger than the total EU land area.
- The European coastline totals 68,000 km, three times longer than the coastline of Africa.
- Only 5 of the 27 Member States that form the European Union do not have coastlines: Hungary, the Czech Republic, Slovakia, Luxembourg and Austria.
- Almost half of Europe's population lives within 50 km of the sea and regularly uses its resources.

Map of the drainage basins of the regional seas (EEA, 2004)⁴



... BUT UNDER THREAT

First observed in 1990, the round goby is now one of the most common near-shore fish in the southern Baltic Sea. Introduced in ballast water from the Black Sea, it has rapidly adapted to Baltic conditions and in some areas dominates coastal fish populations, such as the flounder. It may transfer toxic substances, accumulated in common mussels, to cod and ultimately to humans.⁵

It is estimated that Europe's marine waters are now home to almost 1,400 alien species (May 2009).



Unsustainable use of our seas threatens the fragile balance of marine ecosystems. Human activities that depend on the sea, such as fishing and tourism, suffer when ecosystems become damaged. We can expect increasingly serious competition for marine resources.

Land-based pollution from urban areas, from industry and from intensive agriculture causes eutrophication (accelerated growth of algae that reduces oxygen levels, disturbing the balance of organisms and the quality of the water), contaminates fish and shellfish, and causes acidification of marine waters and is a source of marine litter.

Growing levels of shipping have a major impact on the marine environment. In addition to emitting greenhouse gases, ships can unintentionally carry alien species such as jellyfish, shellfish and barnacles, which often do not have natural predators in our waters, and can seriously damage ecosystems. Difficult navigation conditions, poor ship maintenance and growing traffic all contribute to accidents, which can be devastating for ecosystems. Oil spills such as the one caused by the *Erika* off the coast of Brittany in 1999 can kill a great number of birds (150,000 in the *Erika* case) and marine mammals and hamper the development of sea plants for years.

Dredging is usually carried out to keep shipping routes navigable, but it is also used to gather sediment in order to replenish sand beaches (to compensate for coastal erosion) or provide aggregate for concrete. Dredging greatly disturbs the sea bed, threatening its integrity and related ecosystems. It can also release toxic chemicals from bottom sediments into the water.

Litter from land-based sources and ships is an increasing problem. Not only does it pollute our beaches but it is also a threat to ecosystems. For instance, 95% of fulmars – a species of seabird – in the North Sea have plastics in their stomach that affect their health and reduce their ability to reproduce and even survive.⁶

Overfishing – Many marine species may be threatened by intense commercial fishing. In 2007, 6.4 million tonnes of fish were caught by EU countries. Particularly vulnerable are long-lived species that only start breeding after a relatively long period of immaturity, including sharks, rays and skates, and many deep-water fish. By-catch (the catching of non-target species) reduces populations of other key species and trawling can damage sea beds. Rising sea temperatures and changes in food web structures from overfishing are thought to be responsible for the recent proliferation of jellyfish in all European seas. They can threaten commercial fisheries, bother swimmers, and affect aquaculture.⁷

Offshore energy production - Ecosystems can be threatened by offshore drilling for oil and gas, and by wind farms. Seismic surveys, exploratory drilling and sinking pilings for foundations all create noise levels that can affect cetaceans, while sea-bed disturbance greatly affects benthic ecosystems. Potential oil or gas leakages from tankers or pipelines and increased shipping traffic pose a potential threat to vulnerable species and habitats. Finally, the decommissioning and cleaning of older sites is a difficult and costly process.



Climate change is likely to exacerbate the impact of these pressures in decades to come. Rising sea levels will wipe out areas of intertidal habitat; increased sea temperatures could alter the distribution of plankton (the base of the marine food web) with knock-on effects for higher predators such as fish. Acidification of seawater (from absorbed CO₂) could reduce the oceans' ability to buffer excess CO₂ in the atmosphere and affect marine organisms, such as corals and molluscs, which use calcium carbonate to make shells and plates. Coastal flooding and erosion are also likely to increase with more frequent extreme weather events.

Where marine species and habitat types have been assessed, the majority were found to be in unfavourable or unknown condition; only 10 % of habitats and 2 % of species were in good condition.¹¹



DID YOU KNOW?

- 88% of Europe's fish stocks are being fished beyond their maximum sustainable yield and 30% are being fished beyond safe biological levels, which means that they may not be able to replenish.⁸
- Bluefin tuna are on the verge of a stock collapse in the Atlantic and Mediterranean due to overfishing and illegal fishing.⁹
- More than 132,000 sea turtles are caught annually in the Mediterranean as a by-catch of fishing: 44,000 of these die accidentally, while many others are killed intentionally.¹⁰



A EUROPEAN RESPONSE TO AN URGENT SITUATION: THE MARINE STRATEGY FRAMEWORK DIRECTIVE (MARINE DIRECTIVE)

The Marine Directive provides the legal impetus for the EU to protect and clean up its seas and oceans as part of an integrated strategy that will enable us to use them sustainably.

The **Marine Directive** was adopted on 17 June 2008 and was due to be transposed into national legislation by 15 July 2010. It establishes an integrated approach to maritime activities and provides a long-term policy vision for Europe's marine environment.

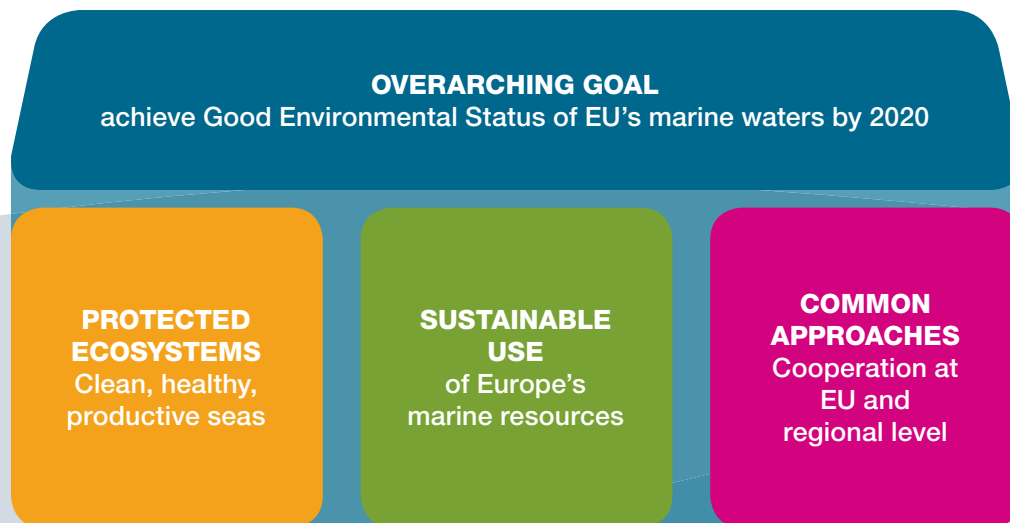


KEY CONCEPTS OF THE MARINE DIRECTIVE

- **PROTECTED:** The overall objective is to achieve or maintain **Good Environmental Status** (GES) of the EU's marine waters by 2020, thus protecting the resources on which marine-related economic and social activities depend.
- **SUSTAINABLE:** The Directive foresees an **ecosystem-based approach** to the management of all human activities that have an impact on the marine environment.
- **COMMON:** The Directive foresees a **regional approach to implementation**, and establishes European Marine Regions on the basis of geographical and environmental criteria. However, Member States must adopt common approaches by:
 - working to a common and ambitious timeline to meet GES by 2020
 - developing Marine Strategies in cooperation with neighbouring countries and, where practical and appropriate, using existing regional cooperation structures, including under regional sea conventions
 - adopting an adaptive management approach so that strategies are kept up-to-date and reviewed every six years.

The Marine Directive is the environmental pillar of the cross-cutting **Integrated Maritime Policy** (IMP), which was presented by the Commission in October 2007. It was the outcome of a European task force established in 2005 to address the problems arising from fragmented management of the EU's maritime areas and so covers all sectors affecting our oceans and seas.

The aim of the IMP is to achieve the full economic potential of the seas in harmony with the marine environment. It is the first time a policy has brought together all the sectors that affect the oceans. Successful implementation of the Marine Directive will be vital if the Integrated Maritime Policy is to be delivered as intended.



OVERARCHING GOAL
achieve GES by 2020

PROTECTED ECOSYSTEMS
Clean, healthy,
productive seas

PROTECTED ECOSYSTEMS

The overarching goal of the Marine Directive is to achieve clean, healthy and productive European seas, and specifically to achieve good environmental status of the EU's marine waters by 2020.

GES DESCRIPTORS IN ANNEX I TO THE DIRECTIVE

1. Biodiversity is maintained
2. Non-indigenous species do not adversely alter the ecosystem
3. The populations of commercial fish species are healthy
4. Elements of food webs ensure long-term abundance and reproduction
5. Eutrophication is minimised
6. Sea floor integrity ensures the functioning of the ecosystem
7. Permanent alteration of hydrographical conditions does not adversely affect the ecosystem
8. Concentrations of contaminants have no effects
9. Contaminants in seafood are within safe levels
10. Marine litter does not cause harm
11. Introduction of energy (including underwater noise) does not adversely affect the ecosystem

ACHIEVE GOOD ENVIRONMENTAL STATUS

The Directive defines **Good Environmental Status (GES)** as “the environmental status of marine waters where these provide ecologically diverse and dynamic oceans and seas which are clean, healthy and productive”. Good Environmental Status means that the different uses made of the marine resources are conducted at a sustainable level, ensuring their continuity for future generations.

In addition, GES means that:

- ecosystems, including their hydro-morphological (i.e. the structure and evolution of the water resources), physical and chemical conditions, are fully functioning and resilient to human-induced environmental change;
- the decline of biodiversity caused by human activities is prevented and biodiversity is protected;
- human activities that introduce substances and energy into the marine environment do not cause pollution, and that noise from human activities is compatible with the marine environment and its ecosystems.

To help Member States interpret what GES means in practice, the Directive sets out, in its Annex I, eleven qualitative descriptors, which describe what the environment will look like when GES has been achieved.



As the descriptors are quite broad, the European Commission in 2010 produced a set of detailed criteria and indicators to help Member States to determine what each descriptor means in practice and to measure progress. Criteria and indicators are distinctive technical features which help make the descriptors more concrete and quantifiable. For instance, Descriptor 3 – The population of commercial fish species is healthy – should be assessed using the following three criteria and indicators:

- Criterion 1:** The level of pressure of fishing activity
> *Indicator: fish mortality*
- Criterion 2:** The reproductive capacity of the stock
> *Indicator: spawning stock biomass*
- Criterion 3:** The population age and size distribution
> *Indicator: high proportion of old, large individuals*

In practice, this means that fishing and other human activities affecting populations of commercially exploited fish and shellfish should not push these populations beyond their maximum sustainable yield (MSY). MSY is defined by the European Environment Agency as the largest yield that can be obtained which does not deplete or damage natural resources irreparably and which leaves the environment in good order for future generations.

Based on these descriptors and the follow-up criteria, Member States have to determine by 2012 the characteristics of what GES means for their own marine waters and set targets accordingly. To do that, Member States must carry out an initial assessment of the state of their marine waters, identifying the main pressures on marine regions, such as pressures arising from human activities or from climate change.

Cooperation among Member States is essential at this early stage, as the Directive requires that GES is defined at the level of the shared marine region (e.g. North-East Atlantic Ocean) or sub-region (e.g. the Bay of Biscay). This is to ensure that achieving GES has the same meaning for countries sharing the same waters. Meeting these requirements will protect renewable marine resources and may require a change in human activity and practices, such as ending the overexploitation of fish resources.



GES: COMMON PRINCIPLES, TAILORED INDICATORS

GES DESCRIPTORS

High level – Generic across Europe

DESCRIPTOR 10

Marine litter does not cause harm to the coastal and marine environment

GES CRITERIA

based on characteristics which define what GES means in each Member State

1. Characteristics of litter in the marine and coastal environment
2. Impacts of litter on marine life

GES INDICATORS AND TARGETS

provide the final level of detail. If the targets are met, GES should be achieved

Indicators:

- Trends in the amount of litter washed ashore and/or deposited on coastlines
- Trends in the amount of litter in the water column (including floating at the surface) and deposited on the sea-floor
- Trends in the amount, distribution and where possible, composition of micro-particles (in particular micro-plastics)
- Trends in the amount and composition of litter ingested by marine animals

Targets (examples):

- X% of overall reduction in the volume of litter on coastlines from 2010 levels by 2020
- Less than X% of northern fulmars (sea birds) having more than 0.1g plastic particles in their stomach
- No increase in micro-plastics by 2020



MAINTAIN BIODIVERSITY

Preventing the decline of biodiversity is a key objective of the Marine Directive.

Maintaining biological diversity is the first of the GES descriptors in the Directive. It applies to species, habitats and ecosystems and means that the quality and occurrence of habitats and the distribution and abundance of species must be maintained and improved, in line with local and regional geographic and climate conditions.

Maintaining biodiversity is essential to achieve GES. The other ten descriptors are all geared towards ensuring that ecosystems, habitats and species are not adversely affected. Biodiversity protection is not just a priority for the Marine Directive: ensuring the favourable conservation status of species, habitats and ecosystems has become a key objective of the European Union and must be integrated into all relevant policies such as the Common Fisheries Policy and European Maritime Transport Policy.

To maintain biodiversity, Member States must develop and implement protection measures, one of which is the establishment of a network of Marine Protected Areas. Marine Protected Areas are designated areas of our oceans, seas and coasts where species and habitats are protected (through legal or other effective means) from activities that are damaging or that cause disturbance to the environment. Activities, which do not have a significant impact on wildlife are unaffected, but other activities such as fishing may be restricted in certain areas, or modified to make them more wildlife-friendly.

Marine Protected Areas, as defined under the Marine Directive, should include Special Areas of Conservation designated under the 'Habitats Directive' (Directive 92/43/EEC) and Special Protection Areas designated under the 'Birds Directive' (Directive 2009/147/EC), both part of the Natura 2000 Network. They should also incorporate other protected areas designated under international or regional agreements, such as the Convention on Biological Diversity. Indeed, almost a third of Europe's protected areas are on the coast. The Marine Directive recognises the importance of Marine Protected Areas and the contribution that they can make to the creation of coherent and representative networks, in line with Article 8 of the Convention on Biological Diversity.



Urdaibai biosphere reserve, Spain



Protected area of Faial, Azores

The Marine Directive recognises the importance of Marine Protected Areas and the contribution that they can make to the creation of coherent and representative networks, in line with Article 8 of the Convention on Biological Diversity.

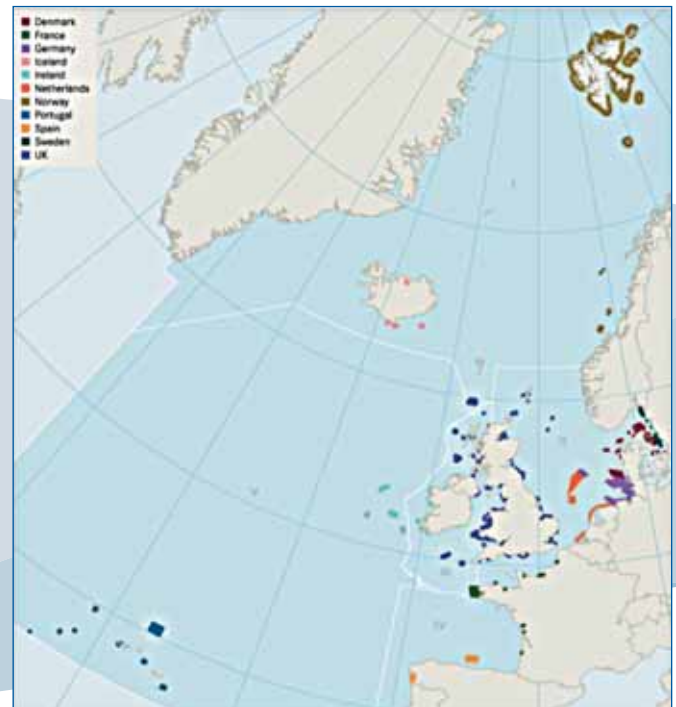
The following map shows the network of marine protected areas already established by the OSPAR Regional Sea Convention (North-East Atlantic).¹²

A Marine Protected Area, or MPA, is an area of sea whose boundaries are drawn in keeping with a long-term nature preservation objective.

There is rarely a single aim, but there is often a link to a local socio-economic development goal, or the MPA may be developed in conjunction with sustainable resource management.

MPAs can be set up to:

- protect or rebuild fish stocks,
- protect biodiversity, including rare or endangered species or habitats,
- maintain the capacities of key ecosystems for fish and shellfish stocks, or for heritage species,
- ensure sustainable management of a natural



ENHANCING OUR KNOWLEDGE

“If we really want to build sustainable policies and practices, we need better knowledge. [...] We need marine research and innovation if we want to make our sick European seas healthy again.”

Janez Potočnik, European Commissioner for Environment

A major challenge in the coming years will be to improve and enrich our scientific knowledge of the marine environment. Researchers from all disciplines are working together to better understand the environmental processes, the impacts of human activities and climate change on marine environments, and the socio-economic aspects of marine life. Among other things, we need to know more about:

- marine environment processes;
- the functional role, evolution, protection and exploitation of marine biodiversity;
- the impact of human activities (land-based and marine) on coastal and marine ecosystems and how to manage these (including via eco-efficient technologies);
- applying an ecosystem approach to resource management and spatial planning so as to come up with the best options for coastal and Maritime Spatial Planning;
- sediments in continental margins and deep seas, gas hydrate behaviour, deep-sea ecosystems and technologies to enhance deep-sea observation.

The Joint Programming Initiative – ‘Healthy and Productive Seas and Oceans’ – specifically dedicated to research on marine issues will develop stronger long-term structures and partnerships to link marine research and marine environment policy. The objective of the programme will be to enhance interaction between the research community and other partners (industry, regional authorities, civil society and other users of the seas) both at national and regional level, and with neighbouring EU countries.

RESEARCH PROJECTS

- OCEAN OF TOMORROW
- HERMIONE: Hotspot Ecosystem Research and Man’s Impact on European Seas;
- KNOWSEAS: Knowledge-based sustainable management for Europe’s seas;
- MARCOM+: Towards an Integrated marine and maritime science community;
- Marine TT: European marine research knowledge transfer and uptake of results;
- MESMA: Monitoring and Evaluation of Spatially Managed Areas;
- ODEMM: Options for Ecosystem-based Marine Management;
- PEGASO: People for Ecosystem-based Governance in Assessing Sustainable Development of Ocean and Coasts.

For more information, visit the Commission’s website on Research & Innovation – Marine Environment. ¹³

LIFE PROJECT - CONSERVATION OF DOLPHINS IN THE BLACK SEA WATERS OF ROMANIA



Bottle-nosed dolphins in the wild

This project was funded under the LIFE programme, the EU's financial instrument supporting environmental and nature conservation projects. The objective was to develop a technical and legal basis for the conservation in the Black Sea off Romanian coasts of three endangered species of dolphin. Extensive killing of dolphins started in the early 1930s. In the 1950s the dolphin population in the whole Black Sea basin was estimated at almost one million. By the 1960s it had dropped to 300 000.

Although the countries surrounding the Black Sea have all forbidden the catching of dolphins, one of the main threats to the population is still accidental catches of dolphins in large fishing nets. Moreover, urban development and industrialisation along the coast, and the subsequent rise in pollution levels, are destroying nurseries, degrading habitat and causing toxic compounds to accumulate in the dolphins.



Danube Delta Biosphere Reserve

Thanks to the project, knowledge of dolphin populations has greatly improved. Dolphin sightings, stranding and incidental takes were systematically recorded with the collaboration of a network of surveyors and volunteers operating along Romania's Black Sea coast. Furthermore, significant steps were made towards the development of a technical and legal basis for strengthening the national regulatory and management framework for the effective conservation of the three endangered species.

This project drew up a national action plan for dolphin conservation with the collaboration of the main stakeholders and authorities involved. It identified the best areas for dolphin protection along the Romanian littoral, namely the marine reserve of Vama Veche-Doi Mai and the Danube Delta Biosphere Reserve. Finally, the project also helped raise local awareness about the conservation of cetaceans by organising numerous activities with the participation of local institutions (dolphinarium, schools, children's clubs, etc.). An annual Dolphin Week was organised featuring exhibitions, theatre performances, drawing competitions, and other activities.

SUSTAINABLE USE

The Marine Directive will ensure the sustainable use of Europe's marine resources and services through an ecosystem-based approach which is integrated and adaptive.

As defined in the Directive, achieving Good Environmental Status (GES) means that the use of marine and coastal environmental resources must be kept at a sustainable level “that safeguards potential uses and activities by current and future generations”. To achieve this goal, the Directive promotes the adoption of an integrated approach to the protection of ecosystems.

On the one hand, as they are drawing up their programmes of measures to implement the Directive and achieve GES by 2020, Member States must take into account the socio-economic effects of the protection measures they are implementing. On the other hand, Member States must make sure that the collective pressure of socio-economic activities does not adversely affect ecosystems and that they are contained within sustainable levels.

They will have to do this by managing competing uses in an integrated way using different tools like:

- **Integrated Coastal Zone Management (ICZM):** the integration of all aspects of the coastal zone, from ecosystems to socio-economic and political factors, in order to achieve sustainability.
- **Maritime Spatial Planning (MSP):** a process for planning and regulating all human uses of the sea, which also sets out to protect the marine ecosystems in which these activities take place and safeguard marine biodiversity.

At the heart of the Directive lie three major concepts that guarantee a sustainable approach to the protection of marine resources:

- > **an ecosystem-based approach to the managing human activities**
- > **the integration of conservation objectives into other policies**
- > **adaptive management for regular review of Marine Strategies.**

OVERARCHING GOAL
achieve GES by 2020

SUSTAINABLE USE
of Europe's
marine resources



Tourist development on the Eastern coast of Malta



Reversal of erosion of Lithuania's Baltic Sea coastline

THE ECOSYSTEM-BASED APPROACH: A TOOL FOR INTEGRATION



The ecosystem approach ensures that the collective pressure of human activities is kept within levels compatible with the achievement of GES, and that the capacity of marine ecosystems to respond to human-induced changes (e.g. climate change) is not compromised. Applying the ecosystem approach should guarantee the sustainable use of marine goods and services by present and future generations. In practice, the ecosystem approach requires to take into account the preservation and enhancement of ecosystems and ecosystem services in the development of socio-economic activities. The costs of human activities on ecosystem services as well as of the benefits of these activities to human society must be systematically assessed.

The ecosystem approach to the management of marine resources is central to the Marine Directive. It promotes environmental protection and sustainable use of living resources and implies that the aims of protecting and restoring the environment should increasingly set the boundaries for sustainable use of the natural environment.

KNOWSEAS - KNOWLEDGE-BASED SUSTAINABLE MANAGEMENT FOR EUROPE'S SEAS

The KnowSeas Project, implemented under the EU's 7th Framework Programme, started from the observation that although Europe's seas suffer from severe environmental degradation due to human pressure, human society is not separate from the marine environment that surrounds it: civilizations are dependent on, and part of, their ecosystems. The ecosystem approach to management, as defined in the Marine Directive, means considering both social systems and the surrounding environment together as parts of a whole. So social sciences (economics) and natural sciences (ecology) need to be applied together to show how we interact with our environment.

The aim of the KnowSeas project is to build a base of scientific knowledge, which can inform the practical choices faced by decision-makers. The outcomes of the project include:

- assessment of the consequences of human pressures on the water quality and ecology of Europe's seas
- evaluation of the benefits derived from goods and services provided by coastal and shelf areas
- evaluation of the costs of human changes to water quality and ecology, including loss of benefits
- a scientifically-based suite of tools to assist policy-makers and regulators with the practical application of the ecosystem approach.



The Marine Directive will ensure the integration of the objective of environmental protection into socio-economic activities and spatial planning. The SEACASE project, presented below, is an example of practical application of the integrated approach. It focuses on a major marine economic activity, aquaculture, which has to reconcile the need to increase production as demand for fish increases in the EU with the need to protect the resources and the environment on which aquaculture depends. According to the Food and Agriculture Organisation, aquaculture, the farming of aquatic organisms such as fish, molluscs, crustaceans and plants, is the fastest growing food production sector in the world. European aquaculture production has increased over the past 15 years, driven by decreasing wild catches and higher demand for fish.

Intensive aquaculture has many adverse impacts on the marine environment, including the alteration of the natural food web structure through the consumption by the fish of fish feed, the eutrophication of waters (i.e. the formation of asphyxiating algae in response to excess fish excretion, faecal waste and nutrients) and pollution of the water column through discharges of nutrients, antibiotics and fungicides.

Traditional extensive and semi-intensive aquaculture systems can help to lower the pressure on the marine environment while providing valuable socio-economic assets. There are many market and non-market benefits associated with these systems, from employment opportunities to environmental protection, including the restoration of areas of particular ecological interest and the maintenance of wetland functionalities. However, in Southern Europe, these production systems face an increasingly competitive market because of the low price of products from intensive aquaculture.

THE SEACASE PROJECT

Sustainable Extensive and Semi-intensive Coastal Aquaculture in Southern Europe (Portugal, Spain, France, Italy and Greece)

The Seacase Project, funded by the EU's 6th Framework Programme aims to support the development of sustainable extensive and semi-intensive aquaculture. The project has a mix of environmental and socio-economic objectives to promote the integration of environmental protection into human activities. Technical improvements, developed to enhance resources conservation and to reduce environmental impact of extensive and semi-intensive farming practices include adaptation to low temperatures, eco-friendly feeds and development of "quality markers" to facilitate traceability. The project also developed a proposal for a Joint European Certification System for products from sustainable non-intensive aquaculture.



Aquaculture in the Mediterranean

HOW TO GET INVOLVED?

The Marine Directive requires Member States to give all interested parties opportunities to comment on each step of the development of Marine Strategies, including:

- a) the initial assessment and determination of GES,
- b) the environmental targets,
- c) the monitoring programmes,
- d) the programmes of measures.

Summaries of these documents must be made available to the public through public consultations, before they are finalised.



MARINE STRATEGIES

Marine Strategies will set out the actions needed to achieve Good Environmental Status (GES) specific to each Member State.

The 22 EU Member States with coastlines have to develop Marine Strategies to ensure the GES of marine regions and sub-regions. They are required to do this in co-operation with neighbouring countries, both inside and outside the EU. The process for developing the strategies is similar to that of the river basin management plans under the Water Framework Directive.

As mentioned, the first step, to be completed by 2012, is to provide an initial assessment of the environmental status of marine waters. This should analyse the predominant pressures and impacts, including human-induced, and include an economic and social analysis of the use of waters and of the cost of degradation of the marine environment.

By 2014, each Member State must establish and implement a monitoring programme to check and test the state of its marine environment on a continuous basis. The outcomes of the monitoring process will allow for the update of the environmental targets. Member States from the same marine region must develop these programmes in cooperation so that transboundary impacts are also monitored.

By 2015, each Member State must develop a coherent and coordinated programme of measures, setting up the necessary actions to achieve GES by 2020 or to keep it at the current level.

The measures, which aim to maintain or achieve GES, should take into consideration key notions including input control (to what extent human activity is permitted), output control (to what extent an ecosystem element can be disturbed), spatial and temporal distribution controls (where and when an activity is permitted), management coordination measures, improvement of marine pollution traceability, economic incentives, and mitigation and remediation tools to restore damaged components of marine ecosystems. Finally, the measures should take into account the involvement of stakeholders and the general public.

ADAPTIVE MANAGEMENT

Adaptive management should be at the center of the development of Marine Strategies and action plans by Member States.

The actions (or measures) taken to implement the Marine Directive and protect marine ecosystems must be flexible enough to adapt to a changing world.

Member States will set up monitoring programmes to measure progress towards GES, using targets and indicators established at national and regional level.

The information coming out of the monitoring process will be used to update Marine Strategies. Measures will then be adapted, when necessary, to take account of this new information and new knowledge.

This adaptive management approach – “learning by doing” – is particularly important as we face many uncertainties concerning the complex functioning of ecosystems and the consequences of climate change on these ecosystems.

Alterations to ecosystems because of climate change are likely to be rapid and difficult to predict. The Marine Directive establishes a clear regulatory framework for adaptation and allows for the regular updating of environmental targets to take into account the changes observed. It allows for integrating the outcomes of future scientific research.

Adaptive management is ensured in the Directive through the obligation for Member States to review their Marine Strategies every six years.



CLIMATE CHANGE AND RESILIENCE

Climate change is already affecting the marine environment and will continue to trigger changes in biological, chemical and physical processes. Such changes can reduce ‘ecosystem resilience’ (the ability of an ecosystem to persist despite disruption and change) to other man-induced pressures, leaving ecosystems increasingly sensitive to disruption. Impacts include rising sea levels, increased sea temperatures, precipitation changes, and ocean acidification.

Although some of the likely impacts of climate change in marine and coastal regions can be anticipated, the extent and location of these impacts is more difficult to predict with any certainty. Little is known for example about the effect of ocean acidification on carbon sequestration and consequential effects on marine foodwebs and ecosystems. Marine Strategies in some coastal areas will need to identify ways of adapting to the effects of global warming and reducing the vulnerability of natural and human systems to the effects of climate change.

MARINE STRATEGY FRAMEWORK DIRECTIVE – MILESTONES AND MANAGEMENT CYCLE

Marine Strategies are not a one-time exercise. Each Member State must keep them up to date and review them every six years using the same steps as they used to draw up the original strategies (Cycle 1). This **adaptive management** approach will ensure that Cycle 2 Marine Strategies take on board lessons learnt from Cycle 1 experiences, are updated to take account of changing conditions, including climate change impacts, and are based on the latest information and understanding as it emerges.

MAIN ELEMENTS OF A MARINE STRATEGY:

- *Initial assessment* of current environmental status of waters and the environmental impact of human activities and socio-economic analysis (by 15 July 2012)
- *Determination* of GES (by 15 July 2012)
- Establishment of environmental *targets* and associated *indicators* (by 15 July 2012)
- Establishment of a *monitoring programme* for ongoing assessment and regular updating of targets (by 15 July 2014)
- Development of a *programme of measures* designed to achieve or maintain GES (by 2015)
- *Review* and preparation of the second cycle (2018 – 2021)



COMMON APPROACHES

Synergies and cooperation at European and regional level will help to develop a common approach and implement coordinated actions to protect our seas

The Marine Directive sets out a regional approach to the management of our seas. It requires Member States to cooperate with their neighbours when developing their Marine Strategies. Sharing our marine waters does not mean sharing only the beauty and the benefits of our seas; it also means addressing together the numerous challenges to be faced in achieving GES. Developing common approaches, pooling resources through experience-sharing, bringing together the best technical expertise and investing in joint research are vital to ensure that Marine Strategies are coherent, consistent and built on the best available scientific and technical advice.

The Directive is an important and complex tool and requires detailed and coordinated input from Member States. In order to facilitate this work, Member States and the European Commission have set up an informal programme of coordination, **the Common Implementation Strategy (CIS)**.

The CIS is composed of different working groups, each of which tackles one aspect of the Directive where coordination is needed. It is based on the model successfully applied for implementing the Water Framework Directive.

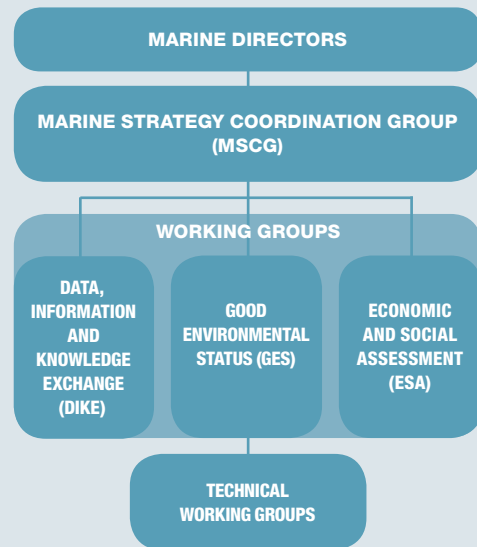
The *Marine Directors* group is the highest level political group and is primarily focussed on ensuring overall implementation of the Directive.

The *Marine Strategic Coordination Group* acts as a link between the Marine Directors and the Working Groups, preparing material for both as required and specifically overseeing the work of the three Working Groups.

OVERARCHING GOAL
achieve GES by 2020

COMMON APPROACHES
Cooperation at EU and regional level

SIMPLIFIED CIS STRUCTURE





Durdle Door, Dorset, UK

Three *Working Groups (WG)* have been established to provide a platform for sharing discussions among Member States to prepare common methods for their implementation of the Directive:

- On Good Environmental Status (WG GES) to help Member States determine what GES means for their marine waters. This includes discussions about the ‘consistency’ and ‘comparability’ of the criteria and methodological standards used to determine GES.
- On Economic and Social Analysis (WG ESA) to develop common methodologies and approaches for Member States to carry out economic and social analysis of the use of their marine waters and of the cost of degradation of the marine environment, as required under the Directive.
- On Data, Information and Knowledge Exchange (WG DIKE) to support Member States with their data reporting obligations, and will lead the development of a WISE-Marine implementation plan and reporting sheets.



In 2007, the European Commission and the European Environment Agency launched the Water Information System for Europe (WISE), a gateway to information on European water issues for the general public and stakeholders. This system has been extended to cover marine waters.

Under the Marine Directive, Member States are required to monitor the measures implemented to reach GES and report on each of the steps taken to establish the Marine Strategies. Sharing data on the state of marine waters and on the pressures and impacts from human activities, climate change, eutrophication, and physical, biological and chemical stressors will ensure there is no duplication of reporting effort and reduce the administrative burden.

WISE-Marine, currently in development, will offer Member States a common platform to facilitate their reporting. It will also allow other actors such as NGOs, intergovernmental organisations, researchers and universities and the general public to access this data.

Two *Technical Working Groups*, focusing on emerging areas of particular concern, underwater noise and litter, have also been set up under WG GES to advise on the standardisation of monitoring methods, prioritise research, and provide a forum to exchange principles and best practice on target setting and assessment methodologies.



BUILDING ON EXISTING LEGISLATION

The Marine Directive builds on existing EU legislation and covers specific elements of the marine environment not addressed in other policies. Some of the key legislation and policies directly relevant to the Directive are described below.

LINKS TO EXISTING EU LEGISLATION AND POLICIES

- The **Water Framework Directive** (2000) is closely linked to the Marine Directive. It sets a goal of achieving Good Status for all EU surface and groundwaters by 2015, tying in with the goal of Good Environmental Status under the Marine Directive. Following an adaptive management approach, it establishes a six-year planning cycle, during which Member States prepare River Basin Management Plans and develop actions and measures to achieve Good Status by 2015. Initial plans were published in 2009 and will be reviewed in 2015. Actions taken will reduce marine pollution from land-based sources and will protect ecosystems in coastal and transitional waters, which are vital spawning grounds for many marine fish species.¹⁴
- The **Habitats and Birds Directives** (1992 and 1979, codified 2009) are Europe's central laws on nature conservation, providing special protection for key sites (the Natura 2000 network), animal species, plant species and habitat types of European importance. This protection will be reinforced with the Marine Directive's Marine Protected Areas.¹⁵
- The **Common Fisheries Policy** (2002) sets out a collaborative approach to managing the EU's shared seas and fisheries. Among other things, it lays down rules to ensure Europe's fisheries are sustainable and do not damage the marine environment. The planned reform in 2011 should take into account the environmental impacts of fishing and the objectives of the Marine Directive to help ensure they are met.¹⁶
- The **Recommendation on Integrated Coastal Zone Management** (2002, to be reviewed in 2011)¹⁷ and the **Roadmap on Maritime Spatial Planning** (2008)¹⁸ define the principles of sound coastal and maritime planning and management. The aim is to promote rational and sustainable use of the sea, balance the socio-economic and environmental interests and improve the quality of decisions.

On an international level, the Marine Directive responds to the EU's international obligations as set out in the **Convention on Biological Diversity** (CBD) and the **United Nations Convention on the Law of the Sea** (UNCLOS). These Conventions require the signatories to integrate the study, the protection and the preservation of their marine resources and biodiversity into the development and management of the policies that affect their marine environment.



Baltic Sea coast in Finland

SUPPORTING EUROPEAN AND INTERNATIONAL COOPERATION

The Marine Directive supports cooperation among Member States and with neighbouring countries that share common waters.

The EU's coastal countries share a number of marine regions and sub-regions. The Directive requires Member States sharing a marine region to cooperate to ensure that the measures implementing the Directive are coherent and coordinated across the marine region. Member States will also have to work with non-EU neighbours with whom they share common seas.

The Submariner project, presented below, is an example of cooperation among the eight Member States of the Baltic Sea Region, which have come together to test and vet new and innovative technological solutions to the problem of growing environmental degradation.

SUSTAINABLE USE OF BALTIC MARINE RESOURCES (SUBMARINER)

The Baltic Sea Region faces severe environmental challenges, including increasing volumes of transport, declines in fish stocks, marine pollution, nutrient input, and the effects of climate change. However, novel technologies and growing scientific knowledge can provide opportunities for new uses of marine ecosystems such as macroalgae cultivation, innovative fish and mussel mariculture solutions, and wave energy.

The purpose of the **Submariner** project (2007-2013) is to pave the way for furthering environmentally friendly and economically appealing innovative uses within the Baltic Sea Region. It will also test these new uses in real conditions, conducting feasibility studies in specific areas, assessing technological and financial needs, estimating impacts on environmental and socioeconomic conditions, and evaluating specific legal constraints.

Cooperation is already taking place through a number of **Regional Sea Conventions**, which bring together Member States and neighbouring states that share marine waters. The Regional Sea Conventions implement progressive action compatible with the requirements of the Marine Directive.



REGIONAL CONVENTIONS



The 1995 **Barcelona Convention** for the Protection of the Marine Environment and the Coastal Region of the Mediterranean, to which the European Union and the countries surrounding the Mediterranean are parties, formulates policies and strategies to protect biodiversity and the marine and coastal environment. A Mediterranean Action Plan (UNEP/MAP) has been developed, to develop a five-year strategic work programme defining key priorities and governance, adopting principles such as the ecosystem approach and tools such as integrated coastal zone management.



The 1992 **Bucharest Convention** on the Protection of the Black Sea against Pollution initiated environmental cooperation in the Black Sea. Its Strategic Action Plan for Environmental Protection and Sustainable Management of the Black Sea is a pillar of regional cooperation, which includes several elements of a Marine Strategy. While the European Union is not yet party to this Convention, an amendment allowing it to participate was proposed in April 2009.



The 1992 **Helsinki Convention** on the Protection of the Marine Environment of the Baltic Sea to which the European Union and all the states bordering the Baltic Sea are parties. It strives to achieve a harmonious balance between all biological components in a healthy Baltic Sea environment, thus supporting a wide range of sustainable economic and social activities. The Convention Secretariat, HELCOM, as been active in coordinating implementation, including public participation. The 2007 Baltic Sea Action Plan is in line with the Marine Directive's requirements.



The 1992 **OSPAR Convention** for the Protection of the Marine Environment of the North-East Atlantic is a long-established forum whose history goes back to 1972. The OSPAR Commission, comprising representatives of 15 countries and the European Union, aims to conserve marine ecosystems and safeguard human health in the North-East Atlantic by preventing pollution. Its key objective is to protect the marine environment from the adverse effects of human activities and contribute to the sustainable use of the seas. In 2010, OSPAR adopted the North-East Atlantic Environment Strategy.

FURTHER INFORMATION

For core policy documents and the latest news on policy developments see:

- Marine Strategy Framework Directive: http://ec.europa.eu/environment/marine/index_en.htm
- Integrated Coastal Zone Management: <http://ec.europa.eu/environment/iczm/home.htm>
- Integrated Maritime Policy: http://ec.europa.eu/maritimeaffairs/index_en.html

For research see:

- The Commission's Research webpage on the marine environment: http://ec.europa.eu/research/environment/index_en.cfm?pg=marine
- EEA's state of the environment reporting for the marine and coastal environment: <http://www.eea.europa.eu/soer/europe/marine-and-coastal-environment>
- The EU's LIFE research programme on coasts, seas and fisheries: marine projects: <http://ec.europa.eu/environment/life/themes/seas/lists/marine.htm>

For information on the Regional Seas Conventions see:

- Barcelona Convention (UNEP/MAP): <http://www.unepmap.org/>
- Helsinki Convention (HELCOM): <http://www.helcom.fi/>
- OSPAR Convention: <http://www.ospar.org>
- Bucharest Convention (Black Sea): <http://www.blacksea-commission.org/main.asp>

Further information

- The European Atlas of the Seas: http://ec.europa.eu/maritimeaffairs/atlas/maritime_atlas
- Eurostat, *Statistics in Focus – Agriculture and Fisheries*, 2010: http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-SF-10-038/EN/KS-SF-10-038-EN.PDF

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5. Kvach and Skóra, 2007
6. Van Franeker et al., 2005
7. Kirby et al., 2009
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9. Oceana, 2008
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14. DG Environment, Water Framework Directive webpage: http://ec.europa.eu/environment/water/water-framework/index_en.html
15. DG Environment, Nature & Biodiversity webpage: http://ec.europa.eu/environment/nature/legislation/habitatsdirective/index_en.htm
16. DG Maritime Affairs and Fisheries, Common Fisheries Policy webpage: http://ec.europa.eu/fisheries/cfp/index_en.htm
17. DG Environment, ICZM webpage: <http://ec.europa.eu/environment/iczm/home.htm>
18. DG Maritime Affairs and Fisheries, Maritime Spatial Planning webpage: http://ec.europa.eu/maritimeaffairs/spatial_planning_en.html

Photos:

iStockphoto (Cover page, page 4, page 7, page 9, page 10, page 14, page 16, page 19, page 22, page 23, page 24, page 27, page 29), Lifesize (page 6, page 7), DG REGIO, Digital Library (page 6, page 16, page 20), http://www.ifremer.fr/posidonia/Gérard_Pergent (page 7), Hemera (page 10, page 14, page 21), Photos.com (page 10), AbleStock.com (page 14), Comstock (page 14), Danube Biosphere Reserve of National Academy of Sciences of Ukraine/Maxim Yakovlev (page 19).



