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## Steps toward a shared governance response for achieving Good Environmental Status in the Mediterranean Sea

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**ABSTRACT.** The Mediterranean region is of fundamental importance to Europe given its strategic position. The responsibility for its overall ecosystem integrity is shared by European Union Member States (EU-MS) and other Mediterranean countries. A juxtaposition of overlapping governance instruments occurred recently in the region, with the implementation of both the Marine Strategy Framework Directive (MSFD) for EU-MS and the Ecosystem Approach Strategy (ECAP) for all Mediterranean countries, including EU-MS. Both MSFD and ECAP are structured around vision-driven processes to achieve Good Environmental Status and a Healthy Environment, respectively. These processes have clear ecosystem-based, integrated policy objectives to guarantee the preservation and integrity of Mediterranean marine ecosystem goods and services. However, adoption of these instruments, especially those related to the new EU-MS directives on marine policy, could result in a governance gap in addition to the well-known economic gap between the EU and the non-EU political blocs. We identify two complementary requirements for effective implementation of both MSFD and ECAP that could work together to reduce this gap, to ensure a better alignment between MSFD and ECAP and better planning for stakeholder engagement. These are key issues for the future success of these instruments in a Mediterranean region where discrepancies between societal and ecological objectives may pose a challenge to these processes.

**Key Words:** *ecosystem approach; environmental status; governance; legislation implementation; marine environment; Mediterranean; shared vision*

### INTRODUCTION

The Mediterranean region is home to some of the world's oldest cultures and has been exploited and managed by humans for more than 8000 years (Trump 1980). This long history of development in the region has resulted in environmental degradation that accelerated during the last decades of the 20th century (EEA 2008, Cinnirella et al. 2013). Mediterranean countries participate in many different initiatives for environmental protection in attempts to halt this degradation (Suárez de Vivero 2012, Suárez de Vivero and Rodríguez Mateos 2015), but differences in legal requirements between countries could potentially limit conservation and management efforts. Despite the complex geopolitical setting of the region, two recent initiatives have been launched to maintain marine ecosystem integrity while enabling sustainable use of ecosystem goods and services. We provide a critical review of the similarities and differences between these two initiatives: the Marine Strategy Framework Directive (MSFD 2008/56/EC; EC 2008) for European Union Member States (EU-MS) and the Ecosystem Approach Strategy (ECAP) for all the Mediterranean countries under the United Nations Environmental Program (UNEP) Mediterranean Action Plan (MAP; UNEP-MAP 2008). Shared governance has the potential to produce a synergistic approach toward fostering both strategy implementation and objective targeting. It is necessary to focus on a shared vision between the MSFD and MAP approaches combined with complete engagement of stakeholders to facilitate progress toward effective implementation of both MSFD and ECAP (see the proposed timeline in Fig. 1).

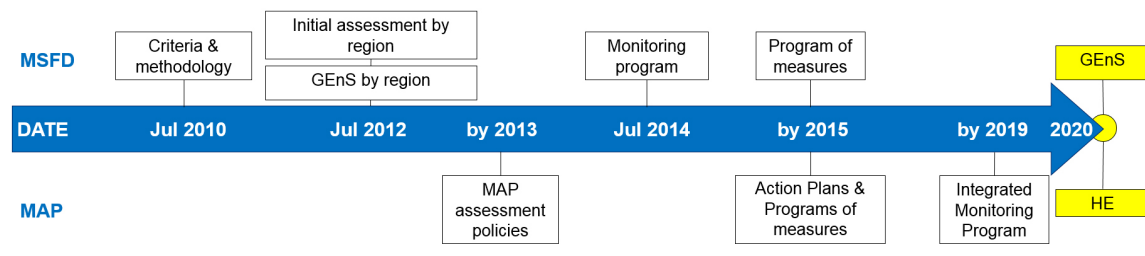
### GEOPOLITICAL CONTEXT AND GOVERNANCE INSTRUMENTS

The Mediterranean Sea is surrounded at present by 22 coastal states, excluding UK sovereignty, that claim national jurisdiction over parts of the sea. This complexity is also reflected in the jurisdictional structure of its maritime space, with the degree of responsibility for EU countries under MSFD depending on the geographical characteristics of each state (Fig. 2a, b). Changes are occurring at a marine jurisdictional level. For example, in 2012 France approved an Exclusive Economic Zone; Italy approved an Ecological Protection Zone; Slovenia currently claims an Ecological Protection Zone; and Croatia claims an Ecological and Fisheries Protection Zone incorporating specific features of an Exclusive Economic Zone, mainly related to the protection of the marine environment. The dispute over water sovereignty among countries (Suárez de Vivero 2012) may also affect the achievement of environmental objectives. The degree of internationalization of the Mediterranean Sea's waters is also relevant: 29.2% of the waters are high seas (Fig. 2c), which theoretically limits intervention in environmental affairs by coastal states because political and security issues are governed by international norms. Nonetheless, the entire sea floor does fall within the control of national jurisdictions.

A diverse range of international maritime governance instruments (Table 1) involve the majority of Mediterranean Sea states. In addition, actions taken by individual states and other regional bodies pertain to Mediterranean Sea management. The different and overlapping initiatives for environmental protection

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**Fig. 1.** Synthetic comparison of Marine Strategy Framework Directive (MSFD) and Ecosystem Approach Strategy (ECAP) milestones (UNEP-MAP 2012; modified from O’Higgins and Roth 2010)



(Suárez de Vivero 2012, Suárez de Vivero and Rodríguez Mateos 2015) range from international conventions, e.g., United Nations Convention on the Law of the Sea, Ramsar, the Convention on Biological Diversity, and the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, to regional initiatives such as UNEP-MAP and H2020. Some are specific to the coastal and marine environment. The EU-MS have adopted binding legislation to protect the environment (EC 1992, 2000, 2001, European Parliament 2002, EC 2008, 2009a, 2014a).

**Table 1.** Legal-institutional marine governance forms in the Mediterranean that involve both EU and non-EU countries (Suárez de Vivero and Rodríguez Mateo 2015).

International initiatives	<ul style="list-style-type: none"> <li>- United Nations Convention on the Law of the Sea</li> <li>- Conservation agreements</li> <li>- Fishing treaties</li> <li>- Agreements on dumping of waste and pollutants</li> <li>- UNEP-Regional Seas Programme</li> </ul>
Regional initiatives	<ul style="list-style-type: none"> <li>- Mediterranean Action Plan: Barcelona Convention and protocols; Blue Plan; MEDPOL Programme</li> <li>- General Fisheries Council for the Mediterranean</li> <li>- EU initiatives</li> <li>- Other initiatives: METAP (World Bank); NGOs (IUCN); subregional initiatives (Declaration on the Conservation and Sustainable Development of the Alboran Sea, Pelagos Sanctuary, RAMOGE Agreement, etc.)</li> </ul>
National initiatives	<ul style="list-style-type: none"> <li>- Transposition of international law</li> <li>- General environmental legislation (natural spaces, pollution prevention, coastal protection, and coastal and marine environment protection, etc.)</li> <li>- Legislation on marine aspects (fishing, protected marine areas, navigation, exploitation of nonliving resources, etc.)</li> </ul>

During the last decade, both the European Commission (EC) through MFSD and UNEP through MAP (UNEP-MAP 2008) have made commitments to foster the sustainable use of marine resources with the stated vision of achieving and/or maintaining a clean, healthy, and productive sea. However, the overlap in the jurisdictional competence and vision of these two initiatives has yet to be resolved. Governance complexity creates institutional ambiguity for implementing MFSD at the Mediterranean level because the EU has jurisdiction only over 36% of the Mediterranean (Fig. 2a), which with the future accession of

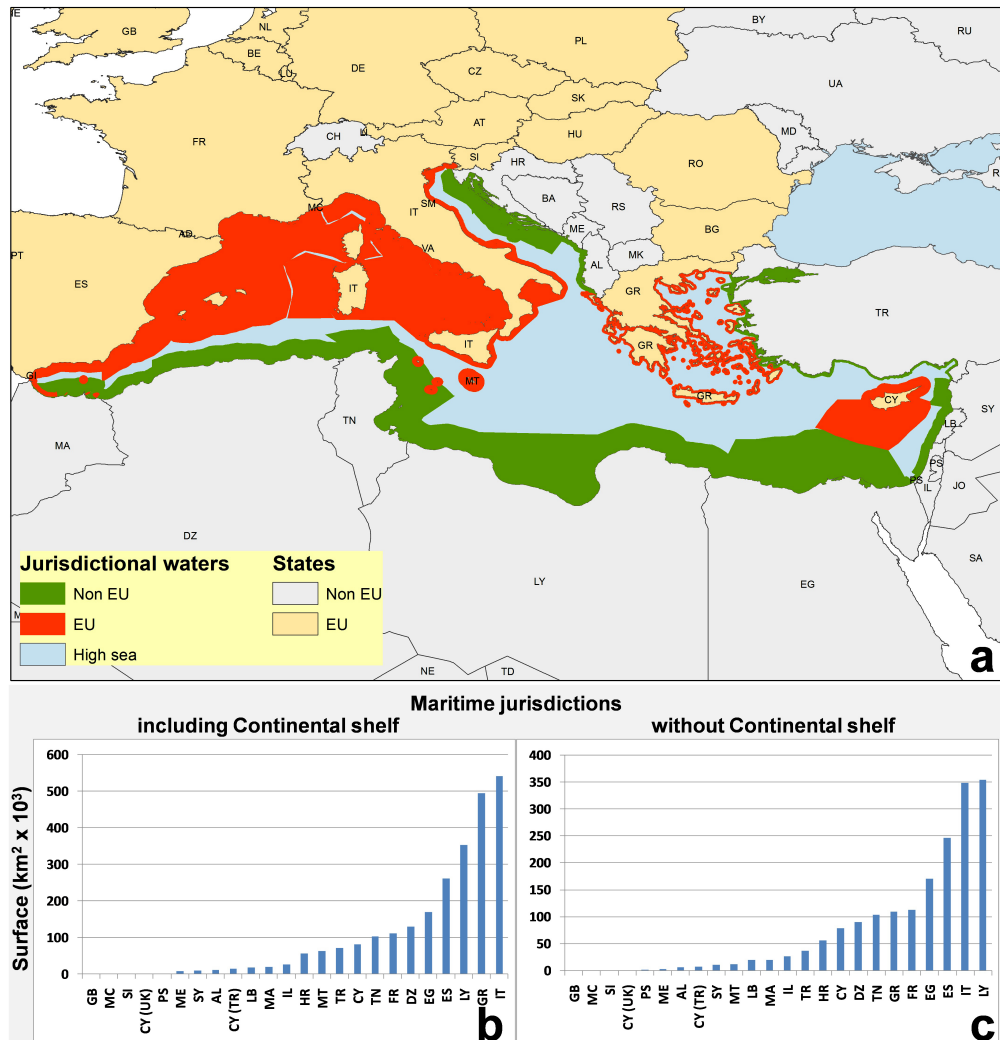
candidate countries such as Montenegro, Turkey, or Albania may increase to 46%. UNEP-MAP includes political institutions from all the countries of the Mediterranean Basin (van Leeuwen et al. 2012).

### The Marine Strategy Framework Directive

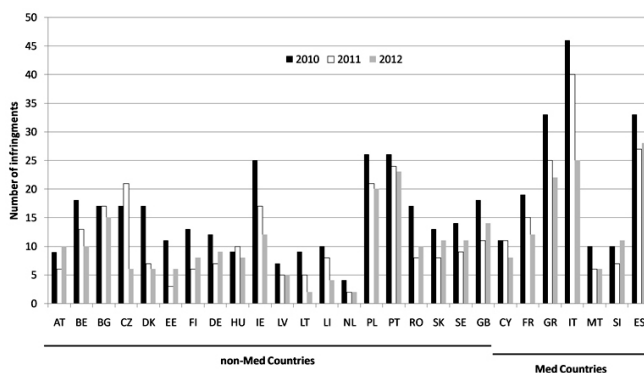
The MSFD establishes a framework within which each EU-MS must take the necessary steps to achieve or maintain Good Environmental Status (GEnS) of the marine environment by 2020. The MSFD has developed a vision-driven process that uses the Ecosystem Approach (EA) to achieve GEnS within a particular marine region or subregion. The MSFD imposes a legal obligation on those EU-MS countries with jurisdiction over Mediterranean maritime waters, including the continental shelf. Each individual EU-MS is responsible for its waters and for reaching predefined targets that must be documented according to a well-defined time line. Wider assessment/reporting scales are desirable, but are not mandatory. Failure to comply with MFSD requirements may lead to legal action against an EU-MS. The EC therefore has specific legal tools to control the implementation of MFSD. Although each EU-MS is responsible for implementing MFSD, the need to collaborate with other EU-MS or non-EU countries in the same region or subregion is also mentioned in the directive. However, although MFSD involves international obligations and commitments (EC 2008, 2013a), administrative compliance with the directive is uneven: all EU-MS have transposed the directive (article 26), completed the initial assessment (article 8), determined GEnS (article 9), and defined environmental targets and indicators (article 10). However, there is only limited coherence at regional and subregional levels (Palialexis et al. 2013, Dupont et al. 2014).

Although conformity and compliance with MFSD across member states are important, a more fundamental question is whether MSFD implementation can resolve marine and coastal environmental problems in the Mediterranean. A very simple indicator of how Mediterranean EU-MS do not focus their policies on the environment is the number of infringements related to the environment opened by the EU Directorate-General for the Environment (Fig. 3). Nonetheless, there are collaborative efforts relevant to the implementation of MFSD. For example, the new multiannual recovery plan for Eastern blue fin tuna (*Thunnus thynnus*) adopted by the International Commission for the Conservation of Atlantic Tunas (EC 2013b) represents a success for Mediterranean regional cooperation.

**Fig. 2.** Map and bar charts of Mediterranean EU and non-EU countries (ISO 3166-2 Codes) jurisdictions (modified from Suárez de Vivero 2012). Further detailed maps can be found in Suárez de Vivero's 2012 publication.



**Fig. 3.** Statistics on environmental infringements in European Countries (ISO 3166-2 Codes) for the years 2010, 2011, and 2012 (EC 2013c).



**The Mediterranean Ecosystem Approach Strategy**

The Barcelona Convention covers all the maritime waters in the Mediterranean Basin, from the open sea to sheltered coves. In 1975, 16 Mediterranean countries and the European Community adopted MAP, of which phase II, the 1995 revision, entered into force in 2004. The Mediterranean Ecosystem Approach Strategy (ECAP) was proposed in 2005 and was aimed, among other objectives, at strengthening efforts to decontaminate the Mediterranean Sea to achieve a Healthy Environment status by 2020. The ECAP was eventually launched under the MAP Five Year Programme (2010-2014), within the Barcelona Convention (UNEP-MAP 2009). The MAP is legally binding because it has been adopted by the contracting parties to advance the implementation of the convention and its protocols, as well to take into account relevant new global and regional developments. Seven protocols were written (Table 2) to create the international legal framework for the Mediterranean region. These protocols

have now been incorporated into ECAP, which is essentially organized around four themes, reflecting the main deliverables expected from the contracting parties: (1) adoption of regional targets and the establishment of a definition for Healthy Environment; (2) development of a regional integrated monitoring program based on indicators and targets; (3) coupling of integrated assessment with socioeconomic analysis for the Mediterranean ecosystem; and (4) establishment of an assessment cycle through the development of a UNEP-MAP policy on the assessment of marine and coastal environments.

**Table 2.** Seven protocols addressing specific aspects of Mediterranean environmental conservation (UNEP-MAP 2013).

Protocol	Adopted	Amended	Entered into force
Prevention and elimination of pollution of the Mediterranean Sea from ships and aircraft or incineration at sea (Dumping Protocol)	1976	1995	Not yet in force
Protection of the Mediterranean Sea against pollution from land-based sources and activities (LBS Protocol)	1980	1996	2008
Protection of the Mediterranean Sea against pollution resulting from the exploration and exploitation of the continental shelf and the seabed and its subsoil (Offshore Protocol)	1994		2011
Specially protected areas and biological diversity in the Mediterranean (SPA & Biodiversity Protocol)	1995		1999
Prevention of pollution of the Mediterranean Sea by transboundary movements of hazardous wastes and their disposal (Hazardous Wastes Protocol)	1996		2008
Cooperation in preventing pollution from ships and, in case of emergency, combating pollution of the Mediterranean Sea (Prevention and Emergency Protocol)	2002		2004
Integrated Coastal Zone Management in the Mediterranean (ICZM Protocol)	2008		2011

Under ECAP, all Mediterranean states need to apply Healthy Environment targets at a regional or subregional level for their jurisdictional waters. Ideally, each signatory country should implement an integrated monitoring program; adopt new regional management plans, e.g., for Special Protected Areas (EC 1992, EC 2009a) and Special Protected Areas of Mediterranean Importance; and update and implement their National Action Plans to control land-based pollution and protect biodiversity, thus reflecting ECAP's environmental targets and commitments (UNEP-MAP 1995). ECAP unifies the many sectoral analyses and management measures of MAP into a single integrated framework (UNEP-MAP 2012). A MAP Compliance Committee reviews the progress of the implementation by the signatories to the Barcelona Convention and its protocols. A periodical review of progress focuses on specific environmental targets every four to five years after the initial setting of those targets. However, because this application requires close collaboration between countries within each specific regional or subregional level, the responsibilities of individual states cannot be easily assessed when

objectives are not achieved. Indeed the implementation has not been clearly defined legally; therefore, most of the actions have been only partially implemented at best, or not at all, requiring the external support of the Global Environmental Facility to accelerate implementation. This is in part because of limited funding, but also because of a lack of political priority, a lack of inclusive environmental governance, and the limited public awareness of the issues at stake (EU 2006). The Mediterranean European Neighbourhood countries (e.g. Algeria, Egypt, Israel, Jordan, Lebanon, Morocco, Palestinian Authority, Syria, and Tunisia) have even greater difficulties than the EU-MS with the implementation and compliance with ECAP because of limited human resources, and in some instances limited technical or economic capacity with which to achieve the Healthy Environment objective (EC 2009b).

### EMPHASIZING VISION ALIGNMENT BETWEEN MSFD AND ECAP

#### Effective implementation

Effective implementation of MSFD and ECAP in the Mediterranean requires a synergy between EU-MSFD and MAP-ECAP strategies (UNEP-MAP 2010). A definition of the required strategic goals to achieve GENs and Healthy Environment should be developed at the highest political level. The MSFD has defined EA as the framework to be used for the management of the marine environment (Agardy and Adler 2005, Farmer et al. 2012). Similarly, parties adhering to MAP have also agreed to use EA to manage human activities with a view to conserving natural marine heritage and protecting vital ecosystem services (UNEP-MAP 2012). Thus, EA could provide a framework to reach consensus between MSFD and ECAP in contexts in which this seems difficult to achieve. Following the EA framework, the Descriptors and Indicators of MSFD and Ecological Objectives of ECAP (Table 3) are similar.

To steer these processes, the focus of management needs to shift from “humanity outside the ecosystem” to the “human-in-nature” concept, from managing commodities to sustaining the production potential of ecosystem goods and services (Cheong 2008, Forst 2009). Regional assessments in the Mediterranean confirm that the capacity of the sea to continue providing natural resources and ecosystem services is declining as a result of human activities (Coll et al. 2010, 2012, Sala et al. 2013). Understanding the economic benefits of a healthy environment is useful in choosing priority actions to avoid further environmental degradation. The benefits provided by the Mediterranean Sea to the surrounding countries are considerable, yet an in-depth understanding of how ecosystem services underpin economic and social well-being within the region is limited. Nevertheless, a comparison between the value of the benefits provided by the Mediterranean and the value provided by all European seas for prominent categories of economic sectors and human activities is presented in Table 4. Although individual values are not theoretically homogeneous, and for this reason should not be added together, the value of the benefits provided by the Mediterranean Sea currently accounts for 36.6% of the total value provided by European seas, using high-end estimates. Unsurprisingly, the Mediterranean Sea delivers considerable recreational benefits, measured by the high visitor expenditure and willingness to pay for good bathing water quality. In addition,

**Table 3.** Comparison between EU-Marine Strategy Framework Directive (MSFD) and Mediterranean Action Plan-Ecosystem Approach Strategy (MAP-ECAP) vision, strategic goals, and ecological objectives already defined. With the exception of MAP-ECAP Objective 8 they are almost identical

EU-MSFD	MAP-ECAP
<p>Good Environmental Status (GEoS)</p>	<p>VISION</p> <p>A healthy Mediterranean with marine and coastal ecosystems that are productive and biologically diverse for the benefit of present and future generations</p>
	<p>STRATEGIC GOALS</p> <p>(i) to protect, allow recovery and, where practicable, restore the structure and function of marine and coastal ecosystems thus also protecting biodiversity, to achieve and maintain good ecological status and allow for their sustainable use;</p> <p>(ii) to reduce pollution in the marine and coastal environment so as to minimize impacts on and risks to human and/or ecosystem health and/or uses of the sea and the coasts;</p> <p>(iii) to prevent, reduce, and manage the vulnerability of the sea and the coasts to risk induced by human activities and natural events (UNEP-MAP 2008)</p>
<p>(i) to protect more effectively the marine environment across Europe;</p>	<p>ECOLOGICAL OBJECTIVES</p> <p>1. Biological diversity is maintained or enhanced. The quality and occurrence of coastal and marine habitats and the distribution and abundance of coastal and marine species are in line with prevailing physiographic, hydrographic, geographic, and climatic conditions.</p>
<p>(ii) to achieve Good Environmental Status of the EU's marine waters by 2020 and to protect the resource base upon which marine-related economic and social activities depend;</p>	<p>2. Nonindigenous species introduced by human activities are at levels that do not adversely alter the ecosystem.</p>
<p>(iii) to constitute the vital environmental component of the Union's future maritime policy, designed to achieve the full economic potential of oceans and seas in harmony with the marine environment.</p>	<p>3. Populations of selected commercially exploited fish and shellfish are within biologically safe limits, exhibiting a population age and size distribution that is indicative of a healthy stock.</p>
<p>DESCRIPTOR / OBJECTIVES</p> <p>1. Biological diversity is maintained. The quality and occurrence of habitats and the distribution conditions</p>	<p>4. Alterations to components of marine food webs caused by resource extraction or human-induced environmental changes do not have long-term adverse effects on food web dynamics and related viability.</p>
<p>2. Nonindigenous species introduced by human activities are at levels that do not adversely alter the ecosystems</p>	<p>5. Human-induced eutrophication is prevented, especially adverse effects thereof, such as losses in biodiversity, ecosystem degradation, harmful algal blooms, and oxygen deficiency in bottom waters.</p>
<p>3. Populations of all commercially exploited fish and shellfish are within safe biological limits, exhibiting a population age and size distribution that is indicative of a healthy stock.</p>	<p>6. Sea-floor integrity is maintained, especially in priority benthic habitats.</p>
<p>4. All elements of the marine food webs, to the extent that they are known, occur at normal abundance and diversity and levels capable of ensuring the long-term abundance of the species and the retention of their full reproductive capacity.</p>	<p>7. Alteration of hydrographic conditions does not adversely affect coastal and marine ecosystems.</p>
<p>5. Human-induced eutrophication is minimized, especially adverse effects thereof, such as losses in biodiversity, ecosystem degradation, harmful algae blooms, and oxygen deficiency in bottom waters.</p>	<p>8. The natural dynamics of coastal areas are maintained and coastal ecosystems and landscapes are preserved.</p>
<p>6. Sea-floor integrity is at a level that ensures that the structure and functions of the ecosystems are safeguarded and benthic ecosystems, in particular, are not adversely affected.</p>	<p>9. Contaminants cause no significant impact on coastal and marine ecosystems and human health.</p>
<p>7. Permanent alteration of hydrographical conditions does not adversely affect marine ecosystems.</p>	<p>10. Marine and coastal litter does not adversely affect coastal and marine environments.</p>
<p>8. Concentrations of contaminants are at levels not giving rise to pollution effects.</p>	<p>11. Noise from human activities causes no significant impact on marine and coastal ecosystems.</p>
<p>9. Contaminants in fish and other seafood for human consumption levels established by community legislation or other relevant standards.</p>	
<p>10. Properties and quantities of marine litter do not cause harm to the coastal and marine environment.</p>	
<p>11. Introduction of energy, including underwater noise, is at levels that do not adversely affect the marine environment.</p>	

results show that Southern European countries are willing to pay more to reduce the risk of illness because of poor water quality compared with other European countries.

An example of how the ecosystem services provided by the Mediterranean accrue to the whole of Europe and beyond is the conservation of seagrasses' "blue carbon." The value of carbon storage in the endemic seagrass *Posidonia oceanica* was found to be more than three times higher than that estimated for all European coastal salt marshes (Luisetti et al. 2013), providing a strong rationale for the protection of this unique Mediterranean habitat (UNEP-MAP 2010). Therefore, protection of seagrasses can lead to strong carbon-storage control.

Effective implementation of MSFD and ECAP would be particularly beneficial if managers could follow a standardized stepwise process to ensure consistency in the development of management measures to address legislative and regulatory requirements. Several systems, such as the Ecosystem-Based Management System (Sardá et al. 2011), have been designed recently with the objective of providing a standard methodology to assist managers of coastal and marine environments in the practical use of EA by introducing a common set of tools and procedures, and a common language to facilitate knowledge transfer and capacity building. The use of standards for practitioners could foster the implementation of the human-in-nature concept, accelerating the acceptance of EA.

**Table 4.** Mediterranean share of current welfare benefits provided by European Seas (base year 2010; Data source: Cooper et al. 2011). The table shows that the value of the Mediterranean Sea space for freight transport is high

Sector/Activity	Mediterranean	European Seas	A/B
	(A)	(B)	
	Million € per annum	Million € per annum	%
Fisheries			
- capture	2262	8,675	26.1
- mariculture <sup>†</sup>	605	5,515	11.0
Freighttransport	6345 - 28,784	13,746 - 62,360	46.2
Recreation (visits) <sup>‡</sup>	15,205	31,394	48.4
Recreation (water quality)			
- health risk	7723	15,327	50.4
- eutrophication	4656	40,342	11.5
Carbon storage			
- salt marshes	0.2 - 120	0.6 - 298	33.3-40.3
- seagrass	31 - 1,095	31 - 1,095	100
Total	36,827 - 60,452	115,031 - 165,007	
Low end			32.0 - 22.3
High end			52.6 - 36.6

<sup>†</sup> In the data source the value of mariculture is not analysed between the Mediterranean and the Black Sea. The value indicated in the table is derived from equally apportioning the value between the two seas.

<sup>‡</sup> The source document specifies values at the level of countries rather than seas. In the case of France the following apportionment has been utilized for the purposes of this table: 50:50, NEA: Mediterranean.

#### From policy fragmentation to policy alignment

The MSFD and ECAP clearly share a common approach in recognizing multiple categories of environmental degradation within the marine environment. However, although both stem from a recognition of interacting multisectoral drivers, in practice there are many examples of a fragmented approach to marine management within the Mediterranean and in other European regional seas (Potts et al. 2012, O'Higgins et al. 2014a). As a consequence, policy objectives at various levels of government may not necessarily be coherent enough to ensure the integrity of the marine ecosystem (EU 2014). The MSFD and ECAP have clear time lines for implementation (Fig. 1) and have similar objectives, i.e., GEnS and Healthy Environment, which are independent of national jurisdictional waters. Both aim to establish a Programme of Measures by 2015 to achieve their respective goals by 2020. Although MAP does not directly assist EU-MS with implementation of MFSD, the subregional initial assessment prepared by MAP under the EA framework is directly relevant to Mediterranean EU-MS in their Initial Assessment required under MFSD. Even if MFSD is not applicable to the whole of the Mediterranean, its philosophy and principles could nonetheless be applied to the whole marine Mediterranean domain through the development of a shared vision via MAP.

Both MFSD and ECAP are committed to seeking mutual collaboration for the protection of the Mediterranean marine environment. However, there are important differences in the capacity for implementing specific measures or initiatives, with the implementation of such goals driven by different visions and concerns between different jurisdictions (Bainbridge et al. 2011, Angelidis 2012). The alignment of MFSD and ECAP would focus the attention of all Mediterranean countries on the two fundamental concepts: a vision-driven process and a single integrated framework.

There are a number of obstacles to policy alignment that significantly affect the implementation of MSFD and ECAP, thereby hindering the achievement of GEnS and Healthy Environment for the Mediterranean Sea. These obstacles should be removed as soon as possible.

#### Economic aspects

Several of the Mediterranean coastal states have been hit particularly hard by the global crisis, whereby economic restrictions have made it difficult to implement the necessary programs of measures to achieve GEnS. Furthermore, economic disparity, jurisdictional conflicts, and rapid political changes have contributed to the lack of a shared action toward achieving environmental goals within the region, including the implementation of MFSD (O'Higgins et al. 2014a). Harmonization of monitoring of MFSD indicators around Europe is also an issue; a recent expert survey highlighted the concern that, although all EU-MS will comply with the requests of MFSD as expected, the data gathered will be heterogeneous and difficult to compare between the member states (HELCOM 2012). Limited communication between scientists within and between EU-MS has reduced both interdisciplinary cooperation and the transfer of relevant scientific information to policy makers.

Although properties of ecosystem integrity are reflected in the GEnS descriptors, establishing connections between ecosystem change and benefits to human welfare should lead to indicators of greater societal relevance (O'Higgins et al. 2014b) and more proactive approaches to conservation, which may also facilitate MSFD implementation (Sardá 2013). The ecosystem service concept (Ehrlich and Ehrlich 1981, Fisher et al. 2009) integrates the connections between humans and the environment, which is the ultimate goal of the new Integrated Maritime Policy. However, different ecosystems provide a complex combination of different

services; thus, problems may arise when an economic valuation of ecosystem services is required, mainly because of the complexity of the ecosystems and the interdependency of the services provided. In summary, an environmental program of measures can have economic justification because societal benefits may be enhanced when environmental quality is improved and the full welfare benefits from ecosystem services are quantified accurately (Goulding et al. 2014). However, disentangling the joint production of ecosystem services as well as the linked nature of GEnS descriptors remains a challenge (O'Higgins et al. 2014b). The decline in certain drivers that can accompany economic recession should also be seen as an opportunity to direct efforts toward environmental objectives (Potts et al. 2015).

#### Policy aspects

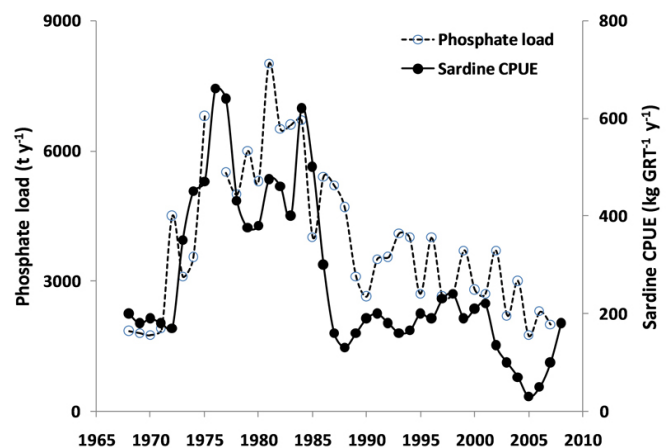
Sometimes, aspects of policy can be obstacles to a coherent implementation of legal instruments. Different European policies dealing with conservation and the use of the sea are not always perfectly coherent. Indeed, the approaches for implementing the legal instruments, including the Habitat Directive, Natura 2000, the Water Framework Directive, the Integrated Maritime Policy, and the Common Fisheries Policy, are still far from being truly integrated among the EU-MS (van Hoof and van Tatenhove 2009, Borja et al. 2010, Ounanian et al. 2012, van Leewen et al. 2012). As recognized by the EC (2014b), "these pieces of legislation, although crucial complementary tools to the protection of marine waters, contribute to the protection of the sea only from specific pressures resulting in a fragmented and sectoral approach."

The need for achieving common targets within common time frames for the implementation of MFSD contrasts with Water Framework Directive 2000/60/EC (WFD; EC 2000), another major piece of legislation that aims at improving water quality within Europe, including coastal waters. Under the concept of subsidiarity, each EU-MS has produced an individual scheme for the implementation of WFD, while the EC provides a common framework applying to all EU-MS for the implementation of MFSD (Borja et al. 2010). Environmental policies in general, and marine policies in particular, have different priorities in different EU countries and mostly operate at different time scales. See, for example, the top environmental issues discussed by the EU institutions under the Greek presidency from January through June 2014: climate and energy, emissions from international aviation, shale gas, waste and resource efficiency, and alternative fuel strategy.

An example showing how the implementation of other policies conflict with MFSD is the application of WFD. The WFD is intended to improve water quality in river catchments (Borja et al. 2010). A specific example is the Adriatic Sea, which supports one of the largest fisheries in the Mediterranean. The Italian-Croatian fishery targeting small pelagic fish, i.e., anchovies (*Engraulis encrasicolus*) and sardines (*Sardina pilchardus*), accounts for approximately 70% of total Adriatic catches (Mulazzani et al. 2012) and is of great economic importance. Here, intense planktonic production underpins the productivity of the fish and invertebrates necessary to sustain a fishery; this biological production is mainly supported by nutrient inputs originating from the Po river catchment that drains into the

Northern Adriatic (Barausse et al. 2009, 2011). Sectoral policies, e.g., the Common Agricultural Policy, and the adoption of WFD have committed watershed managers to reduce nutrient loads from EU riverine systems, but this goal could endanger the productivity of small pelagic fish stocks. Achieving GEnS requires healthy commercial fish stocks, for which fishing mortality should be equal to or lower than the level for maintaining harvest at the Maximum Sustainable Yield (EC 2010). But Maximum Sustainable Yield in this case also depends on the productivity of the marine ecosystem, which can be dramatically altered by the nutrient load of human origin discharged by rivers (Fig. 4; Barausse et al. 2011). To prevent resource collapse in the Adriatic, the fishing effort targeting anchovies and sardines should be managed so that < 40% of stock depletion is caused by fishing (Santojanni et al. 2006). However, if ecosystem productivity is further decreased by reducing nutrient inputs, the healthy fish stocks required by MFSD may be difficult to obtain without even greater, socially undesirable reductions in fishing effort. In short, one aim of WFD is to reduce nutrient discharges to water bodies, e.g., to prevent eutrophication, which could decrease the productivity of coastal seas to levels that would make the current fishing pressure potentially unsustainable, thus jeopardizing MFSD goals. To achieve GEnS in the Mediterranean, the target requirements of these overlapping policies need to be aligned.

**Fig. 4.** Relative abundance (CPUE, Catch Per Unit Effort) of sardine (*Sardina pilchardus*) in the Northern Adriatic Sea (Barausse et al. 2011; data refer to Chioggia, a city hosting a major fishery of the Northern Adriatic Sea), and phosphate inputs entering the ecosystem through the Po river (UNEP-MAP-MEDPOL 2003, Cozzi and Giani 2011). Nutrient inputs peaked from the mid-1970s to the mid-1980s causing severe eutrophication, but were subsequently halved because of a phosphate ban in household detergents and treatment of waste waters, thus reducing system productivity (Artioli et al. 2008, Mozetič et al. 2010). These changes in nutrient inputs strongly influenced the biomass of Adriatic fishing resources (Barausse et al. 2011): in the figure, sardine abundance closely mirrors the trajectory of nutrient inputs over time.



#### Management aspects

Integrated approaches and policy objectives such as those introduced by MFSD can only be effective if adequate management measures are carried out in combination with

effective governance structures. This was the basis for the adoption of the Integrated Coastal Zone Management (ICZM) protocol for the Mediterranean Sea, which is an ecosystem-based instrument that links catchments with coastal zones. The proposed directive, establishing a framework for maritime spatial planning and integrated coastal management, may also help to coordinate the application of the different policies relating to the coastal zone and coastal zone activities through EA (EC 2014b).

The concept of GEnS in MFSM gives integrated management a clear objective at which to aim (Cormier et al. 2013). Although currently fragmented policies and administrative jurisdictions are an obstacle to the sustainable use of the Mediterranean Sea, there is the potential for change through the clear procedures required for MFSM implementation aligned with other integrated tools such as the Strategic Environmental Assessment combined with Marine Spatial Planning. To facilitate this type of management, new tools that combine adaptive, proactive, and transparent principles are recommended (Sardá et al. 2011), as well as building interoperable systems for the exchange of information (Cinnirella et al. 2012).

#### **ENGAGING WITH MULTIPLE STAKEHOLDERS**

The EA could help to ensure a healthy Mediterranean marine and coastal environment, prosperous coastal communities, and viable coastal industries; but achievement of these goals requires that all the relevant societal sectors are involved in its application (Haley 2011, PISCES 2014). A multiple-stakeholder platform is of indisputable benefit, as was recently demonstrated in the PEGASO Project (Breton and Skaricic 2013). Such a platform should allow stakeholders adequate and timely participation in transparent decision-making processes, provide them with tools such as full-cost accounting methods to calculate damage and restoration costs, and provide the minimum levels of natural capital needed for sustainability (Haines-Young and Potschin 2011, Maccarrone et al. 2014).

The MFSM and ECAP processes remain fragmented because their implementation is restricted to national efforts and involves limited collaboration with nonofficial stakeholders. The effective implementation of MFSM and ECAP in the Mediterranean Sea requires a move from governance approaches developed to address specific competencies and concrete tasks to other much more flexible approaches that account for the multiple uses of the sea. This requires establishing a permanent interaction between related stakeholders (Tallis et al. 2010).

The identification of stakeholders in places where MFSM-ECAP is implemented would allow the selection of participants with the capacity to prioritize the actions and issues necessary to produce an effective management plan for implementation. Facilitating the dialogue between all relevant stakeholders to develop and share a common vision for the integrity of the Mediterranean, i. e., GEnS-Healthy Environment using the EA, would help create a common understanding of the future actions necessary to bring both MFSM and ECAP into effective compliance, regardless of possible political constraints. If national agencies consider EA frameworks as just another piece of administrative compliance, it is unlikely that any transformation of present managerial practices related to the marine environment will occur. A shared vision among the main actors/stakeholders could transform the implementation of MFSM and ECAP from merely administrative

compliance to effective compliance. If this process could be carried out using a standardized procedure, it would be of major benefit to all stakeholders.

#### **CONCLUSIONS**

Humans have long inhabited the shores of the Mediterranean Sea, thereby producing significant anthropogenic-driven change that has accelerated over the last decades. The large benefits provided by Mediterranean Sea ecosystems, estimated by Cooper et al. (2011) to be 36.6% of the total current welfare benefits provided by European seas, have been recognized to be under threat because anthropogenic pressures have degraded their status (Coll et al. 2010, 2012, Cinnirella et al. 2013). Although MAP was created in 1975 to address the environmental degradation of the Mediterranean, there has been limited funding, low political priority, a lack of environmental management initiatives, and limited public awareness, all of which has been made worse by the substantial socioeconomic gap between the EU political bloc and the non-EU political bloc (EU 2006). In addition to the socioeconomic gap, there is now an expanding governance gap with new EU initiatives including an expansion of the Integrated Maritime Policy and its instruments, such as the recently approved Directive on Maritime Spatial Planning (EU 2014), which strengthens and deepens the concept of EA.

Currently two juxtaposed strategies, MFSM and ECAP, overlap in the Mediterranean Sea. Although differences exist between both instruments, these should not constitute a serious obstacle to possible harmonization of the two processes. Both MFSM and ECAP are committed to applying the EA framework, particularly when it is difficult to find agreement within a specific sociopolitical context. To advance the application of EA with the goal of achieving GEnS in the Mediterranean Sea, we have identified two complementary requirements for its implementation: (1) vision alignment between MFSM and ECAP must be emphasized, with a better road map to reach common strategic goals and adequate management plans; and (2) there must be a coherent plan to engage stakeholders, to facilitate the understanding of what a healthy environment actually is, and to introduce the necessary measures and actions.

#### **Vision alignment**

Both MFSM and ECAP require dialogue, common directions, and, ideally, a shared vision to remove obstacles and establish a systems perspective. Effective implementation should drive the focus of management into a general human-in-nature concept, not just the management of necessary commodities, but also sustainable production of ecosystem goods and services. Use of standard methodologies for management, such as the Ecosystem-Based Management System framework (Sardá et al. 2011), could introduce a common set of tools and procedures, and a common language that would facilitate knowledge transfer and capacity building in a harmonized fashion. A major effort to establish coordinating mechanisms, e.g., high-level policy planning bodies, should deal with the issue of policy fragmentation. Governance mechanisms need to operate both at the level of setting strategic objectives across jurisdictions and at the level of operational management to link management measures to the strategic objectives.



### Stakeholder engagement

The common approach adopted today of engaging stakeholders and specific competencies only when necessary to solve concrete tasks should be replaced by a much more flexible and integrated concept with permanent interaction with the stakeholders. The institutional fragmentation of policies and objectives could encourage the impression that environmental strategies are just targets of administrative compliance. A clear engagement with stakeholders with the final objective of sharing a common desired vision should bring both MFSD and ECAP to effective compliance, rather than encouraging strategies aimed simply at ensuring compliance with legislation.

The future of the Mediterranean Sea is not to balance development against conservation, but rather to emphasize that conservation can facilitate further sustainable development. There is a large consensus that application of the EA philosophy and principles is necessary to attain a clean, healthy, and productive Mediterranean Sea. Nevertheless, there still are many obstacles to adequate implementation. These include the absence of political and public perception of the priorities concerning the quality of the marine domain, as well as the complexity and potentially conflicting jurisdictional policy objectives of various levels and agencies within the governments in a given geographical area. However, there are no fundamental reasons why these obstacles should continue to be an impediment to achieving GEnS for the Mediterranean Sea.

Responses to this article can be read online at:  
<http://www.ecologyandsociety.org/issues/responses.php/7065>

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