



Review of Ocean Literacy in European Maritime Policy



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1. Introduction

1.1 Purpose of the Review

The purpose of this review is to demonstrate how ocean literacy is currently embedded in European maritime policy and to provide recommendations on how to increase its representation. As well as contributing to baseline information for Sea Change, it is intended that the review and its recommendations will provide a basis from which to develop initiatives and case studies targeting policymakers as part of WP5 (mobilizing governance).

Six policies were chosen as case studies for review: the Blue Growth Strategy; the Marine Strategy Framework Directive; the Marine Spatial Planning Directive; the Common Fisheries Policy; the Birds Directive; and the Habitats Directive. For each policy, an explanation is provided as to why ocean literacy is important in relation to the area of marine protection that the policy covers. Following this, the policy is analysed for ocean literacy content, demonstrated through reference to the 7 principles of ocean literacy. The way in which the policy is communicated is also taken into account. Finally, the policies are discussed and recommendations proposed for increasing the representation of ocean literacy in EU maritime policy.

1.2 Ocean Literacy

Ocean literacy is defined as having an ‘understanding of the ocean’s influence on you and your influence on the ocean’. On an individual level this translates into an ocean literate person being someone who: understands the importance of the ocean to humankind; can communicate about the ocean in a meaningful way; and is able to make informed and responsible decisions regarding the ocean and its resources¹. To guide the development of ocean literacy, the above definition is accompanied by seven essential principles (Figure 1) which are further elaborated through 45 supporting fundamental concepts (Appendix 1), outlined in the Ocean Literacy Guide², as part of the Ocean Literacy Framework. The framework was developed in the United States as part of an ocean literacy campaign started in 2004 arising from concern over the lack of public awareness about the importance of the ocean in our daily lives and the absence of ocean topics in the U.S. science curriculum. The campaign was led by scientists and educators that wanted to create a more ocean literate society (Schoedinger *et al.*, 2010).

Creating a more ocean literate society in Europe is also the aim of the Sea Change project. Building on and extending the work started in the United States, Sea Change aims to establish a fundamental “Sea Change” in the way European citizens view their relationship with the sea, by empowering them, as Ocean Literate citizens, to take direct and sustainable action towards a healthy ocean and seas, healthy communities and ultimately a healthy planet. By using the concept of Ocean Literacy, Sea Change will create a deeper understanding amongst European citizens of how their health depends on the health of our seas and ocean.

¹ The definition of an ocean literate person is adapted from Cava *et al.* (2005)

² <http://www.coexploration.org/oceanliteracy/documents/OceanLitChart.pdf>

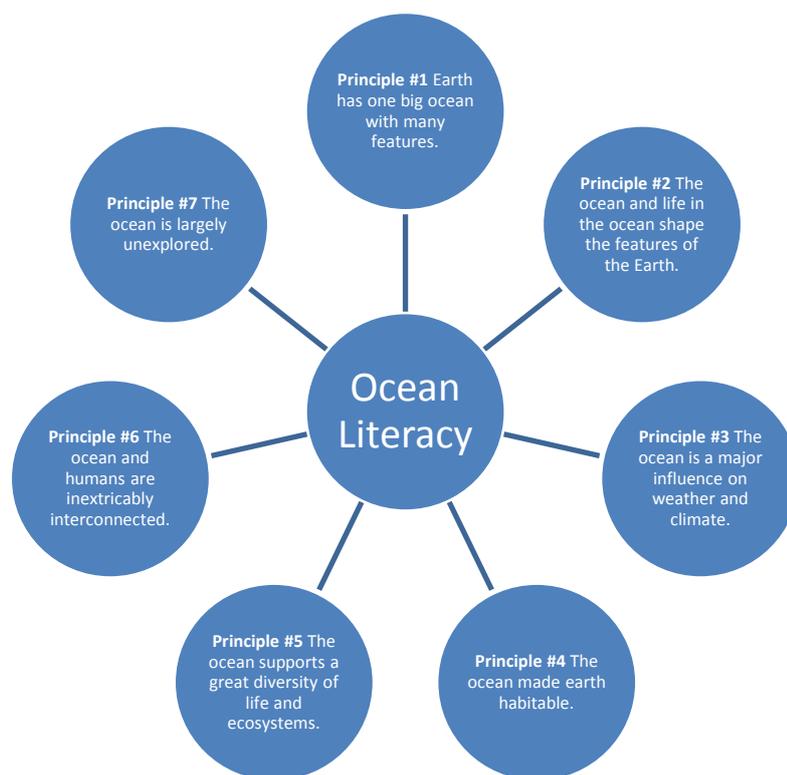


Figure 1 The seven Essential Principles of Ocean Literacy

1.3 European Maritime Policy

Europe's seas are shared by a myriad of individuals, institutions, cultures, and activities (EEA, 2015). With a coastline 89,000 km in length, Europe has an estimated coastal population of at least 200 million (Depledge *et al.*, 2013) and in line with worldwide trends; population sizes along Europe's coasts are increasing. Global ecosystem services provided by the ocean, and on which we depend, include raw materials and food, coastal protection, water purification, carbon sequestration, tourism and recreation (Barbier *et al.*, 2011). Concurrently, human activities such as fishing, maritime transport, energy, tourism and waste discharge all impact the marine environment. A recent assessment of Europe's seas at the EU-wide scale found that although productive, Europe's seas cannot be considered 'healthy' or 'clean' (EEA, 2015). At the same time Europe's maritime economy, with political support under the auspices of the EU Blue Growth strategy³, is increasing in magnitude and in terms of its environmental impact (Boyes and Elliot, 2014).

In response to the environmental challenges and human activities influencing Europe's seas, the EU has developed an extensive policy framework that seeks to manage and address these challenges and activities. Historically, maritime activities were regulated through separate sectoral policies, addressing the priorities of one policy area (i.e. transport, fisheries, pollution) without assessing wider impacts, leading to a piecemeal approach to protecting the marine environment (Boyes and Elliott, 2014). Now, recognizing the complex relationship between human activities and environmental problems and the challenges this

³ http://ec.europa.eu/maritimeaffairs/policy/blue_growth/

presents for public policy, Europe has increasingly moved towards an ecosystem-based approach to policy. In contrast to addressing issues in isolation, ecosystem-based management is an integrated approach to management that considers the entire ecosystem including humans, with the overall goal of maintaining ecosystems in a healthy, clean, productive, and resilient condition, so that they can continue to provide humans with the services and benefits upon which we depend (EEA, 2015).

The EU has adopted more than 200 pieces of legislation that affect marine environmental policy and management. Despite the resulting complexity, Boyes and Elliott (2014) have illustrated the comprehensive nature of the system by replacing the names of the European directives and policies with the topics they cover, affording a clearer view of how the legislation in place addresses the many uses and users of the marine environment (Figure 2).

Looking ahead, the vision for the future management of European seas is set out in the Integrated Maritime Policy which calls for the integrated maritime governance to ensure stakeholder engagement, coherent agendas, removal of sectoral policy thinking and creation of cross sectoral management structures (EC, 2009).

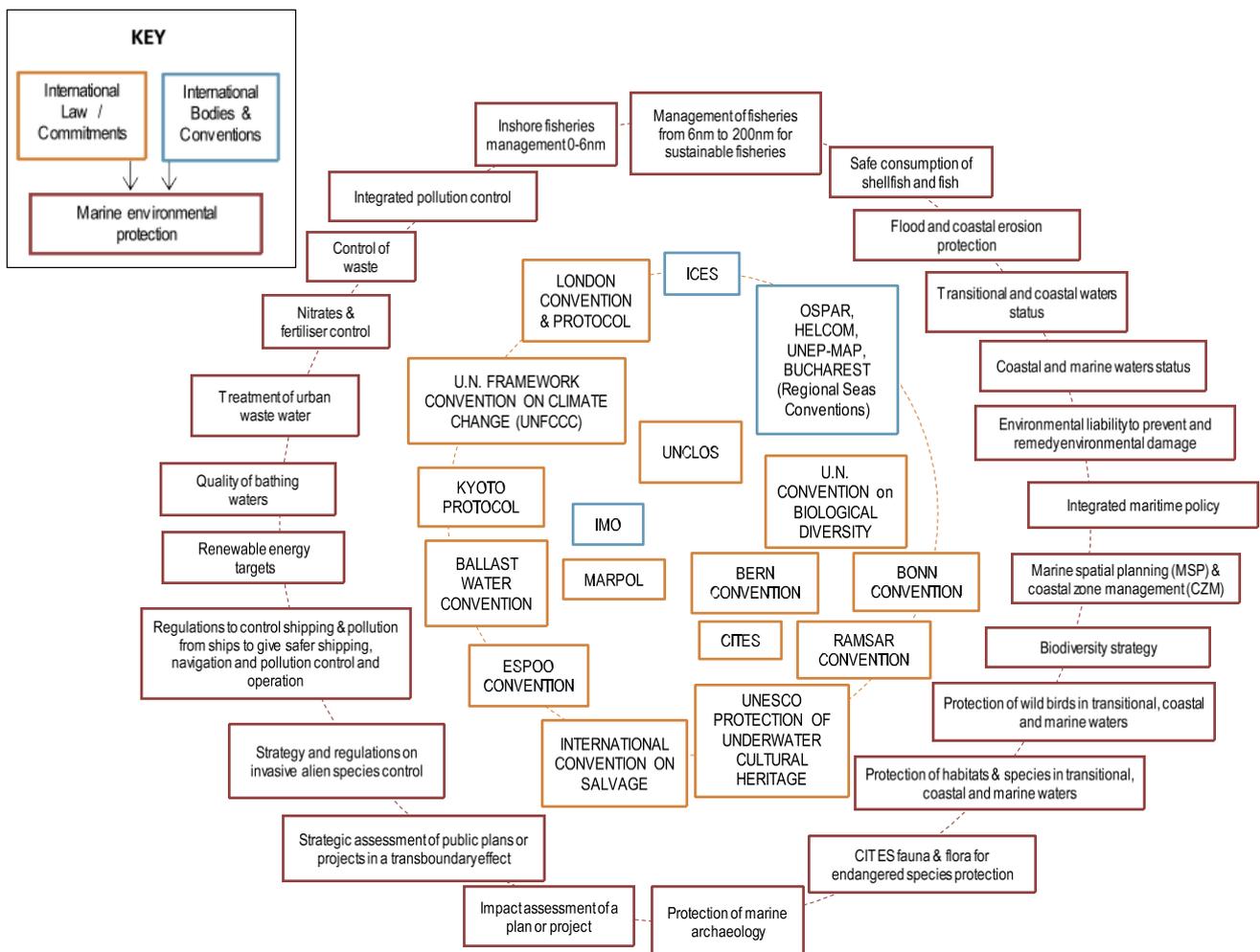


Figure 2 Map of the areas of marine environmental protection covered under European legislation (taken from Boyes and Elliott, 2014).

1.4 The Role of Ocean Literacy in Maritime Policy

The aim of Sea Change is to empower European citizens to take direct and sustainable action towards a healthy ocean and seas, healthy communities and ultimately a healthy planet. In the policy context, it is anticipated that creating a more ocean literate society in Europe will result in increased interest in, understanding of and engagement with marine policy. This is in view of the fact that we are all users of the marine environment and therefore have a common interest in its sustainable use.

Guest *et al.* (2015) explain that to ensure sustainable use of ocean resources there is a need for both top-down and bottom-up approaches; that is, responsible policies, regulations and management strategies (Mora *et al.*, 2009) as well as individual behaviour changes (McKinley and Fletcher, 2010). In addition, it is suggested that low levels of ‘ocean literacy’ can be a barrier for citizens to engage in environmentally responsible behavior. Further to understanding the ocean’s influence on you and your influence on the ocean, the translation of this knowledge into action has been recognized as ‘marine citizenship’. Recognizing that there are many social, cultural, and economic factors that are likely to influence marine citizenship (McKinley and Fletcher, 2012), ocean awareness is nonetheless deemed a crucial ‘prerequisite’ to behavioral change (Fletcher and Potts, 2007).

Fletcher and Potts (2007) elaborate on the concept of marine or ocean citizenship which recognizes that individual behaviour can impact on coastal and marine spaces, in particular the health and management of those spaces. In return for modified personal behaviour, citizens will receive the benefits of healthy oceans, which may include enhanced resource options, aesthetic improvements to coastal areas, improved water quality, and ethical and moral benefits.

Individual action relies on the connection between individuals and their local environment as a key rationale for personal involvement in environmental issues through invoking a sense of global ownership and responsibility that is actualized locally. To illustrate the importance of individualized action, Fletcher and Potts (2007) refer to documented examples of the failure of centralized integrated coastal management programmes due to insufficient support from local people. Responsible and informed individual behavior within the context of a group or society can therefore lead to more stable and sustainable management approaches to ocean governance. However, the success of such approaches tends to be in contexts where individuals are closely connected to the ocean.

In a pre-conference survey (the conference was titled “Public Understanding of the Marine Environment”), carried out by the UK Wildlife Trust in 2005 to identify the potential benefits of enhanced public understanding of the marine environment, a number of responses cited benefits to ocean governance (The Wildlife Trust, 2005). These included:

- Acceptance of personal responsibility for the state of the marine environment;
- Pressure on politicians and decision makers;
- Better management of seas;
- Expression of consumer choice/power in favor of, for example, sustainable seafood;
- Greater appreciation of the marine environment;
- Better understanding of the impacts of human activities;
- More public participation in marine and coastal conservation;
- Sense of ownership/stewardship of the marine environment;
- Support for environmental initiatives and campaigns;

- Greater understanding of the value of marine resources and our dependence on them;
- Effective protected areas; difficult decisions made easier (e.g., coast realignment, marine protected areas);
- More stakeholder participation in marine decision making;
- Greater assimilation of local/traditional knowledge into decision making;
- Socioeconomic gains;
- Increased marine biodiversity

In fitting with the overall aim of Sea Change, which is to create a more ocean literate society, the literature reviewed supports the premise that ocean literacy fosters individual action towards the benefit of ocean management.

2. Policy Review

2.1 The Blue Growth Strategy

2.1.1 Introduction to the Blue Growth Strategy

Recognizing that the seas and ocean are vitally important to our future economic welfare and well-being, Blue Growth⁴ (COM (2012) 494) is Europe's long term strategy to support sustainable growth in the marine and maritime sectors as a whole.

In the marine policy domain, Blue Growth is positioned within the framework of the Integrated Maritime Policy⁵ (IMP) (COM (2007) 575). The IMP seeks to provide a more coherent and coordinated approach to maritime issues and the different policy domains involved. This integrated and inter-sectoral approach to Europe's marine-related policies covers all aspects of our relationship with the ocean and seas, incorporating areas such as maritime transport, surveillance, spatial planning and climate change mitigation. The IMP is based on the premise that Europe's well-being is inextricably linked with the sea, recognizing its contribution to the economy and potential business opportunities as well as the significance of ecosystem services, and its recreational, aesthetic and cultural value. In addition, the policy recognizes that ensuring sustainable use of the marine environment is a prerequisite for industries to be competitive.

In this context, Blue Growth refers to harnessing the potential of Europe's seas and coasts for jobs and growth to develop the blue economy while making efforts to reduce negative environmental impacts of maritime activities, safeguarding biodiversity and protecting the marine environment.

As well as being part of the IMP, the Blue Growth strategy is embedded in the wider Europe 2020 strategy⁶ (COM(2010) 2020 final). This strategy, as a response to Europe's long term challenges such as climate change, pressure on natural resources and urbanization and concentration in coastal regions, prioritizes smart, sustainable and inclusive growth and sets targets to be achieved by 2020. Smart growth refers to developing an economy based on knowledge and innovation; sustainable growth promotes a more resource efficient, greener and more competitive economy and; inclusive refers to fostering a high-employment economy delivering social and territorial cohesion. As the maritime dimension of the Europe 2020 strategy,

⁴ http://ec.europa.eu/maritimeaffairs/policy/blue_growth/

⁵ <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52007DC0575&from=EN>

⁶ <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2010:2020:FIN:EN:PDF>

Blue Growth is further defined as "smart, sustainable and inclusive economic and employment growth from the oceans, seas and coasts" (ECORYS, 2012)⁷.

The Blue Growth strategy comprises three main components. The first is to develop sectors that have a high potential to deliver sustainable growth and jobs in the blue economy. Currently, the areas of focus are ocean energy, aquaculture, coastal tourism, seabed mining for mineral resources, and blue biotechnology. The second component refers to the ongoing implementation of a range of framework conditions necessary to progress the five focus areas. In general terms, these include adequate infrastructure, labour, public acceptance, legal frameworks and good governance at local and regional levels (ECORYS, 2012). Particular EU initiatives considered essential to Blue Growth are access to marine knowledge to improve access to information about the sea; maritime spatial planning to ensure efficient and sustainable management of activities at sea and; access to data on maritime surveillance to give authorities a better picture of what is happening at sea. The third component involves developing separate strategies for Europe's sea basins (Adriatic and Ionian seas⁸; Arctic Ocean⁹; Atlantic Ocean¹⁰; Baltic Sea¹¹; Black Sea; Mediterranean Sea; North Sea) to cater for Europe's geographical differences and ensure specific measures for these areas and foster cooperation between countries.

2.1.2 The Importance of Ocean Literacy to the Blue Growth Strategy

Europe's Blue Growth strategy is centred on sustainable economic growth in the marine and maritime sectors as a whole. Achieving sustainable Blue Growth requires economic development to be accompanied by environmental protection and social inclusion, all of which are underpinned by good governance. In a report on scenarios and drivers for sustainable growth from the oceans, seas and coasts (ECORYS, 2012), it is acknowledged that Blue Growth is unlikely to reach its full potential without public acceptance and support. This, in turn requires public understanding of the ocean's influence on us and our influence on the ocean as well as the Blue Growth strategy. Ocean literacy, therefore, will play an increasingly important part as the Blue Growth strategy progresses.

Further to understanding the Blue Growth strategy, a more informed and ocean literate public can actively contribute to different elements of the strategy as it moves forward. Because Blue Growth is both a recent strategy, launched in 2012, and ongoing, as well as covering many areas, there is opportunity to contribute to and shape different parts of the strategy as it continues to develop. One of the ways in which this can occur is through European Commission (EC) led public consultations that are used to gather opinions to help the EU develop its position with regard to a particular area. For example, a recent consultation was held on seabed mining from March to June 2014¹² and on international ocean governance¹³. An ocean literate society with an understanding of the role the ocean plays in our lives and acknowledgement of a shared responsibility for the health of the ocean allows for increased involvement in shaping the Blue Growth agenda.

⁷ http://ec.europa.eu/maritimeaffairs/documentation/studies/documents/blue_growth_third_interim_report_en.pdf

⁸ <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52014DC0357&from=EN>

⁹ http://ec.europa.eu/maritimeaffairs/policy/sea_basins/arctic_ocean/documents/join_2012_19_en.pdf

¹⁰ <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52013DC0279&from=EN>

¹¹ http://ec.europa.eu/maritimeaffairs/policy/sea_basins/baltic_sea/documents/swd-2014-167_en.pdf.pdf

¹² http://ec.europa.eu/dgs/maritimeaffairs_fisheries/consultations/seabed-mining/index_en.htm

¹³ http://ec.europa.eu/dgs/maritimeaffairs_fisheries/consultations/ocean-governance/index_en.htm

2.1.3 Ocean Literacy Content as part of the Blue Growth Strategy

The IMP (COM (2007) 575) recognizes that ‘Europe's maritime spaces and its coasts are central to its wellbeing and prosperity – they are Europe's trade routes, climate regulator, sources of food, energy and resources, and a favoured site for its citizens' residence and recreation.’ At the same time, the IMP also recognizes that our activities are leading to ‘the deterioration of the marine environment that everything else depends on’ and describes our relationship with the ocean as strained and requiring a response. In acknowledging that the ocean influences us and that we influence the ocean, the IMP includes the concept of ocean literacy in introducing the policy that follows. Subsequently, the Blue Growth strategy as part of the IMP is also based on the concept of ocean literacy.

Overall, the Blue Growth strategy is positioned within ocean literacy principle 6, ‘The oceans and humans are inextricably interconnected.’ One of the concepts covered by this principle is that the ocean supports jobs and national economies, directly relevant to the Blue Growth strategy because it is about harnessing the potential of Europe's seas and coasts for jobs and growth to develop the blue economy. Consequently, it is concepts covered under ocean literacy principle 6 that are predominantly referred to in the text, with other ocean literacy principles and concepts also referred to.

Specifically, the Blue Growth strategy makes reference to the following principles of ocean literacy in the text:

Principle 1: The Earth has one big ocean with many features.

The introduction to the strategy includes the fact that 71% of the planet is ocean (principle 1A; Appendix 1). It also states the necessity for us to obtain resources from the ocean, such as food and energy, in a more sustainable way. The necessity for the blue economy to be sustainable and to reduce negative environmental impacts of maritime activities is also referred to later in the strategy. This is in alignment with principle 1H which refers to the ocean's finite and limited resources.

Principle 5: The ocean supports a great diversity of life and ecosystems.

The Blue Growth strategy refers to principle 5 in a general sense in the introduction, when it refers to economic growth ‘whilst safeguarding biodiversity and protecting the marine environment, thus preserving the services that healthy and resilient marine and coastal ecosystems provide.’

Principle 6: The ocean and humans are interconnected.

As mentioned previously, this ocean literacy principle is the one that is referred to most often in the Blue Growth strategy. In the introduction to the strategy it states that, ‘The sea and the coasts are drivers of the economy’, providing figures for total economic activities that depend on the sea. It also mentions resources and services that we get from the ocean, such as food and energy, trade and transport, all of which are part of principle 6B. In addition, principle 6D (which deals with humans affecting the ocean in a variety of ways) is included in the strategy when it states, ‘Efforts are needed to reduce negative environmental impacts of maritime activities such as the emission of pollutants and the discharge of noxious substances.’

The five focus areas of the Blue Growth strategy are also linked to principle 6. Four of the focus areas (blue energy, aquaculture, marine and mineral resources and blue biotechnology) refer to resources provided by the sea that are included as part of principle 6B while coastal tourism fits into principle 6C due to its inclusion of recreation.

Principle 7: The ocean is largely unexplored.

The introduction mentions the ‘rapid technological progress in working offshore in ever-deeper waters’ that has been made in the last ten years, making use of robotics, video-surveillance and submersible technology. Indirectly, this references principle 7D about new technologies, sensors and tools expanding our ability to explore the ocean. In addition, the focus areas of marine mineral resources and blue biotechnology both refer to principle 7 when dealing with the unknown impacts of disturbance as a result of extracting minerals from the seafloor and the ‘unexplored and understudied nature of much of the underwater world’ in reference to developing new medicines from marine biodiversity.

2.1.4 Communication of the Blue Growth Strategy to advance Ocean Literacy

The benefits of an ocean literate society include increased awareness, understanding and interest in policies that affect the ocean. It is therefore important that marine strategies and policies are communicated to the public, increasing ocean literacy by informing citizens about ocean issues and how we are managing our relationship with the ocean.

There are a number of publicly available communication products to assist understanding of the Blue Growth strategy. Central to these is the EC maritime affairs Blue Growth webpage¹⁴ which outlines the components of the strategy and provides links to each of the five focus areas and sea basins. A prominent feature of the webpage is the link to the Blue Growth interactive infographic¹⁵ which provides an engaging way to gain familiarity with the Blue Growth strategy and similarly, provides further links to the different sectors and sea basins. As the Blue Growth strategy is positioned within ocean literacy principle 6, ‘The oceans and humans are inextricably interconnected’, so too is the infographic, highlighting Europe’s reliance on the ocean for economic benefit and the importance of sustainability. At the top of the infographic it is stated that ‘71% of the Earth surface is water’, as contained in the first principle of ocean literacy.

The links to the Blue Growth focus areas contain further information on each area comprising an explanation of the sector, why the EU is focusing on the area, and latest initiatives and progress such as recent communications or consultations; for example, the 2014 communication on ‘A European strategy for more Growth and Jobs in Coastal and Maritime Tourism’¹⁶ (COM (2014) 86 final) and the results of a 2014 public consultation on seabed mining¹⁷. There are also links to relevant policies and campaigns. For example, in the case of aquaculture, a link is provided to the Common Fisheries Policy reform, which has relevance for aquaculture and to a campaign called ‘Farmed in the EU’ which promotes sustainable seafood and highlights the importance of aquaculture. Also contained on the main webpage for each of the Blue Growth sectors is a news column containing information on the latest Directorate-General for Maritime Affairs and Fisheries (DG MARE) events and activities and the DG MARE twitter feed.

From the main Blue Growth webpage, there are also links to further information on the EU initiatives that are essential for Blue Growth, these being marine knowledge, maritime spatial planning, integrated maritime surveillance and a maritime security strategy. Similarly, the links explain the importance of these initiatives and current plans and progress for each.

¹⁴ http://ec.europa.eu/maritimeaffairs/policy/blue_growth/

¹⁵ http://ec.europa.eu/maritimeaffairs/policy/blue_growth/infographics/

¹⁶ http://ec.europa.eu/maritimeaffairs/policy/coastal_tourism/documents/com_2014_86_en.pdf

¹⁷ http://ec.europa.eu/dgs/maritimeaffairs_fisheries/consultations/seabed-mining/index_en.htm

DG MARE also communicates the Blue Growth strategy through a series of brochures and leaflets¹⁸ covering components such as blue energy, an action plan for a maritime strategy in the Atlantic area and marine knowledge 2020. These leaflets are available both in pdf and print versions. In addition, there is an online magazine titled 'European maritime affairs and fisheries' which reports on the activities of DG MARE which people can subscribe to.

To complement the information on the Blue Growth strategy, there is a link on the Blue Growth page to facts and figures about the EU coastline and information about European seas through the European Atlas of the Seas¹⁹. This is a resource developed to raise awareness of Europe's marine environment, and where information can be obtained on subjects such as the location of UNESCO world heritage sites and maritime museums and aquariums, bathymetry, port statistics, aquaculture, the European fishing fleet, fish stocks, quotas and catches, and information on blue energy and maritime resources.

2.1.5 Discussion

The Blue Growth strategy, as part of the IMP, is based on the concept of ocean literacy, despite the term 'ocean literacy' not appearing in the text. Ocean literacy principle 6 is the principle most commonly referred to in the strategy along with reference to principles 1, 5 and 7.

Considering that Blue Growth is a recent strategy that is still being developed, there is continued opportunity to incorporate the term ocean literacy into resulting initiatives and communication products. In this way ocean literacy will become increasingly considered as part of Blue Growth actions. This process has already been initiated with the inclusion of the term in the 2013 Galway Statement on Atlantic Ocean Cooperation²⁰ (which builds on the Atlantic Action Plan²¹), where it is stated that, '*We further intend to promote our citizens' understanding of the value of the Atlantic by promoting oceans literacy.*' The inclusion of this statement has drawn attention to ocean literacy concepts and provided the impetus to increase ocean literacy in Europe, through for example, the funding of projects by the EU to increase citizens understanding of ocean issues. As addressed in a previous section of this review, it is acknowledged that Blue Growth is unlikely to reach its full potential without public acceptance and support (ECORYS, 2012). Increased ocean literacy of citizens will play an important role in this respect. It is therefore recommended that ocean literacy as a term continues to be included in future actions arising from the Blue Growth strategy so that public understanding of Blue Growth remains an important focus of the strategy.

¹⁸ http://ec.europa.eu/maritimeaffairs/documentation/publications/index_en.htm

¹⁹ http://ec.europa.eu/maritimeaffairs/atlas/index_en.htm

²⁰ https://ec.europa.eu/research/iscp/pdf/galway_statement_atlantic_ocean_cooperation.pdf

²¹ <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52013DC0279&from=EN>

2.2 The Marine Strategy Framework Directive (MSFD)

2.2.1 Introduction to the MSFD

The European Union (EU)'s approach to environmental protection outside of the domain of sea fisheries has been piecemeal until relatively recently. The EU has regulated marine-based activities as a matter of practice over the past four decades by means of a number of sector policies such as the common maritime transport policy²² and the common fisheries policy²³.

A new European approach to the management of the marine environment was the adoption of the Thematic Strategy on the Protection and Conservation of the Marine Environment by the European Council and European Parliament²⁴ as part of the Sixth Community Environment Action Programme in 2002. Although thematic strategies are not legally binding for Member States they allow European institutions to define broad policy objectives on priority issues, and pave the way for the definition of new legislations. This was the case for the MSFD whose definition and design process started in the year 2002. It entailed a long and articulated consultation which included specialist regulatory bodies in the Member States; non-EU countries sharing regional seas with the Member States; 16 international organisations concerned with the management of the marine environment; as well as various interest groups representing civil society, the scientific community and offshore industries.

The consultation revealed the principal threats to the European marine environment such as the effects of climate change, oil spills and discharges, eutrophication and the related growth of harmful algal blooms or litter pollution, and in 2005 the Commission reviewed a number of policy and regulatory options on how best to respond to these threats.

Following the result of the review it was decided to promote the adoption of a flexible instrument in the form of a framework instrument which would be 'ambitious in its scope but not overly prescriptive in its tools'²⁵. The transit for the draft legislation through the European institutions was a long one and the MSFD was approved in 2008²⁶.

The Directive provides for the establishment of marine regions/subregions on the basis of geographical and environmental criteria. Article 4 defines the following marine regions: the Baltic Sea, the North-east Atlantic Ocean, the Mediterranean Sea, the Black Sea. The North-east Atlantic Ocean is further sub-divided into, the Greater North Sea, the Celtic Sea, the Bay of Biscay and the Iberian Coast, the Macronesian biogeographic region. The Mediterranean Sea is sub-divided into the Western Mediterranean Sea, the Adriatic Sea, the Ionian Sea and the Central Mediterranean Sea, and the Aegean-Levantine Sea.

Each Member State was required by 2012 to develop strategies for sea areas under their sovereignty and jurisdiction and these must contain a detailed assessment of the state of the environment, a definition of Good Environmental Status (GEoS) at a regional level, as well as the establishment of clear environmental targets and monitoring programmes.

GEoS is defined at the article 3 of the MSFD as follows: "*The environmental status of marine waters where these provide ecologically diverse and dynamic oceans and seas which are clean, healthy and productive*".

²² http://www.europarl.europa.eu/workingpapers/tran/w14/1_en.htm

²³ http://ec.europa.eu/fisheries/cfp/index_en.htm

²⁴ <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:52005DC0504>

²⁵ <http://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX:52008PC0005>

²⁶ <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32008L0056>

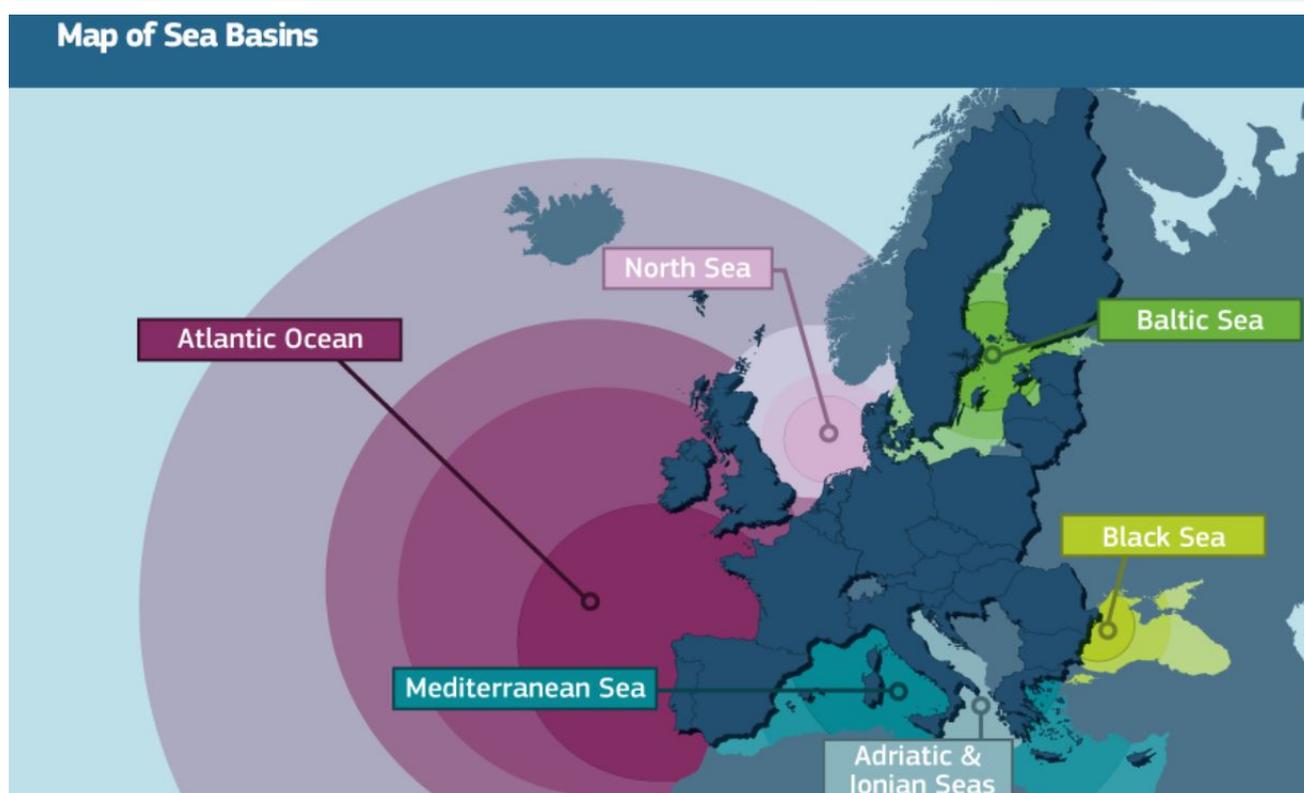


Figure 3 The European Seas (European Union, 2014)²⁷

Each Member State must then draw up a programme of cost-effective measures by 2015 in coordination with other Member States in their marine region. Prior to the implementation of any new measure, there is a requirement to undertake an impact assessment which contains a detailed cost-benefit analysis of the proposed measures. Where Member States cannot reach the environmental targets, the MSFD provides a legal basis for the adoption of EU measures. The overall aim of the Directive is to protect the resource base upon which all marine-related economic and social activities depend and this requires all Member States to achieve GEnS of marine waters by 2020 at the latest.

2.2.2 The Importance of Ocean Literacy to the MSFD

The conceptual approach to environmental protection and natural resources management underpinning the MSFD reflects a number of important normative principles on environmental policy that are enshrined in the Treaty on the Functioning of the European Union including the precautionary principle, and the principles that preventive action should be taken, that environmental damage should, as a priority, be rectified at source and that the polluter should pay.

The importance of the MSFD is framed around the view that a high level of marine environmental protection is essential for the EU to realise the full economic potential of the marine resources and ecological services that are available in sea areas under the sovereignty and jurisdiction of the Member States. The MSFD also intended to address the failure of the Member States to undertake sufficient scientific monitoring of the status of the ocean environment, as well as the natural resources and ecological systems that it supports.

Moreover, the MSFD provides a solid legal basis for the application of an ecosystem-based approach to the

²⁷ http://ec.europa.eu/maritimeaffairs/policy/blue_growth/infographics/

management of *human activities affecting the marine environment* and ecological systems, all with a view to ensuring that they are not irreversibly damaged by the cumulative effects of natural and anthropogenic pressures. In addition, the MSFD is the key policy framework for developing in Europe, and in the neighbouring countries, a coordinated and science-based approach to the *link between ocean and human health*.

These two major elements of the MSFD are perfectly in line with the definition of ocean literacy in that an ocean literate person is able to make informed and responsible decisions regarding the ocean and its resources. The MSFD requires Member States not only to define marine strategies, which can be understood in this context as an action plan for applying an ecosystem-based approach to the management of human activities in the marine environment, but also to define a programme of measures, and therefore make (informed and responsible) decisions on how to manage the marine environment.

The MSFD clearly calls for the active involvement of the general public in the establishment, implementation and updating of marine strategies, and for the provision of public information on the different elements of marine strategies. Many scholars (Beierle and Cayford, 2002) confirmed through their research that knowledge is a key component in accomplishing effective environmental policies. Knowledge is central to both policy making and policy implementation processes, and enhancing public awareness and knowledge of the marine environment will lead to increased public support for sustainable marine management strategies. There is a need to provide the public, as well as the decision and policy-makers, with understandable information about the structure and functioning of coastal and marine ecosystems, how ecosystems affect daily lives, and how we affect ecosystems.

Additionally, because citizens are either directly or indirectly involved in activities and behaviours that may place our ocean and coastal areas at risk, it is important to assess the scope and depth of policy-relevant knowledge among the public and to learn where people tend to acquire their information about ocean and coastal conditions (Steel et al., 2005). The developing movement in “Ocean Literacy” in Europe has potential to provide a more coordinated approach to improving peoples’ knowledge and appreciation of the oceans and the benefits they provide to human wellbeing (European Marine Board, 2013a).

2.2.3 Ocean Literacy Content as part of the MSFD

The MSFD states that *“the marine environment²⁸ is a precious heritage that must be protected, preserved, and where practicable, restored with the ultimate aim of maintaining biodiversity and providing diverse and dynamic ocean and seas which are clean, healthy and productive”*. At the same time, it also recognizes that *“the pressures on natural marine resources and the demand for marine ecological services are too high”*, and that therefore measures should be defined by EU Member States to *“address all human activities that have an impact on the marine environment”*.

The MSFD also introduces the concept of GENs, and in doing so puts an emphasis on the structure, function and processes of marine ecosystems, brings together natural physical, chemical, physiographic, geographic and climatic factors, and integrates these conditions with anthropogenic impacts and activities carried out in the area of concern. It is then clear the difference with the objective of Good Ecological Status (GECS) as required by the Water Framework Directive (WFD) which, covers transitional and coastal waters up to 1

²⁸ Many people use the terms "ocean" and "sea" interchangeably when speaking about the ocean, but there is a difference between the two terms when speaking of geography (the study of the Earth's surface). Seas are smaller than oceans and are usually located where the land and ocean meet. Typically, seas are partially enclosed by land and it is for this reason that in Europe we mainly refer to marine environment rather than to the ocean.

nautical mile from the continental baseline, and focuses more on ecological structure, i.e. at a given time the abundance, presence, cover, etc., of ecological components, referred to as biological quality elements (Borja 2010, and Borja et al., 2013).

Therefore, even if the MSFD never explicitly mentions ocean literacy one can easily link it with the 6th principle of Ocean Literacy which states that “The ocean and humans are inextricably interconnected” and more into details that “the ocean affects every human life”, that “humans affect the ocean in a variety of ways. Laws, regulations and resource management affect what is taken out and put into the ocean”, and that “Collective actions are needed to effectively manage ocean resources for all”.

Reference to other ocean literacy principles can be found in the text of the directive.

Principle 1: The Earth has one big ocean with many features

Although in the text of the MSFD one can find oceans rather than ocean, the Directive clearly states that the Community marine environment is made up of marine regions and subregions, and that when considering coastal waters also their seabed and subsoil should be considered as an integral part of the marine environment. Furthermore, the Directive asks Member States to consider the different features (or characteristics) of every marine subregion to define the programme of measures. The MSFD also recognizes that the ocean is connected to watersheds, and that rivers and streams transport pollutants from watershed to coastal waters and to the ocean. This means that the MSFD is closely interwoven with the WFD which requires Member States to achieve good ecological and chemical status in their terrestrial and coastal water bodies by 2015.

Principle 3: The ocean is a major influence on weather and climate

Changes in the ocean-atmosphere system can result in changes in the climate that in turn, cause further changes to the ocean and the atmosphere. These interactions have dramatic physical, chemical, biological, economic and social consequences. The MSFD, recognizing the dynamic nature of the marine environment and that the pressures on it may vary due to the impacts of climate change, considers appropriate that the programmes of measures for the protection and management of the marine environment be flexible and adaptive.

Principle 5: The ocean supports a great diversity of life and ecosystems

Recognizing the importance of marine biodiversity and marine habitats the MSFD considers the establishment of Marine Protected Areas (MPAs) an important contribution to the achievement of GEnS. The MSFD supports the strong position taken by the community in the context of the Convention for Biological Diversity²⁹ on halting biodiversity loss, ensuring the sustainable use of marine biodiversity and the creation of global network of MPAs.

2.2.4 Communication of the MSFD to advance Ocean Literacy

As already mentioned, the MSFD clearly refers to the need for public information. In line with the Directive 2003/4/EC on environmental information, the MSFD has a specific article (Article 19), which defines the activities that Member States should undertake to promote the participation of all interested parties. In

²⁹ <https://www.cbd.int>; http://ec.europa.eu/environment/nature/natura2000/marine/index_en.htm

particular “Member States shall publish and make available to the public for comments, summaries of the marine strategies”³⁰.

The EC has a dedicated page on the MSFD³¹ entitled ‘Our oceans, seas, and coasts’. The page summarizes the main aspects of the Directive with a focus on the GEnS. Additionally, the EC produced one brochure, Seas for life, which includes all the main underlying principles and approaches of the Directive. In particular, that seas and oceans are precious but under threat, that productive and healthy seas are essential for European Member States welfare, and that maintaining the marine biodiversity is essential to achieve the GEnS by 2020. Interestingly, the brochure also refers to the fact that seas and oceans are still largely unexplored (Principle 7 of Ocean Literacy) and many knowledge gaps on marine processes and the impact of our activities on the complex marine environment persist, and it underlines the importance of marine scientific research.

The MSFD is also communicated through twitter with the hashtag #msfd.

Important facts and figures on the status of the European marine environment in relation to the targets and objectives defined by the MSFD can also be found on the dedicated page of the European Environmental Agency³².

A special case is Marine Litter, which is Descriptor³³ 10 of GEnS. The Leader's Declaration of this year's G7 Summit acknowledged the global risks posed by marine litter, particularly plastics, to marine and coastal life, ecosystems and potentially human health. The statement called for actions and solutions to combat litter, stressing the need to address land and sea based sources and its removal, as well as education, research and outreach.

The EEA has developed Marine Litter Watch³⁴, a citizen science based tool (Figure 4) that can help fill data gaps relevant for policy, while raising awareness about the problem of litter and the policy response to it; it is already being used in European-wide campaigns, such as the Ocean Initiatives.

³⁰ See for example the consultation page for:

- the UK Marine Strategy: <https://consult.defra.gov.uk/marine/msfd-programme-of-measures>
- the Italian Marine Strategy: <http://www.strategiamarina.isprambiente.it/consultazioni/consultazioni-2014>
- The French Marine Strategy:
<http://www.lesagencesdeleau.fr/les-agences-de-leau/la-consultation-du-public-20142015/>

³¹ http://ec.europa.eu/environment/marine/eu-coast-and-marine-policy/marine-strategy-framework-directive/index_en.htm

³² <http://www.eea.europa.eu/soer-2015/europe/marine-and-coastal>

³³ To help Member States interpret what GEnS means in practice, the Directive sets out, in Annex I, eleven qualitative descriptors which describe what the environment will look like when GES has been achieved.

³⁴ http://www.eea.europa.eu/themes/coast_sea/marine-litterwatch/at-a-glance/marine-litterwatch-in-a-nutshell

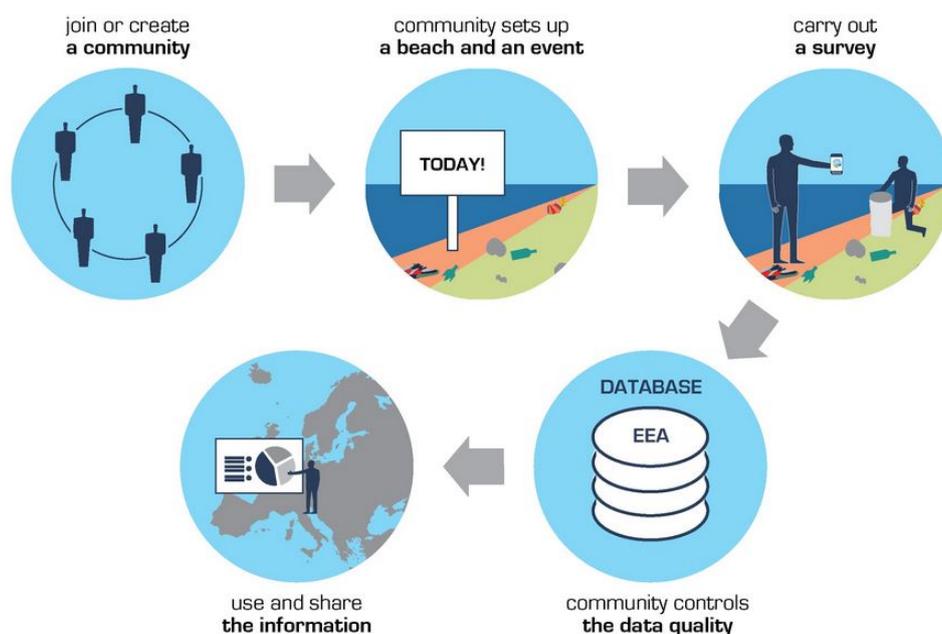


Figure 4 The Marine Litter Watch mobile phone app (EEA 2014)³⁵

2.2.5 Discussion

The MSFD can be clearly considered a policy that embraces the approach and many of the principles of Ocean Literacy. First of all, the full recognition of the close relationship between the ocean and humans, of the importance of sustaining the diversity of marine life, and of promoting individual and collective approaches for the sustainable management of the marine environment.

Moreover, the EC using the MSFD as a driver is promoting marine scientific research and marine monitoring to inform decision-making, and awareness raising of European citizens on the importance of a healthy marine environment.

2.3 The Maritime Spatial Planning Directive (MSP)

2.3.1 Introduction to the MSP Directive

Marine ecosystems provide important economic and social benefits to citizens (food, employment, carbon storage, coastal hazard protection amongst others). The global ocean economic activity, often called the 'Blue economy' includes a wide range of ocean industries (e.g. fishing, shipping, tourism, marine renewable energy, sub-marine cabling) essential to both current and future economic development. However, the capacity of the ocean to provide those benefits is increasingly hampered by the degradation of the marine environment. In addition, the increasing demand for marine space to conduct these economic activities creates conflicts amongst users. In order to mitigate this degradation, restore and sustain its critical

³⁵ <http://www.eea.europa.eu/highlights/new-mobile-phone-app-will>

monetary and social/cultural ecosystem services, a framework for the integrated governance of maritime activities is necessary. This is the essence of Marine (or Maritime) Spatial Planning³⁶ (MSP).

The 23 European Union Member States that have marine areas, including their territories, have a collective Exclusive Economic Zone (EEZ) of 27.6 million square km (about 20% of the area of the EEZs of the world)—well over twice as large as the United States of America—the world's largest EEZ at 11.6 million square km, including its territories (just over 8% of the area of the EEZs of the world). The collective EEZs of the "continental EU" cover about 4.9 million square km—about 4% of the area of all the EEZs of the world. Therefore, there is clear need to define a legislation to sustainably manage the EU's ocean space.

On 13 March 2013, the EC adopted a proposal for a Directive on Maritime Spatial Planning and Integrated Coastal Management, which would require Member States to draw up maritime spatial plans and integrated coastal management strategies, using an ecosystem-based approach. The proposal aims to facilitate sustainable growth in the 'blue economy' – renewable energy installations, oil and gas exploitation, maritime shipping, fishing, aquaculture and tourism.

Each Member States remains responsible for its own planning process and the contents of the plans. However, Member States would have to ensure public participation, establish cross-border cooperation, and organise the collection and exchange of data and information. Member States would be required to designate competent authorities.

The legislative proposal was preceded by a roadmap on MSP³⁷ (COM(2008) 791), a communication on the achievements and future development of MSP (COM(2010) 771), a consultation in 2011, and an international conference on MSP in 2012. In its resolution of 12 July 2007³⁸ on a future maritime policy, the European Parliament welcomed ecosystem-based MSP as a tool to foster sustainable economic development, while ensuring the protection of the marine environment. The resolution of 21 October 2010 on IMP³⁹ welcomed the roadmap on MSP. The same year, Members of the European Parliament established the "Seas and Coastal Areas" intergroup⁴⁰ as a way to improve exchanges on maritime policies which fall under the competences of various committees.

In July 2014 the European Parliament and the Council adopted the MSP Directive⁴¹. While each EU country will be free to plan its own maritime activities, local, regional and national planning in shared seas would be made more compatible through a set of minimum common requirements outlined in the new legislation. MSP means a process by which the relevant Member State's authorities analyse and organise human activities in marine areas to achieve ecological, economic and social objectives. The new EU legislation provides a framework for MSP, but Member States remain responsible for designing and determining, within their marine waters, the format and content of such plans, including institutional arrangements and, where applicable, any allocation of maritime space to different activities and uses. Belgium, the Netherlands, and Germany already have national maritime spatial plans. In the United Kingdom, England has two sub-national

³⁶ Elher Charles, and Fanny Douvère. Visions for a Sea Change. Report of the First International Workshop on Marine Spatial Planning. Intergovernmental Oceanographic Commission and Man and Biosphere Programme. IOC Manual and Guides No.48, IOCAM Dossier no.4. Paris: UNESCO, 2007 (<http://www.unesco-ioc-marinesp.be>)

³⁷ <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2008:0791:FIN:EN:PDF>

³⁸ <http://www.europarl.europa.eu/sides/getDoc.do?type=TA&reference=P6-TA-2007-0343&language=EN>

³⁹ <http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//TEXT+TA+P7-TA-2010-0386+0+DOC+XML+V0//en>

⁴⁰ <http://searica.eu/en/>

⁴¹ <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:32014L0089>

plans approved and Scotland has completed a national maritime spatial plan.

Member States must implement the laws, regulations and administrative provisions needed to comply with the MSP Directive by September 2016. The maritime spatial plans should be implemented as soon as possible, and at the latest by March 2021. Plans will be reviewed at least every 10 years.

2.3.2 The Importance of Ocean Literacy to the MSP Directive

The MSP Directive does not have a single purpose but is intended to address a whole range of concerns that impinge upon maritime transport, offshore development and the protection of the marine environment. Noticeably, the importance of avoiding conflicts between different commercial sectors regarding the use of maritime space is the principal purpose of the MSP Directive.

The European Parliament expressed the view that MSP (and Integrated Coastal Management) should contribute to the following objectives: “promoting multimodal links and sustainability; fostering the sustainable development of the fisheries sector and sustainable growth of the aquaculture sector; ensuring the preservation, protection and improvement of the environment through a representative and coherent network of protected areas and reduce and prevent marine and coastal areas pollution risks; and protect vulnerable coastal areas”⁴².

The normative approach of the MSP Directive is aimed at implementing an ecosystem-based approach to manage the cross-boundary activities that take place in the marine environment. This accords fully with the scheme of environmental protection set down by the MSFD, which aims to achieve good environmental status of all European marine waters by 2020. “Sustainable growth”, “sustainable use” and “sustainable management” of marine and coastal resources, as well as in relation to the maritime economies of the Member States, are three of the themes that permeate the MSP Directive.

Moreover, the Preamble of the MSP Directive points out that marine ecosystems and the services derived therein, if integrated into planning and management decisions concerning the use of ocean space, are capable of delivering “*substantial benefits in terms of food production, recreation and tourism, climate change mitigation and adaptation, shoreline dynamics control and disaster prevention*”.

The MSP Directive approach is therefore very close to the definition of ocean literacy which is an *understanding of ocean’s influence on you* (in this case especially in terms of potential for providing goods and services), *and your influence on the ocean* (in this case especially in terms of potential impacts of human activities on the marine environment). An ocean literate person is able to make informed and responsible decision regarding the ocean and its resources, and can communicate about the ocean in a meaningful way. The MSP Directive explicitly mentions the importance of the dialogue among different stakeholders, including the public authorities, the economic operators and the public. However, in order for this dialogue to be successful stakeholders need to be empowered to enable their full engagement (Pomeroy and Douvere, 2008), and ocean literacy is a way to empower communities and individuals to become ocean stewards.

⁴² European Parliament: Legislative Observatory. 013/0074(COD)—12/12/2013

2.3.3 Ocean Literacy Content as part of the MSP Directive

The MSFD provides a mechanism for EU Member States to identify criteria and targets for GES. Those activities or uses of the marine environment that compromise environmental status must be considered explicitly when identifying management measures to achieve GES. However, the MSFD does not provide the operational framework to manage those activities (Frazão Santos et al. 2012). The implementation of MSP by individual nations provides an opportunity to develop maritime sectors sustainably and at the same time achieve GES (Suárez de Vivero and Rodríguez Mateos 2012). Humans are integral to ecosystem processes, combining to form a social–ecological system (e.g., Armsworth et al. 2007, Curtin and Prellezo 2010, Pollnac et al. 2010), and so a plan that explicitly addresses GES while rationalizing use of marine space could be an influential tool within an ecosystem approach to managing maritime activities.

Therefore, even if the MSP Directive never explicitly mentions ocean literacy one can easily link it with the 6th principle of Ocean Literacy which states that “The ocean and humans are inextricably interconnected” and specifically that: “the ocean affects every human life”; that “humans affect the ocean in a variety of ways. Laws, regulations and resource management affect what is taken out and put into the ocean”; and that “Collective actions are needed to effectively manage ocean resources for all”.

Reference to other ocean literacy principles can be found in the text of the directive.

Principle 1: The Earth has one big ocean with many features

One of the aspects that the MSP Directive highlights in several parts of its text is the importance of considering the land-sea interactions. The Directive therefore recognizes that the ocean is connected to watersheds, and that rivers and streams transport pollutants from watershed to coastal waters and to the ocean. The MSP Directive also acknowledges the need of considering the different particularities (or features) of the European seas and marine regions.

Principle 2: The ocean and life in the ocean shape features of Earth

The MSP Directive states that: “human activities, but also climate change effects, natural hazards and shoreline dynamics, such as erosion and accretion, can have severe impacts on [...] marine ecosystems leading to deterioration of the environmental status...”.

It, therefore, refers to the erosion occurs in coastal areas as results of ocean processes and phenomena such as high waves and high tides and storm surge conditions, and sea-level changes.

Principle 3: The ocean is a major influence on weather and climate

Changes in the ocean-atmosphere system can result in changes in the climate that in turn, cause further changes to the ocean and the atmosphere. These interactions have dramatic physical, chemical, biological, economic and social consequences. The MSP Directive suggests that Member States shall ensure that the planning process or processes should take into account the long-term changes due to climate change.

2.3.4 Communication of the MSP Directive to advance Ocean Literacy

The MSP Directive clearly refers to the need of public participation. Article 9 states that: “Member States shall establish means of public participation by informing all interested parties and by consulting relevant stakeholders and authorities, and the public concerned, at an early stage in the development of maritime spatial plans...”.

Interesting examples of these consultation processes can be found mainly in countries which implemented MSP as practice even before the formal approval of the Directive. A good example is Belgium, which can be defined as a pioneer of Marine spatial planning.

A scientific study "A sea of Space" identified and listed the activities in the Belgian part of the North Sea, made a preliminary analysis of the interactions between these activities and initiated a spatial structure plan for the sustainable management of the Belgian part of the North Sea. Promoted then by the Minister of the North Sea, a "North Sea master plan" was approved by a number of cabinets in 2003 and 2004. From 2 July till 29 September 2013 the Federal Public Service for Public Health, Food Chain Safety and Environment organized a public consultation about the draft marine spatial plan and the environmental impact assessment. The public consultation produced a total amount of 140 contributions⁴³. These related to the content and the procedure of the plan, and also to the content of the environmental impact assessment. All comments have been carefully considered and the plan has been adapted at several places.

The EC has a dedicated page on MSP⁴⁴. The page summarizes the main aspects, not only of the Directive, but also highlights the benefits of MSP, such as reduced conflicts, increased investments, increased coordination, increased cross-borders cooperation, and protection of the environment.

Brochures, leaflets and videos were also produced by the EC (DG MARE) on MSP. The EC has also established the Maritime Forum⁴⁵ which aims to improve communication amongst EU maritime policy stakeholders. It allows parties interested in the EU maritime policy to communicate on a common platform. They can publish events, documents and follow developments in their areas of interest. Information can be shared amongst a closed community or published openly.

Finally, the MSP directive states that Member States should make best use of data and existing information, such as those developed in the context of the Marine Knowledge 2020 initiative. Marine Knowledge 2020 brings together marine data from different sources with the aim of:

- Helping industry, public authorities and researchers find the data and make more effective use of them to develop new products and services.
- Improving our understanding of how the seas behave

Marine Knowledge 2020 works through the European Marine Observation and Data Network (EMODNET) which consists of more than 100 organisations assembling marine data, products and metadata to make these fragmented resources more available to public and private users. Interestingly EMODNET is now developing the so-called 'check-points' which are regional seas (for the moment the one for the Mediterranean Sea and the one for the North Sea have been set up) wide monitoring system assessment activity based upon targeted end-user applications.

2.3.5 Discussion

The MSP Directive can be clearly considered a policy that embraces the approach and many of the principles of Ocean Literacy. The recognition of the close relationship between the ocean and humans, and of promoting individual and collective approaches for the sustainable management of the marine environment,

⁴³ www.consult-environment.be

⁴⁴ http://ec.europa.eu/maritimeaffairs/policy/maritime_spatial_planning/index_en.htm

⁴⁵ <https://webgate.ec.europa.eu/maritimeforum/en>

and the use of marine knowledge to promote the full participation of all actors concerned with the use of ocean space.

2.4 The Common Fishery Policy (CFP)

2.4.1 Introduction to the CFP

The Common Fishery Policy (CFP) is a set of rules on fisheries and aquaculture and applies to all those who fish, farm, or trade seafood in the EU. To ensure sustainability the policy determines for instance how much fish fishermen can catch, and how, when, and where they do so. Designed to manage a common resource, it gives all European fishing fleets equal access to EU waters and fishing grounds and allows fishermen to compete fairly.

The CFP is a common policy that originates from 1983⁴⁶ and has been renewed every 10 years^{47&48}. The most recent⁴⁹ reform took effect on 1 January 2014. The CFP has 4 main policy areas:

- Fisheries management;
- International policy;
- Market and trade policy;
- Funding of the policy.

The goal of fisheries management under the CFP is to ensure high long-term fishing yields for all stocks, referred to as maximum sustainable yield (MSY), to boost the aquaculture sector and to reduce unwanted catches and wasteful practices. Related regulations exist to set catch limits (Total Allowable Catches, TACs), combat illegal, unreported and unregulated (IUU) fishing, or set landing obligations to reduce discards.

More than a quarter of the fish caught by European fishing boats are taken from outside EU waters, either via bilateral agreements or in the high seas (areas outside national jurisdiction), usually under the auspices of regional fisheries management organizations (RFMO). The effective international governance of the CFP is therefore important for the EU to implement the CFP.

The EU regime for managing the market in fishery and aquaculture products is the Common Organisation of the Market (COM)⁵⁰, established in 1970. Areas covered by the scheme are the organization of the sector, marketing standards, consumer information, competition rules and market information.

The European Maritime and Fisheries Fund (EMFF), one of five European Structural and Investment Funds (ESIF), is the funding mechanism for the EU's maritime and fisheries policies. The EMFF 2014-2020 aims to help fishermen adapt to sustainable fishing, create jobs for the sector and diversify economies in coastal communities. The EMFF also assists Member States to co-finance operational programmes and projects to reach the objectives of the reformed CFP.

⁴⁶ Council Regulation (EC) no. 170/83 of 25 January 1983 establishing a Community system for the conservation and management of fishery resources. OJ L 24; 27.01.1983.

⁴⁷ Council Regulation (EC) no. 3760/92 of 20 December 1992 establishing a Community system for fisheries and aquaculture. OJ L 389; 31.12.1992.

⁴⁸ Council Regulation (EC) no.2371/2202 of 20 December 2002 on the conservation and sustainable exploitation of fisheries and aquaculture. OJ L 389; 31.12.2002.

⁴⁹ Council Regulation (EC) no.1381/2013 of 11 December 2013 on the Common Fisheries Policy. OJ L354; 28.12.2013.

⁵⁰ http://ec.europa.eu/fisheries/cfp/market/com/index_en.htm

The CFP includes a control system with the necessary tools to enforce the implementation of rules (regulation⁵¹). The fisheries rules and control system are agreed at EU level, but implemented by the Member States through their national authorities and inspectors. The European Fisheries Control Agency (EFCA)⁵² was set up to promote the standards for control, inspection and surveillance under the CFP. Its primary role is to organize coordination and cooperation between national control and inspection activities so that the rules of the CFP are respected and applied effectively. The EC has its own inspectors that check if national authorities are implementing EU rules correctly. If the national authorities are found to be not enforcing rules correctly, there is a series of actions that can lead to taking the Member State concerned to the EU Court of Justice.

The EMFF is used to co-finance projects, along with national funding. When the operational programme drawn up by each country is approved by the EC, it is up to the national authorities to decide which projects will be funded. Both national authorities and the EC are responsible for the implementation of the programme.

In 2015, a support unit to Fisheries and Aquaculture Monitoring and Evaluation (FAME) is being set up to foster the development of the Common Monitoring and Evaluation System (CMES) under EMFF. It will assist in monitoring and evaluating the implementation of the EMFF and provide the EC with regular updates and analysis of the state of play of the EMFF implementation. The support unit will also build capacity across the Member States and in the EC on evaluation and monitoring methodologies, indicators and good practices.

2.4.2 The Importance of Ocean Literacy to the CFP

Responsibility

Fishing is an activity that exploits common natural resources. The CFP aims to regulate human behavior (e.g. fishing activity) to achieve the stated goals of resource conservation, structural development and market management. It is therefore crucially important for everyone to understand the ocean-human relationship and humanity's responsibility to preserve common resources. This understanding will assist the successful implementation of policy rules, such as abiding by catch limits (TACs), applying discarding/landing obligations or fighting against IUU fishing.

Sustainability

The management of fish stocks is a key aim of the CFP. To protect overfished stocks, in addition to the management rules in place, consumer awareness is essential regarding issues such as species conservation status, the status of the marine environment (e.g. level of pollution) or if the products were caught/farmed sustainably. Knowledge of these issues can be increased through ocean literacy and increasing the public's awareness of the importance of the ocean and the life it sustains.

The European seafood industry is economically and socially important. The industry contributes to an overall value output of €33 billion and supports approximately 400,000 jobs (European Marine Board, 2013b). To advance Europe's bioeconomy, the CFP is necessary to regulate and manage fisheries and aquaculture for sustainable development. An ocean literate society can recognize the intrinsic connection between the ocean and humans and why sustainable management is necessary, in line with the aims of the policy.

⁵¹ Council Regulation (EC) No 1224/2009 of November 2009 on establishing a Community control system for ensuring compliance with the rules of the common fisheries policy, OJ L343/1. Available at <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:343:0001:0050:EN:PDF>

⁵² <http://www.efca.europa.eu/>

The regulations contained in the CFP leads back to the concept of ocean literacy. Without public comprehension of the relationship between human health and the ocean, it would be difficult to communicate, promote and implement the policy.

2.4.3 Ocean Literacy Content as part of the CFP

In this report, we use the essential principles and their supporting fundamental concepts (Appendix 1) developed through the ongoing Ocean Literacy Campaign as a guide to analyze the Ocean Literacy content found in the CFP.

Principle 1: The Earth has one big ocean with many features

A fundamental concept of this principle is that ‘although the ocean is large, it is finite, and resources are limited’ (principle 1H). This is the premise of the CFP, i.e. sustainable fisheries management. This finite resource and the need to manage it sustainably are referenced in the preamble of the policy text and the introduction to many of the associated communication materials.

Principle 3: The ocean is a major influence on weather and climate.

The ocean is a major regulator of Earth’s climate, absorbing heat and carbon dioxide. However, industrial activity and the accompanying increased greenhouse gas emissions have affected the health of the ocean, making it increasingly warmer and causing ocean acidification⁵³ which has had major impacts on coastal and marine ecosystems. This adds considerable challenges to fish stock management, adaptation strategies in aquaculture, and to coastal fishing communities. The term ‘climate change’ is not used in the policy text and in its campaigning products. However, it is flagged as one of the challenges that local communities should work together to tackle in the Spring-Summer 2015 issue of the EC publication, FARNET (Fisheries Areas Network) magazine⁵⁴. The EMFF⁵⁵ supported Fisheries Local Action Groups (FLAGs) can be instrumental to identify and promote awareness of the challenges and opportunities within fishing communities and in facilitating the emergence of local responses. In addition, FLAGs can play a crucial role in educating and informing local communities and businesses about climate change, its potential impacts and engaging with other initiatives and stakeholders.

Principle 5: The ocean supports a great diversity of life and ecosystems.

This principle is about the diversity of life that the ocean supports. In the previous CFP funding mechanism, the European fisheries fund (EFF) (2007-2013), one of the priority areas (axis 3) was measures of common interest, e.g. to support activities such as the protection of aquatic flora and fauna, ports, shelters and landing sites, pilot projects and the development of new marketing and promotional campaigns. This was a “green” subsidy of the EFF. In the CFP, there are rules on technical measures to govern how, where and when fishermen may fish. It is also noted in the sustainable seafood campaign ‘Inseparable’⁵⁶ that *“Renewable resources only stay renewable (or sustainable) if we respect their reproductive rhythm and capacity to recover. We should all care that individual species are overfished, because ecosystems are finely*

⁵³ The Ocean Climate Nexus, The Critical Role of Ocean Science in Responding to Climate Change. Available at: http://www.marineboard.eu/file/308/download?token=Wh_VqNgi

⁵⁴ https://webgate.ec.europa.eu/fpfis/cms/farnet/files/documents/FarnetMag_12_EN.pdf

⁵⁵ Previously European Fisheries Fund (EFF), in operation since 2007, the financial instrument of this policy. EUR 4.3 billion were allocated for 2007-2013. Since 2014, the EFF has been replaced by the European Maritime and Fisheries Fund (EMFF), with a budget of around EUR 6,4 billion for the period 2014-2020.

⁵⁶ <http://ec.europa.eu/fisheries/inseparable/en/faq>

balanced and when we tip the scales too far in one direction, the impact can be felt by many other sea creatures.”

Principle 6: The ocean and humans are inextricably interconnected.

This is the principal that is referred to the most throughout the CFP and its communications. As discussed earlier, our responsibility to use the ocean’s resources sustainably is crucial to the health of our shared ecosystem and ourselves. This was the exact reason that EU countries took actions to *“ensure the European fishing industry is sustainable and does not threaten the fish population size and productivity over the long term.”*⁵⁷

2.4.4 Communication of the CFP to advance Ocean Literacy

As a long-existing policy that has strong relevance in both economic and environmental aspects, the Common Fishery Policy has been communicated extensively by the EC. Although the term ‘Ocean Literacy’ and its key essential principals may not be spelled out in different communication materials, one can find many references to its core concepts. The CFP is a policy that is over 20 years old. With accumulated knowledge and experience, the communication of the CFP has evolved as communication tools have evolved. In general, the communication follows the principles of being simple, interactive and engaging.

Make it simple: communicating the CFP with facts and graphics

A regulation policy such as the CFP entails large amounts of legal text and lengthy documents, making the reading of the policy unappealing to a general audience. Since 2014, EC DG MARE has used infographics to explain the CFP. This communication approach simplifies complicated policy text and illustrates the CFP’s objectives and implementing instruments through graphics, numbers and short text presented in varying formats such as leaflets, videos, or posters. Examples of the range of print materials to communicate the CFP are provided in Figure 5.

⁵⁷ http://ec.europa.eu/fisheries/cfp/index_en.htm



Leaflets explain what the CFP is.



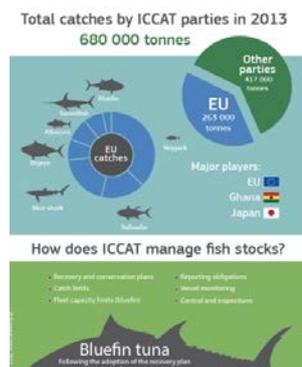
The Consumers' Pocket Guide educates consumers on the new label rules: mandatory and voluntary information to accompany fish & aquaculture products.



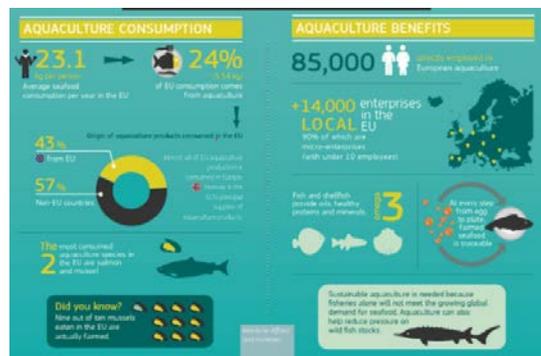
This poster on fishing quotas provides information on catch limits for different species.



Protecting sea bass: This infographic focuses on a single species, and how it is protected.



The EU and ICCAT⁵⁸: This infographic explains how fish stocks are managed.



Farmed in the EU: This infographic presents facts on the amount of aquaculture we consume and how we benefit from it.



TAC: This infographic explains the term TAC (Total Allowable Catch)



This infographic explains the budget distribution of the EMFF funding mechanism.



This infographic explains the various international organizations that manage international policy.

Figure 5 Examples of CFP print communication materials

⁵⁸ ICCAT: International Commission for the Conservation of Atlantic Tunas. It is an inter-governmental fishery organization responsible for the conservation of tunas and tuna-like species in the Atlantic Ocean and its adjacent seas.

Videos that animate the CFP

The CFP is also communicated through video. Figure 6 shows some videos that promote the CFP, including: why we need such a policy; how regulated fishing can sustain our future; and how Europe is connected to fisheries and aquaculture. These videos have been widely distributed among various platforms and in communication materials. Ocean literacy messages are embedded in each of these videos.



Sustainable fisheries for sustainable development (Sep. 2015)⁵⁹



Size does matter (Jan. 2014)⁶⁰



From Sea to Plate (Apr. 2014)⁶¹



We are farmed in the EU (May 2015)⁶²

Figure 6 Videos that communicate aspects of the CFP.

Make it interactive: through citizen participation to promote sustainable seafood

Campaigns

EC DG MARE organized two campaigns to promote policies related to the CFP, called “Inseparable”⁶³ and “Farmed in the EU”⁶⁴ (Figure 7). These campaigns use an interactive approach to engage the public, either to highlight Europeans’ inseparable relation with the seas and our responsibility towards it or to promote European aquaculture. A separate multi-lingual website interface⁶⁵ for these campaigns has been set up by the EC. Fishermen, fishmongers and consumers can all find information via the portal.

⁵⁹ <https://www.youtube.com/watch?v=ITWelRky7Bc>

⁶⁰ <https://www.youtube.com/watch?v=2w-JQHW-p8U>

⁶¹ <https://www.youtube.com/watch?v=vojwaKe5ag&feature=youtu.be>

⁶² <https://www.youtube.com/watch?v=o6Ouo36vJc>

⁶³ <http://ec.europa.eu/fisheries/inseparable/>

⁶⁴ <http://ec.europa.eu/fisheries/inseparable/en/farmed-eu>

⁶⁵ <http://ec.europa.eu/fisheries/inseparable/it/farmed-eu>

In the campaign ‘Farmed in the EU’, schools are encouraged to participate and raise awareness of the aquaculture sector among Europe’s teenagers (12-18 years old)⁶⁶. The project will bring students closer to fish farming and find out how it affects their local community. A list of EU aquaculture professionals is available for schools to contact, as well as a handbook⁶⁷ setting out preparation guidelines for teachers.

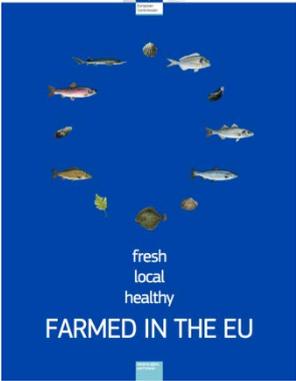
Campaign	Inseparable	Farmed in the EU
<p>Objective</p> <p>Communication tools</p>	  <p>Europeans have been inseparable from the sea and its fish for centuries. The campaign aims for everyone to realize that we can all make a difference, even one small step, to eat, buy or sell a sustainable seafood product, will help to ensure future generations will have the same story we have with our fish today.</p>	 <p>Part of the ‘Inseparable’ campaign, this initiative is to promote a healthy, fresh and local alternative, the aquaculture.</p> <ul style="list-style-type: none"> • Independent webpage/portal https://ec.europa.eu/fisheries/inseparable in 23 European language • Face book https://www.facebook.com/InseparableEU • Promoting materials (ruler with fish size) • Interactive portal allow users to look for information from each Member State and collect testimonials on sustainable practices.

Figure 7 DG MARE initiated two user-friendly campaigns to explain the Common Fishery Policy to the public.

Portals

The ‘European Atlas of the Seas’⁶⁸ is a trans-sectoral interactive tool hosted by the EC (Figure 8). This portal allows users to superimpose different layers of maritime information on a single map. For example, a user

⁶⁶ http://ec.europa.eu/fisheries/inseparable/en/farmed-eu#quicktabs-farming_in_the_eu_en=5

⁶⁷ Farmed in the EU, Learning about European aquaculture https://ec.europa.eu/fisheries/inseparable/sites/inseparable/files/schoolproject_en.pdf

⁶⁸ http://ec.europa.eu/maritimeaffairs/atlas/maritime_atlas/

can combine information on fish consumption, stock and quota on a single map. This public portal presents information with self-explanatory graphics that aid understanding of fishery resources and the way they are being managed.

The 'European Market Observatory for Fisheries and Aquaculture Products (EUMOFA)⁶⁹' is an online database that provides regular weekly prices, monthly market trends, and annual structural data along the fishery and aquaculture supply chain. It aims to give stakeholders, administrations and researchers a better understanding of the international and local European fishery markets. It is part of the objectives of the CFP to help the EU fishing industry regain economic stability in the context of soaring fuel price. In the aspects related to this report, this market observatory provides the latest reports on our fisheries and aquaculture consumption and trade (import & export) patterns. This information can be translated into how we depend on fishery & aquaculture resources from the ocean, both for economic activity and for protein intake.

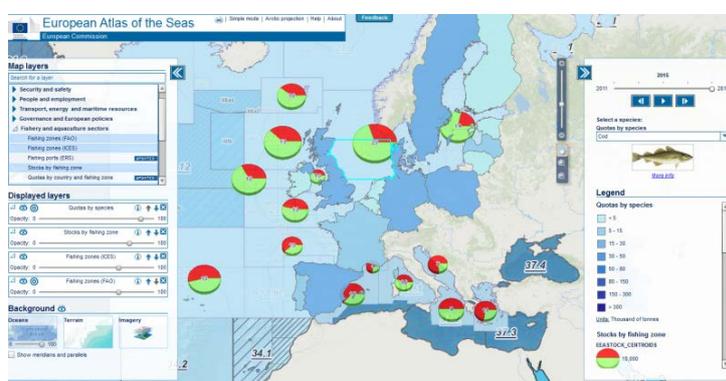


Figure 8 The European Atlas of the Seas portal displays maritime information such as tourism, fisheries and transport data.

Make it engaging: Local participation for coastal area development

The European Fisheries Areas Network (FARNET)⁷⁰ is the community of people implementing Community-Led Local Development (CLLD) under the EMFF. This network brings together FLAGS, managing authorities, citizens and experts from across the EU. Launched in 2009, FARNET is a tool to engage local community and to implement CFP strategies. This initiative promotes the priority area referred to as Axis 4 of the EFF, i.e., 'Sustainable development of fisheries areas'. Axis 4 requires the creation of a partnership in a local area to prepare and implement a local development strategy. Throughout Europe, more than 300 of the FLAGS have already generated several thousand projects adapted to local needs, with the ultimate aim of harnessing the potential of blue growth. For example, through these action groups, local fishing communities can receive training or test innovative new products, services, and processes.

⁶⁹ <http://www.eumofa.eu/>

⁷⁰ <https://webgate.ec.europa.eu/fpfis/cms/farnet/>

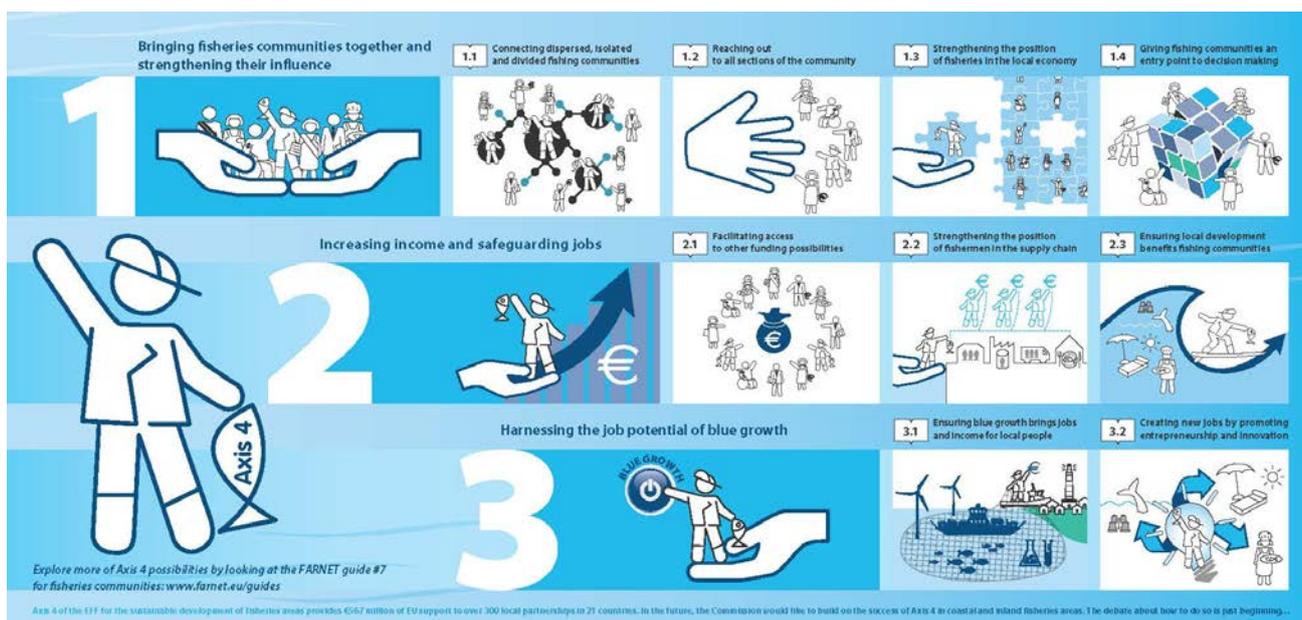


Figure 9 The benefits of Fisheries Local Action Groups (FLAGs)⁷¹.

2.4.5 Discussion

The CFP is a policy with more than 30 years of history. The discussion on the details of the previous CFP (i.e. the 1983, 1992 and 2002 regulations) is not within the scope of this report. However, it should be noted that there has been an increased focus on ‘sustainability’ in each reform. The new CFP is meant to ensure that the activities of the fishing and aquaculture sectors are environmentally sustainable in the long term and are managed in a way that is consistent with the objectives of achieving economic, social and employment benefits⁷². This echoes ocean literacy principles 5 & 6 in particular, i.e. the ocean supports a great diversity of life and ecosystems and the ocean and humans are inextricably interconnected. The CFP communication strategy, combining infographics, public awareness campaigns, and local engagement with fishing communities (FLAGs) all embed principle 1 that the ocean’s resources are finite.

The ocean literacy principles were developed much later than the start of the CFP. However, the ocean literacy concept has already been incorporated and communicated through associated campaigns and media formats. Thanks to the developments of graphic and social media, there are continued opportunities to further promote ocean literacy. An example of this is the new labelling rules which help consumers to understand fishing practices and the objectives of the CFP. The current momentum on environmental issues is high with positive public perception on sustainability. Highlighting ocean literacy concepts as part of CFP communications will not only assist implementation of the CFP but also create a sense of responsibility regarding our relationship with the ocean.

⁷¹ <https://webgate.ec.europa.eu/fpfis/cms/farnet/axis-4-nutshell-pocket-guide>

⁷² http://www.europarl.europa.eu/ftu/pdf/en/FTU_5.3.1.pdf

2.5 The Habitats and Birds Directives

2.5.1 Introduction to the Habitats Directive

Recognising that the preservation, protection and improvement of the quality of the environment, including the conservation of natural habitats and of wild fauna and flora, are an essential objective of general interest pursued by the Community, the Habitats Directive⁷³ aims to promote the maintenance of biodiversity, taking account of economic, social, cultural and regional requirements, thereby making a contribution to the general objective of sustainable development. In this sense it states that, however, the maintenance of such biodiversity may in certain cases require the maintenance, or indeed the encouragement of human activities.

The Habitats Directive dates from 1992 and defines several responsibilities at Member State level. Key amongst these responsibilities is the formation of a coherent European ecological network of special areas of conservation, known as Natura 2000. The Directive prescribes that these special areas of conservation are to be composed of sites hosting the natural habitat types listed in Annex I and habitats of the species listed in Annex II of the Habitats Directive.

The annexes of the Habitats Directive comprise the following:

- Annex I: Natural habitat types of community interest whose conservation requires the designation of special areas of conservation.
- Annex II: Animal and plant species of community interest whose conservation requires the designation of special areas of conservation.
- Annex III: Criteria for selecting sites eligible for identification as sites of community importance and designation as special areas of conservation.
- Annex IV: The animal and plant species of community interest in need of strict protection.
- Annex V: The animal and plant species of community interest whose taking in the wild and exploitation may be subject to management measures.
- Annex VI: The prohibited methods and means of capture and killing and modes of transport.

2.5.2 Introduction to the Birds Directive

Recognising that a large number of species of wild birds naturally occurring in the European territory of the Member States are declining and that this decline represents a serious threat to the conservation of the natural environment threatening biological balances, the Birds Directive⁷⁴ relates to the conservation of all species of naturally occurring birds in the wild state in the European territory of the Member States. It covers the protection, management and control of these species and lays down rules for their exploitation. The

⁷³ http://ec.europa.eu/environment/nature/legislation/habitatsdirective/index_en.htm

⁷⁴ http://ec.europa.eu/environment/nature/legislation/birdsdirective/index_en.htm

Directive dates from 2009 and is the codified⁷⁵ version of Directive 79/409/EEC as amended. It comprises several annexes defining:

- Annex I: List of endangered, as well as migratory, species that should be subjected to special conservation measures concerning their habitat in order to ensure their survival and reproduction in their area of distribution.
- Annex II A : List of species that can be hunted in all Member States under national legislation.
- Annex II B : List of species that can be hunted in listed Member States under national legislation.
- Annex III A: List of species allowed for sale, transport for sale, keeping for sale and the offering for sale of live or dead birds and of any readily recognisable parts or derivatives of such birds in all Member States.
- Annex III A: List of species which is allowed for sale, transport for sale, keeping for sale and the offering for sale of live or dead birds and of any readily recognisable parts or derivatives of such birds in Member States in agreement with EC.
- Annex IV: List of prohibited non-selective, large-scale methods of killing of birds.
- Annex V: List of species that require enhanced research to underpin their protection and management.

2.5.3 The Importance of Ocean Literacy to the Habitats and Birds Directives

The need for the development of a rational approach to fully implement Natura 2000 at sea has been emphasised by the EC as evidenced in their '*Guidelines for the establishment of the Natura 2000 network in the marine environment: Application of the Habitats and Birds Directives*'⁷⁶. These guidelines recognise that until May 2007 there had been relatively few Natura 2000 sites identified for the offshore marine environment, representing the most significant gap in the Natura network. Due to the lack of scientific knowledge on the distribution/abundance of species and habitat types, implementation of the Birds and Habitats Directives in the marine environment presents substantial challenges, especially in relation to the offshore (as opposed to the coastal) marine environment. Therefore work will be needed to complement the present lists with additional marine habitat types and species, which would provide a legal basis for extending the scope of the marine network.

This process will benefit from the engagement of citizens either through public consultations or through their day to day actions to promote preservation of the sea as a whole. Public acceptance and support are essential for the success of conservation policies that require public understanding of the ocean's influence on us and our influence on the ocean. It is likely that the more ocean literate a society is, the more willing they will be to support policies that benefit the marine environment. Ocean literacy, therefore, will play an increasingly important part in the implementation of the Habitats and Birds Directives.

⁷⁵ Codification is the process of bringing together a legislative act and all its amendments in a single new act. The new act passes through the full legislative process and replaces the acts being codified.

http://ec.europa.eu/dgs/legal_service/codifica_en.htm

⁷⁶ http://ec.europa.eu/environment/nature/natura2000/marine/docs/marine_guidelines.pdf Available at http://ec.europa.eu/environment/nature/natura2000/marine/index_en.htm

2.5.4 Ocean Literacy Content as part of the Habitats and Birds Directives

The inclusion of the concept of sustainable development in the directives while at the same time considering the need to maintain biodiversity indirectly addresses ocean literacy concepts regarding the interconnectivity of inland and marine (coastal and offshore) habitats. Recognizing that the conservation of such biodiversity may require the maintenance, or encouragement of human activities, can be interpreted as an understanding of the environment's influence on us and our influence on the environment. Although the marine environment is not specifically mentioned in the directives at present, it does not mean that it will be excluded in future application of the directives. This provides room for the marine environment and ocean literacy to be accounted for in the future.

Furthermore, it is mentioned throughout the Habitats Directive that there is a need for education and general information to ensure its effective implementation. Article 22 clearly states that Member States shall promote education and general information on the need to protect species of wild fauna and flora and to conserve their habitats and natural habitats.

Specifically, the Habitats Directive could make reference to the following principles of ocean literacy:

Principle 1: The Earth has one big ocean with many features.

The introduction to the Directive states that the aim is to promote the maintenance of biodiversity, in line with the general objectives of sustainable development. Sustainable development cannot be achieved without a holistic approach to the earth (inclusive of marine and inland resources). Annexes I and II include marine habitats and species under protective measures. Therefore, in this sense, ocean literacy could be further explored. Moreover, article 14 refers to the possibility of exploitation of species (some of which are marine) listed in Annex V as long as they are maintained at a favourable conservation status. This is in alignment with principle 1H which refers to the ocean's finite and limited resources.

Principle 5: The ocean supports a great diversity of life and ecosystems

The Habitats Directive refers to principle 5 in a general sense in the introduction, when it refers to its aim to promote the maintenance of biodiversity, and it particular when it includes in Annex I marine habitats such as estuaries which links to principle 5I. This principle states that estuaries provide important and productive nursery areas for many marine and aquatic species.

Principle 6: The ocean and humans are interconnected

The statement in the introduction of the Directive that the maintenance of biodiversity may in certain cases require the maintenance, or indeed the encouragement of human activities, relates to principle 6D (which deals with humans affecting the ocean in a variety of ways).

Principle 6D also stresses the relevance of laws and regulations in marine resources management. This is addressed in the Directive in article 23 when recognising the need for Member States to bring into force laws, regulations and administrative provisions necessary to comply with the Directive. This last point also relates to principle 6G which deals with the necessary individual and collective actions for marine resource management. This can be further developed since, as previously mentioned, article 22 of the Habitats Directive states that Member States shall promote education and general information on the need to protect species of wild fauna and flora and to conserve their natural habitats.

Although the marine environment is not specifically mentioned, there is the possibility that the directive may evolve to include the marine environment in the future. Under this scenario, the concepts of ocean literacy will gain more prominence in the directive.

Principle 7: The ocean is largely unexplored

Article 14 refers to the possibility of exploitation of the species, some of which are marine, listed in Annex V and indicates several possible measures to ensure that species are maintained at a favourable conservation status. These include fishing rules and quotas, which is in line with principle 7C, where it is recognised that future sustainability of ocean resources depends on our understanding of those resources and their potential. In that sense scientific research will have a crucial role to promote the understanding of the ocean system which is partially recognised throughout the Directive since it determines that Member States and the Commission shall encourage the necessary research and scientific work to accomplish the defined objectives.

2.5.5 Communication of the Habitats and Bird Directives to advance Ocean Literacy

The benefits of an ocean literate society include increased awareness, understanding and interest in policies that affect the ocean. It is therefore important that strategies and policies that have an impact on the ocean are communicated to the public. Increasing ocean literacy by informing citizens about ocean issues and how we are managing our relationship with the ocean will promote the acknowledgement of a shared responsibility for the health of the ocean. As mentioned earlier in this report, an ocean-literate person understands the importance of the ocean to humankind, can communicate about the ocean in a meaningful way, and is able to make informed and responsible decisions regarding the ocean and its resources.

In this regard, the lack of emphasis on ocean literacy in the Habitats and Birds Directives represents a gap in the publicly available communication products, in terms of aiding understanding how the Directives relate to marine issues.

However, on the Natura 2000 menu of the EC webpage there is a specific sub-menu that targets the marine environment⁷⁷ where it is stated:

'The need to fully apply the Habitats and Birds Directives to the offshore marine environment of the European Union, especially with regards to the establishment of the Natura 2000 network, represents a key challenge for EU biodiversity policy in the coming years.'

'The establishment of a marine network of conservation areas under Natura 2000 will significantly contribute, not only to the target of halting the loss of biodiversity in the EU, but also to broader marine conservation and sustainable use objectives.'

In the Natura 2000 marine environment sub-menu there are also links to several technical documents:

- Guidelines (and appendices) for the establishment of the Natura 2000 network in the marine environment. Application of the Habitats and Birds Directives.
- Introducing fisheries measures for marine Natura 2000 sites
- Methodology for assessing the impact of fisheries on marine Natura 2000 sites

⁷⁷ http://ec.europa.eu/environment/nature/natura2000/marine/index_en.htm

- Benefits of marine Natura 2000
- Links between the Nature Directives and the Marine Strategy Framework Directive
- Links between the Nature Directives and the Marine Strategy Framework Directive.

Complementing these resources, there is information on the ‘Natura 2000 biogeographical process for the marine regions’ and on ‘The context of EU marine biodiversity and protected areas policy’. However, this information lacks simplicity in its language and summary images or infographics are needed to reach a broader audience. This synthesized view is achieved by the Natura 2000 barometer⁷⁸ which already includes, in an excel sheet, the number of marine sites per Member State.

2.5.6 Discussion

The analysis of the Habitats and Birds Directives indicates that although ocean literacy is not directly referred to in any of the documents, some of its principles are implied throughout the policies. The need to increase public awareness concerning the protective measures defined in the Directives are generalised to the scope of the document and marine issues are seldom mentioned. However, the presence of marine species in the annexes provides an opportunity to further explore the concepts of ocean literacy in future science outreach programmes.

Such ocean literacy programmes and the implementation of the Directives by the Member States would certainly benefit from a clear incorporation of the ocean literacy concepts into the directives. To achieve those goals the marine scope of the directives could be further developed.

The communication products related to the Habitats Directive available in the EC webpage are deemed to be too complex for a broader audience, although some of them do target marine issues. Flyers, leaflets, short videos and other synthesizing communication products are needed to create more ocean literate citizens and engage them in halting the loss of marine biodiversity in the European Union.

3. Review Findings

The purpose of this review is to demonstrate how ocean literacy is currently embedded in EU maritime policy and to provide recommendations on how to increase its representation. Based on the reviews of the 6 policies in the previous section, the three main findings are that:

- **EU maritime policy is largely based on the concept of ocean literacy**, evidenced by reference to the ocean literacy principles and fundamental concepts either in the policy text itself or in associated communication products. This is in spite of the fact that the term ‘ocean literacy’ is not used in the policies. An exception is the use of the term in the 2013 Galway Statement on Atlantic Ocean Cooperation which builds on the Atlantic Action Plan as part of the Blue Growth Strategy.
- **The human health aspect of our connection with the ocean is mainly not directly addressed.** While it is evident that the concepts of ocean literacy and sustainability underlie maritime policy, the connection between oceans and human health in particular does not feature largely. Instead, it is the provision of ecosystem services such as food, raw materials and climate regulation that are emphasized in communication of the ocean’s influence on us.

⁷⁸ http://ec.europa.eu/environment/nature/natura2000/barometer/index_en.htm

- **It is recognized that public information and public participation are important to policy implementation.** A common feature of the policies reviewed is that many of them acknowledge the importance of public information and stakeholder dialogue for effective implementation.

4. Recommendations

We are all users of the marine environment and therefore have a common interest and responsibility in its sustainable use through effective management of human activities. It is anticipated that creating a more ocean literate society in Europe will foster a sense of ocean stewardship in citizens and affect individual behaviour. Furthermore, in a policy context, a more ocean literate society is expected to benefit maritime policy through increased stakeholder engagement and participation. Increasing the representation of ocean literacy in policy can only serve to enhance the objectives of the Sea Change project in spreading ocean literacy and encouraging society to act. Based on this review we suggest some ways in which this could be approached:

- **Use the term ‘ocean literacy’ when communicating about the policy or in follow-up activities and initiatives.** As this review showed, the concept and principles of ocean literacy are already embedded in European marine policies, both in their normative approach and in the underlying principles. Future efforts should be undertaken to make these links clear and known by the actors involved in marine policy formulation and implementation. As demonstrated by the 2013 Galway Statement on Atlantic Ocean Cooperation, the use of the term ocean literacy can provide impetus for further action. Although existing policy text may not be modified, there is continued opportunity to incorporate the term ocean literacy into communications and actions related to the policy areas.
- **Communicate policies in the context of ocean literacy.** Communication products represent the avenue through which the majority of people learn about policy content and its context, not by reading the policy itself. This provides an opportunity to frame policy in an ocean literacy context and increase the incorporation of ocean literacy concepts. For example, in the case of ocean and human health, presenting these aspects of policy areas will help to make the connection with people’s daily lives.
- **Simplify representation of the maritime policy landscape to make it more accessible to non-specialists.** The EU maritime policy landscape is complex with the EU adopting more than 200 pieces of legislation that have repercussions for marine environmental policy and management. Boyes and Elliott (2014) have illustrated this, using the term ‘horrendogram’ to describe the resulting complex figure. Now that the EU is moving towards more integrated marine management, there is an opportunity to present the policy landscape in a way that is easier to understand for non-specialists. For example, a summary infographic available on EU websites would provide an introduction to maritime policy in the EU and how the separate policies relate to integrated management. At present, this does not exist.
- **Use a number of media formats for policy communication products.** This is to ensure that knowledge of the policies appeal to as wide an audience as possible. In this regard, the Common Fisheries Policy provides a good example of a policy which employs several media formats and

strategies to communicate the policy and its associated regulations. For example, it uses infographics, videos, consumer guides and campaigns targeting different audiences.

- **Emphasise the land-sea connection in policy communication.** The literature demonstrates that individual action relies on the connection between individuals and their local environment as a key rationale for personal involvement in environmental issues through invoking a sense of global ownership and responsibility that is actualized locally (Fletcher and Potts, 2007). Therefore, one of the challenges in changing behaviour is making that connection for people who do not live in or have access to coastal areas. In line with the move towards integrated maritime policy, it is suggested to also communicate the links between activity in inland areas and how it affects the ocean.

5. Conclusion

The Sea Change project will progress the findings and recommendations of this review through WP5 'Mobilisation: Marine Governance', which will focus on improvements to the existing science-policy interface.

Particularly relevant is task 5.2 involving consultation and engagement with key actors of the marine governance system on the link between seas and ocean and human health. This task will help to address the review finding that while EU maritime policy is largely based on the concept of ocean literacy, the human health aspect of our connection with the ocean is mainly not directly addressed. During the consultations with policymakers in task 5.2, emphasis will be placed on aspects of ocean and human health related to policy, including the recommendation that the connections between human health and the ocean are important to incorporate into maritime policy and as another angle through which to communicate policies to the public. To aid the discussions, factsheets on different aspects of the connection between the ocean and human health (an output of task 1.2) will be used as an accompanying information resource. It is hoped that the consultations will lead to increased consideration of and communication of the connections between the ocean and human health in maritime policy.

The majority of the recommendations from the review relate to the communication of maritime policy to the public and ways in which ocean literacy can be further included in that communication. Considering that the largest source of communication material on maritime policy is the EC, the recommendations on communications will be brought to their attention.

Finally, in relation to the recommendation to emphasise the land-sea connection in policy communication, this topic will be further investigated as part of task 5.1 which will look at science-policy interface mechanisms. Specifically, the process leading to the successful approval of Sustainable Development Goal 14⁷⁹, '*Conserve and Sustainably Use Oceans, Seas and Marine Resources for Sustainable Development*', will be traced and key actors in the process will be interviewed to clarify the process. One of the questions the identified key actors will be asked their opinion on is whether there was a noticeable difference between actors in terms of whether they represented coastal versus landlocked states? The answers received may lend further support to the recommendation to emphasise the land-sea connection in future policy communication.

⁷⁹ <http://www.un.org/sustainabledevelopment/oceans/>

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7. Appendices

Appendix 1 Ocean Literacy Essential Principles and Fundamental Concepts

Ocean Literacy Principle #1: The Earth has one big ocean with many features.

- A. The ocean is the dominant physical feature on our planet Earth—covering approximately 70% of the planet’s surface. There is one ocean with many ocean basins, such as the North Pacific, South Pacific, North Atlantic, South Atlantic, Indian, Southern and Arctic.
- B. Ocean basins are composed of the seafloor and all of its geological features (such as islands, trenches, mid-ocean ridges and rift valleys) and vary in size, shape and features due to the movement of Earth’s crust (lithosphere). Earth’s highest peaks, deepest valleys and flattest vast plains are all in the ocean.
- C. Throughout the ocean there is one interconnected circulation system powered by wind, tides, the force of the Earth’s rotation (Coriolis effect), the Sun, and water density differences. The shape of ocean basins and adjacent land masses influence the path of circulation. This ‘global ocean conveyor belt’ moves water throughout all of the ocean’s basins, transporting energy (heat), matter, and organisms around the ocean. Changes in ocean circulation have a large impact on the climate and cause changes in ecosystems.
- D. Sea level is the average height of the ocean relative to the land, taking into account the differences caused by tides. Sea level changes as plate tectonics cause the volume of ocean basins and the height of the land to change. It changes as ice caps on land melt or grow. It also changes as sea water expands and contracts when ocean water warms and cools.
- E. Most of Earth’s water (97%) is in the ocean. Seawater has unique properties: it is saline, its freezing point is slightly lower than fresh water, its density is slightly higher, its electrical conductivity is much higher, and it is slightly basic. The salt in seawater comes from eroding land, volcanic emissions, reactions at the seafloor, and atmospheric deposition.
- F. The ocean is an integral part of the water cycle and is connected to all of the earth’s water reservoirs via evaporation and precipitation processes.
- G. The ocean is connected to major lakes, watersheds and waterways because all major watersheds on Earth drain to the ocean. Rivers and streams transport nutrients, salts, sediments and pollutants from watersheds to estuaries and to the ocean.
- H. Although the ocean is large, it is finite and resources are limited.

Ocean Literacy Principle #2: The ocean and life in the ocean shape the features of Earth.

- A. Many earth materials and geochemical cycles originate in the ocean. Many of the sedimentary rocks now exposed on land were formed in the ocean. Ocean life laid down the vast volume of siliceous and carbonate rocks.
- B. Sea level changes over time have expanded and contracted continental shelves, created and destroyed inland seas, and shaped the surface of land.
- C. Erosion—the wearing away of rock, soil and other biotic and abiotic earth materials—occurs in coastal areas as wind, waves, and currents in rivers and the ocean move sediments.
- D. Sand consists of tiny bits of animals, plants, rocks and minerals. Most beach sand is eroded from land sources and carried to the coast by rivers, but sand is also eroded from coastal sources by surf. Sand is redistributed by waves and coastal currents seasonally.

- E. Tectonic activity, sea level changes, and force of waves influence the physical structure and landforms of the coast.

Ocean Literacy Principle #3: The ocean is a major influence on weather and climate.

- A. The ocean controls weather and climate by dominating the Earth's energy, water and carbon systems.
- B. The ocean absorbs much of the solar radiation reaching Earth. The ocean loses heat by evaporation. This heat loss drives atmospheric circulation when, after it is released into the atmosphere as water vapor, it condenses and forms rain. Condensation of water evaporated from warm seas provides the energy for hurricanes and cyclones.
- C. The El Niño Southern Oscillation causes important changes in global weather patterns because it changes the way heat is released to the atmosphere in the Pacific.
- D. Most rain that falls on land originally evaporated from the tropical ocean.
- E. The ocean dominates the Earth's carbon cycle. Half the primary productivity on Earth takes place in the sunlit layers of the ocean and the ocean absorbs roughly half of all carbon dioxide added to the atmosphere.
- F. The ocean has had, and will continue to have, a significant influence on climate change by absorbing, storing, and moving heat, carbon and water.
- G. Changes in the ocean's circulation have produced large, abrupt changes in climate during the last 50,000 years.

Ocean Literacy Principle #4: The ocean makes the Earth habitable.

- A. Most of the oxygen in the atmosphere originally came from the activities of photosynthetic organisms in the ocean.
- B. The first life is thought to have started in the ocean. The earliest evidence of life is found in the ocean.

Ocean Literacy Principle #5: The ocean supports a great diversity of life and ecosystems.

- A. Ocean life ranges in size from the smallest virus to the largest animal that has lived on Earth, the blue whale.
- B. Most life in the ocean exists as microbes. Microbes are the most important primary producers in the ocean. Not only are they the most abundant life form in the ocean, they have extremely fast growth rates and life cycles.
- C. Some major groups are found exclusively in the ocean. The diversity of major groups of organisms is much greater in the ocean than on land.
- D. Ocean biology provides many unique examples of life cycles, adaptations and important relationships among organisms (such as symbiosis, predator-prey dynamics and energy transfer) that do not occur on land.
- E. The ocean is three-dimensional, offering vast living space and diverse habitats from the surface through the water column to the seafloor. Most of the living space on Earth is in the ocean.
- F. Ocean habitats are defined by environmental factors. Due to interactions of abiotic factors such as salinity, temperature, oxygen, pH, light, nutrients, pressure, substrate and circulation, ocean life is not evenly distributed temporally or spatially, i.e., it is "patchy". Some regions of the ocean support

more diverse and abundant life than anywhere on Earth, while much of the ocean is considered a desert.

- G. There are deep ocean ecosystems that are independent of energy from sunlight and photosynthetic organisms. Hydrothermal vents, submarine hot springs, and methane cold seeps rely only on chemical energy and chemosynthetic organisms to support life.
- H. Tides, waves and predation cause vertical zonation patterns along the shore, influencing the distribution and diversity of organisms.
- I. Estuaries provide important and productive nursery areas for many marine and aquatic species.

Ocean Literacy Principle #6: The ocean and humans are inextricably interconnected.

- A. The ocean affects every human life. It supplies freshwater (most rain comes from the ocean) and nearly all Earth's oxygen. It moderates the Earth's climate, influences our weather, and affects human health.
- B. From the ocean we get foods, medicines, and mineral and energy resources. In addition, it provides jobs, supports our nation's economy, serves as a highway for transportation of goods and people, and plays a role in national security.
- C. The ocean is a source of inspiration, recreation, rejuvenation and discovery. It is also an important element in the heritage of many cultures.
- D. Much of the world's population lives in coastal areas.
- E. Humans affect the ocean in a variety of ways. Laws, regulations and resource management affect what is taken out and put into the ocean. Human development and activity leads to pollution (such as point source, non-point source, and noise pollution) and physical modifications (such as changes to beaches, shores and rivers). In addition, humans have removed most of the large vertebrates from the ocean.
- F. Coastal regions are susceptible to natural hazards (such as tsunamis, hurricanes, cyclones, sea level change, and storm surges).
- G. Everyone is responsible for caring for the ocean. The ocean sustains life on Earth and humans must live in ways that sustain the ocean. Individual and collective actions are needed to effectively manage ocean resources for all.

Ocean Literacy Principle #7: The ocean is largely unexplored.

- A. The ocean is the last and largest unexplored place on Earth—less than 5% of it has been explored. This is the great frontier for the next generation's explorers and researchers, where they will find great opportunities for inquiry and investigation.
- B. Understanding the ocean is more than a matter of curiosity. Exploration, inquiry and study are required to better understand ocean systems and processes.
- C. Over the last 40 years, use of ocean resources has increased significantly, therefore the future sustainability of ocean resources depends on our understanding of those resources and their potential and limitations.
- D. New technologies, sensors and tools are expanding our ability to explore the ocean. Ocean scientists are relying more and more on satellites, drifters, buoys, subsea observatories and unmanned submersibles.

- E. Use of mathematical models is now an essential part of ocean sciences. Models help us understand the complexity of the ocean and of its interaction with Earth's climate. They process observations and help describe the interactions among systems.
- F. Ocean exploration is truly interdisciplinary. It requires close collaboration among biologists, chemists, climatologists, computer programmers, engineers, geologists, meteorologists, and physicists, and new ways of thinking.