PHAROS4MPAs

PROMOTING THE COEXISTENCE OF MARINE PROTECTED AREAS AND SEA ACTIVITIES IN GREECE:

RECOMMENDATIONS OF THE PROJECT INTERREG MED-PHAROS4MPAs

NATIONAL REPORT
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Interreg Mediterranean
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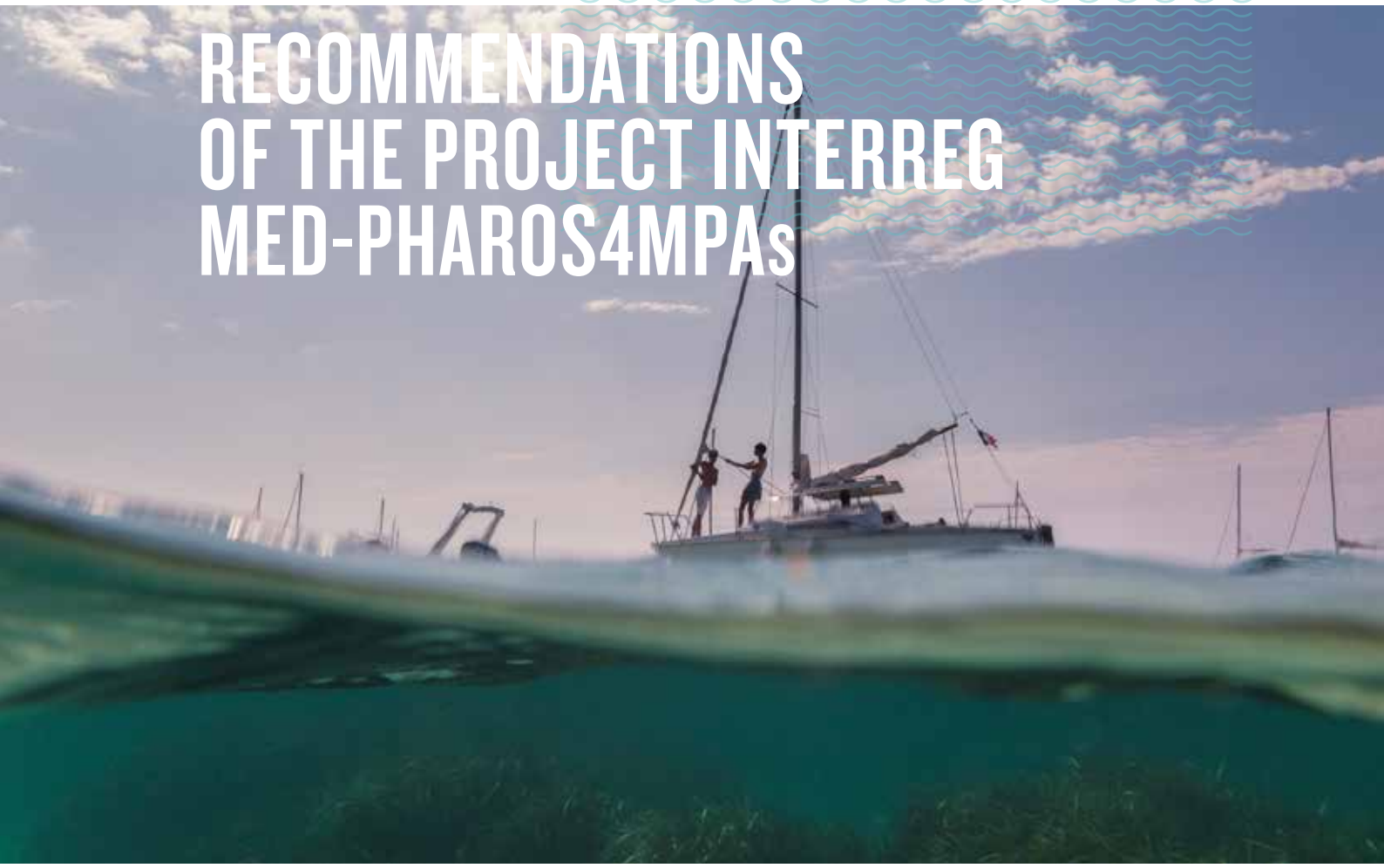

Interreg Mediterranean

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EXECUTIVE SUMMARY

The Greek Seas are characterized by a high degree of biodiversity due to the number of species and habitats they host. The vast majority of the Greek population (as well as its economic development and impacts) is concentrated in the coastal zone, and together with maritime activities, is exerting a great amount of pressure on coastal and marine resources. Over the past decades, the Greek State has created a number of marine protected areas (MPAs) of various types due to national, European and international legislation regarding the conservation of habitats and species (three formally established MPAs end ten protected areas with a marine component) and 19.60% of the Greek Seas have been designated as part of the Natura 2000 network. However, the effectiveness of the Greek MPA system still needs to make great progress in order to achieve its conservation goals, due to the existing administrational and organizational problems, as well as the lack of human and financial resources it is facing.

Just like the rest of the Mediterranean, the Greek Seas are experiencing a surge of maritime activities and development from sectors such as maritime transport, aquaculture, tourism (including cruise and leisure boating) and more recently oil and gas exploration and exploitation. However, the principles of Blue Economy are yet to be integrated in Maritime Spatial Planning (MSP) in Greece. Unfortunately, currently there is no legally binding national MSP plan in Greece or on-going process for their development, despite the fact that spatial planning should be finalized by 2021 according to the EU MSP Directive. The MSP Directive is supposed to function in synergy with the Marine Strategy Framework Directive (MSFD), aiming to achieve Good Environmental Status (GES) for the marine environment of the EU by 2020. The implementation of the MSFD in Greece has been delayed and needs to take quite a few bold steps in order for GES to be achieved in the Greek Seas.

The PHAROS4MPAs project explores how Mediterranean MPAs are affected by activities in the growing Blue Economy, and provides a set of practical recommendations for regional stakeholders on how the environmental impacts of key sectors can be prevented or minimized. Encouraging international collaboration across MPA networks and cooperation between state, industry and other actors, PHAROS4MPAs aims to enhance MPA management effectiveness and improve the conservation of marine ecosystems across the whole of the Mediterranean. PHAROS4MPAs has 8 core partners: WWF France, Priority Actions Programme Regional Activity Centre (PAP/RAC), Regional Development Funds for North Aegean Region, Regional Agency of the Administration of Protected Areas in Albania, Institute of the Republic of Slovenia for Nature Conservation, Consiglio Nazionale delle Ricerche (ISMAR and IRBIM), WWF Mediterranean, University of Girona - Institute of Aquatic Ecology at the Faculty of Sciences. Furthermore, it has 9 associated partners: Mediterranean Protected Areas Network (MedPAN), WWF Spain, France Energie Eolienne (FEE), Regional Marine Pollution Emergency Response Centre for Mediterranean Sea (REMPEC), Regional Activity Center for Specially Protected Areas (RAC/SPA), European Boating Industry, WWF Greece, Agence Française pour la Biodiversité - Antenne de façade maritime – Méditerranée, CPMR Intermediterranean Commission.

Within the growth of the Mediterranean Blue Economy and the aforementioned legal framework, the project PHAROS4MPAs aims at safeguarding MPAs and the marine environment overall, by providing recommendations regarding the pressures and impacts of the following sectors:

Aquaculture

The development of aquaculture in the Mediterranean has increased the impacts on the marine environment and the competition for coastal zone use. In order for the aquaculture sector to move towards sustainable development, coordinated maritime spatial planning and an ecosystem approach based on the carrying capacity of the marine environment are necessary. As far as MPAs are concerned, only aquaculture farms with no detrimental effect on the designated protected areas should be permitted, decided on a case-by-case basis, while taking into consideration the conservation requirements of important habitats and species. Fish farms with cage settlements should be avoided inside or in the close vicinity of MPAs, and should not be allowed in areas with important habitats. Furthermore, industrialized intensive fish production should be avoided in MPAs. For marine Natura 2000 sites, only marine aquaculture farms without a detrimental effect on the habitats and species of the Birds and Habitats Directive should be permitted, again on a case-by-case basis. Regarding aquaculture in Greece, emphasis should be put at the level of national authorities regarding compliance to legislation, as well as establishing legal frameworks that promote sustainable & responsible practices. Such practices minimize the negative impacts of aquaculture such as nutrient release, escapes, antifouling chemicals like copper, antibiotics, anti-parasiticides such as formaldehyde, non-biological wastes and interactions with wildlife. Furthermore, more emphasis should be given to organic aquaculture, as well the implementation certification schemes such as the Aquaculture Stewardship Council (ASC).

Small-Scale Fisheries

In a Mediterranean where 80% of all assessed stocks are fished outside safe biological limits and catches are decreasing, small-scale fisheries (SSF) still make up most of the commercial fishing sector, constituting 83% of the total fleet and 57% of the total workforce. Despite the fact that the volume of SSF catches are relatively low compared to large-scale commercial fisheries, SSF still have the potential to impact fishing resources and marine ecosystems. Their impacts include altering biodiversity and ecosystem functioning, targeting vulnerable species, affecting hermaphrodite species such as groupers, catching undersized fish, habitat degradation, ghost fishing and bycatch of endangered or protected species such as marine mammals and marine turtles. National authorities can play a major role in avoiding or minimizing SSF impacts through environmental and socioeconomic measures including fishing effort management (gear selectivity, size restrictions, spatial and temporal closures), derelict gear management schemes, co-management governance schemes, legal frameworks regarding the organization of SSF, infrastructure, awareness campaigns etc. MPA authorities should promote co-management, use spatial management tools including no-take zones, monitor SSF, and develop and implement fisheries management plans specifically aiming at reducing impacts. Greece, with over 14,000 vessels, has the largest fleet in the EU. Given that approximately 96% of the Greek fleet is made up by SSF vessels, it is strongly recommended that the national fleet register should be updated on a regular basis and in accordance with the activity of each fishing vessel (inactive fishing vessels should be excluded), so that it can serve as an effective and comprehensive tool for the management of the capacity of the national SSF fleet and its activity. In addition, increasing investments aiming at improving selectivity in Greece in order to avoid or reduce unwanted catches is imperative. Finally, a national legal framework that promotes co-management by enabling fishers and other stakeholders to participate in fisheries management is of crucial importance. By empowering fishers and other relevant stakeholders to take an active role in fisheries management and the protection of ecosystems can make fisheries more sustainable.

Recreational fisheries

Recreational fisheries have a presence all along the northern coasts of the Mediterranean. Despite the fact that the exact number of recreational fishers in the region is unknown, their number in some MPAs has been assessed, and the overall European Union estimate holds recreational fisheries accountable for roughly 10% of the overall Mediterranean catches. Furthermore, the impact of recreational fisheries is heavy on vulnerable species (many of them endangered and protected), which constitute 20% of the total recreational catch in coastal areas and MPAs. Given the fact that recreational fisheries are largely under national jurisdiction, public authorities can play an important role in minimizing their impacts. More specifically, national authorities should ensure that national license systems are in place (possibly with fees), with an obligation to report all catches and a robust monitoring regime regarding the environmental, social and economic impacts, which can constitute the basis for management measures if necessary. In addition, MPA managers should also prioritize monitoring and surveillance as a decision-making

basis for management measures, issue fisheries licenses when a national system is not available, run awareness programs for recreational fishermen, involve them in the management process along with other stakeholders, and most importantly, implement different types of management measures when the fishing effort is too high. As far as recreational fisheries in Greece are concerned, a very important step towards the conservation of fish stocks in general would be the re-establishment of a licensing system as the basis for their proper monitoring, control and management. The obligation to report all catches, together with marine conservation awareness raising for recreational fishers would further the assessment and the lessening of the impacts of fisheries on fish stocks.

Maritime transport

Fifteen percent of the worlds' shipping crosses the Mediterranean Sea, which nonetheless constitutes less than 1% of the world's oceans. With a 4% annual growth rate over the next decade, the maritime transport sector is responsible for increasing environmental impacts, such as chemical pollution, noise pollution and collisions with marine mammals. In order for these impacts to be prevented – or at least minimized – in MPAs, national authorities should utilize MSP tools and area-based regulations to protect MPAs from the risks of maritime traffic accidents and reduce the chances of collisions with cetaceans, prevent anchoring impacts etc. In addition, national authorities should implement joint cross-border actions navigation monitoring and safety to ensure environmental impacts are avoided or minimized, as well as establish MPAs on the high seas to protect sensitive marine areas in international waters. Local authorities can play a significant role in reducing the impact of maritime traffic by collaborating with local maritime companies, identify and implement piloting solutions to avoid accidents in particularly sensitive areas, enforce international and national standards and requirements in ports, use innovative procedures, tools and technologies to reduce the risks and mitigate the impacts of oil spills, collaborate with MPA management bodies to develop joint solutions to monitor the impact of maritime traffic and mitigate the impact of pollution from port operations. Regional ocean governance bodies such as the Barcelona Convention can contribute to safeguarding MPAs from the impacts of maritime transport by establishing stronger enforcement and compliance mechanisms, emissions controls, prioritizing Maritime Spatial Planning and Integrated Coastal Zone Management tools implementation, promoting transboundary oil spill contingency plans, early warning systems and decision support systems, and by increasing surveillance at sea. As far as transportation in the Greek Seas is concerned, Greek national authorities should engage with the International Maritime Organization and submit proposals for the adoption of effective routing measures so as to achieve coherent protection of the marine environment and species both in the 6nm within its national jurisdiction and beyond, on the high seas. This is particularly urgent for the protection and conservation of sperm whales in the Hellenic Trench where routing measures need to be adopted to mitigate the risk of ships/whales collision. Regarding Greek MPAs, area-based regulations such as banning the transit of dangerous goods or routing measures (including speed reduction) should be included in the regulatory framework for MPAs and their management plans. Real-time positioning systems are also important tools to prevent collisions between ships and cetaceans and should be adopted within MPAs or adjacent areas including straits. Furthermore, MPA Management Bodies should design, run or participate in monitoring programs and research studies to increase knowledge on the interactions between MPAs and the maritime transport sector, and its impacts on habitat and species. Finally, given that Greek shipowners control the largest fleet in the world, national authorities should engage and collaborate with maritime transport companies to promote innovative procedures and technologies, raising of awareness, training of seafarers, compliance with best operational and navigational practices etc. Regarding Greek port authorities, considering the fact that Piraeus is developing into the most important hub for maritime transport in the Mediterranean, authorities should ensure that visiting vessels comply with IMO regulations (including the Ballast Water Management Convention) and other national and international standards through robust port state control measures and inspections. Additionally, port authorities need to ensure that port regulations prohibit the stop-over and anchorage of large vessels especially in small ports with inadequate facilities and in areas with sensitive and fragile ecosystems including MPAs.

Cruise

As cruise activities in the Mediterranean and its adjoining seas have tripled over the last decade, reaching 25 million passengers in 2018, so has their environmental impact, both in volume and intensity, putting thus increasing pressure on some Mediterranean MPAs. National and local

authorities can play a key role in minimizing the cruise sector's accident risks and environmental impacts on MPAs, by utilizing MSP processes and tools to regulate distance, access and speed of cruise ships near protected areas and to monitor cruise activities. Furthermore, cooperation between authorities beyond territorial waters is essential to promote stricter controls on airborne emissions, prevent or minimize the impacts of cruise ships on MPAs and beyond, and regulate the cruise sector's operations in relation to marine conservation under the Barcelona Convention. As projections indicate an increase in cruise tourism in Greece (especially in Attica, South Aegean and Ionian Sea), its impacts regarding organic, chemical, noise and air pollution will also have a bigger negative effect on the marine and coastal environment. Greek authorities must promote and enforce stricter monitoring and regulations to safeguard MPAs and important marine ecosystems from the cruise sector's operations.

Leisure boating

Leisure boating is significant in economic terms for the Mediterranean, and so are its environmental impacts, which vary greatly depending on the type and size of boats. The environmental impacts of leisure boating include damage on sensitive sea bottom habitats from anchoring, air pollution, marine pollution from leaks, wastes and antifouling paints, noise and light pollution, strikes and disturbance of marine biodiversity among others. Public authorities can play a major role in minimizing the leisure boating sector's impacts on MPAs by establishing environmental monitoring programmes and by defining a leisure boating spatial strategy at national level regarding conflicts with other users, and a regulatory framework regarding marinas, mooring areas, pollution and other impacts. More specifically for MPAs, a step-by-step approach is the best way to develop regulatory frameworks to promote eco-friendly boating regarding access, navigation and general practices. A priority for Greece regarding safeguarding important habitats such as Posidonia meadows in MPAs and Natura 2000 areas would be the establishment of no-mooring zones and designated permanent mooring areas, which should include ecological mooring systems that avoid impacts on fragile bottoms.

Offshore wind energy

Despite the fact that offshore wind energy (OWF) is considered crucial for the mitigation of climate change and with great potential as a source of renewable energy for the Mediterranean, no OWFs operate in the region at this point. As OWFs can have a series of negative impacts on marine biodiversity, the potential interactions with MPAs constitute a source of grave concern. In order for MPAs to be safeguarded from the impacts of OWFs, public authorities should ensure that there is no overlap with MPAs.

More specifically, responsible authorities must ensure that OWFs are not developed in areas which host sensitive habitats, species and/or ecological processes, and in particular in MPAs. In the event OWFs are already planned to be deployed in ecologically sensitive areas or MPAs, developments should be robustly assessed on a case-by-case basis according to the relevant environmental legislation and based on the precautionary approach, commercial production should only start on a small scale in order to monitor environmental impacts, and as a last resort impact mitigation measures must be implemented, including ecological compensation.

The Greek state has initiated the process of amending the Special Spatial Planning for Renewable Energy including the development of off-shore wind farms. In this framework, a Strategic Environmental Assessment will be conducted and it is therefore important that this SEA follows the first recommendation regarding MSP following the ecosystem approach to reach or maintain Good Environmental Status, as well as Favorable Conservation Status. In the framework of this process, sensitivity mapping should be used as tool for effective OWF planning in the Greek Seas. The SEA and the Spatial Planning should identify ecologically sensitive areas in general and MPAs in particular where the development of OWF should be avoided/prohibited.

Beyond the aforementioned sector-specific proposals, the PHAROS4MPAs project recommends that in order for marine protected areas to be safeguarded, new and/or significant pressures on MPAs should be avoided through Maritime Spatial Planning, and ecosystems should be protected beyond MPA borders with sustainable management measures. Additionally, the carrying capacity of ecosystems must be the guide for activities that take place within MPAs. Finally, sustainable practices and prerequisites regarding how economic sectors operate should constitute the basis and framework for Blue Growth.

CHAPTER 1

SAFEGUARDING MARINE PROTECTED AREAS IN THE GROWING MEDITERRANEAN BLUE ECONOMY

INTRODUCTION TO COUNTRY REPORTS

POSIDONIA MEADOWS *(POSIDONIA OCEANICA)* IN THE MARINE PARK IN BLUE COAST, FRANCE

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THE MEDITERRANEAN SEA: A GROWING BLUE ECONOMY

For thousands of years, the seas and oceans represented infinite space, giving the feeling that humanity might be free of constraints and limitations. The illusion lasted until the middle of the 20th century, when increasingly intensive fishing began to degrade global fish stocks. This was among the first warning signs that marine resources had limits, and underlined the need for regulated fishing activities to maintain them.

Since then, many more activities have developed in coastal areas and on the open sea, competing for the same resources and the same spaces. Seas and oceans have become engines for economic growth. Activities such as shipping have rapidly intensified, cruise tourism has been growing swiftly, and offshore oil and gas exploitation are extending the human footprint to the depths of the oceans. In addition, new sectors such as offshore wind energy and marine mining have recently begun developing in the Mediterranean.

The idea of the infinite sea is over (Figure 1). In response to the increasing pressures on marine ecosystems, it has over the last decade been proposed that maritime spaces should be organized and spatially planned so marine resources can be used in a more sustainable manner. At the same time, marine spatial planning must encourage investments and development by promoting predictability, transparency and clearer rules – including for natural resource protection.

The Mediterranean Sea is an interesting case study for marine spatial planning as it combines strong demographic pressures, numerous maritime activities, and the oceanographic conditions of a semi-enclosed sea which accentuates the responsiveness of marine ecosystems to human pressures.

Today, the Mediterranean Sea is experiencing an unprecedented 'Blue Gold Rush.' Key factors behind this include the European Commission's 'Blue Growth' strategy which aims to support the sustainable growth of maritime economic sectors; developing trade between Europe and Asia increasing international maritime traffic; the multiplication of offshore oil and gas contracts; and a growing global middle class driving tourist numbers (Source: MedTrends 2015).

FIGURE 1: TIMELINE (LOG SCALE) OF MARINE AND TERRESTRIAL DEFAUNATION. MARINE DEFAUNATION IS MUCH LESS ADVANCED, EVEN THOUGH HUMANS HAVE BEEN HARVESTING OCEAN WILDLIFE FOR THOUSANDS OF YEARS. THE RECENT INDUSTRIALIZATION OF THIS HARVEST, HOWEVER, HAS HERALDED AN ERA OF INTENSE MARINE WILDLIFE DECLINES. IN ADDITION, IF LEFT UNMANAGED, MARINE HABITAT ALTERATION ALONG WITH CLIMATE CHANGE (COLORED BAR: IPCC WARMING) WILL FURTHER EXACERBATE MARINE DEFAUNATION. (SOURCE: MCCAWLEY ET AL. 2015)

THE LEGAL AND POLITICAL BACKGROUND

In 2007, the European Commission adopted the 'Blue Book' for an Integrated Maritime Policy (IMP) in the European Union, aiming to provide a more coherent approach to maritime issues with increased coordination between different policy areas. The Marine Spatial Planning Directive (MSPD), adopted on 23 July 2014, is the key instrument guiding the implementation of IMP to ensure the best use of marine spaces and promote economic development.

The MSPD sits alongside the Marine Strategy Framework Directive (MSFD), the environmental pillar of the IMP adopted on 17 June 2008, which aims to achieve Good Environmental Status (GES) for all EU marine waters by 2020 through an ecosystem-approach to maritime activities

At the level of the Barcelona Convention, UNEP/MAP is aiming to mainstream the ecosystem approach in the entire Mediterranean, so as to achieve GES for the Mediterranean Sea and Coast.

As a complement to these policies, the European Commission developed a 'Blue Growth' strategy (adopted on 23 July 2014) to support sustainable development in five key areas – aquaculture, coastal tourism (including cruise and yachting), marine biotechnologies, marine energies and marine mining – while also supporting the development of other marine sectors. Non-EU countries are also pushing for Blue Growth.

Ensuring a coherent strategy to nurture Blue Growth while protecting marine ecosystems is one of the key challenges across the world's oceans, and for the Mediterranean Sea in particular.

THE MEDITERRANEAN SEA: A MARINE ENVIRONMENT WITH HIGH CONSERVATION VALUE

The Mediterranean Sea boasts rare and important marine habitats, extensive endemism and a number of critically endangered species. In fact, it's recognized as one of the 25 top biodiversity hotspots on Earth, containing between 4% and 18% of the world's known marine species in an area covering less than 1% of the world's oceans.

Marine protected areas (MPAs) are recognized as key tools for biodiversity conservation and the protection of ecosystems. In the words of the IUCN, an MPA is "a clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values." Various different types of MPAs have been established in the Mediterranean sea to protect biodiversity hotspots.

MPAs can be established under a wide variety of designations, such as national parks, marine reserves, no-take zones, SPAMIS etc. More specifically, MPAs in the Mediterranean can be established under the framework of:

- The EU nature directives in European countries, i.e. the Habitats and Birds Directives (Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora; and Directive 2009/147/EC of 30 November 2009 on the conservation of wild birds): MPAs of this kind are known as marine Natura 2000 sites
- National designation, i.e. sites directly designated as MPAs by the countries in which they are located
- The Regional Sea Convention , which in the Mediterranean means the Barcelona Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean Sea. MPAs of this kind are designated as Specially Protected Areas of Mediterranean Importance (SPAMIs).

The Convention on Biological Diversity (CBD), the global policy framework for action to maintain biodiversity for future generations, has a 10% marine protection objective by 2020: this aim is articulated in the CBD Aichi target 11. The objective very much applies to the

Mediterranean Sea, where riparian countries have been working to establish new MPAs to reach it.

MedPAN's 2016 Status of *Marine Protected Areas in the Mediterranean* report provides a region-wide analysis of the progress of marine protection in the basin. Since the 1950s, Parties to the Barcelona Convention have established many different MPAs and other effective area-based conservation measures (OECMs). Figures from 2016 show there are 1,231 MPAs and OECMs in the Mediterranean, covering 179,798 km^2: this places 7.14% of the Mediterranean Sea's surface area under a legal designation of some kind (Figures 2 and 3). However, it should be noted that about half of this area is made up solely of the Pelagos Sanctuary, an MPA that's important to marine mammals but which has a very light regulatory framework and low enforcement measures.

MPAs can be established under a wide variety of designations, such as national parks, marine reserves, no-take zones, SPAMIS etc. Overall, most MPAs in the Mediterranean still allow wide use and exploitation of their waters. To put this in perspective, among nationally designated sites, only 76 have at least one no-go, no-take or no-fishing zone, which between them cover a mere 0.04% of the Mediterranean Sea (976 km^2), far below the area needed to replenish fish stocks and regenerate ecosystems in the face of human pressures and climate change (Source: 2016 Status report).

Moreover, when we look at the location of MPAs around the Mediterranean Sea, it's clear that some sensitive areas are still not covered. Most MPAs are coastal and small, and collectively they don't currently provide enough protection for the region's marine ecosystems.

FIGURE 2: THE MEDITERRANEAN MPA NETWORK IN 2016 (MAPAMED, 2017)

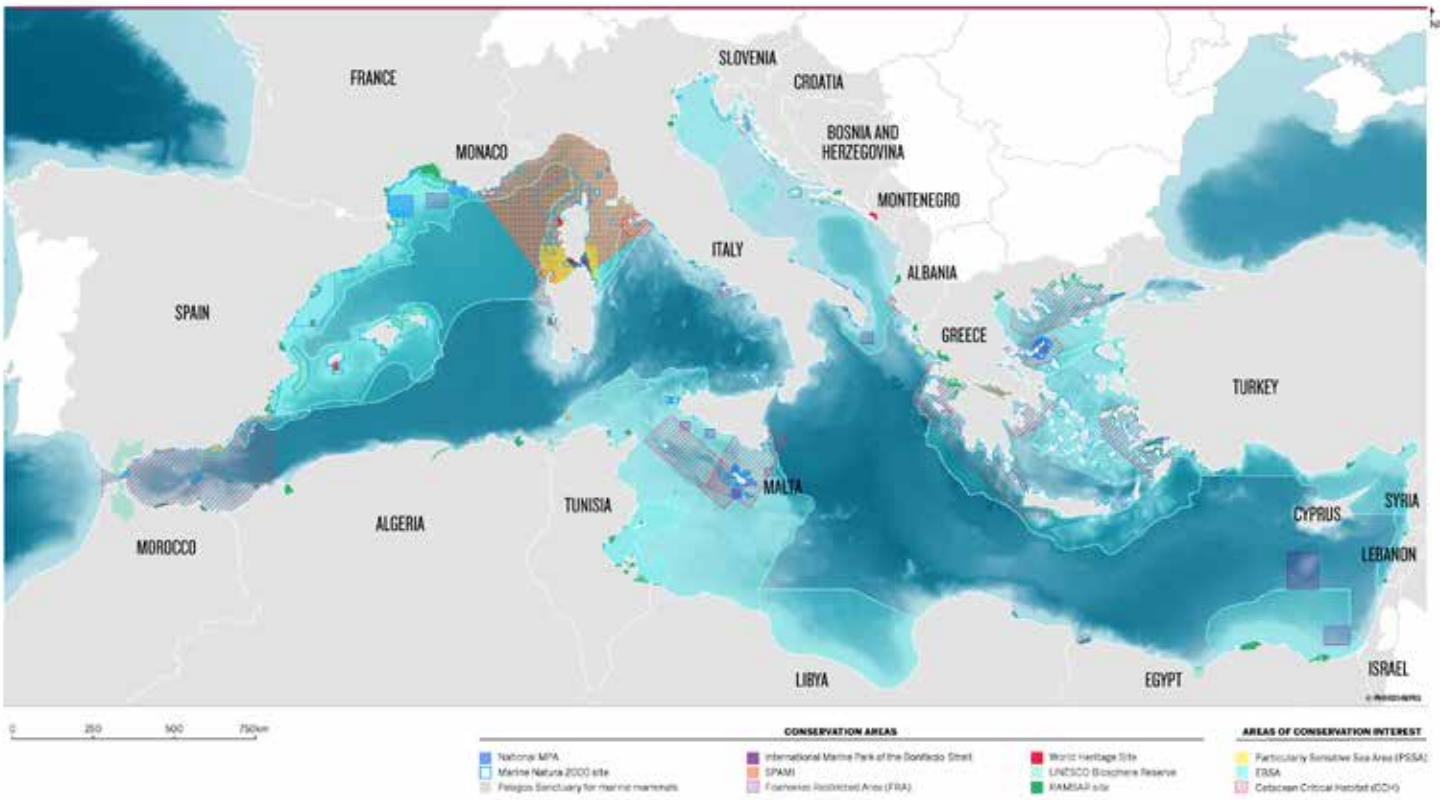
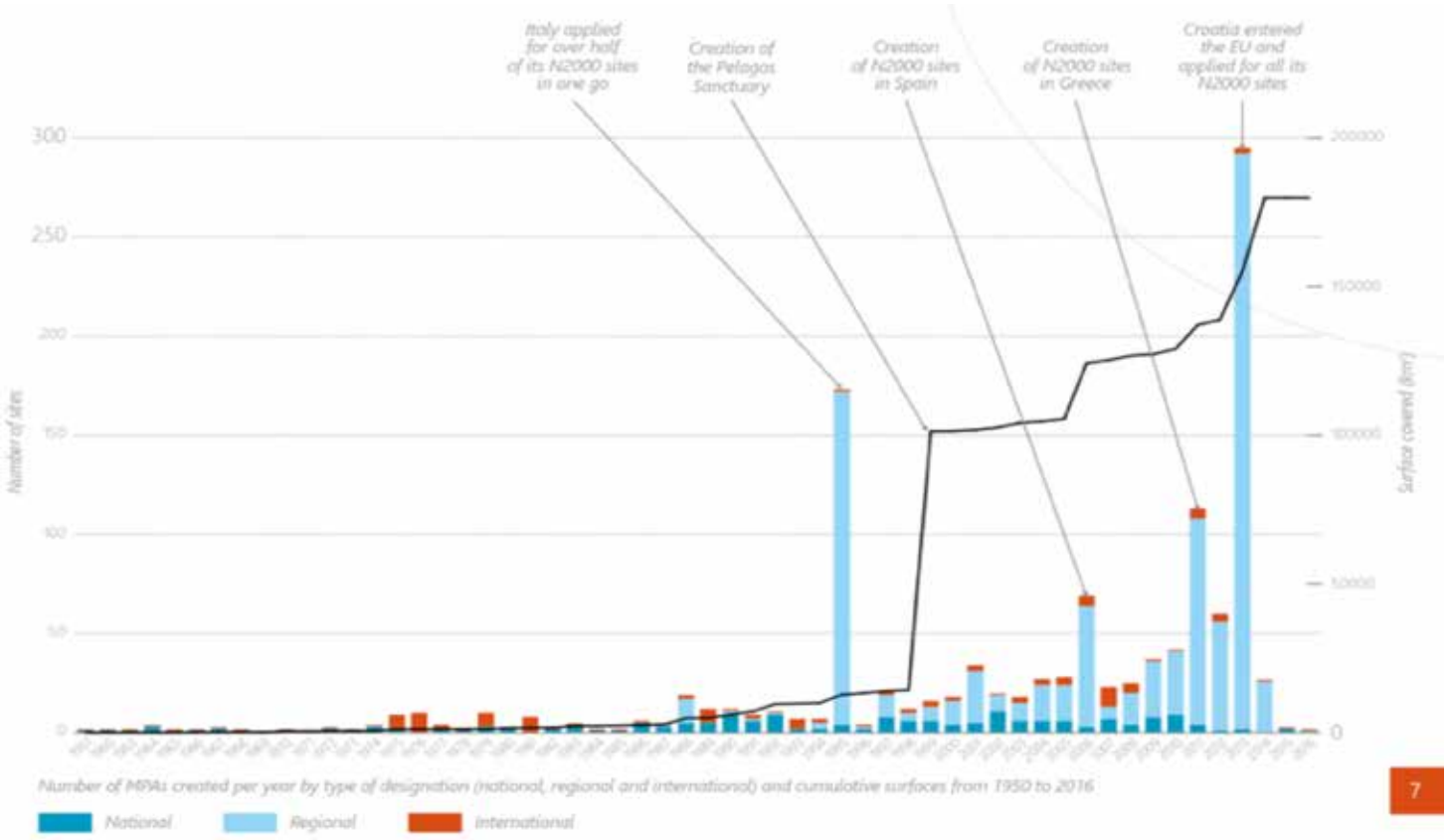


FIGURE 3: NUMBER OF MPAs AND MARINE NATURA 2000 SITES CREATED PER YEAR BY TYPE OF DESIGNATION (NATIONAL, REGIONAL AND INTERNATIONAL) AND CUMULATIVE SURFACE AREAS FROM 1950 TO 2016 (MEDPAN, 2016):



NEW PROTECTION TARGETS FOR 2030: A SEA CHANGE?

A new conversation is now taking place at global level to prepare for the 15th Conference of Parties of the CBD in 2020 that will set the stage for a Global Deal for Nature. This clearly supports the 2030 United Nations Sustainable Development Goals, the blueprint agreed by the whole world to achieve a better and more sustainable future for all. It also aims to achieve a similar impact to the Paris agreement on climate change in 2015, that has left the world with a clear and strong imperative to limit Earth's temperature rise to well below 2°C above pre-industrial levels. Negotiations are ongoing to define new post-Aichi nature protection targets – and for marine ecosystems this means moving beyond 10%. In fact, some experts strongly argue that up to 30% (IUCN) and even 50% (Nature Needs Half) of the world's oceans must be under protection by 2030.

Targets of this magnitude would mean a paradigm shift for the planet and would affect countries in different ways, according to the size of their marine areas, coastal populations, uses of the sea etc. In areas with no local populations which encompass only a limited number of economic sectors, strict regulations are easier to impose and conservation objectives can be more easily attained. By contrast, in areas like the Mediterranean with high population density and multiple maritime sectors, governments tend to establish flexible multi-use MPAs to guarantee social acceptability and maintain economic development. Countries with large EEZs will tend to designate large MPAs to reach their coverage objectives, while in small EEZs it's harder to do so without causing a degree of conflict with activities in the Blue Economy. In any case, to achieve anything like adequate levels of MPA coverage in future it's clear that significant mindset changes will be needed just as much as additional financial investments.

SAFEGUARDING MPAS IN THE GROWING MEDITERRANEAN BLUE ECONOMY

Competition for maritime space – for renewable energy, aquaculture, transport and many other uses – will increase in the future, reflecting the pressing need to manage our waters more coherently.

Negotiations are likely to be channeled through public policies such as maritime spatial planning (MSP). MSP works across borders and sectors to ensure that human activities at sea are conducted in an efficient, safe and sustainable way. The European Parliament has adopted legislation to create a common MSP framework in Europe, and Member States have been asked to deliver their first maritime spatial plans by 2021. MSP is also important for non-EU countries seeking to develop their maritime economies. Under the Barcelona Convention, the Mediterranean Action Plan of the UN Environmental Programme (UNEP MAP) is working to provide a common framework for an ecosystem-based MSP for the whole basin.

Key benefits of MSP include:

- Protecting the environment – through early identification of impacts and opportunities for effective multiple use of space
- Reducing conflicts between sectors and harnessing synergies between different activities
- Encouraging investment – by creating predictability, transparency and clear rules
- Increasing cross-border cooperation – to develop energy grids, shipping lanes, pipelines, submarine cables and other international infrastructure, but also to develop coherent international networks of protected areas.

MPAs and OECM are key tools for environmental protection, including in pursuing the goal of Good Environmental Status for Mediterranean waters. It is thus important to include MPAs as a central component in ecosystem-based MSP. To date this is not happening widely enough, and there needs to be a change in mindset so MPAs are not simply treated as another marine sector to be accommodated alongside all the others, but as an essential function for maintaining critical ecosystems and marine resources.

The Mediterranean Sea hosts a multitude of areas of important ecological value which deliver a wide range of ecosystem services and are rich in biodiversity – some Ecologically or Biologically Significant Areas in the Mediterranean are in fact directly identified in the CBD. This web of valuable areas needs to be linked by so-called blue corridors – these connect important ecological features like stepping stones and currents, and are free of disconnecting factors like physical infrastructure, noise barriers, polluted areas, heavily used shipping lines, regular trawling grounds etc. (Source: SWAM).

The MPA network covers part of this network of important areas. MPAs are the best known and most effective tool developed so far to protect marine ecosystems. However, marine management and planning needs a much broader perspective that accommodates not only MPAs but also all other areas of high ecological value (Figure 4).

Future marine economic development must therefore consider areas of ecological value in general and MPAs in particular, viewing them as part of a wider network where areas with different ecological functions connect. By using spatial and/or temporal regulations for specific areas (such as maritime transport regulated areas, marine concessions for aquaculture development, no-mooring zones for leisure boating, seasonal fisheries closures etc) and carefully managing the spatial distribution of competing maritime sectors, effective MSP can significantly complement the aims of MPAs (Figure 5). MSP should:

- Play a critical role in reaching Good Environmental Status in Mediterranean waters
- Avoid negative impacts on priority areas
- Minimise negative effects in larger areas with important ecological value.

FIGURE 4: AREAS WITH HIGH ECOLOGICAL VALUE AND MPAs IN MSP
(SOURCE: MODIFIED FROM SWEDISH AGENCY FOR MARINE AND WATER MANAGEMENT)

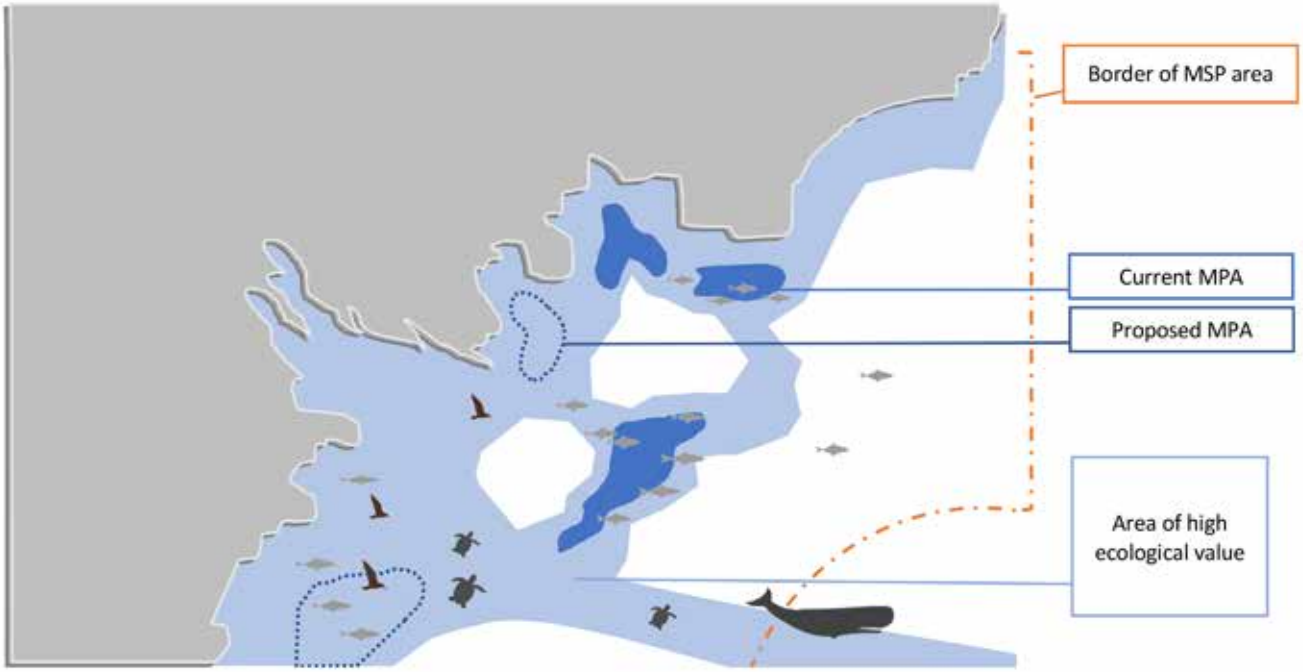
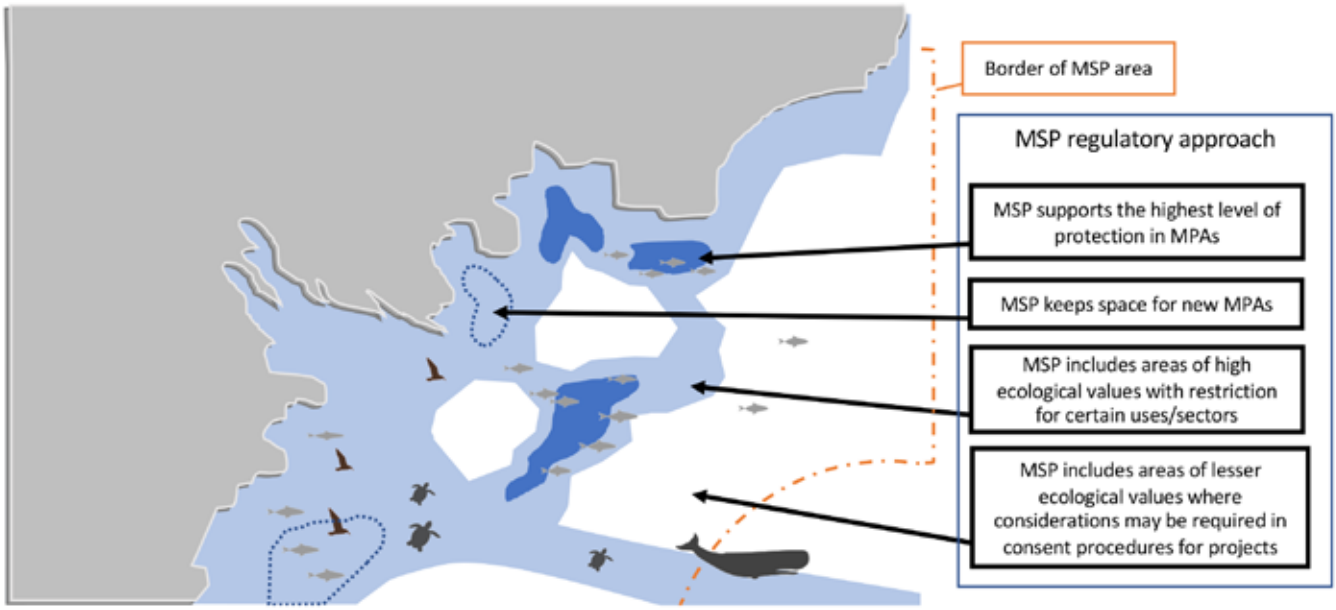


FIGURE 5: SIMPLIFIED VIEW OF MSP REGULATORY APPROACH AS A COMPLEMENT TO MPA. SOURCE: MODIFIED FROM SWEDISH AGENCY FOR MARINE AND WATER MANAGEMENT



In or near MPAs, priority in decision-making needs to be given to impact avoidance strategies. Avoiding impacts means locating an activity, a marine use or sector in an area where the pressures it generates will not impact valuable ecosystems. While this may seem to place heavy constraints on decision-makers, it's increasingly being seen as a cost-effective long-term approach: when impacts are avoided in the first place, business sectors will not face any mitigation costs, and legal risks are minimized or cancelled. Such an approach can take many different forms – for example locating offshore wind farms outside significant bird areas, fish farms away from sensitive habitats, maritime routes outside key habitats for marine mammals, forbidding ships from anchoring on Posidonia meadows, and so on.

Sectors can be more or less compatible with MPAs. If MPA can achieve their conservation goals and demonstrate that under targeted regulations the impacts of economic activities can be avoided or sufficiently mitigated, then in principle compatibility can be guaranteed. Most Mediterranean MPAs are multi-use areas and already provide a wealth of experience on these issues.

This point is at the core of the PHAROS4MPAs project (www.pharos4mpas.eu), which assesses how maritime traffic, offshore wind farms, aquaculture, cruise, small-scale fishing, recreational fishing and leisure boating affect Mediterranean MPAs, and suggests strategic approaches for avoiding or mitigating their impacts. The answers vary widely from one sector to the other, but all recommendations are based on the best available science.

Key conclusions include the following:

- **Avoid putting new pressures on existing MPAs through thoughtful MSP – e.g. avoid setting up offshore wind farms or fish farms within MPA boundaries, establish buffer zones around the MPA to avoid pressures at MPA borders etc.**
- **Protect ecosystems across a larger scale than solely within the MPA**
- **Where activities do take place, mitigate their impacts in an appropriate manner, taking into account cumulative impacts and staying focused on the overall carrying capacity of local ecosystems**
- **Spread knowledge of sustainable MPA management measures to the rest of the unprotected ocean: MPA managers can lead a change in our thinking about sustainability.**
- **Identify sustainable practices and conditions by sector to provide tailored guidelines and standards for sustainable Blue Growth.**

A sustainable and inclusive Blue Economy should:

- Ensure that Blue Economy investments deliver long-term social and economic benefits while protecting and restoring the diversity, productivity and resilience of marine ecosystems
- Be based on participatory and effective governance that is inclusive, accountable and transparent
- Promote sustainable use in marine areas through far-sighted, anticipatory and preventive spatial planning to ensure Good Environmental Status, through the implementation of an ecosystem-based approach
- Be based on clean technologies, renewable energy and circular material flows and promote innovation and research in all Blue Economy sectors to achieve zero carbon net emissions
- Enable the creation of employment opportunities for jobs in the marine and maritime sectors.

Source: WWF principles for a Blue Economy

CHAPTER 2

SAFEGUARDING MARINE PROTECTED AREAS IN THE GROWING MEDITERRANEAN BLUE ECONOMY

INTRODUCTION TO COUNTRY REPORTS - CONTRIBUTION OF PHAROS4MPAs

ATLANTIC BLUEFIN TUNA *(THUNNUS THYNNUS)* FEEDING IN THE MEDITERRANEAN SEA

© FRÉDÉRIC BASSEMAYOUSSE WWF - MEDITERRANEAN

Interreg Mediterranean

PHAROS4MPAs

The PHAROS4MPAs project (https://pharos4mpas.interreg-med.eu/) explores how Mediterranean MPAs are affected by activities in the growing Blue Economy, and provides a set of practical recommendations for regional stakeholders on how the environmental impacts of key sectors can be prevented or minimized. Encouraging international collaboration across MPA networks and cooperation between state, industry and other actors, PHAROS4MPAs aims to enhance MPA management effectiveness and improve the conservation of marine ecosystems across the whole of the Mediterranean.

PHAROS4MPAs focuses on the following sectors of the Blue Economy:

- Maritime transport and industrial ports
- Cruise
- Leisure boating
- Offshore wind farms
- Aquaculture
- Small-scale fisheries
- Recreational fisheries

The recommendations are very different from one sector to another and are based on the best available scientific data.

Key conclusions include the following:

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CHAPTER 3

AN INTRODUCTION OF GREECE'S BACKGROUND ON MPAs AND BLUE ECONOMY

DIVING IN GYAROS ISLAND, GREECE

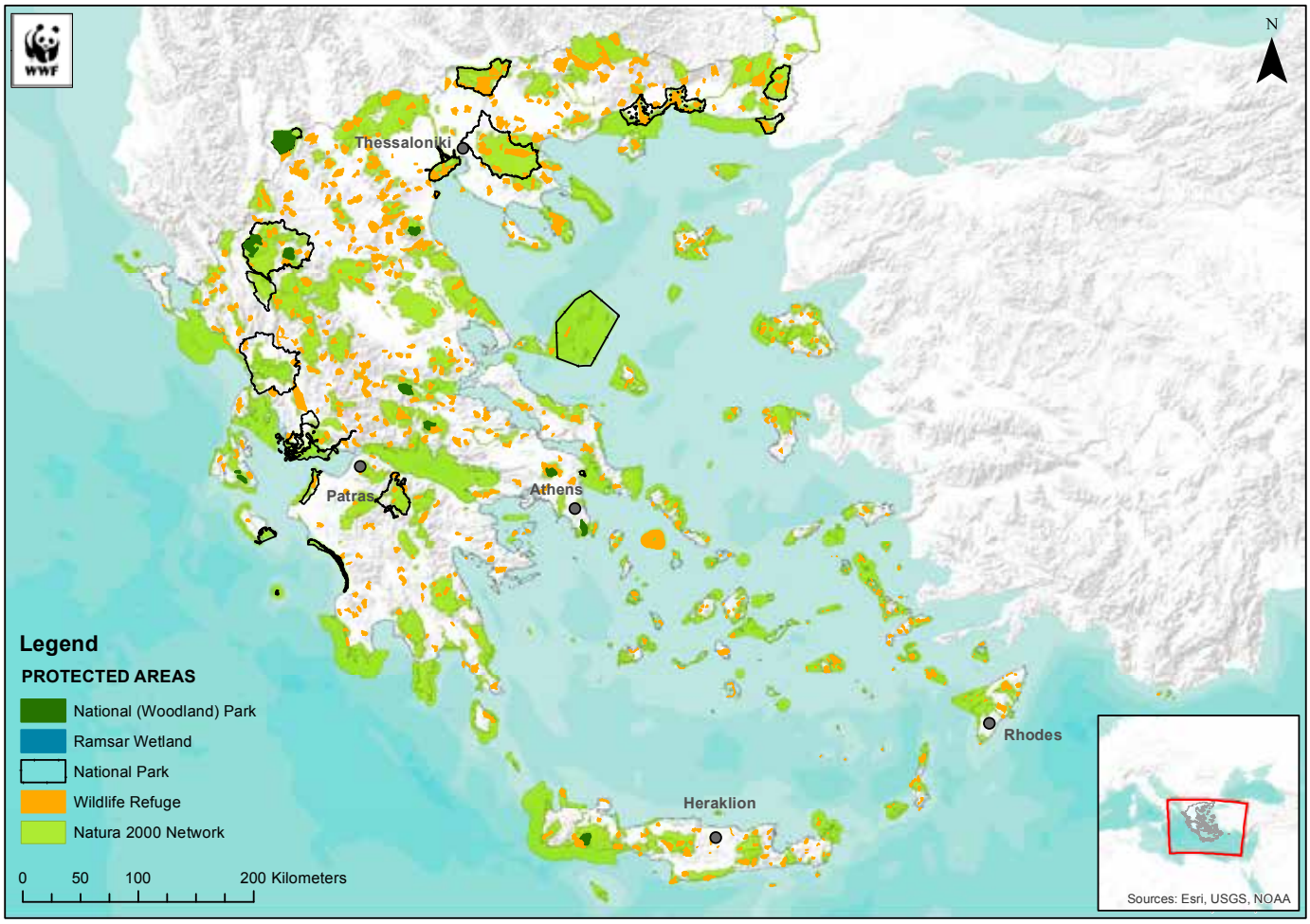
@ G. RIGOUTSOS, WWF GREECE

Interreg Mediterranean PHAROS4MPAs

Greece is characterized by an extensive coastline of over 18,000 kilometers (comprising about one third of the Mediterranean coastline), with approximately 9,800 islands and islets spread around its seas. Greek seas and coasts display an amazing degree of marine biodiversity, hosting 80% of the Mediterranean fish fauna (510 out of 638 species). Furthermore, the Greek seas are home to an impressive number of iconic conservation species: eight cetacean species (bottlenose dolphin *(Tursiops truncatus)*, stripped dolphin *(Stenella coeruleoalba)*, common dolphin *(Delphinus delphis)*, Risso's dolphin *(Grampus griseus)*, harbor porpoise *(Phocoena phocoena)*, Cuvier's beaked whale *(Ziphius cavirostris)*, sperm whale *(Physeter macrocephalus*), and fin whale *(Balaenoptera physalus)*, half of the world's population of the Mediterranean monk seal *(Monachus monachus)*, three sea turtle species (loggerhead turtle *(Caretta caretta)*, green turtle *(Chelonia mydas)* and leatherback turtle *(Dermochelys coriacea)*), as well as a large number of marine avifauna species, such as the Mediterranean shearwater (*Puffinus yelkouan)*, the Aegean seagull *(Laurus audouinii)*, Cory's shearwater *(Calonectris diomedea)*. The Aegean Sea is ranked as the second richest in species numbers in the Mediterranean. Furthermore, the Greek seas and coasts are made up by a great number of habitat types, ranging from pelagic to benthic and from coastal to offshore in the Greek seas, including seagrass meadows, corralligenous formations and seamounts (Simboura et al., 2019) Greeks developed a strong link with the sea since ancient times. As a result, Greek civilization, history and economic development has been strongly dependent on the sea, the coastline and the islands of Greece, creating a web of interdependencies and impacts (WWF Greece, 2015). Nowadays, one third of the the population of Greece is heavily concentrated in a relatively narrow zone of the coastal area (SoHelME, 2005), and 227 islands of the Greek Seas are inhabited (WWF Greece, 2015).

Given the importance of the biodiversity of the Greek seas and coasts, the increasing pressures that human activities exert on natural resources, and foremost national, European and international legislation regarding the conservation of habitats and species, the Greek state has created a number of Marine Protected Areas (MPAs) of various types over the past decades. Currently, there are three formally established MPAs in Greece (the National Marine Park of Alonissos and Northern Sporades since 1992, the National Marine Park of Zakynthos since 1999 and the protected area of Gyaros since 2019). In addition, ten nationally designated protected areas that have a marine component exist in Greece, but these are mostly narrow zones along the coast (WWF Greece, 2015). Furthermore, according to the latest Hellenic Ministry of Environment and Energy updated Natura 2000 network submission to the European Commission, in 2018, Greece updated its Natura 2000 network adding approximately 60 new marine and coastal NATURA sites and expanding the boundaries of existing ones. Now the Greek Natura 2000 areas cover 19.60% of the Greek Seas, amounting to a total of 22,481.53 km^2 of marine surface (Hellenic Ministry of Environment, updated database).Based on a 2018 law, the Natura 2000 sites are managed by 38 Management Bodies, each one of them responsible for different sites, grouped mainly by geographical and administrational criteria. For example, the Management Body for the protected areas of the Cyclades islands has to manage 37 sites – marine, terrestrial and freshwater - at 23 different islands (WWF Greece, 2018). Not all Management Bodies are established and are functional, with their majority struggling to fulfill their mission and mandate. In addition, Management Bodies of Greek MPAs face organizational problems and lack of human and financial resources. Essentially, all MPAs in Greece (and protected areas in general) lack a formally adopted and long-term Management Plan and thus are operating without clearly set goals, conservation objectives and targeted Plans of Action, making it quite difficult to assess the effectiveness of the conservation measures (WWF EPO, 2019). As a result, currently, the operation of Protected Areas' Management Bodies in Greece is still far from being characterized efficient and effective, due to a number of political, legal and financial constraints (WWF Greece, 2018). In 2019, the Hellenic Ministry of Environment and Energy subcontracted the development of Presidential Decrees (i.e. zoning schemes and conservation measures) and Management Plans for the Natura 2000 network of Greece, a process currently underway (MinEnv, 2019). This is expected to organize the currently diffused responsibilities related to the management of MPAs and of key maritime and coastal activities between various agencies and government levels, with quite different mandates (WWF Greece, 2018).

MAP WITH THE PROTECTED AREAS OF GREECE (OIKOSKOPIO, 2019).



Sustainable economic development and activities that take place in the marine environment are collectively described as "Blue Growth" or "Blue Economy". Nevertheless, depending on the user of the terms, the inclusion of the concept of sustainability in the "Blue" definition may or may not be present, referring merely to the marine element or resources of an economic activity (WWF Baltic Ecoregion Program, 2015). Currently, the Mediterranean is experiencing a Blue Growth bloom, alas without the sustainability element to a great extent. Just like the rest of the Mediterranean, the Greek Seas are experiencing a surge of maritime activities and development from sectors such as maritime transport, aquaculture, tourism (including cruise and leisure boating) and more recently oil and gas exploration and exploitation.

However, the principles of Blue Economy are yet to be integrated in Maritime Spatial Planning (MSP) in Greece. Currently MSP issues are addressed in Special Frameworks for Spatial Planning covering some specific sectors such as aquaculture. However, there is no legally binding national MSP plan in Greece or on-going process for their development, despite the fact that spatial planning should be finalized by March 31st, 2021 according to the Directive 2014/89/EU establishing a framework for maritime spatial planning. The Directive was transposed with a delay to the Greek legal system with the Law 4546 (GG 101/A/12-June-2018) and further delays characterize its implementation ever since. As the deadline is approaching, maritime spatial plans will need to be developed swiftly, something which might endanger their potential effectiveness, especially regarding the aim of protecting, preserving and restoring the marine environment. It should also be noted that although the responsibility regarding MSP is under the Ministry of Environment and Energy, spatial plans should be coherent and coordinated across the region involved and include different activities. Therefore, the process should involve a multitude of issues, sectors and jurisdictions and the participation and coordination

with other authorities (e.g. Ministry of Shipping, Ministry of Rural Development, Prefectures etc.) should be ensured (WWF Greece, 2018). Given the close connection of many marine activities to the coastal areas, an additional challenge will be the complementarity of the maritime spatial plans to the integrated coastal zone management, still Greece has yet to ratify the Protocol to the Barcelona Convention on Integrated Coastal Zone Management (ICZM). It should be noted however that the Greek MSP transposition law states that the MSP plans should take into account the coastal areas as well. Finally, an additional drawback is that any maritime spatial plan will refer only to the 6nm Greek territorial waters, as Greece has not yet implemented the 12nm as per the Convention of the Law of the Sea, or proclaimed an exclusive economic zone (EEZ).

The MSP Directive is supposed to function in synergy with the Marine Strategy Framework Directive (MSFD), the environmental pillar of the EU Integrated Maritime Policy. The MSFD aims to achieve Good Environmental Status (GES) for the marine environment of the EU by 2020. The MSFD defines Good Environmental Status (GES) in Article 3 as "The environmental status of marine waters where these provide ecologically diverse and dynamic oceans and seas which are clean, healthy and productive" (European Commission, 2008). The following 11 descriptors outline the state of the marine environment once GES is achieved:

Descriptor 1. Biodiversity is maintained

Descriptor 2. Non-indigenous species do not adversely alter the ecosystem

Descriptor 3. The population of commercial fish species is healthy

Descriptor 4. Elements of food webs ensure long-term abundance and reproduction

Descriptor 5. Eutrophication is minimized

Descriptor 6. The sea floor integrity ensures functioning of the ecosystem

Descriptor 7. Permanent alteration of hydrographical conditions does not adversely affect the ecosystem

Descriptor 8. Concentrations of contaminants give no effects

Descriptor 9. Contaminants in seafood are below safe levels

Descriptor 10. Marine litter does not cause harm

Descriptor 11. Introduction of energy (including underwater noise) does not adversely affect the ecosystem (European Commission, 2008).

Unfortunately, the implementation of the MSFD in Greece (which is rather demanding) has been delayed and needs to take quite a few bold steps in order for GES to be achieved in the Greek Seas. Furthermore, as in the case of the MSP Directive, the effective coordination between the Ministry of Environment and Energy and the other state authorities and agencies involved is much needed (WWF Greece, 2018).

The proper implementation of the MSP Directive and the MSFD in Greece is absolutely necessary as - based on the available predictions for the development and growth of maritime activities - impacts on natural resources will most likely increase, resulting also in serious conflicts between different sectors, calling thus for integrated maritime planning and sustainable national and regional strategies. Marine Protected Areas are usually in competition for space with several economic sectors, whereas they might find synergies with some (WWF Greece, 2015). Nonetheless, given that MPAs have been created to protect species, habitats and ecological processes, compatibility of MPAs with maritime activities (if any) can be only demonstrated and ensured when conservation goals, measures and management plans are in place and operate effectively.

CHAPTER 4

SAFEGUARDING MARINE PROTECTED AREAS IN THE GROWING MEDITERRANEAN BLUE ECONOMY: AQUACULTURE

FLOATING CAGES IN AN AQUACULTURE FARM, CALANQUES NATIONAL PARK, MARSEILLE, FRANCE

© LIONEL ASTRUC / BIOSPHOTO

Interreg Mediterranean PHAROS4MPAs

AQUACULTURE & MEDITERRANEAN MARINE PROTECTED AREAS:

INCREASING INTERACTIONS

Demand for fish for human consumption is rapidly growing. Analysis projects that 62% of fish for human consumption will be produced by aquaculture by 2030.

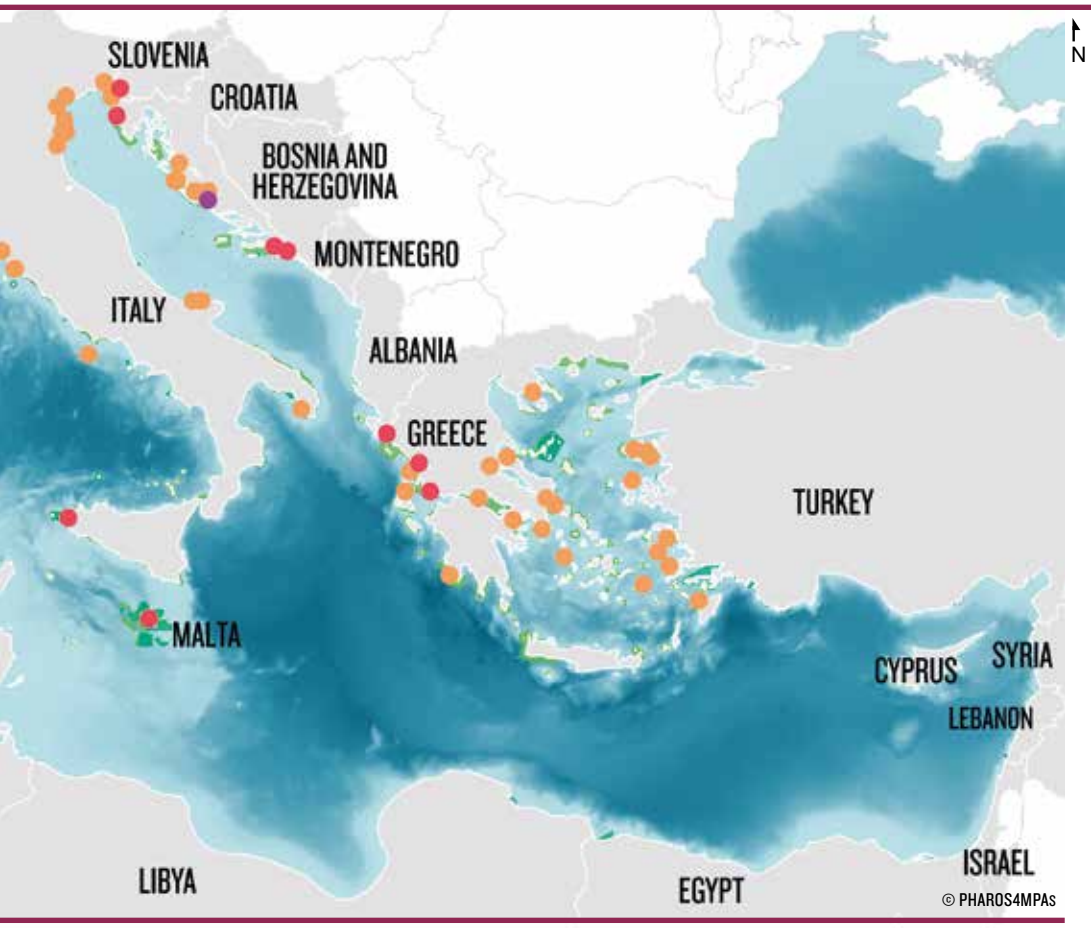
Aquaculture already accounts for more than half of the Mediterranean's total fishery output, and the sector is projected to continue growing. With almost 80% of wild fish stocks in the region at risk of overfishing, aquaculture represents the most effective way of meeting the still-rising demand for fish and shellfish products.

The best sites for marine aquaculture tend to be in coastal and shallow areas of the Mediterranean, with good water quality – and this means that in recent years aquaculture operations have increasingly been overlapping with ecologically significant areas, including marine protected areas (MPAs) and marine Natura 2000 sites.

This has focused attention on the environmental impacts of fish and shellfish farming, and raised the question of whether and how far aquaculture should be allowed to take place in such vulnerable locations. As with all human activities, aquaculture generates environmental and social impacts: the extent to which marine aquaculture is compatible with a healthy marine environment is one of the main questions concerning its sustainability.

> It's clear that some ecologically fragile areas should be kept entirely off limits, but in others it may be possible to support a growing sustainable aquaculture sector without causing irreparable harm to vital ecosystems.

The PHAROS4MPAs recommendations illustrate the main trends shaping the aquaculture sector, identifies its projected impacts on Mediterranean MPAs and Natura 2000 sites, and proposes priority policy responses.



MPAs (PURPLE DOTS), NATURA 2000 SITES (ORANGE DOTS) AND AREAS WHERE BOTH DESIGNATIONS OVERLAP (RED DOTS) IN WHICH FISH FARMS ARE LOCATED

CONSERVATION AREA IN WHICH FISH FARMS ARE LOCATED

- National MPA
- National MPA and Natura 2000
- Natura 2000

CONSERVATION AREAS

- National MPA
- Marine Natura 2000 Site

Conservation areas
SOURCES: MAPAMED (2017), EAA (2018), EMODnet (2018)
Conservation area in which shellfish farms are located
SOURCE: WWF (2019)

MPAs (PURPLE DOTS), NATURA 2000 SITES (ORANGE DOTS) AND AREAS WHERE BOTH DESIGNATIONS OVERLAP (RED DOTS) IN WHICH SHELLFISH FARMS ARE LOCATED

CONSERVATION AREA IN WHICH SHELLFISH FARMS ARE LOCATED

- National MPA
- National MPA and Natura 2000
- Natura 2000

CONSERVATION AREAS

- National MPA
- Marine Natura 2000 Site

Conservation areas
SOURCES: MAPAMED (2017), EAA (2018), EMODnet (2018)
Conservation area in which shellfish farms are located
SOURCE: WWF (2019)

MARINE AQUACULTURE:

KEY IMPACTS ON THE MARINE ENVIRONMENT

Aquaculture's environmental effects depend very much on the size of the farms, the production systems and management methods used, and also on the marine habitats in which they're located. Some key impacts are described on the right.

Every operation – whether already established or proposed for the future – needs careful scrutiny, and decisions should be made on a case by case basis in the context of detailed and dynamic management plans.

KEY PRESSURES AND THEIR LINKS TO AQUACULTURE PRODU

(ISPRA, 2011 ADAPTED FROM HUNTINGTON ET AL. 2006)

Environmental Pressures/Category	ECOLOGICAL CLASSIFICATION	
	Traditionnal classification (type and intensity of production)	
	Sedimentation	Organic load
		Turbidity
	Change in geochemical processes	Disolved O_2
		Nutrients
	Spread of alien species	
	Interaction with wild species	
	Use of chemical products	
	Collection of wild forms	
	Control of predators	
	Disease spread	
	Use of fishery resrouces in feeds (fish meal/oil)	

IMPACTS OF FISH FARMING

Depleted wild fish populations

Fish-farming in the Mediterranean has progressively shifted from producing herbivore fish such as grey mullet to producing predatory species such as sea bass. Such 'farming up' the food chain requires a supply of wild-caught fish to use as feed: this is a major issue, since the stocks targeted to produce fish meal are already fully exploited and will not support any further increase in fishing pressure.

Escapes and introduction of non-indigenous species

Non-indigenous species can be introduced in the marine environment by aquaculture operations. Such species can compete with native species for food and space if accidentally released into the natural environment; and they could also potentially transfer pathogens and/or parasites, disturbing wild fauna and ecosystem functions.

Excessive nutrients in the foodweb

Many studies have also pointed at overfeeding in fish farms (which may drift into surrounding foodwebs and favour some organisms over others) as the cause of changes in benthic community structure.

Effluent discharges

Effluent discharges from aquaculture facilities may contain residues of therapeutic products, antifouling agents or uneaten fish feed. If improperly managed, these discharges can lead to water eutrophication and oxygen depletion.

IMPACTS OF SHELLFISH FARMING

In contrast to finfish, shellfish are generally considered as the most environmentally sound animal species to farm. Although they do generate an ecological impact, it appears to be limited.

Well placed and cleverly managed, shellfish farms can provide services to coastal ecosystems such as carbon sequestration, nutrient or phytoplankton biomitigation, and benthic biodiversity restoration. These areas also provide biomass for coastal ecosystems with the spillover of spat, or with longline mussels for wild sea bream predation.

Less positively, there's a growing concern in several areas of the Mediterranean, particularly in the Adriatic and Ionian Seas, over the use and disposal of plastic socks for mussel culture. According to recent data, these plastic nets make up the seventh most common category of litter recorded on beaches and the third most common category on the seafloor.

Compared to other types of marine aquaculture, net pens aquaculture holds the highest potential risks for several sensitive habitats, communities and species. In the Mediterranean, this relates mainly to the farming of seabream, seabass, meager and tuna.

CTION SYSTEMS: HIGH PRESSURE IS SHOWN IN RED, MODERATE IN ORANGE, LOW IN YELLOW AND NEGLIGIBLE IN WHITE

	Open systems			Semi-open systems				Closed Systems
	Intensive	Semi-intensive	Solar	Intensive		Semi intensive	Extensive	Intensive
	Mollusc long lines	Mollusc bottom	Ranching	Fish (net pens)	Fish (tanks)	Fish (ponds)	Fish (valli, lagoons)	Fish (RAS)*

* Recirculating aquaculture system

FEEDING TUNAS IN CARTAGENA, SPAIN

© JORGE SIERRA WWF

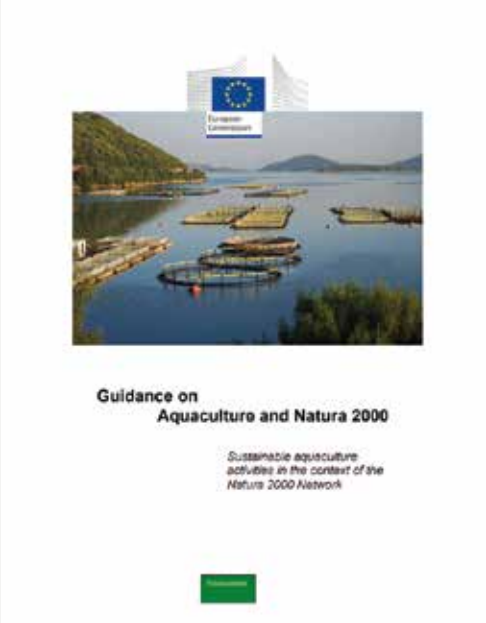
PUBLIC AUTHORITIES CAN PLAY A MAJOR ROLE IN MINIMIZING THE AQUACULTURE SECTOR'S IMPACTS ON MPAs

National public authorities are the most influential actors in minimizing the impacts of aquaculture development on the marine environment. The rapid expansion of aquaculture in the Mediterranean has intensified the competition for the use of coastal zones, and as such there is a pressing need to integrate aquaculture into marine spatial planning processes. Without coordinated spatial planning, it will be impossible to move towards sustainable development for the sector.

Likewise, taking an ecosystem approach to aquaculture means it's necessary to assess the carrying capacity of the marine environment, to identify suitable boundaries for aquaculture production within ecological limits.

KEY RECOMMENDATIONS FOR PUBLIC AUTHORITIES FOR FUTURE AQUACULTURE DEVELOPMENT IN PROTECTED AREAS

- Only marine aquaculture farms with no detrimental effect on the designated protected areas should be permitted in MPAs, and this should be decided on a case-by-case basis.
- Fish farms with net pens settlements in areas with significant seagrass meadows and coralligenous formations and/or important fish habitats, spawning grounds and nursery areas should not be allowed. In general, habitats sensitive to the discharge of organic matter are not appropriate for fish or shellfish aquaculture.
- In general, fish farms with net pens settlements inside or in the close vicinity of MPAs should be avoided. Buffer zones should be maintained between fish net pens settlements and protected areas.
- The farming of exotic species should be avoided in MPAs.
- Industrialized intensive fish production should be avoided in MPAs.
- For marine Natura 2000 sites, the **EU Commission Guidelines on Aquaculture and Natura 2000 offer clear advice.** Only marine aquaculture farms without a detrimental effect on the habitats and species protected under the Birds and Habitats Directive should be permitted in such areas, and these should be assessed on a case-by-case basis.



OYSTER BEDS IN THE THAU LAGOON NATURA 2000 SITE, FRANCE

© SHUTTERSTOCK / OLIVIER TABARY

National aquaculture strategies must ensure sustainable development and growth, avoiding potential negative impacts in terms of non-indigenous species, eutrophication, seafloor integrity, concentrations of contaminants (both in the water generally and in seafood specifically), populations of commercial fish, and marine litter.

To provide a solid basis for implementing these recommendations, public authorities should put in place environmental monitoring programmes for marine aquaculture. While such monitoring is usually made mandatory in national regulatory frameworks, in some countries this monitoring is left to the aquaculture producers themselves, without any public oversight – this in itself is clearly not an adequate solution.

Public research on sustainable aquaculture should also be encouraged to support businesses in progressively enhancing production efficiency and sustainability.

AQUACULTURE FARMS CLOSE
TO KARABURUN-SAZAN NATIONAL PARK (ALBANIA)

© ESPEN RØNNEVIK OG ROAR LINDEFJELD /STATOIL

CHAPTER 5

SAFEGUARDING MARINE PROTECTED AREAS IN THE GROWING MEDITERRANEAN BLUE ECONOMY: SMALL-SCALE FISHERIES

FISHER IN ZAKYNTHOS MPA, GREECE, WITH A CRUISE SHIP IN THE BACKGROUND

© CLAUDIA AMICO / WWF

Interreg Mediterranean

PHAROS4MPAs

SMALL SCALE FISHERIES:

A MAJOR SEGMENT OF MEDITERREANEAN FISHERIES

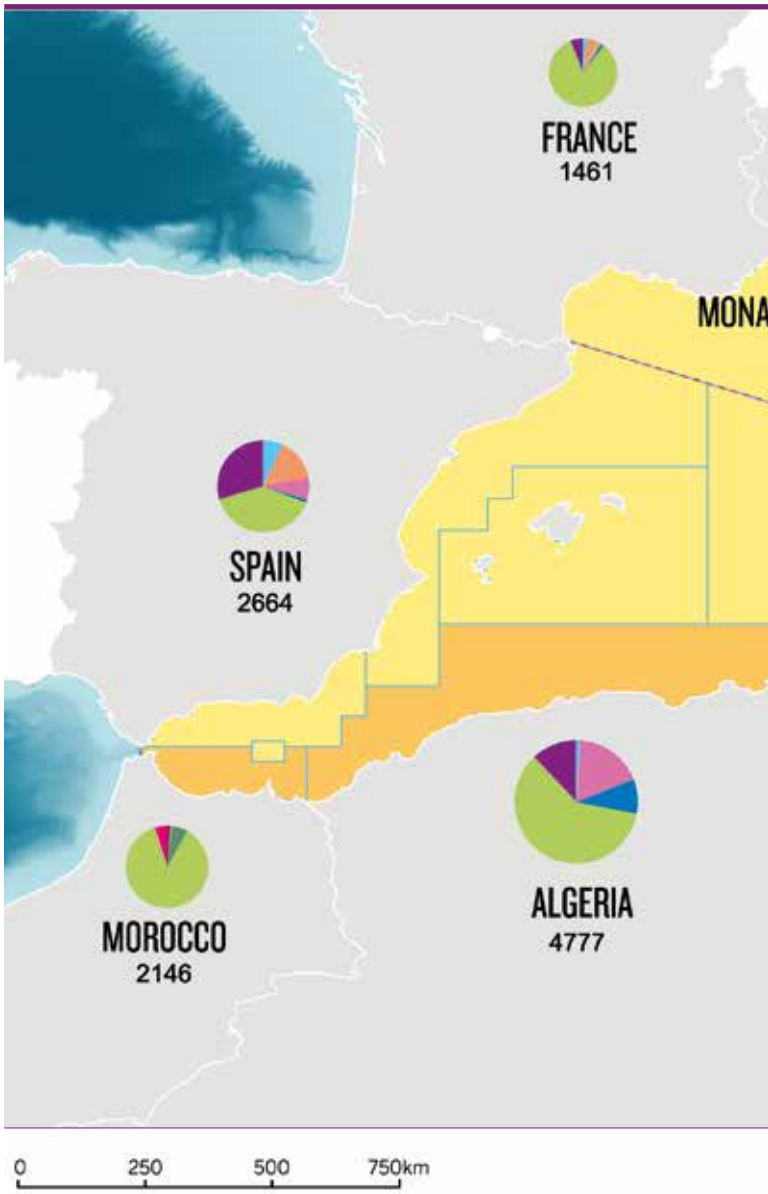
Mediterranean fisheries are facing serious challenges due to over-exploitation. About 80% of all assessed stocks are fished outside safe biological limits, catches are decreasing, and regional fleets are shrinking. Environmental degradation, coastal development and pollution are putting further pressure on fish stocks, while climate change is modifying the spatial distribution and productivity of marine species across the Mediterranean. Professional fishery landings have been declining for the past 20 years.

Small-scale fisheries (SSF) still make up most of the commercial fishing sector in the Mediterranean, both in terms of number of boats (83% of the total fleet) and of people employed (57% of the total workforce). SSF use many different techniques and more than 50 types of fishing gear to target species, often switching among them during a fishing trip. However, despite its socio-economic importance, the sector currently faces unprecedented challenges due to marine resource depletion.

According to the EU definition, 'small-scale coastal fishing' means fishing carried out by vessels of an overall length of less than 12 metres and not using towed fishing gear, including surrounding seines, beams and trawls (as listed in Table 3 of Annex I to Commission Regulation (EC) No 26/2004).

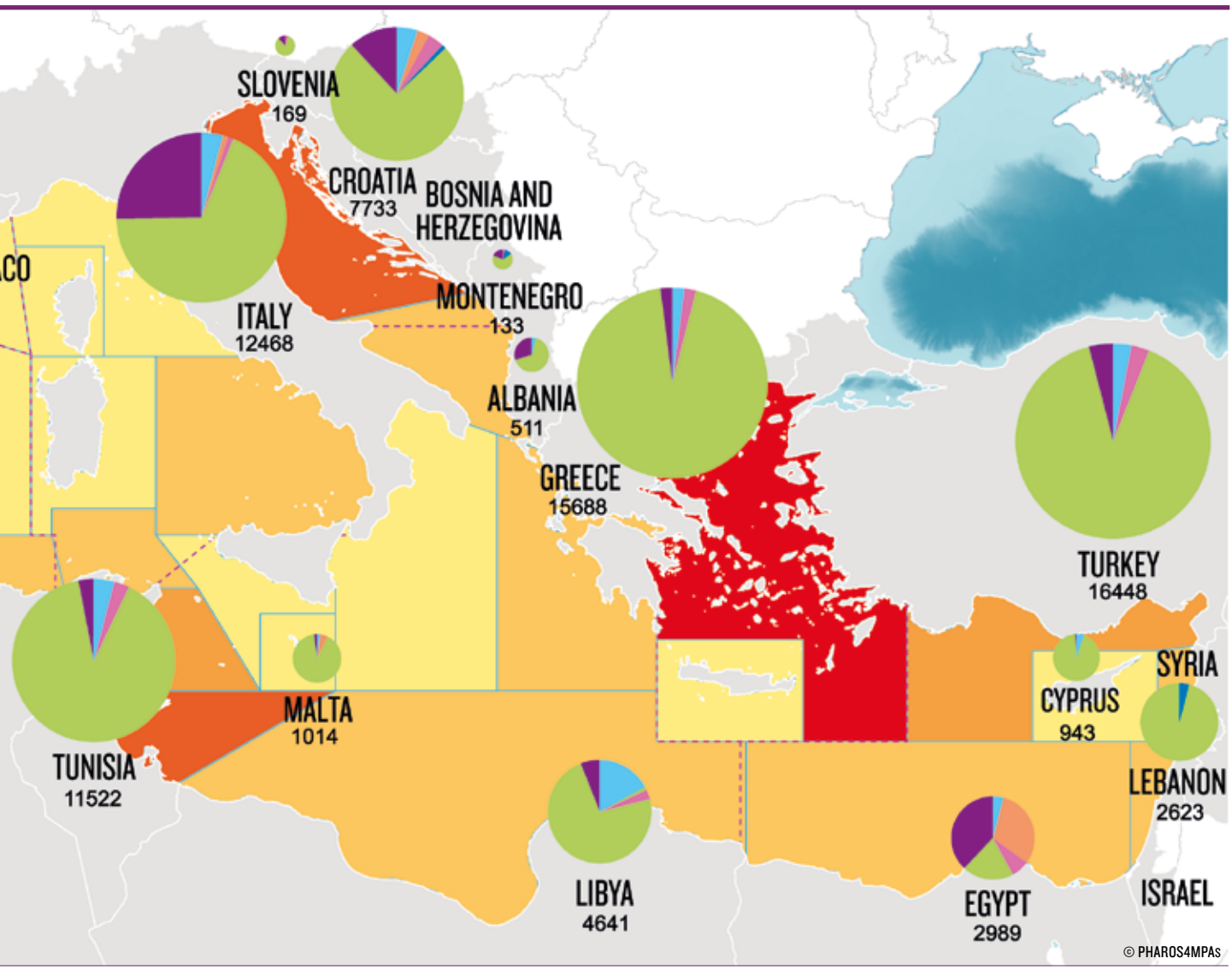
SSF landing sites are widespread along the coasts and in fishing ports, which makes effective monitoring, control and surveillance (MCS) extremely challenging. The heterogeneity of markets and points of sale poses further complications for assessing the sector. In addition, the governance of the sector is very fragmented, and SSF have limited representation at both national and regional level.

NUMBER OF FISHING VESSELS IN GFCM SUB-AREAS AND BREAKDOWN OF FIS



SOURCE: FAO (2016, 2018)

SHING VESSELS BY FISHING PRACTICE GROUP AND COUNTRY



FISHING AREAS (STATISTICAL UNITS)

- FAO Subarea Limit
- GFCM Subarea Limit

REPORTED FISHING BOATS

- 17 - 1500
- 1500 - 3500
- 3500 - 6000
- 6000 - 10000
- 10000 - 14600

BREAKDOWN BY FISHING PRACTICE

- Trawlers and Dredgers
- Small Scale Artisanal
- Purse Seiners 6-12m
- Purse Seiners >12m
- Tuna Seiners
- Long Liners >6m
- Polyvalent Vessels >12m

16448
10000
5000
1000
500
100

Nevertheless, during the last decade there have been serious efforts to improve the sector's regulatory framework. These include an **FAO-GFCM Regional Plan of Action for Small-Scale Fisheries in the Mediterranean and the Black Sea (RPOA-SSF)**, supported by a Ministerial Declaration. The implementation of the Action Plan is essential for the sustainability of the sector and applies in MPAs where new practices have proved to be effective in both ecological and socio-economic terms.

SSF AND MPAs: A LONG HISTORY OF WORKING TOGETHER IN THE MEDITERRANEAN

SMALL-SCALE FISHERS IN CALANQUES NATIONAL PARK, FRANCE

© MATHIEU FOULQUIÉ

Most MPAs are primarily designated with conservation objectives, but they may additionally aim to protect or recover fishery resource species and/or habitats. Fully or highly protected MPAs are likely to bring ecological benefits including an increase in abundance, biomass, density and fecundity of fish populations. This so-called 'reserve effect' results in the export of fish biomass to fishing grounds, and it may lead to economic benefits for SSF in adjacent areas.

The establishment of MPAs in the Mediterranean is a relatively recent development for SSF. While MPAs and other spatial tools such as Fisheries Restricted Areas (FRAs) can support an ecosystem approach to fisheries management, the designation of coastal MPAs has created new constraints for fishers. This has led to frequent conflicts and has in some cases made it difficult to promote collaboration between MPAs and small-scale fishers. However, the situation is evolving. Increasing numbers of MPA managers and small-scale fishers are finding that through dialogue they can create a shared vision and objectives, such as the recovery of fishery resources.

BENEFITS AND IMPACTS OF SMALL-SCALE FISHERIES

At a global scale, SSF support livelihoods in coastal communities and contribute significantly to food security, especially in developing countries. The same is true in the Mediterranean basin, especially in countries with high numbers of small-scale fishers. Despite accounting for only 26% of overall fishery revenue, SSF account for around 59% of all onboard employment in the Mediterranean, a total of some 134,300 jobs, and they represent 80% of the Mediterranean fleet, with some 60,000 vessels. These brought in USD 519 million (24%) of the region's commercial fishing revenue in 2017.

Despite the fact that the volume of SSF catches are relatively low compared to large-scale commercial fisheries, SSF still have the potential to impact fishing resources and marine ecosystems. While other factors – including climate change, pollution from marine and terrestrial sources and catches from recreational fishers – also contribute to the decline of fish resources, SSF can cause serious impacts when, for example, the fishing effort is very high. Yet they are generally considered to have less ecological impact than industrial fisheries, and are usually seen as more sustainable.

Potential impacts include:

- **Altering biodiversity and changing ecosystem functioning** by removing key species (e.g. top predators) or specific size classes. Key species are regulative species which help control the proliferation of other species; while larger females have more offspring, reproduce over a longer period and spawn bigger eggs and larvae with better survival rates than smaller females.
- **Targeting species that are classed as vulnerable** on the IUCN Red List. In a study carried out in France, Italy and Spain, nearly 50% of the total SSF catch in coastal waters – and 100% in offshore waters – was of vulnerable species.
- **Size-selective fishing affecting hermaphrodite fish species,** such as dusky grouper (*Epinephelus marginatus*), which can make up a significant portion of the catch. Fishing may disproportionately remove members of one or other sex, altering sex ratios and leading to egg or sperm limitation.
- **Catches below the minimum landing size** prevent individuals from reaching maturity and reproducing. There is growing concern that levels of fishing mortality as a result of **bycatch** and **discards** threaten the long-term sustainability of many fisheries and the maintenance of biodiversity in many areas.
- **Habitat degradation with direct and indirect action.** Specific fishing techniques (e.g. small-scale dredges) and anchoring destroy or erode vulnerable habitats including seagrass meadows (*Posidonia oceanica*), coralligenous reef assemblages and deep rocky habitats that contain sessile and fragile organisms such as gorgonians, sponges and corals.
- **Lost or abandoned fishing gear** – such as nets, hooks and lines – also causes harm. So-called ghost gear continues to catch fish, and gear of all kinds can abrade sessile animals like corals and gorgonians. It also represents a significant fraction of marine litter. Oil and antifouling paints are other notable sources of pollution.

IMPACTS ON ENDANGERED, THREATENED OR PROTECTED SPECIES

Marine mammals are mostly impacted by polyvalent vessels when they're caught in nets. Small vessels using set nets, demersal longlines or pelagic longlines make up most of the Mediterranean fleet, and likely cause more incidental or intentional deaths of marine turtles than large vessels typically using bottom trawls or pelagic longlines. The total annual bycatch of marine turtles in the Mediterranean is estimated at up to 132,000 individuals, resulting in a potential annual mortality of 44,000. Gillnet, trammel net, longline and bottom trawl fisheries are considered a major threat to the survival of elasmobranch (sharks and rays) populations in the Mediterranean and the Black Sea. Seabird populations are mainly impacted by longliners, while fishing on longliners' baits.

LOGGERHEAD TURTLE (*CARETTA CARETTA*) TRAPPED IN A DRIFTING ABANDONED NET, MEDITERRANEAN SEA

© NATUREPL.COM / JORDI CHIAS / WWF

ABANDONED FISHING NET IN THE CÔTE AGATHOISE MPA, FRANCE

© MATHIEU FOULQUIÉ

PUBLIC AUTHORITIES AND MPA MANAGERS CAN PLAY A MAJOR ROLE IN AVOIDING OR MINIMIZING SSF IMPACTS ON MPAs

At the Mediterranean level, **the implementation of the GFCM's Regional Plan of Action on SSF (RPOA-SSF) by 2028 will be key in bringing the small-scale fisher community onto a sustainable path.** Contracting parties must address its priority actions as soon as possible.The EU is a contracting party to the GFCM, so EU policies should be coordinated with the RPOA-SSF. New CFP regulations, such as the control regulations, should take SSF specificities into account and deliver an approach that they can practically and effectively implement without becoming overburdened.

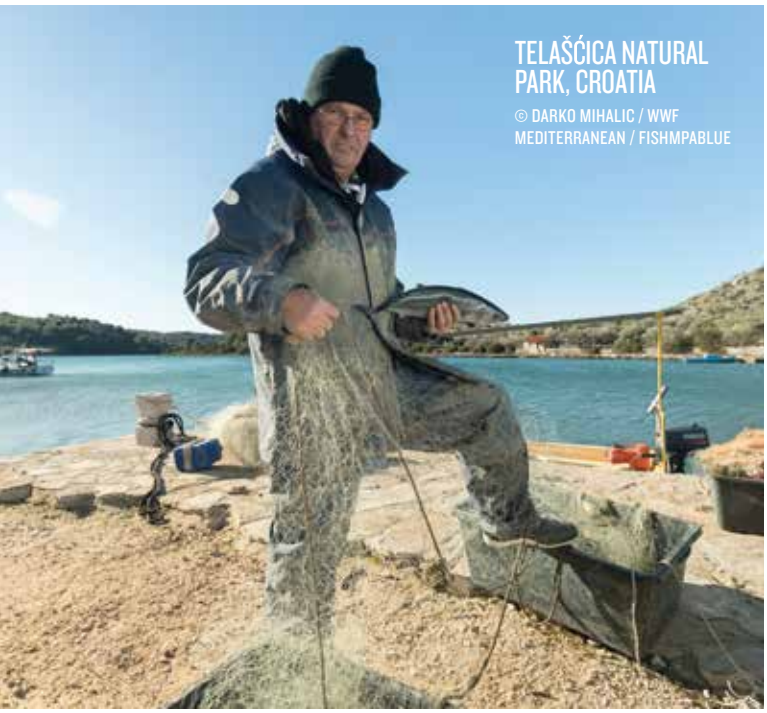
RECOMMENDATIONS FOR MSP AUTHORITIES

National public authorities are the most influential actors in implementing and coordinating international policies nationally and locally, whether the RPOA-SSF or EU policies. They should in general support the implementation of environmentally favourable frameworks, such as the ecosystem-based approach.

Following the EU Directive on maritime spatial planning (MSP) (DIRECTIVE 2014/89/EU), EU Member States are currently developing their marine spatial plans and associated visions and strategies, a process which should be finalized by 2021. Non-EU countries are also addressing MSP, although on a non-binding basis. Any new economic development overlapping with or impacting fishing grounds should be thoroughly discussed with fishers.

To address impacts of SSF, environmental measures need to be taken to:

- Avoid the excessive impact of SSF on marine resources and vulnerable marine species, through gear and size restrictions, fishing effort limitation, seasonal closures, etc.
- Improve the selectivity of fishing gear with regard to size and species
- Increase investments in fishing techniques that eliminate discards by avoiding or reducing unwanted catches of commercial and non-commercial stocks
- Support the exclusion of fishing activities in areas showing high probabilities of unwanted catches, including the establishment of zones for the recovery of fish stocks, in spawning sites and nursery areas for juveniles
- Support – in close coordination with fishers – an increase in coverage of no-take zones that help ecosystem and marine resource recovery
- Minimize the impact of fishing activity and gear on sensitive habitats such as *Posidonia* meadows and coralligenous assemblages
- Establish derelict fishing gear management schemes from collection to final treatment or recycling together with waste collection plans in landing sites.



TELAŠĆICA NATURAL PARK, CROATIA

© DARKO MIHALIC / WWF MEDITERRANEAN / FISHMPABLUE

From a socio-economic perspective, measures could include:

- Developing a national legal framework enabling fishery co-management to support sustainable stocks
- Improving legal frameworks that enable the SSF sector to be organized as cooperatives, producer groups or organizations, micro-enterprises or other structures to help fishers better manage their activities, mutualize costs, add value, develop diversification schemes (such as pescatourism activities) and ensure a sale directly or in short circuits
- Guaranteeing good and fair access to landing sites adequately equipped to facilitate SSF activities – fully serviced docking areas, moorings, refrigerated warehousing, drinking water, ice machines, litter disposal and recycling (e.g for expandable polystyrene boxes, etc.)
- Taking into account recreational fishing activities in fishery management through multiannual plans
- Raising awareness among consumers and local communities about SSF activities and their benefits, to improve the image of the SSF sector.

Collaboration with MPAs can be beneficial to fishers, as both pursue common objectives of restoring fish stocks and preserving habitats used by fish at different life stages. Many MPAs have already supported some of these objectives in their management plans: the implementation of national strategies should take into account experience gathered and existing best practice.

RECOMMENDATIONS FOR MPA MANAGERS

MPA managers have a central role in SSF management. They should:

- Proactively establish a permanent and close dialogue with the SSF sector and implement governance which supports co-management
- Monitor SSF to support management measures
- Use appropriate zoning, especially by the establishment of no-take zones. Zoning approaches should aim to avoid gear interaction or conflicts over access to marine resources, both with other fishers (e.g. large-scale industrial fishers, recreational fishers) and with other stakeholders
- **Prepare and implement a fisheries management plan.** Specific management measures may include:
  - Reducing fishing effort, through for instance seasonal or temporary closures in adjacent zones or through gear restrictions or time limitation of fishing (maximum 24 hours)
  - Improving the selectivity of fishing gear
  - Reducing the incidental catch of elasmobranchs, seabirds, turtles and marine mammals through mitigation measures
  - Minimizing bycatch and reducing discards, through regulations or economic incentives
  - Minimizing the impacts of SSF on vulnerable marine species through gear and size restrictions or seasonal restrictions
  - Reducing ghost fishing by collecting lost fishing gear
  - Implementing waste collection plans in landing sites
  - Implement effective control and enforcement of regulations
  - Support initiatives to enhance the added value of small-scale fisheries products: optimization of distribution channels, promotion of less marketable catches, eco-labeling of sustainable SSF products, education and awareness-raising among consumers, pescatourism.

FISHER FROM KAS, TURKEY

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CHAPTER 6

SAFEGUARDING MARINE PROTECTED AREAS IN THE GROWING MEDITERRANEAN BLUE ECONOMY: RECREATIONAL FISHERIES

CATCHING A GREATER AMBERJACK *(SERIOLA DUMERILI)* FROM A BIG GAME FISHING BOAT

© LIONEL ASTRUC / BIOSPHOTO

Interreg Mediterranean

PHAROS4MPAs

RECREATIONAL FISHING & MEDITERRANEAN MARINE PROTECTED AREAS:

INCREASING INTERACTIONS

Recreational fishing is one of the most popular leisure activities in coastal zones worldwide: it involves large numbers of people, and high levels of fishing effort. In Europe there are almost 9 million practitioners, who generate around €6 billion annually for regional economies. The sector is present all along the Mediterranean northern coasts – it's easy to access a large number of potential sites where boat and spear fishers can operate.

The number of recreational fishers has been assessed in some locations (in MPAs in particular), but the overall number is still unknown. However, experts agree on the fact that the number of recreational fishers in the Mediterranean has reached a significant level. As an example, in the Balearic Islands the number of recreational fishing licences has quadrupled in the last 20 years.

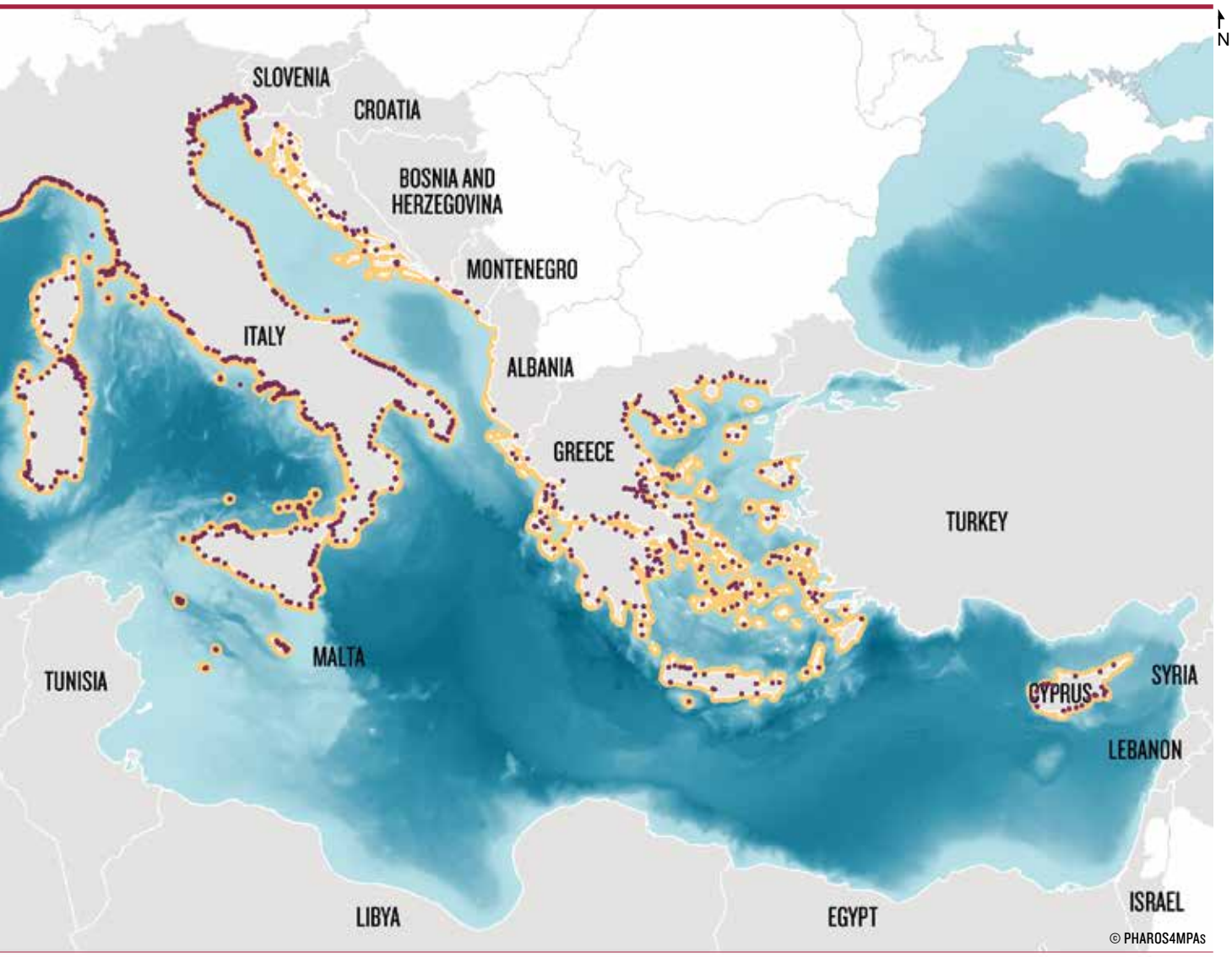
Clearly, such an increase in fishing effort is likely to lead to increased catch volumes, which will have an impact on fish stocks and the protection of vulnerable species. According to rough EU estimates, recreational fishing could account for 10% of all fish production in the Mediterranean.

DISTRIBUTION OF MARINAS AND POTENTIAL RECREATIONAL FISHING ZONES IN EU

SOURCE: IFREMER revised by WWF France (2019)

Due to the weak distinction between recreational fishers and small-scale fishers, the identification of port facilities exclusively or partially occupied for leisure activities is not yet possible in the other Mediterranean countries.

U MEDITERRANEAN COUNTRIES, PLUS MONTENEGRO, ALBANIA, BOSNIA AND HERZEGOVINA



LOCATION OF MARINAS

- Marina

POTENTIAL FISHING ZONES

- Area within 6 miles from shore

DEFINITION OF RECREATIONAL FISHERIES

EU Member States have not yet agreed on a common definition of marine recreational fisheries. The General Fisheries Commission for the Mediterranean define them as: "Fishing activities exploiting marine living aquatic resources for leisure or sport purposes from which it is prohibited to sell or trade the catches obtained".

A clear, agreed Europe-wide definition of marine recreational fisheries is still needed for regulation and enforcement purposes. An appropriate definition should enable a clear distinction between different types of fishery, and the different methods of recreational fishing. The definition should extend across the whole Mediterranean basin, where subsistence issues are also very important in some areas.

The recommendations in this report apply to strictly recreational fisheries, and do not consider subsistence fisheries[1].

INTERACTIONS WITH MARINE PROTECTED AREAS

MPAs play a significant role in protecting fish communities and enhancing fish stocks within their designated boundaries. Their success thus makes them attractive to recreational fishers, who may expect higher yields inside and in the close vicinity of these areas.

[1] One issue that remains to be solved is how to distinguish subsistence fisheries from strictly recreational fisheries.

The success of MPAs in attracting fishers and tourists can result in conflicts between sectors, involving recreational and commercial fishers, scuba divers and tour boats, among others, as well as harm to the marine environment. There is much debate over whether or not commercial small-scale fishers and recreational fishers should be given equal rights to access an MPA and its resources.

Most multi-use MPAs in the region allow regulated recreational fisheries within their boundaries. However, recreational fishing, in all its forms, is considered to be an extractive activity and, therefore, is not always compatible with ecosystem and wilderness qualities protection.

RECREATIONAL FISHERY: KEY IMPACTS ON THE MARINE ENVIRONMENT

Mediterranean fisheries are facing serious challenges: roughly 80% of all assessed stocks are fished outside safe biological limits, and catches are decreasing and commercial fleets shrinking across the region. Recreational fisheries can exacerbate this situation in a number of ways.

AERIAL VIEW OF LA VALETTE HARBOUR PACKED WITH FISHING BOATS

© MALTESE ROBINSON ROBINSON / SHUTTERSTOCK

INCREASING FISHING EFFORT AND ITS IMPACT ON FISH STOCKS

Recreational fishing has been shown to be an important component of fishing mortality across the globe. Failing to include recreational catch estimates in stock assessments can undermine their accuracy and lead to incorrect advice on fisheries management.

Comprehensive data is lacking, but the EU broadly estimates that recreational fishing represents more than 10% of the total production of all fishing. Illegal fishing also adds extra pressure on fishery resources – this is a problem in most coastal areas and MPAs.

IMPACT ON VULNERABLE FISH SPECIES

Overall, vulnerable species make up nearly 20% of the total recreational catch in coastal waters (including MPAs) of the western Mediterranean. Some recreational fishing methods (e.g. spearfishing, jigging and trolling) target species – mostly larger individuals[2] with a high economic value – that are also exploited by artisanal fisheries.

Many of these species – e.g. grouper (*Epinephelus marginatus*), red scorpionfish (*Scorpaena scrofa*) and common pandora (*Pagellus erythrinus*) – are endangered, and are included in international conventions (e.g. Barcelona, Bern or Washington conventions), laws (e.g. EU Habitats Directive) or lists (e.g. the IUCN Red List).

There are other environmental impacts associated with recreational fishing:

- **Disruption of trophic chains:** Some fish species targeted by recreational fishers are regulative species among marine ecosystems and help control the proliferation of other species, such as sea urchins.
- **Catch-and-release and fish welfare:** Certain handling techniques can cause great stress and subsequent death among fish.
- **Potential introduction of exotic species used as bait:** The use of living exotic species as bait by recreational fishers in the Mediterranean is common. Living material can displace endemic species, changing the structure of the trophic chain.
- **Potential environmental impacts of fishing gear lost or abandoned at sea:** Lines and nets can remain in the water column as litter and on the seabed for many years still capturing fish, particularly in rocky habitats, resulting in additional mortality of both target and non-target species as well as abrasive action on soft and hard habitats.
- **Damage to sensitive habitats:** Three negative phenomena are observed: 1) Shellfish collectors and shore anglers trampling on fragile *Cystoseira* forests in coastal areas. 2) Unintended contact of spearfishers with sessile organisms – inexperienced spearfishers, in particular, tend to come into contact more frequently with coralligenous assemblages. 3) Anchoring on *Posidonia* meadows – conventional mooring chains scrub the substrate, and can destroy the immediate environment.

[2] Larger individuals tend to produce a higher quantity and better quality of eggs and larvae, thus producing more offspring; or because, in the case of sex-changing species, the demographic structure of the population is disrupted as the larger sex will be disproprtionately caught, leading to egg or sperm limitation.

SUMMARY OF PRESSURES AND IMPACTS AFFECTING TAXONOMIC GROUPS AND HABITATS, TOGETHER WITH THE LEVEL OF INTENSITY

PRESSURE	IMPACT	TAXONOMIC GROUP/HABITAT	INTENSITY
Overexploitation of vulnerable species	Insufficient population recovery	Different vulnerable species, e.g. groupers	High
Additive predation	Perturbation of trophic chain	Sea urchin in coastal habitats	Low
Physical contact from boat anchors and trampling on sensitive habitats	Habitat degradation	Cystoseira and coralligenous assemblages as well as *Posidonia* meadows	High
Catch-and-release	Increased mortality	All fish	Medium
Exotic species	Ecosystem disturbance	All types of coastal habitats	Medium
Fishing gear lost or abandoned at sea	Pollution/Ghost fishing	All type of marine habitats	High

PUBLIC AUTHORITIES CAN PLAY A MAJOR ROLE IN MINIMIZING RECREATIONAL FISHING'S IMPACTS ON MPAs

SPEARFISHER IN CÔTE AGATHOISE MPA, FRANCE

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NATIONAL AUTHORITIES

Unlike professional fishing, recreational fishing in the EU largely remains under national control – however, in recent years it has been increasingly made subject to EU fisheries legislation. In 2009, a chapter on recreational fishing was included in the Council Regulation (EC) No 1224/2009. Article 55 of this regulation requires that "Member States should ensure that recreational fisheries on their territories and in Union waters are conducted in a manner compatible with the objectives and the rules of the Common Fisheries Policy".

- It is strongly recommended that **national licence systems** should be developed so that the numbers of recreational fishers (among other parameters) can be better evaluated.
- The licence system should include the **obligation to report all catches** – this is an essential element to obtain greater accuracy on the status of fish stocks and a clear assessment of the share of catches from recreational fisheries in relation to commercial fishing.
- **Monitoring of the ecological, social and economic impacts of recreational fisheries** should be implemented by all Mediterranean states.
- The **establishment of recreational fisheries fees** should be explored as an effective mechanism towards sustainable management. These fees can contribute to lessening the environmental impacts of recreational fishing, covering the costs of management and – importantly – control measures.
- **Management measures** might be required at national level and in MPAs in particular when the fishing effort is too high, including the limitation of fish catches or the prohibition of particular fishing methods impacting vulnerable species such as groupers (*Epinephelus spp.* and *Mycteroperca rubra*), and brown meagre (*Sciaena umbra*).

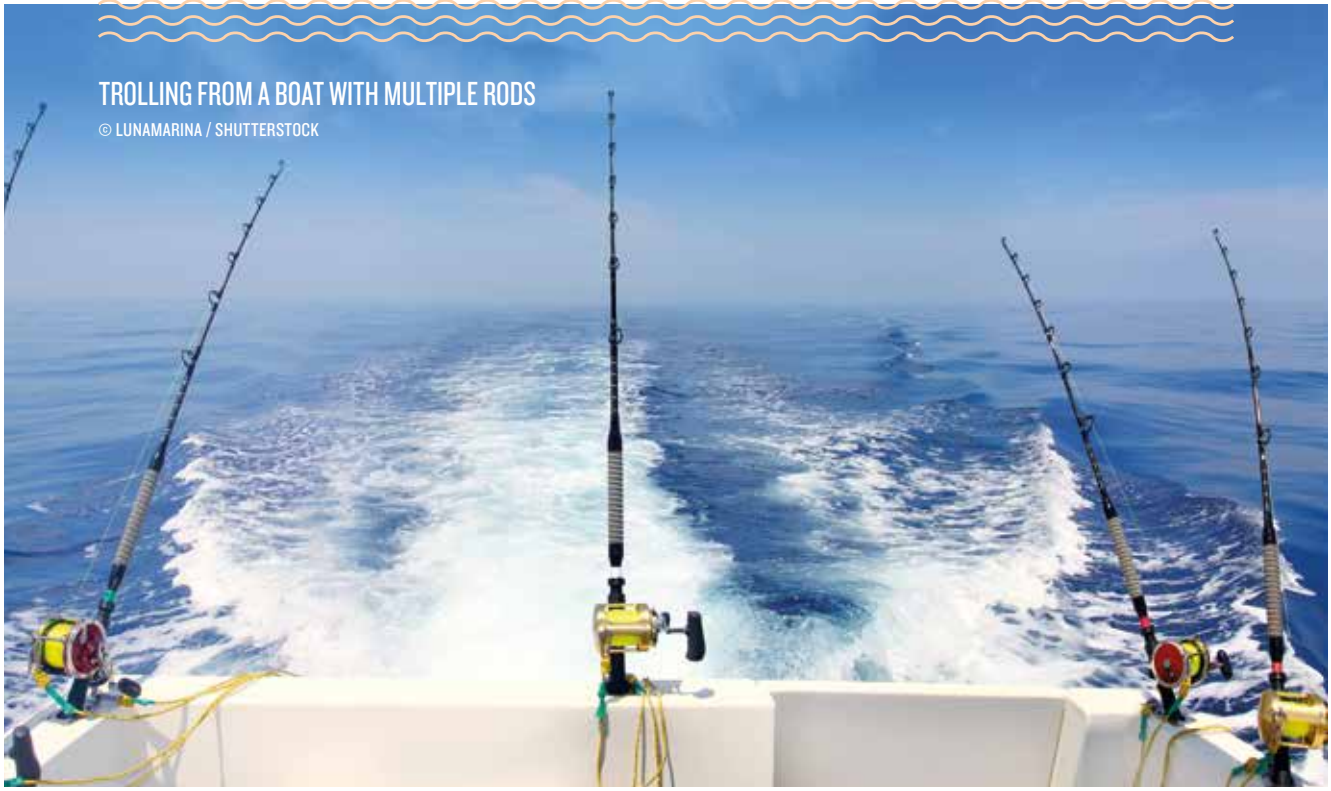
Local public authorities can also be instrumental in implementing initiatives to incentivize and support recreational fishers to switch to more sustainable practices. At the local level, MPAs generally have the power to regulate recreational fisheries, along with other public authorities, thus acting as laboratories for sustainable development. For instance, the zoning of an MPA can be a key tool in the sustainable management of its recreational fisheries, including the establishment of no-take zones. Proactively establishing a dialogue with the recreational fishing sector is crucial for implementing management actions.

MPA MANAGERS

The following recommendations concern MPA managers: they are suggested to avoid or minimize impacts on target and non-target species and habitats, reduce conflicts with other sectors, and maximize the economic benefits of the sites.

- **Monitoring**[3] is a key starting point in order to identify and quantify both the number of recreational fishers and the impacts of their activity. Performing such studies regularly is necessary to understand not only the effects on marine communities but also the economic and social benefits produced by this activity. The collected data can contribute to establishing sites' carrying capacity and help develop science-based measures that ensure a sustainable recreational exploitation of the sea.
- In countries without a licence system, MPAs may still be allowed to **issue licences** themselves, depending on their regulatory framework. Whenever possible MPAs should establish an obligatory licensing system for fishers who want to fish within their boundaries, particularly in countries without a national licence system.
- **Environmental awareness-raising programmes** are most effective when MPA managers engage with all relevant stakeholders – primarily recreational fisher organizations, but also specialized shops and public administrations – in their campaigns. To help engage recreational fishers, charters or codes of good practice can be agreed in a participatory way, then they can be distributed and even signed as a 'moral' contract.
- **Regular surveillance** of users within and around MPA waters is the most effective way to ensure regulations are enforced and poaching is prevented.
- Involve recreational fishers along with other stakeholders such as **scuba divers and particularly small-scale fishers in management.**
- MPA managers can **implement different types of management measures** when the fishing effort is too high. Limitations include bans on fishing at night, catch limitations to reduce fishing effort (e.g. catch limits in number of fish or kilograms, limited number of rods per fisher or boat, shorter soak times, etc.), minimum landing sizes (different than for fish caught outside the MPAs), prohibition of particular fishing gears affecting vulnerable species (usually spearfishing and jigging, as well as electric reels), prohibition of competitions.

[3] The MedPAN publication on recreational fisheries in Mediterranean MPAs provides a sound review of monitoring techniques



TROLLING FROM A BOAT WITH MULTIPLE RODS

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CHAPTER 7

SAFEGUARDING MARINE PROTECTED AREAS IN THE GROWING MEDITERRANEAN BLUE ECONOMY: MARITIME TRANSPORT

BOTTLENOSE DOLPHINS *(TURSIOPS TRUNCATUS)* IN THE STRAITS OF GIBRALTAR

© SYLVAIN CORDIER / BIOSPHOTO

Interreg Mediterranean

PHAROS4MPAs

MARITIME TRANSPORT SECTOR & MEDITERRANEAN MPAs:

INCREASING INTERACTIONS

Maritime transport is the backbone of the global economy. The sector is particularly important for the Mediterranean region – despite covering less than 1% of the world's oceans, the Mediterranean carries about 15% of global shipping.

The maritime transport sector is expected to grow at a rate of 4% per annum for the next decade; shipping activity in the region is growing in terms of the number of routes, traffic intensity and size of ships.

And with this growth will come increasing environmental impacts, such as chemical pollution, noise pollution and collisions with marine mammals.

These environmental impacts are an issue for the whole of the Mediterranean, but it's critical that they're prevented – or at least minimized – in Marine Protected Areas (MPAs), which by definition are areas of great importance for marine biodiversity and ecosystems.

Considering the growth of the sector, it's inevitable that major commercial traffic routes will increasingly interact with MPAs and other area-based conservation measures in some Mediterranean locations, especially where vessels are approaching ports or passing through straits.

In all MPAs, shipping activities with the most serious potential environmental impacts – such as the transport of dangerous goods or hydrocarbons – should be avoided altogether. Public authorities – from state transport agencies to port authorities – should impose a range of measures to prevent accidents and protect ecosystems.

Cross-border, sub-regional and regional cooperation are particularly important given the scales over which the sector operates. Where there are unavoidable interactions between maritime traffic and protected areas – such as in MPAs near ports and straits, or in larger MPAs like the Pelagos Sanctuary – solutions to avoid or mitigate impacts do exist, and they should be implemented to protect the precious marine resources of the Mediterranean region.

This paper illustrates the main trends shaping the maritime transport sector, identifies the impacts it has on Mediterranean MPAs, and proposes priority policy responses.

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MARITIME TRANSPORT:

KEY IMPACTS ON THE MARINE ENVIRONMENT

Maritime transport affects the marine environment, both in the course of routine operations and through accidental events. Its impacts can be localized (e.g. the effects of anchoring or mooring) or far-reaching (e.g. underwater noise from ship engines); and they occur during offshore navigation as well as in coastal areas.

UNDERWATER NOISE

Chronic exposure and cumulative effects of underwater noise can have long-term consequences for the conservation status of cetaceans, sea turtles, fish, aquatic birds and marine invertebrates.

Underwater noise hotspots in the Mediterranean – particularly acute on busy maritime routes – overlap with several protected areas and/or with areas of importance to noise-sensitive marine mammal species.

COLLISIONS WITH MARINE FAUNA

Collisions with large vessels represent the main fatal threat for whales in the region. Ship strikes are made more likely by underwater noise, which can interfere with cetacean communication and prevent animals from detecting and reacting to threats.

POLLUTION FROM OIL AND OTHER CHEMICALS

Oil spills are one of the most serious causes of marine pollution; the Regional Marine Pollution Emergency Response Centre (REMPEC) estimated that the total input of oil from ships into the Mediterranean is between 100,000-150,000 tonnes per year.

While major sea routes and the areas around key oil terminals are clearly most at risk, serious accidental oil spills could occur anywhere in the Mediterranean.

AIR POLLUTION

Gaseous emissions from ships seriously affect marine ecosystems, as well as human health. In particular, emissions are known to exacerbate ocean acidification, and they are also a major contributor to climate change.

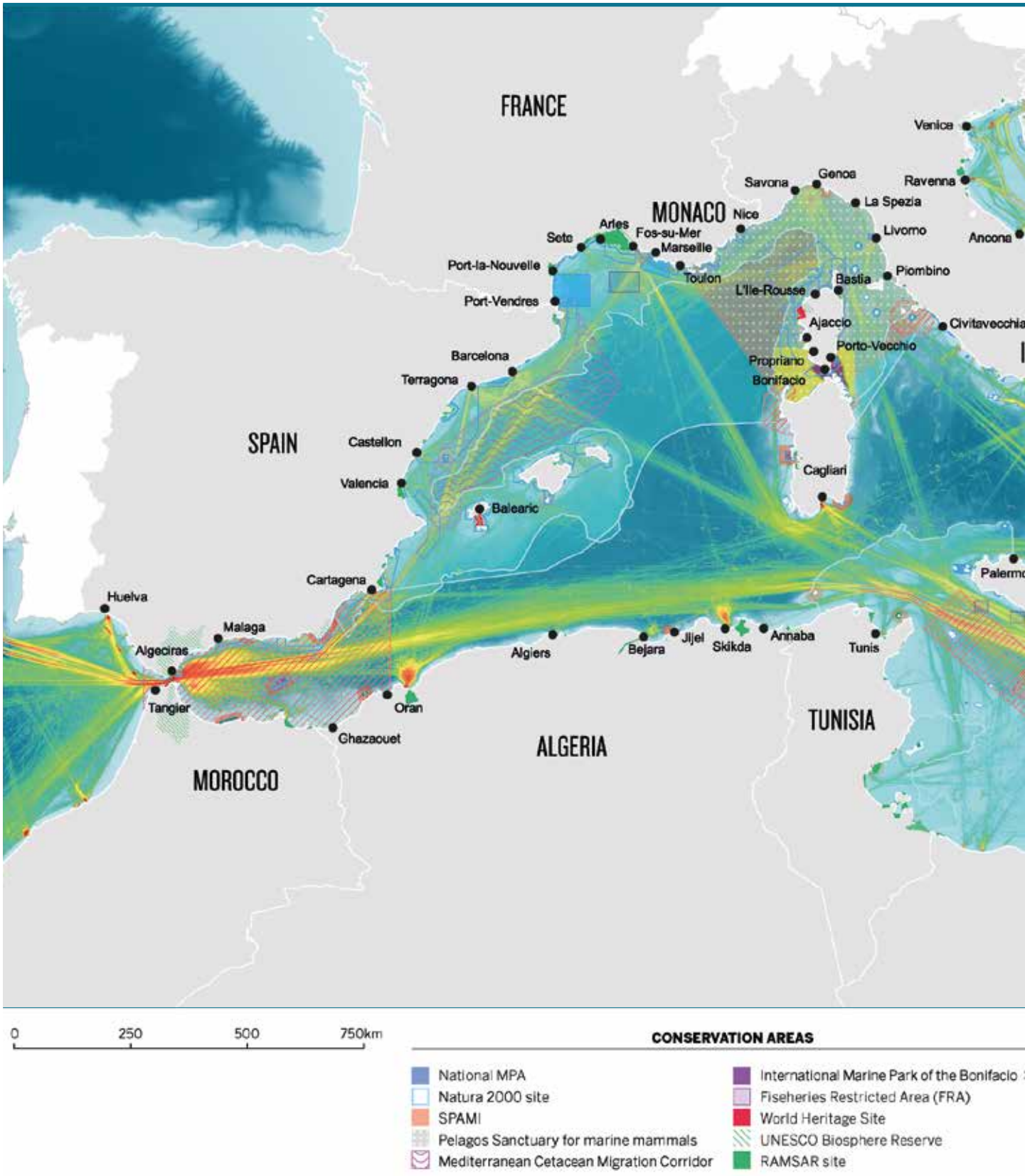
SEABED DISTURBANCE

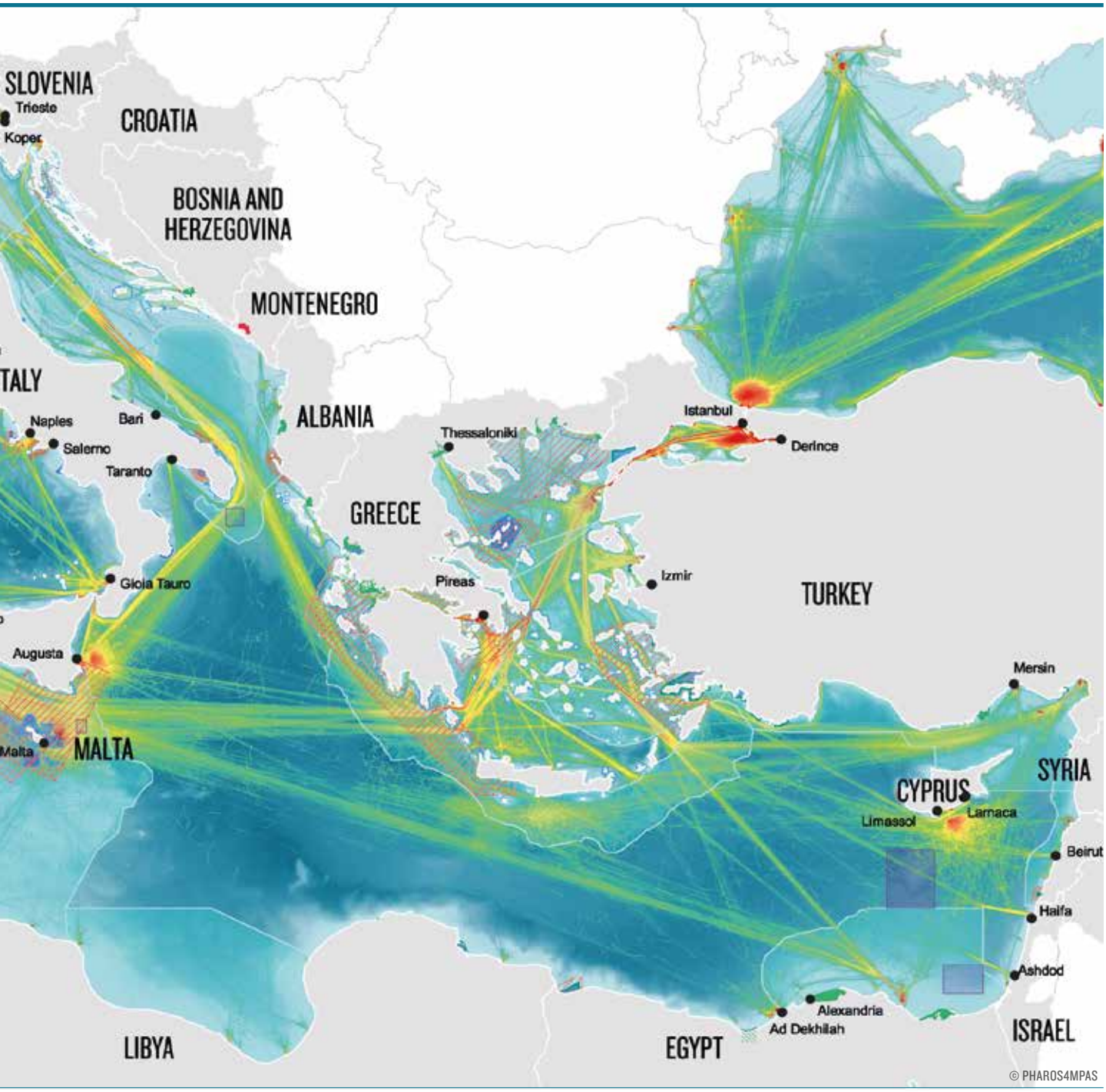
The anchoring and mooring of large vessels leads to abrasion and disturbance of bottom sediments, which damages benthic habitats and species. In addition, when bottom sediments are physically disturbed, water turbidity may increase: this can harm habitat types of important conservation value, including the seagrass *Posidonia oceanica*.

INTRODUCTION OF ALIEN SPECIES

A steady rise in numbers of non-indigenous species introduced via shipping has been detected across the Mediterranean basin, with a current rate (based on the last decade) of about one new species every six weeks. According to the European Environmental Agency, shipping accounts for 51% of the introductions of non-indigenous marine species. Some of those species are invasive and could pose a serious threat to Mediterranean ecosystems.

ANNUAL DENSITY OF CARGO VESSELS, MPAs AND OTHER CONSERVATION AREAS





Strait

AREAS OF CONSERVATION INTEREST

- PSSA
- EBSA
- CCH

Density of Cargo Vessels - 2017
(Total Hours per Square km per Year)

0 0.5 2 5 10 20 ≥100 h

● Port

Conservation areas and Areas of conservation interest
SOURCES: MAPAMED (2017), EMODnet (2018)
Natura 2000 sites
SOURCES: EEA (2018)
Ports
SOURCES: Eurostat (2015)
Traffic density
SOURCES: EMODnet (2019)

PUBLIC AUTHORITIES CAN PLAY A MAJOR ROLE IN MINIMIZING THE MARITIME TRANSPORT SECTOR'S IMPACTS ON MPAs

NATIONAL PLANNING AUTHORITIES

National authorities planning and managing the use of sea space, including marine spatial planners, are key actors in identifying and implementing measures to avoid maritime sector impacts on ecosystems, particularly in relation to traffic accidents. National maritime authorities and conservation authorities can significantly contribute by defining ecosystem protection measures.

- Through **Maritime Spatial Planning (MSP),** authorities should make use of tools such as Particularly Sensitive Sea Areas (PSSAs), Areas To Be Avoided (ATBAs) and Traffic Separation Schemes (TSSs) to **protect MPAs from the risks of maritime traffic accidents and reduce the chances of collisions with cetaceans**.National authorities should coordinate monitoring programmes on marine mammal range and routes, to support MSP processes. In the case of transboundary MPAs, states should participate actively in the IMO and coordinate joint proposals at IMO level for routeing systems and PSSAs.
- MSP processes can prevent anchoring impacts by introducing **voluntary no-anchoring zones,** adopting zoning plans indicating sensitive areas as well as suitable anchoring areas, and by including MPA boundaries and anchor-sensitive areas on nautical charts.
- Authorities should also introduce **area-based regulations,** such as banning the transit of dangerous goods in important marine areas to prevent severe accidents, or mandating the use of technical solutions to prevent collisions with cetaceans (e.g. real-time positioning systems). In addition, authorities should ensure the implementation of the Ballast Water Management Convention, particularly through inspections and monitoring activities.
- Joint **cross-border actions** need to be implemented for navigation monitoring and safety to ensure environmental impacts are avoided or minimized. These may include coordinated governance systems (a joint action plan) and innovative surveillance methods (e.g. new high-frequency radar antennae, data sharing, interoperability). Participation in coordinated response and contingency plans for oil spills and other pollution events at cross-border, sub-regional and regional levels is essential.
- Neighbouring states need to collaborate to **establish MPAs on the high seas** (e.g. under the Specially Protected Areas and Biological Diversity Protocol to the Barcelona Convention). These are necessary to protect sensitive marine areas that are not currently under the jurisdiction of national states, either due to the lack of an official EEZ or to uncertain navigational rights.

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LOCAL AUTHORITIES

Local authorities (regions, provinces, municipalities etc, depending on national governance frameworks), local coastguards and port authorities can play a significant role in reducing the impact of maritime traffic. By running initiatives that complement actions put in place at state level, they can ensure that measures in force are implemented.

- Local authorities should **collaborate with local maritime companies, identify and implement piloting solutions** to avoid accidents in particularly sensitive areas. They should promote innovative procedures and technologies, such as collision avoidance devices.
- Port authorities should **enforce international and national standards** and requirements, for example through ship inspections. Coordination mechanisms involving port authorities and port states such as the Mediterranean MoU are particularly useful in order to avoid 'ports of convenience' in the region[1].
- Coastguards should **use innovative procedures, tools and technologies, such as risk assessment and spills modelling,** to reduce the risks and mitigate the impacts of oil spills. In addition, they should support and promote the establishment of volunteer rescue and cleaning patrols and rescue centres. Coastguards should also patrol MPAs regularly and ensure the compliance of ships through enforcement actions such as board-and-search and even arrest.
- Local authorities need to collaborate with MPA management bodies to **develop joint solutions** – including monitoring, modelling and vulnerability assessments – to monitor the impact of maritime traffic and mitigate the impact of pollution from port operations.

[1] Ports of convenience are those ports deliberately chosen by ship owners to circumvent shipping regulations, because these ports or states are unwilling to take adequate enforcement actions to support conservation and management measures.

REGIONAL GOVERNANCE

Regional ocean governance mechanisms such as the Barcelona Convention can contribute to safeguarding MPAs from the impacts of navigation. They do this through a variety of tools including regional protocols and action plans; while also providing guidance to the contracting parties on the impacts of maritime transport and potential mitigation strategies.

- From the regulatory perspective, **stronger enforcement and compliance mechanisms** should be established for relevant legal frameworks. These include the Protocol Concerning Co-operation in Preventing Pollution from Ships and, in Cases of Emergency, Combating Pollution of the Mediterranean Sea and the Protocol on the Prevention of Pollution in the Mediterranean Sea by Transboundary Movements of Hazardous Wastes and their Disposal.
- Regional governance mechanisms should also be used to further support the designation of the Mediterranean as an **Emission Control Area,** particularly for nitrogen and sulphur oxides, to the benefit of all marine ecosystems in the region. They can facilitate increased engagement by regional states, and underpin the development of proposals to the IMO as part of MARPOL Annex VI.
- **The implementation of ecosystem-based marine and coastal planning tools, such as MSP and ICZM,** should be prioritized across the whole region. All Mediterranean countries should ratify and implement the ICZM Protocol, as this will support ecosystem-based planning processes which consider all possible interactions within an ecosystem, including the potential environmental risks related to maritime traffic activities. The ICZM Protocol should integrate a regional framework for ecosystem-based MSP.
- Regional governance mechanisms in collaboration with national authorities should promote the further development of **transboundary oil spill contingency plans, early warning systems and decision support systems.** These tools are much needed in the region, particularly in maritime transportation hotspots such as the Aegean Sea, the Adriatic and the Sicily Channel/Tunisian Plateau. Regional governance mechanisms can foster collaboration among countries to develop such tools.
- Coordinated regional **initiatives aiming to increase surveillance at sea,** using aerial surveys and radar satellite imagery, also represent important means of avoiding and controlling spills in the Mediterranean region.

SPILLED OIL SPREADS TO THE ATHENS RIVIERA FOLLOWING THE SINKING OF A TANKER IN THE SARONIC GULF (GREECE, 14 SEPTEMBER 2017)

© THEASTOCK / SHUTTERSTOCK

CHAPTER 8

SAFEGUARDING MARINE PROTECTED AREAS IN THE GROWING MEDITERRANEAN BLUE ECONOMY: CRUISE SECTOR

WOODEN TRADITIONAL MALTESE WATER TAXI (DGHAJSA BOAT) OFFERING TRIPS FROM VALLETTA FERRY PORT AROUND GRAND HARBOUR (MALTA)

© REINE NASSAR

Interreg Mediterranean PHAROS4MPAs

CRUISE SECTOR AND MEDITERRANEAN MPAs: INCREASING INTERACTIONS

The global ocean cruise industry has expanded rapidly in recent decades, with an annual passenger compound growth rate of 6.63% from 1990-2020. Several factors have contributed to this growth, including increasingly large vessel capacity, greater port availability, new technologies, and on-board and on-shore tourist activities geared to satisfying growing consumer demands.

Cruise activities in the Mediterranean and its adjoining seas are developing fast: in 2007 there were 8.7 million cruise passengers in the Mediterranean, in 2018 there were more than 25 million. Cruise tourism is also rapidly changing as ships have evolved from carrying fewer than a thousand people in the 20th century to today's mega-cruisers that can hold more than 6,000 guests and 2,000 crew. As a result, their environmental impact is growing in volume and intensity.

These trends are putting increasing pressure on some marine protected areas (MPAs). Cruises operate near and sometimes within many Mediterranean MPAs, posing a serious risk to the conservation of key biodiversity hotspots. Examples are numerous: Portofino MPA (Italy) and Kaş -Kekova Special Protected Area (Turkey) are particularly popular attractions for cruises, while other MPAs such as Calanques National Park (France) or Scandola (France) are located in close proximity to large cruise ports and routes. In the case of Venice, the cruise port is actually located inside a marine Natura 2000 site.

The cruise sector's pressure on MPAs and other sites of ecological importance is expected to continue to grow, and public authorities across the region have an important role to play in monitoring and managing the overall situation. Clearly, efforts must be made to limit the environmental impacts of cruising as far as possible, particularly in ecologically vulnerable areas – but strategies need to be realistic and practical, acknowledging that the industry is not likely to stop visiting popular destinations. If carefully managed, collaborative multi-stakeholder maritime spatial planning (MSP) processes can go some way towards achieving effective compromises between economic and environmental considerations.

With these processes in mind, this policy brief highlights the key impacts of the cruise sector on Mediterranean MPAs, and proposes priority policy responses.

AERIAL VIEW OF THE PORT OF LA VALETTA, MALTA

© VALLETTA CRUISE PORT

CRUISE SECTOR:

KEY IMPACTS ON THE MARINE ENVIRONMENT

Although modern ships have significantly reduced their environmental impacts relative to their size, cruises remain a major source of air, noise and marine pollution.

However, while the capacity of the biggest new boats – which can accommodate up to 8,000 passengers, equivalent to the size of a small Mediterranean town – is a key factor behind the environmental impacts of the industry, smaller boats can also harm the marine environment.

IMPACT		CONSEQUENCES
EMISSIONS AND DISCHARGES	Solid waste	Waste management practices on cruise ships often fail to meet adequate levels for communal and hazardous waste disposal.
	Wastewaters	Wastewater emissions reduce ocean oxygen levels and increase the potential for algal blooming. Bacteria and viruses can also be released into the sea and transferred to other organisms.
	Ballast water	Ballast water can contain wastewaters, oil and other hydrocarbons, bacteria and invasive species. This has numerous consequences for marine resources, human health, and the ecosystem and the economic activities depending on it.
	Antifouling coatings	Antifouling coatings contain high concentrations of biocides which can seriously harm marine organisms.
	Hydrocarbons	Polluting hydrocarbons enter the marine environment through 'routine' activities such as the discharge of bilge water, ballast water, and fuel intake.
	Acid rain	Caused by emissions of sulphur dioxides (SOx) and nitrogen oxide (NOx), acid rain can fall large distances from the actual site of the emissions.
	Air pollution	Gaseous emissions cause localized smog and ground-level ozone, increasing ocean acidification and contributing to global climate change. Cruise ships also add to air pollution in ports.
PHYSICAL DISTURBANCE	Collisions	Collisions with marine mammals and sea turtles are a major concern. Ship velocity and mass have significantly increased in recent years, as well as the total number of ships – and so have the chances of collision.
	Noise pollution	Ship engine noise can alter ecosystems by displacing fish and/or predators.
	Light pollution	Light pollution from brightly-lit ships poses problems for species that need darkness for orientation in daily and seasonal migrations, feeding and breeding.

BOTTLENOSE DOLPHIN (*TURSIOPS TRUNCATUS*) AND THE COSTA MEDITERRANEAN IN THE NORTHERN ADRIATIC SEA

© BLUE WORLD INSTITUTE

PUBLIC AUTHORITIES: KEY ROLES

Public authorities can play a major role in minimizing the cruise sector's impacts on MPAs:

- **National environmental authorities** can highlight issues relating to areas which are particularly exposed to cruise impacts/threats. Maritime spatial planning (MSP) processes are an opportunity for cross-sector dialogue: public authorities can drive solutions by encouraging engagement between cruise sector representatives, port authorities, environmental protection specialists and MPA managers.
- **Local authorities** can also play an important role in spreading awareness of the impacts from or risks posed by cruise traffic in the MPAs under their territorial jurisdiction. Where necessary, they can bring the need for better MPA protection to higher decision levels.

RECOMMENDATIONS TO PUBLIC AUTHORITIES

- National authorities should establish strict limitation and buffer zones regarding the minimum distance cruise ships are allowed to navigate, moor or stop from the borders of MPAs. This would minimize existing impacts and counterbalance the growing interest from the industry in visiting these areas.
- National environmental authorities should promote continuous monitoring of cruise activities, with close cooperation between MPA managers and relevant public authorities (e.g. registration of operational data, emissions and discharges, fuel type).
- The granting of authorization for navigation in highly sensitive natural areas must be a well-informed process, with the close involvement of MPA managers to help limit the risks (e.g. grounding, collisions).
- Maritime authorities should implement speed restrictions to mitigate collision risk. In addition, lower speeds reduce potential acoustic impacts and emissions of air pollutants.
- National authorities should make use of MSP tools such as IMO Particularly Sensitive Sea Areas (PSSAs) which can prevent accidents and consequent environmental impacts.

INTERNATIONAL AND REGIONAL COOPERATION

Cross-border, sub-regional and regional cooperation between public authorities is particularly important given the geographical scale across which the cruise sector operates – coordinated solutions are essential if they are to have wide and lasting impacts across the Mediterranean. Collective transnational action is also needed to balance the considerable lobbying force of the industry.

On a regional scale, each country should comply with MARPOL (International Convention for the Prevention of Pollution from Ships) rules, and enforce the application of relevant international standards.

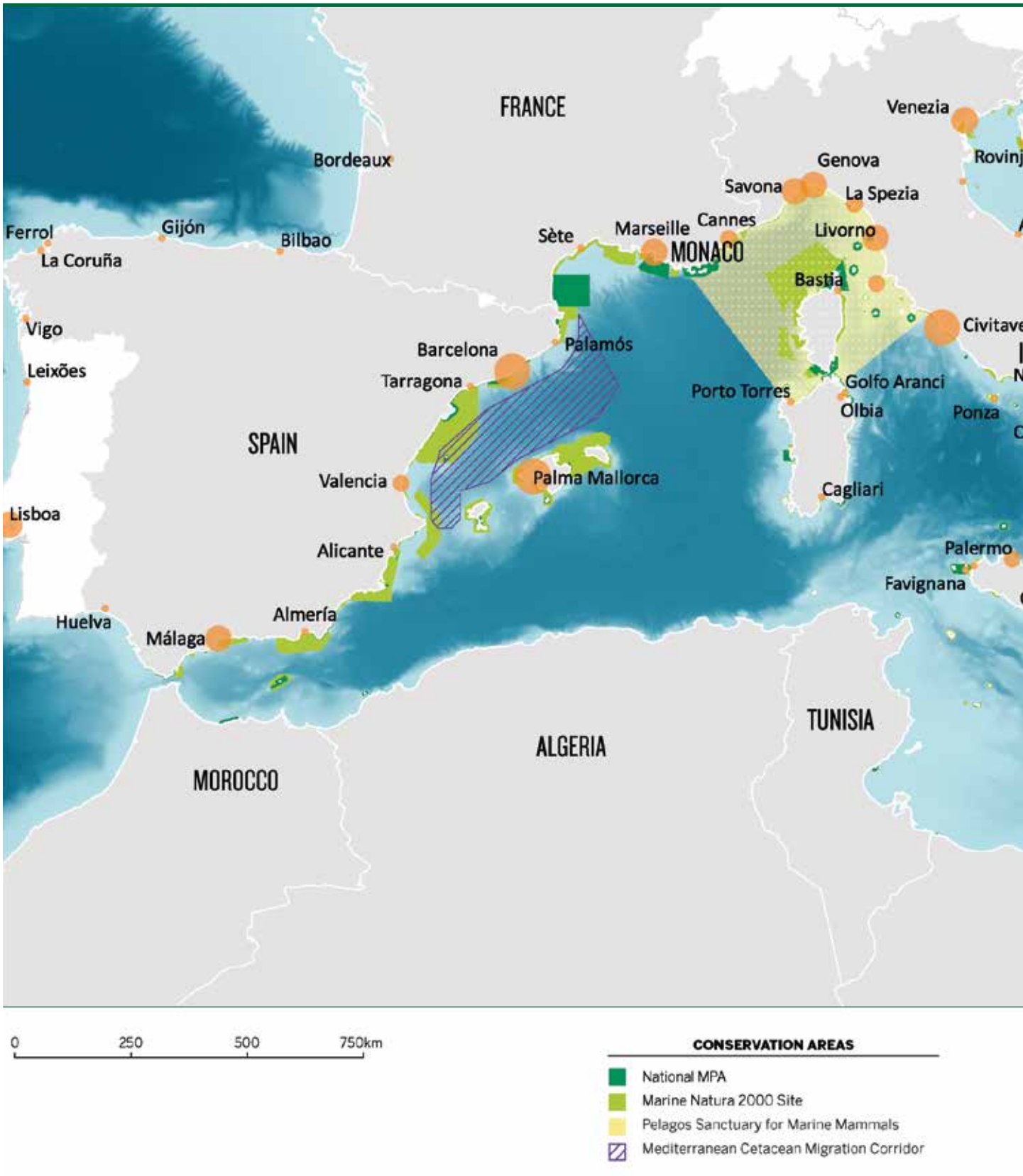
RECOMMENDATIONS TO COUNTRIES IN A REGIONAL COOPERATION FRAMEWORK

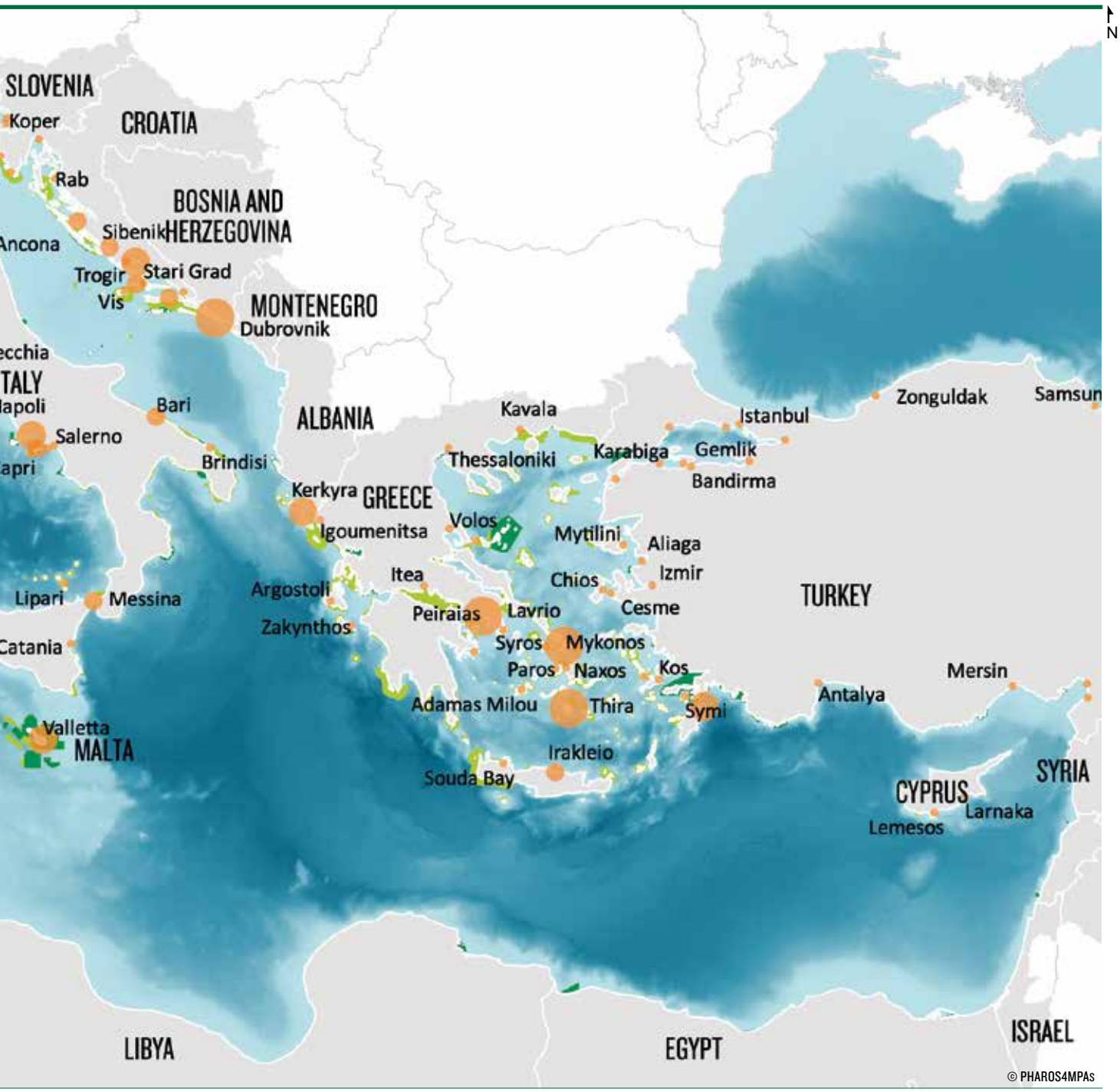
- Regional regulations promoting stricter controls on airborne emissions from the cruise industry (e.g. SECAs) are needed to limit impacts on ecosystems, both in MPAs and at the level of eco-regions and regional seas.
- The Barcelona Convention should be used as guidance to Contracting Parties on how to prevent or minimize the impacts of cruise ships on MPAs and beyond, fostering regional cooperation. This could be achieved initially through the implementation process of strategic documents that support the Barcelona Convention: e.g. the Conceptual Framework for Marine Spatial Planning, the ICZM Protocol and relevant action plans.
- In addition, a specific regional action plan to better regulate the cruise sector's operations in relation to marine conservation should be urgently created, adopted and implemented under the Barcelona Convention.

CRUISE SHIP IN THE VENETIAN LAGOON ON OCTOBER 22, 2011 IN VENICE (ITALY)

© SHUTTERSTOCK

ANNUAL CRUISE VESSELS FREQUENTATION IN NORTH MEDITERRANEAN CRUISE PORTS (2016)





N° OF CRUISE VESSELS IN NORTH MEDITERRANEAN CRUISE PORTS IN 2016

- 10 - 100
- 100 - 200
- 200 - 500
- 500 - 914

Conservation areas
SOURCES: MAPAMED (2017), EMODnet (2018)

Cruise ports
SOURCE: EMODnet (2016) adapted by ISMAR (2018) and NSO Malta

DOCKING CRUISE SHIPS: TUI DISCOVERY (FRONT), THOMSON CRUISES & NORWEGIAN EPIC (BEHIND) IN BARCELONA CRUISE PORT, SPAIN

© HALAND / SHUTTERSTOC

CHAPTER 9

SAFEGUARDING MARINE PROTECTED AREAS IN THE GROWING MEDITERRANEAN BLUE ECONOMY: LEISURE BOATING

MOORED BOATS ABOVE A POSIDONIA MEADOW IN CAP DE CREUS MARINE PARK, SPAIN

© DAMSEA / SHUTTERSTOCK

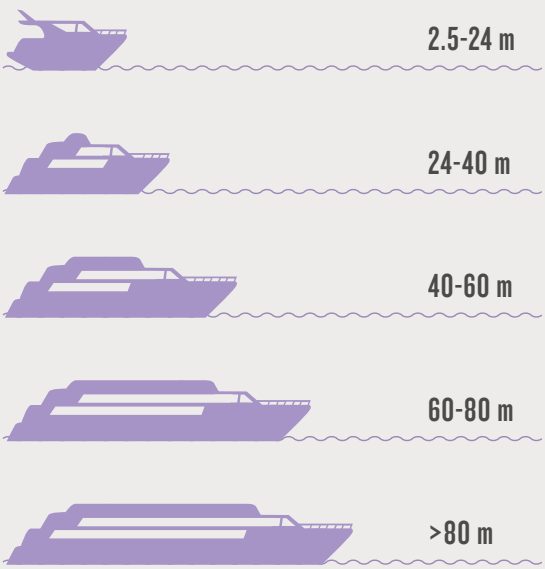
LEISURE BOATING AND MEDITERRANEAN MARINE PROTECTED AREAS:

INCREASING INTERACTIONS

Leisure boating in the Mediterranean region is a key component of coastal tourism, and it has significantly developed over the last decades.

In the Mediterranean, around 95% of leisure boats measure less than 24 metres. However, the region is also a leading global destination for large to very large yachts. Studies show that 50% of the global fleet of large yachts spends 8 of every 12 months in Mediterranean waters, with the Côte d'Azur being the most popular destination. 70% of worldwide charter contracts are for the Mediterranean, and 56% of these are for the western part of the region.

LEISURE BOATS DIFFERENT SIZE CLASSES



The EU definition (Art.3, European Directive 2013/53/EU) identifies leisure boats as recreational craft up to 24 metres. In general, vessels above 24 metres are called large yachts.

LARGE YACHTS IN MYKONOS HARBOR WITHOUT FACILITIES FOR WASTEWATER RELEASE, GREECE

© NEIL COOPER / FLICKR

Leisure boating is economically important in many countries on the northern shore of the Mediterranean. Nautical tourism in Europe generates annual revenues from €20 to €28 billion and employs between 200,000 and 234,000 people. European countries account for 20% of the sector's total global turnover.

Marinas and recreational ports are widespread along the Mediterranean coast. There were around 940 marinas in the Mediterranean Sea in 2010, of which 253 were located in Italy, 191 in Spain and 124 in France.

There is little data available on future trends for marinas. In 2015, many new marina projects were underway: 17 in Greece, 10 in Spain, 1 in Malta and several (exact number unknown) in Italy and the Adriatic. However, in some countries such as France which already have a high density of marinas (on average one every 14 km), the potential for their spatial expansion is now very limited due to current environmental protection legislation.

Coastal Marine Protected Areas (MPA) and marine Natura 2000 sites are very attractive for leisure boating, and in recent years they've been attracting increasing numbers of visitors.

The increase in leisure boating is creating significant environmental and socio-economic challenges, since leisure boats and their associated infrastructure (ports, marinas, etc.) can threaten marine fauna and habitats, as well as cause conflicts with other sectors from recreational users to professional fishers. Increasing attention is being paid to the environmental impacts of recreational boating, raising the question of whether and to what extent it should be allowed in such vulnerable locations, and how best to manage it.

This PHAROS4MPAs policy brief illustrates the main trends shaping the recreational boating sector, identifies its projected impacts on Mediterranean MPAs and Natura 2000 sites, and proposes priority policy responses.

LEISURE BOATING:

KEY IMPACTS ON THE MARINE ENVIRONMENT

As with all human activities, leisure boating inevitably generates environmental and social impacts: the extent to which it is compatible with a healthy marine environment is one of the main questions concerning its sustainability.

Impacts vary greatly according to the type and size of boat.

Main pressures include:

- Anchorages on sensitive habitats such as *Posidonia* meadows. Large yachts with large anchors cause the most damage to the sea bed. Inexperienced boaters, such as those who usually rent small boats without a navigation licence, also cause more damage than their experienced peers
- Air pollution from hydrocarbon releases by motor engines, particularly from old 2-stroke engines and high-speed boats
- Fuel and oil leaks, including those from bilge waters
- Sediment suspension from motorboats passing over sandy or muddy bottoms, contributing to the turbidity of the water
- Motor noise disturbance, particularly from high-speed boats
- Impact from human waste:[1] black (sewage) and grey (washing) waters which contain a wide range of toxic chemicals and fats
- Toxic antifouling paints that are used to prevent marine organisms developing on the surface of the hull, as well as harmful cleaning products
- Invasive species dissemination through involuntary transport
- Artificial light emissions

Other impacts include boat strikes on marine mammals and turtles, and harmful actions like fish feeding, collecting sea animals and dropping marine litter.

[1] Each passenger of larger crafts can use up to 40 litres of sewage and 300 to 340 litres of 'grey water' from sinks, showers, laundry facilities.

BOAT ANCHOR DAMAGING *POSIDONIA MEADOW*

© F.BEAU / OBSERVATOIRE MARIN

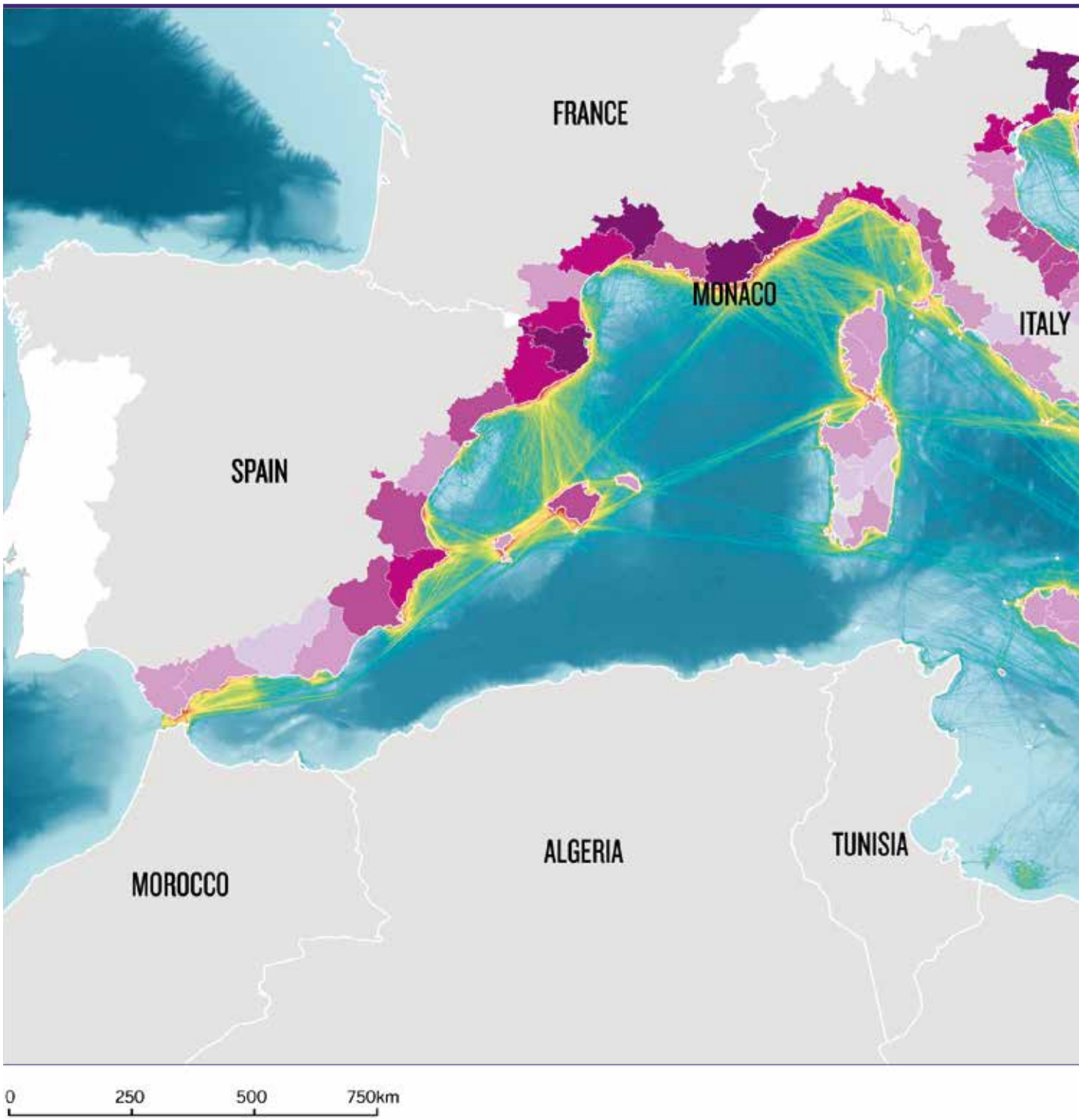
ANCHORING: THE MAIN IMPACT

The largest impact that leisure boating has on MPAs comes from anchoring. Damage to *Posidonia* meadows, coralligenous assemblages and maërl bottoms tends to be proportional to the size of the ship: the larger boats do more damage because they have bigger anchors and heavier chains. Among other local stressors, leisure boating has had a major influence on the estimated 34% reduction in Mediterranean *Posidonia* meadows over the last 50 years.

THE PROBLEM OF OLD TWO-STROKE ENGINES

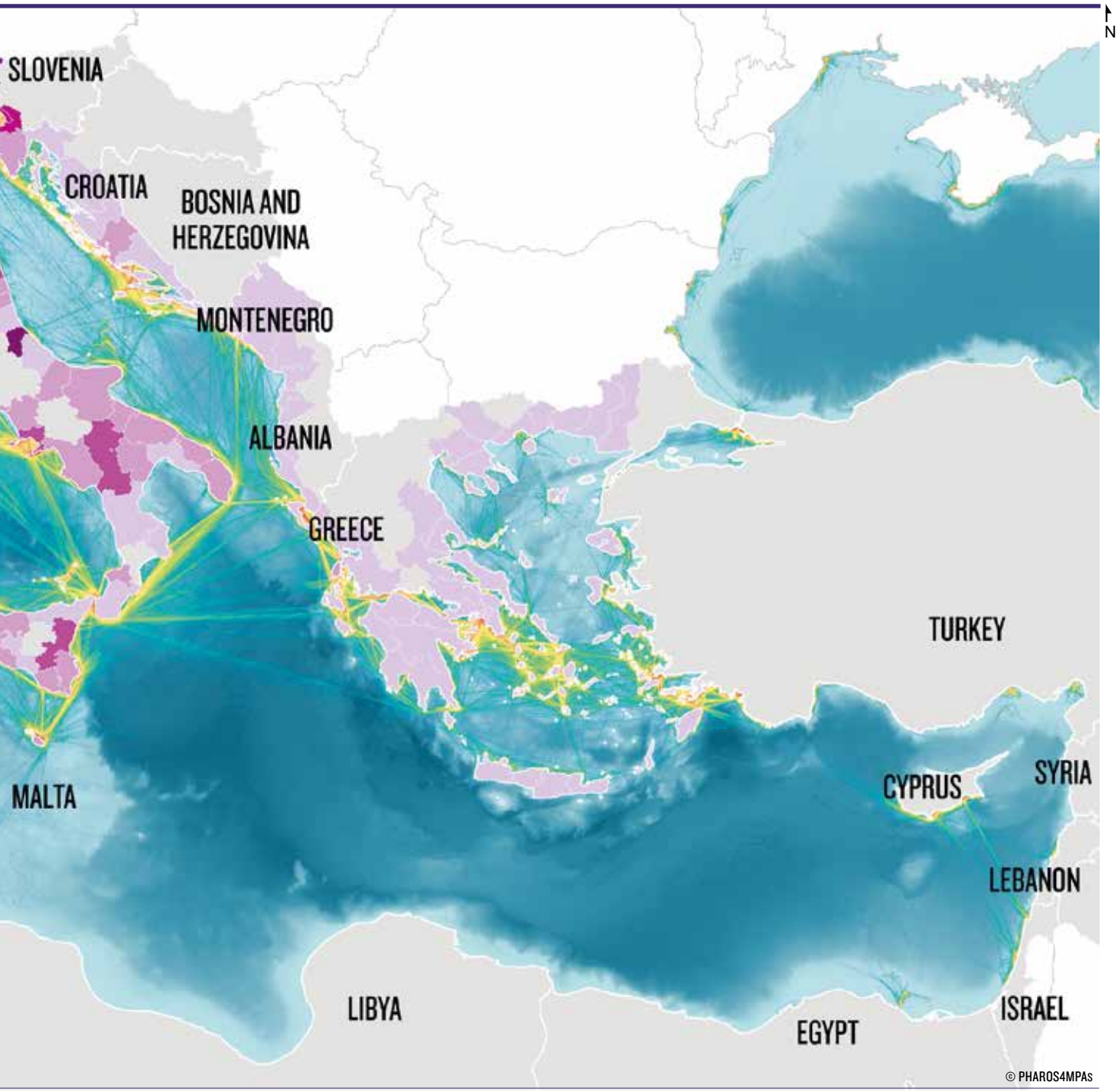
The old highly polluting two-stroke engines still used by many leisure craft are one of the major sources of air and water pollution in coastal areas. It is estimated that 20-30% of the fuel and the added oil that these engines use is emitted unburned directly into the water. At low speeds, up to 40% of the fuel entering a cylinder might escape unburned while at the most efficient operating range 8% of the fuel is expelled as exhaust.

MARINA PORT CAPACITY IN NUMBER OF MOORINGS PER KM OF COASTLINE IN EU COUNTRIES (EXCEPT CYPRUS) AND ROUTES OF SAILING AND PLEASURE CRAFTS U



NUMBER OF MOORING PER KM OF COASTLINE
SOURCE: European Environment Agency (2017)
DENSITY OF VESSELS TRACKS
SOURCE: EMODNET (2019)

USING AUTOMATIC IDENTIFICATION SYSTEM (AIS) SIGNALS (CRAFTS > 24M)



MARINA PORT CAPACITY IN MOORINGS PER KM OF COASTLINE

- <10
- 10 35
- 35 - 60
- 60 - 100
- > 100

DENSITY OF VESSEL TRACKS BY AIS SIGNALS (IN TOTAL HOUR OF LEISURE BOAT PRESENCE PER SQUARE KM PER YEAR)

0 0.5 2 5 10 20 ≥100h

PUBLIC AUTHORITIES CAN PLAY A MAJOR ROLE IN MINIMIZING THE LEISURE BOATING SECTOR'S IMPACTS ON MPAs

Along with the leisure boating sector itself, local and national public authorities are the actors who can do most to minimize the impacts of further sector development on the marine environment.

KEY RECOMMENDATIONS FOR PUBLIC AUTHORITIES FOR RECREATIONAL BOATING IN MPAs

1. Put in place environmental monitoring programmes for recreational boating to track its ecological and socio-economic impacts along the national coastline

Main parameters to be analysed include:

- Numbers and types of recreational boats berthing in marinas and use patterns
- Visiting patterns in nearby MPAs
- Anchoring patterns and impacts on fragile habitats such as *Posidonia* meadows
- Presence of water and air pollutants in marinas and at sea
- Invasive species coming from biofouling, anchors, etc.
- Any other significant factors, such as the presence of marine fauna, especially cetaceans, and reported collisions.

2. Define a recreational boating spatial strategy at national coastline level

National recreational boating strategies must aim to ensure sustainable use of the sea and avoid potential negative impacts. MSP authorities have a crucial role to play.

Depending on the findings from monitoring activities, proactive management measures can be put in place.

Addressing conflicts between leisure boating and other users

The spatial development of recreational boating should take into account traditional uses such as small-scale fisheries, as well as other sectors which need space, and integrate these in maritime spatial plans.

Defining a strategic vision for marinas

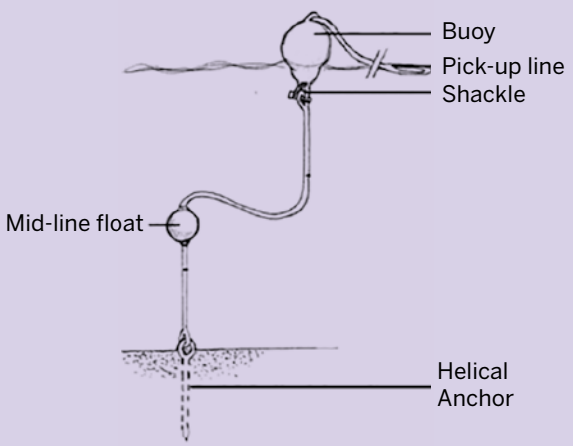
The number of marinas as well as the number of recreational boats should be limited to stay within the carrying capacity of the available coastline, particularly in popular marine areas. Boat-sharing schemes should be explored as ways to reduce the footprint of individual boat ownership.

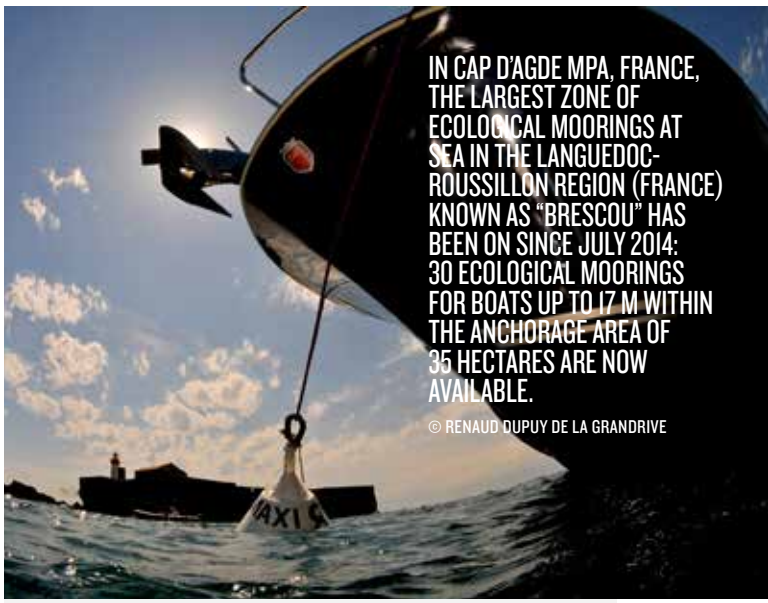
All marinas should operate with high environmental standards, including developing facilities to collect grey and black waters as well as solid waste from visiting boats, along with dedicated careening areas where waste waters can be collected.

Planning moorings areas

- Define no-mooring zones in sensitive habitats, such as *Posidonia* meadows and coralligenous bottoms.
- Design authorized mooring areas, but not as an answer to a potential lack of berths in marinas - they should not become 'permanent' mooring sites. These can include:
  - Regulated mooring on anchors: authorized mooring location on soft (sandy) bottom only, boat number limitation, mooring duration limitation, strict requirements for boats' equipment.
  - Light equipment (or so-called 'ecological moorings') on mooring areas: these areas enable boats to moor safely without the need to build a harbour which would destroy the coastline. Only ecological mooring systems that avoid impacts on fragile bottoms should be used (see Figure).

EXAMPLE OF ECOLOGICAL MOORINGS





IN CAP D'AGDE MPA, FRANCE, THE LARGEST ZONE OF ECOLOGICAL MOORINGS AT SEA IN THE LANGUEDOC-ROUSSILLON REGION (FRANCE) KNOWN AS "BRESCOU" HAS BEEN ON SINCE JULY 2014: 30 ECOLOGICAL MOORINGS FOR BOATS UP TO 17 M WITHIN THE ANCHORAGE AREA OF 35 HECTARES ARE NOW AVAILABLE.

© RENAUD DUPUY DE LA GRANDRIVE

Fees can be charged for the use of the buoys, and these can be used to help fund management of the MPA (as is the case in Portofino, the Egadi Islands and Cabrera).

Preventively, large yachts should be forbidden from mooring in waters shallow enough for *Posidonia* meadows (generally to a depth of 30m, but deeper in some pristine areas). This 30m limit could be relaxed for areas with less sensitive habitats, such as sandy bottoms.

Large yachts should be completely forbidden inside most vulnerable MPAs, and should be kept away from their boundaries in particularly vulnerable or busy areas (this is already the case around France's Scandola MPA, for example).

Dealing with pollution and other impacts

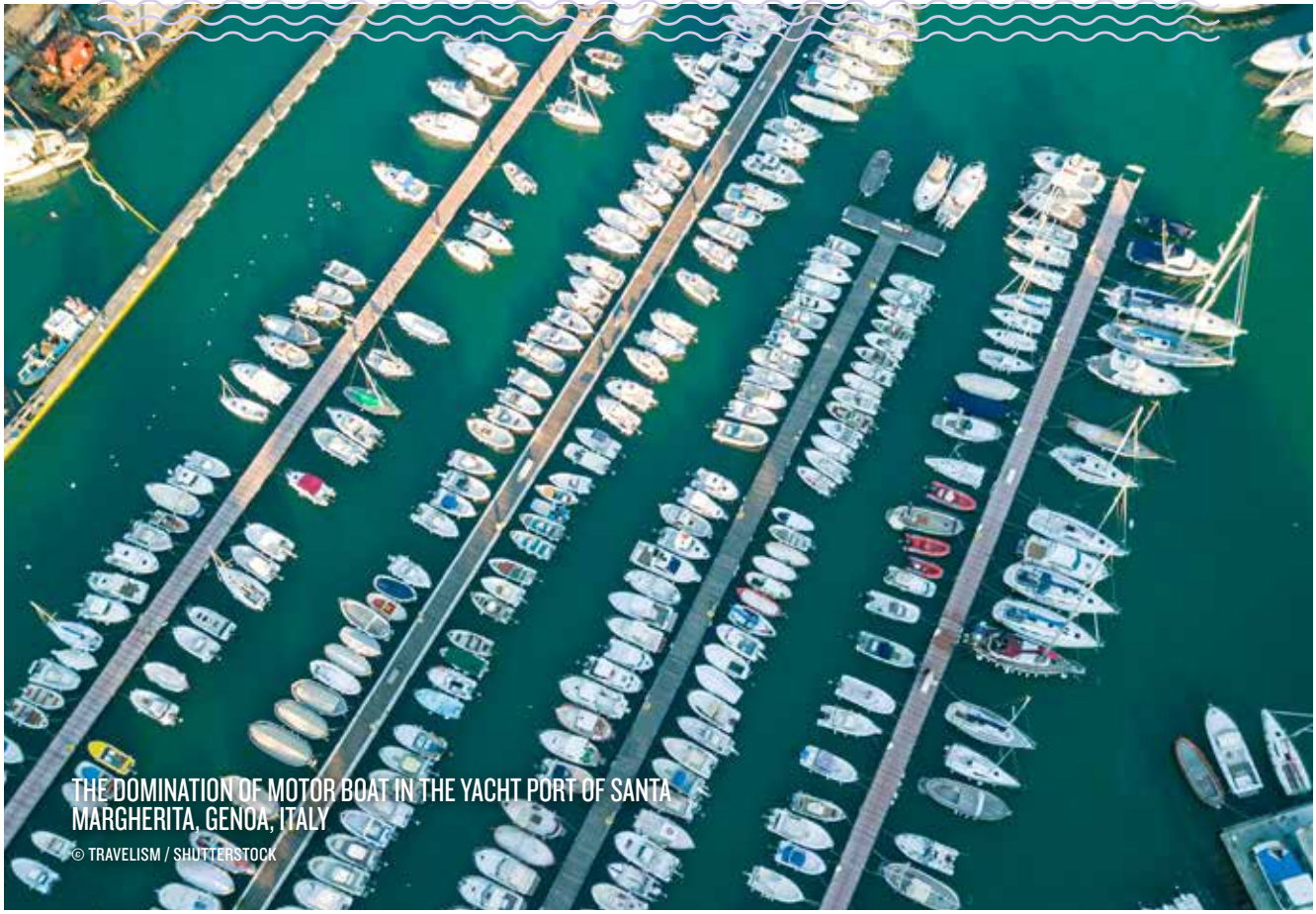
National regulations should encourage and ultimately make compulsory the eco-friendly design, construction and maintenance of recreational boats. This includes issues such as:

- Low consumption and clean propulsion and energy systems
- Safe handling of waste waters (grey and black) and solid waste
- Engine noise limitation
- Use of ecological anti-fouling paints and in-board cleaning products
- Recycling vessels when they reach the end of their lives

In MPAs, a step-by-step approach is the best way to develop regulatory frameworks to promote eco-friendly boating. This may include for instance:

- Only accepting the entry of recreational boats that are fully equipped to avoid all discharge of waste at sea
- Requiring MPA entry permits and issuing a maximum number of permits per day according to the estimated carrying capacity of the site
- Banning navigation and mooring by boats over 24m in length (large yachts)
- Setting up speed restrictions inside the MPA and creating alternative routes to prevent strikes with cetaceans
- Consider a ban on old two-stroke engines. Encourage the use of eco-friendly alternatives
- Consider banning high-speed boats in MPAs
- Consider prohibiting overnight stays if too many boats are present in the area or no mooring areas are available
- Encourage the use of non-toxic (ecological) antifouling paints and eco-friendly in-board cleaning products
- Promote responsible leisure boating courses, particularly for motor boats, to encourage users to follow good environmental practice
- Plan awareness-raising strategies to spread best practice knowledge among all stakeholders (rental boat owners, port facilities, etc)

Surveillance is needed in order to prevent illegal activities (anchoring on *Posidonia* meadows, etc.).



THE DOMINATION OF MOTOR BOAT IN THE YACHT PORT OF SANTA MARGHERITA, GENOA, ITALY

© TRAVELISM / SHUTTERSTOCK

CHAPTER 10

SAFEGUARDING MARINE PROTECTED AREAS IN THE GROWING MEDITERRANEAN BLUE ECONOMY: OFFSHORE WIND ENERGY SECTOR

IMMATURE GREAT BLACK-BACKED GULL *(LARUS MARINUS)* IN THE THORNTON BANK WIND FARM IN THE BELGIAN NORTH SEA

© NICOLAS NICOLAS VANERMEN

Interreg Mediterranean

PHAROS4MPAs

OFFSHORE WIND ENERGY SECTOR & MEDITERRANEAN MARINE PROTECTED AREAS:

INCREASING INTERACTIONS

In the EU, wind power represents one of the most promising tools for reducing greenhouse gas emissions, and hence diminishing the consequences of climate change.

According to forecasts for the Mediterranean, offshore wind energy is the most promising future source of renewable power. To date though, the development of the sector in the region is in its infancy: there are currently no OWFs in operation; the first is due to be completed by early 2020 in Italy, while several projects are in a pilot phase in France, and Greece is considering potential development of the sector.

However, while its contribution to climate change mitigation is critical, offshore wind development may have potential negative impacts on the surrounding environment. As in other parts of the world, the projected growth of the OWF sector in the Mediterranean is raising concerns over its potential interactions with Marine Protected Areas (MPAs) – these, by definition, are areas of great importance for marine biodiversity and ecosystems. In recent years, across the Mediterranean, MPAs and other area-based conservation measures have been increasing in number and area covered.

As key tools for protecting marine biodiversity and ecosystems, it's essential that their relation to activities such as OWFs is well defined.

With this in mind, future locations for OWFs should be decided through processes which take into account conservation objectives, and aim to avoid ecologically valuable areas, and in particular protected areas. Ecosystem-based marine spatial planning (MSP) and strategic environmental assessments (SEA) should as far as possible ensure that OWFs are not deployed in areas that contain habitats, species and/ or ecological processes that are particularly sensitive to their likely impacts, whether during construction or operation.

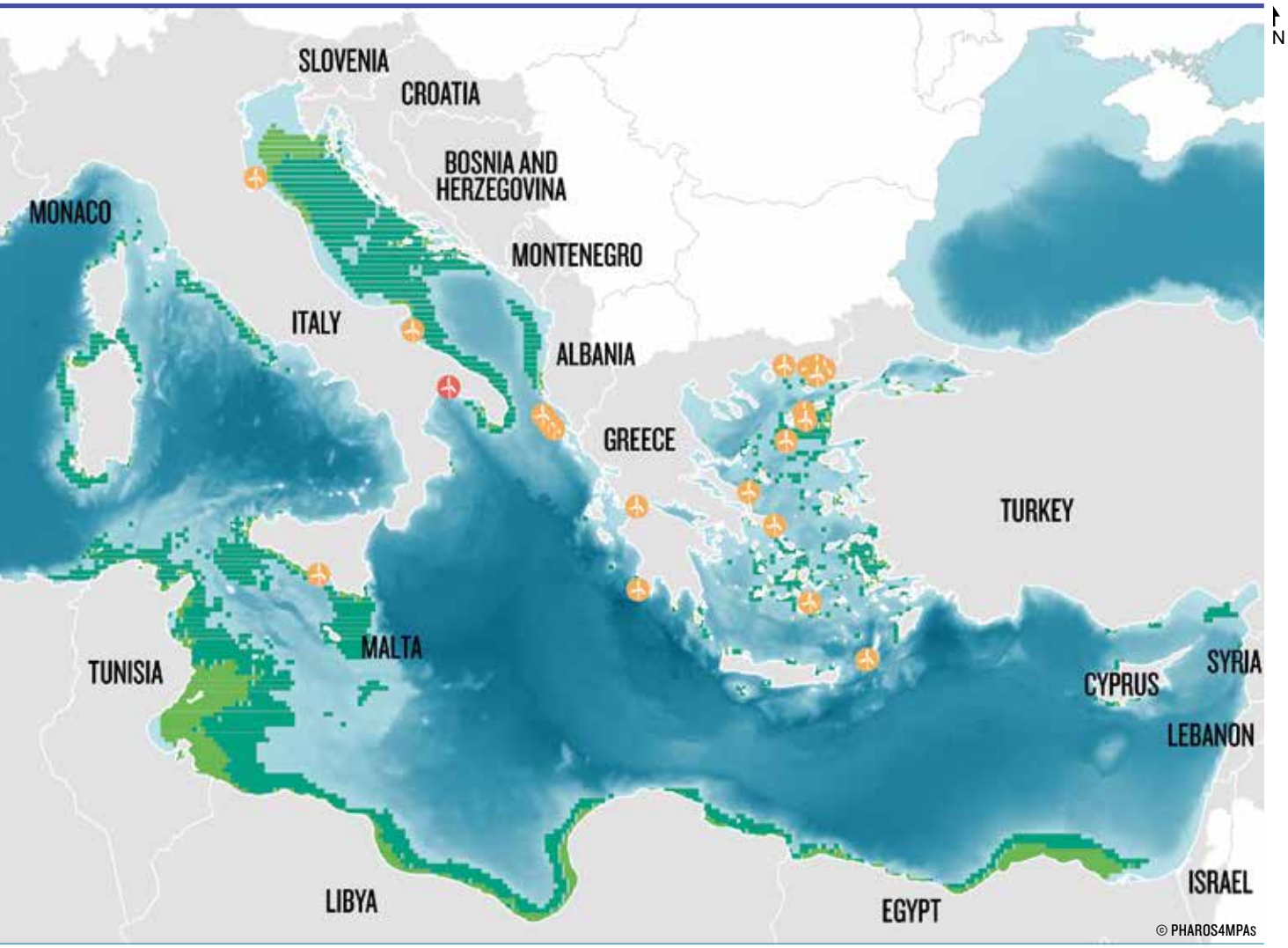
In countries where renewables have already been deployed in MPAs, or which are at the planning and assessment stage, the environmental impacts of each development should be robustly scrutinized on a case- by-case basis under relevant nature conservation legislation.

POTENTIAL AREAS SUITABLE FOR OWF DEVELOPMENT,

Active cross-sectoral participation is essential in MSP to ensure both marine wildlife conservation and the sustainable development of OWFs in the Mediterranean in the face of climate change.

This PHAROS4MPAs policy brief illustrates the main trends shaping the OWF sector, identifies its projected impacts on Mediterranean MPAs, and proposes priority policy responses as well as the best available technical approaches available to mitigate impacts.

AND PLANNED AND AUTHORIZED OWF PROJECTS IN THE MEDITERRANEAN SEA



WINDFARM PROJECTS

- Planned OWF
- Authorised OWF

POTENTIAL SUITABLE AREAS FOR OWF DEVELOPMENT

- Suitable area for fixed OWF (water depth < 50 m and wind speeds greater than 5m/sec at 80 m height above sea level)
- Suitable area for floating OWF (water depth 50 to 200 m and wind speeds greater than 5m/sec at 80 m height above sea level)

Potential locations
SOURCE: MedTrends (2015)
Windfarm project
SOURCE: EMODNET (2017), revised by WWF

OFFSHORE WIND ENERGY:

KEY IMPACTS ON THE MARINE ENVIRONMENT

As OWFs increase in number and size, there's a growing need to consider their cumulative impacts on marine habitats and wildlife.

While the effects of one wind farm on a particular wildlife population may be negligible, the aggregate effects of multiple wind farms through space and time are likely to cause wildlife population declines, while also adding to the pressures generated by other maritime sectors.

PRESSURES, INTENSITY AND OCCURRENCE OF IMPACTS ON MARINE HABITATS AND ANIMAL GROUPS

PRESSURE	IMPACT	TAXONOMIC GROUP / HABITATS
Cable laying	Habitat loss	**Habitats/ benthic communities**
Cable laying	Physical damage, disturbance	
Foundations occupation	Habitat loss/ Physical damage, disturbance	
Submerged structures	Reef effect	
Underwater operating cables	Electromagnetic fields/Temperature increase	
Piling noise	Physical damage, disturbance	**Fish**
Underwater operating cables	Electromagnetic fields	
Submerged structures	Reef effect	
Foundations occupation	Habitat loss	
Piling noise	Physical damage, disturbance	**Marine mammals**
Ship traffic / Ship presence	Collision / displacement	
Ship traffic - noise	Displacement	
Ship traffic	Displacement	**Birds**
Light	Collision	
Operating wind turbines	Collision	
Operating wind turbines	Barrier effect	
Operating wind turbines	Collision	**Bats**
Ship traffic	Collision	**Sea turtles**
Piling noise	Physical damage, disturbance	
Light	Disorientation	
Underwater operating cables	Disorientation due to EMF	
Waste and pollution	Habitat degradation, disturbance, physical damage	**All taxonomic groups and habitats**
Sacrificial anodes	Habitat degradation, disturbance, physical damage	

The level of OWF impacts is highly dependent on the habitat characteristics of an individual site, the types of turbines and foundations used, and the installation techniques involved. It should also be noted that OWFs may sometimes have beneficial effects for some organisms, for instance by acting as artificial reefs, which can enhance biodiversity and increase food sources.

Floating wind farms will likely have different impacts to fixed wind farms, but they are a recent development and research is so far scarce.

KEY FIGURES RELATED TO IMPACTS

- **Collision risk** – bird fatality rates vary widely by region, ranging from 8-14 per year per turbine in Germany, to a shocking 100-1,000 in the Baltic Sea
- **Noise** – pile driving during construction can displace dolphins by up to 50km, while operational noise is audible to some whale species at up to 18km
- **Metal pollution** – a single turbine's sacrificial anodes input 0.5-1 tonne of metals into the marine environment every year
- **Damaged seabed habitats** – a single turbine 'footprint' on the seafloor can be above 2,000m^2
- **Cable laying** and **cable landing** can have negative impacts on sensitive coastal habitats such as Posidonia beds

DURING THE FOUR OWF LIFECYCLE PHASES

IMPACT INTENSITY DURING:			
Siting phase	Construction	Operation	Decommissioning
—	MEDIUM/HIGH	LOW	LOW/UNKNOWN
—	MEDIUM/HIGH	LOW	UNKNOWN
—	MEDIUM/HIGH	LOW	—
—	—	UNKNOWN	UNKNOWN
—	—	UNKNOWN	—
—	HIGH	—	—
—	-	UNKNOWN	UNKNOWN
—	-	UNKNOWN	UNKNOWN
—	MEDIUM/HIGH	LOW	—
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UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN
LOW/MEDIUM	MEDIUM/HIGH	MEDIUM/HIGH	MEDIUM/HIGH
LOW/MEDIUM	LOW/MEDIUM/HIGH depending on species		
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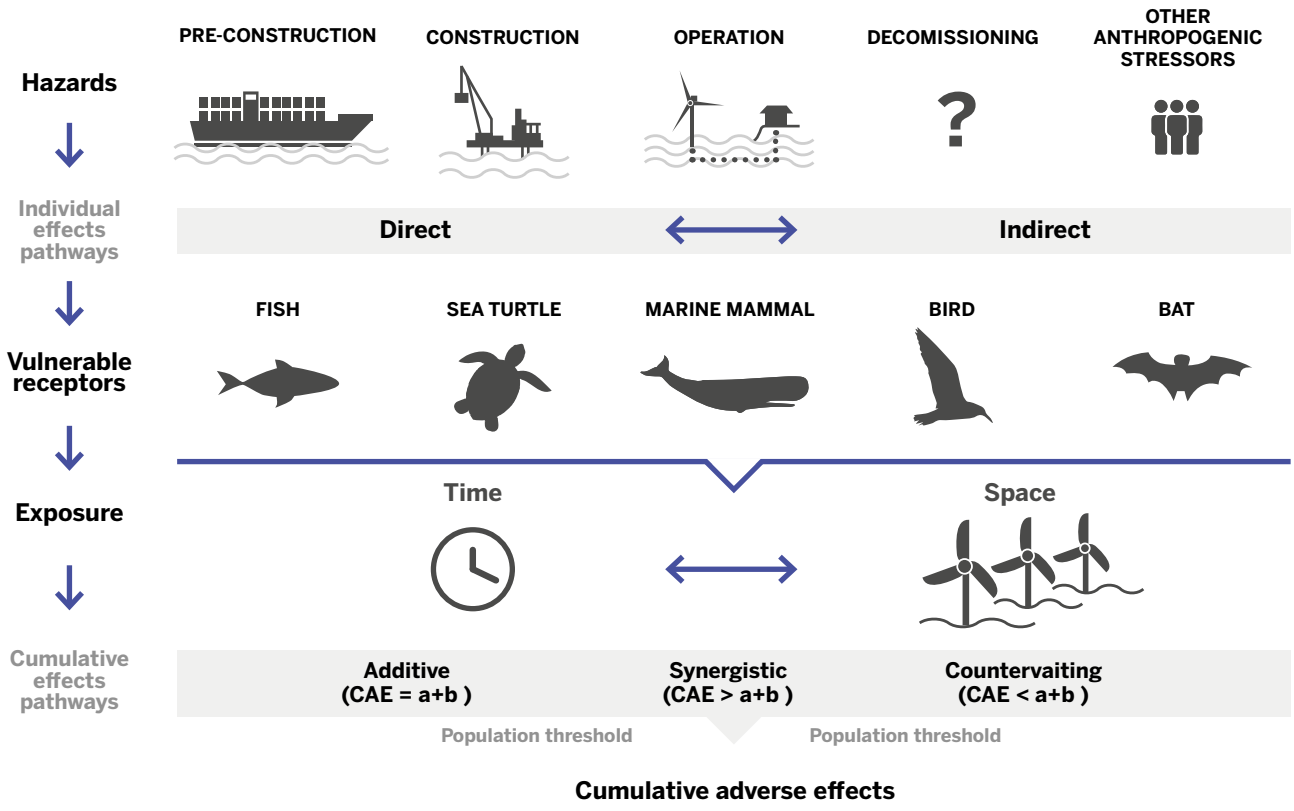
CUMULATIVE ADVERSE EFFECTS OF OFFSHORE WIND ENERGY DEVELOPMENT ON WILDLIFE



DURING PILE-DRIVING OPERATIONS FOR THE CONSTRUCTION OF AN OWF, VAN OORD USES A BIG BUBBLE SYSTEM TO REDUCE UNDERWATER NOISE

© VAN OORD

PUBLIC AUTHORITIES CAN PLAY A MAJOR ROLE IN MINIMIZING THE OWF SECTOR'S IMPACTS ON MPAs

Public authorities involved in the development of the OWF sector should follow the Avoid – Mitigate – Compensate approach, and prioritize the spatial segregation of protected areas and areas designated for OWFs.

KEY RECOMMENDATIONS FOR PUBLIC AUTHORITIES

- MSP should follow the ecosystem approach to reach or maintain Good Environmental Status as well as Favourable Conservation Status. This needs strong SEAs to identify potential future locations for OWFs which as far as possible avoid ecologically sensitive areas in general and MPAs in particular. MSP should also consider cumulative impacts and assess them more broadly.
- Decision-making processes regarding future locations for OWFs should reflect conservation priorities and aim to avoid ecologically valuable and protected areas. Effective, ecosystem-based MSP and SEAs should as far as possible ensure that OWFs are not deployed in areas that contain habitats, species and/or ecological processes that are particularly sensitive to their impacts, whether during construction or operation. Sensitivity mapping is one of the most valuable tools for effective OWF planning, helping developers and regulators in the early stages of decision-making to steer development away from sensitive areas where negative interactions are most likely to happen. This also reduces business risk.
- In countries where OWF deployment already lies within MPAs or which are at the stage of environmental impact and appropriate assessment, developments should be robustly assessed on a case-by-case basis in line with relevant nature conservation legislation, taking a precautionary approach to ensure that site conservation objectives are met.
- When OWFs are planned in sensitive areas, including MPAs, where projected information on their impacts is lacking, commercial production should only begin on a small scale (10-20 turbines). This will enable monitoring of environmental impacts and provide data to define the no-go criteria for further development. To ensure environmental conservation objectives are met, specifications for small-scale OWF proposals should be set by a national scientific expert group which includes MPA managers.
- When avoidance is impossible, impact mitigation measures must be implemented by the competent authority. Ultimately, ecological compensation may be needed if there are still significant residual impacts – this could include measures to restore degraded habitat or create new habitat areas. However, due to their uncertainties, complexity and costs, such measures are generally only considered as a last resort and they are not discussed in PHAROS4MPAs recommendations.
- Cooperation between countries and areas sharing sea space or transborder MPAs is essential for the exchange of information, and for setting unified conservation goals, monitoring concepts and action plans.

THE ROLE OF STRATEGIC ENVIRONMENTAL ASSESSMENTS

Strategic environmental assessments (SEAs) are conducted on a large spatial scale, and are a prerequisite for effective MSP. There are many species and marine environmental issues which are not restricted within national borders, so some recent EU projects have focused on how SEAs can be improved to support international MSP protocols and facilitate cross-border collaborations. Mediterranean countries need to develop MSP on an international basis, meaning they can account for the cumulative impacts of large-scale development, including of OWFs. Successful MSP – and thus the SEAs that support it – depends on thorough baseline investigations and research.

TRIPODS BEING TRANSPORTED TO AN OWF CONSTRUCTION SITE

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GENERAL CONCLUSIONS

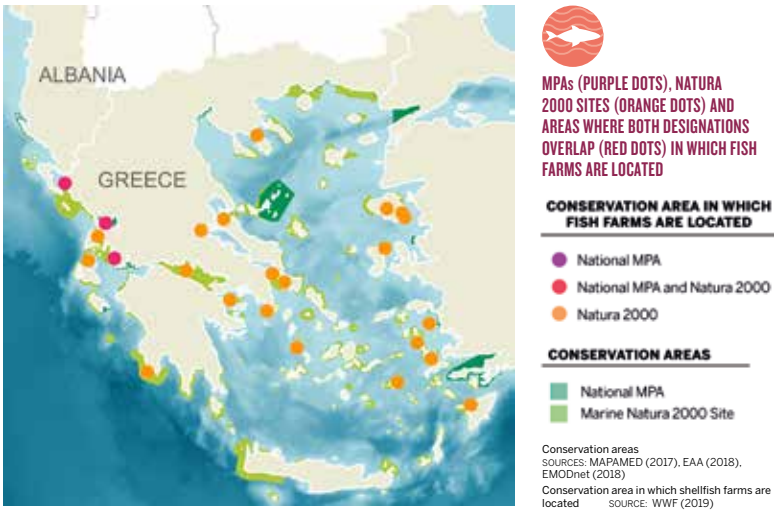
The PHAROS4MPAs project, amongst the "Blue Gold Rush" that the Mediterranean Sea is experiencing, is providing recommendations towards safeguarding marine protected areas. The majority of the recommendations in this report focuses on public authorities, as they are the actor with the most influence and power to regulate economic activities and their impacts on natural resources in general. Some recommendations also refer to regional and international governance bodies, due to their role and authority regarding specific sectors such as maritime transport. The PHAROS4MPAs project provides recommendations regarding the following sectors:

AQUACULTURE

In order for the aquaculture sector to move towards sustainability, coordinated maritime spatial planning and an ecosystem approach based on the carrying capacity of the marine environment are necessary. As far as MPAs are concerned:

- Only marine aquaculture farms with no detrimental effect on the designated protected areas should be permitted in MPAs, decided on a case-by-case basis.
- Fish farms with cage settlements in areas with significant seagrass meadows and coralligenous formations and/or important fish habitats, spawning grounds and nursery areas should not be allowed. In general, habitats sensitive to the discharge of organic matter are not appropriate for fish or shellfish aquaculture.
- Fish farms with cage settlements inside or in the close vicinity of MPAs should be avoided. Buffer zones should be maintained between cage settlements and protected areas.
- The farming of exotic species should be avoided in MPAs.
- Industrialized intensive fish production should be avoided in MPAs.
- For marine Natura 2000 sites, the EU Commission Guidelines on Aquaculture and Natura 2000 offer clear advice. Only marine aquaculture farms without a detrimental effect on the habitats and species protected under the Birds and Habitats Directive should be permitted in such areas, and these should be assessed on a case-by-case basis

Regarding aquaculture in Greece, emphasis should be put at the level of national



authorities regarding compliance to legislation, as well as establishing legal frameworks that promote sustainable & responsible practices. Such practices minimize the negative impacts of aquaculture such as nutrient release, escapes, antifouling chemicals like copper, antibiotics, anti-parasiticides such as formaldehyde, non-biological wastes and interactions with wildlife. Furthermore, more emphasis should be given to organic aquaculture, as well the implementation certification schemes such as the Aquaculture Stewardship Council (ASC).

SMALL SCALE FISHERIES

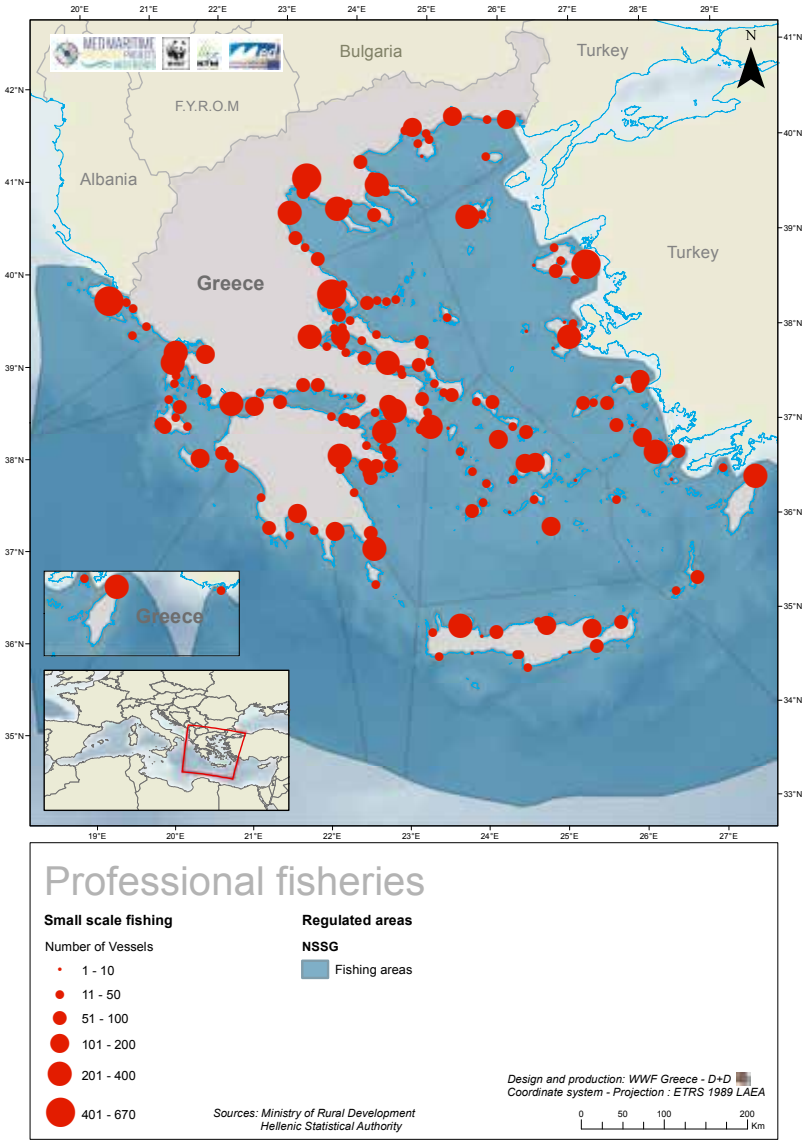
Given the importance and the impacts of SSF in the Mediterranean, public authorities and MPA managers can play a major role in avoiding or minimizing SSF impacts on MPAs.

Through their role and influence, national public authorities should address the impacts of SSF by environmental and social measures such as:

- Implementing management tools such as gear and size restrictions, fishing effort limitation, seasonal closures, etc., to avoid the excessive impact on marine resources and vulnerable marine species
- Improving the selectivity of fishing gear with regard to size and species
- Increasing investments in fishing techniques that eliminate discards by avoiding or reducing unwanted catches of commercial and non-commercial stocks
- Supporting the exclusion of fishing activities in areas showing high probabilities of unwanted catches, including the establishment of zones for the recovery of fish stocks, in spawning sites and nursery areas for juveniles
- Supporting – in close coordination with fishers – an increase in coverage of no-take zones that help ecosystem and marine resource recovery
- Minimizing the impact of fishing activity and gear on sensitive habitats such as Posidonia meadows and coralligenous assemblages
- Establishing derelict fishing gear management schemes from collection to final treatment or recycling together with waste collection plans in landing sites.
- Developing a national legal framework enabling fishery co-management to support sustainable stocks
- Improving legal frameworks that enable the SSF sector to be organized as cooperatives, producer groups or organizations, micro-enterprises or other structures to help fishers better manage their activities, mutualize costs, add value, develop diversification schemes (such as pescatourism activities) and ensure a sale directly or in short circuits
- Guaranteeing good and fair access to landing sites adequately equipped to facilitate SSF activities – fully serviced docking areas, moorings, refrigerated warehousing, drinking water, ice machines, litter disposal and recycling
- Taking into account recreational fishing activities in fishery management, through multiannual plans
- Raising awareness among consumers and local communities about SSF activities and their benefits, to improve the image of the SSF sector

MPA managers can play a crucial role in SSF management by:

- Proactively establishing a permanent and close dialogue with the SSF sector and implement governance which supports co-management
- Monitoring SSF to support management measures
- Using appropriate zoning, especially by the establishment of no-take zones, aiming at avoiding gear interaction or conflicts over access to marine resources, both with other fishers and with other stakeholders
- Preparing and implementing a fisheries management plan. Specific management measures may include:
  - Reducing fishing effort, through for instance seasonal or temporary closures in adjacent zones or through gear restrictions
  - Improving the selectivity of fishing gear
  - Reducing the incidental catch of elasmobranchs, seabirds, turtles and marine mammals through mitigation measures
  - Minimizing bycatch and reducing discards, through regulations or economic incentives
  - Minimizing the impacts of SSF on vulnerable marine species through gear and size restrictions or seasonal restrictions
  - Reducing ghost fishing by collecting lost fishing gear
  - Implementing waste collection plans in landing sites
  - Implement effective control and enforcement of regulations



Small scale fisheries in Greece (WWF Greece, 2015).

- Support initiatives to enhance the added value of small-scale fisheries products: optimization of distribution channels, promotion of less marketable catches, eco-labeling of sustainable SSF products, education and awareness-raising among consumers, pescatourism etc.

It should be stressed that collaboration between MPAs and fishers can be mutually beneficial, as they share a common goal of healthy fish stocks.

Greece, with over 14,000 vessels, has the largest fleet in the EU. Given that approximately 96% of the Greek fleet is made up by SSF vessels, it is strongly recommended that the national fleet register should be updated on a regular basis and in accordance with the activity of each fishing vessel (inactive fishing vessels should be excluded), so that it can serve as an effective and comprehensive tool for the management of the capacity of the national SSF fleet and its activity. In addition, increasing investments aiming at improving selectivity in Greece in order to avoid or reduce unwanted catches is imperative. Finally, a national legal framework that promotes co-management by enabling fishers and other stakeholders to participate in fisheries management is of crucial importance. By empowering fishers and other relevant stakeholders to take an active role in fisheries management and the protection of ecosystems can make fisheries more sustainable.

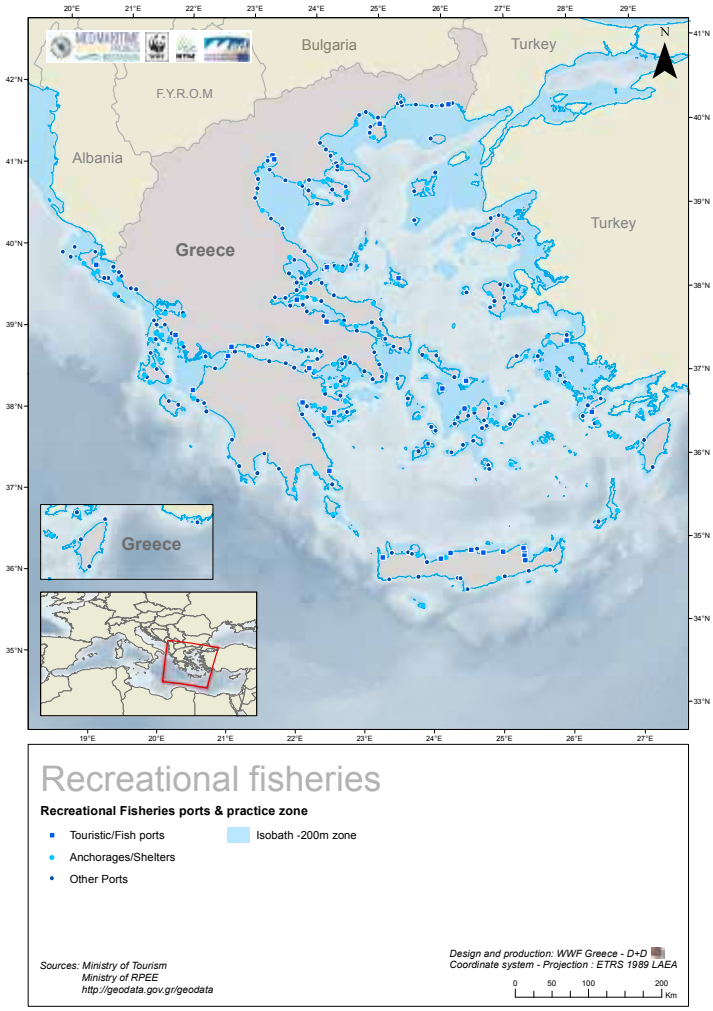
RECREATIONAL FISHERIES

Given the fact that recreational fisheries are largely under national jurisdiction, public authorities can play an important role in minimizing their impacts. More specifically, national authorities should:

- Ensure that national license systems are in place.
- Establish within the license system the obligation to report all catches, so as to obtain greater accuracy on the status of fish stocks and a clear assessment of the share of catches from recreational fisheries in relation to commercial fishing.
- Explore the establishment recreational fisheries fees as an effective mechanism towards sustainable management. These fees can contribute to lessening the environmental impacts of recreational fishing, covering the costs of management and – importantly – control measures.
- Monitor the ecological, social and economic impacts of recreational fisheries.
- Management measures might be required at national level and in MPAs in particular when the fishing effort is too high, including the limitation of fish catches or the prohibition of particular fishing methods impacting vulnerable species.

In addition, at the local level, MPA managers should:

- Prioritize monitoring and surveillance in order to identify and quantify both the number of recreational fishers and the impacts of their activity and as a decision-making basis for management measures. Furthermore, regular surveillance of users within and around MPA waters is the most effective way to ensure regulations are enforced and poaching is prevented.
- Establish an obligatory licensing system for fishers who want to fish within their boundaries, particularly in countries without a national license system.
- Engage with all relevant stakeholders – primarily recreational fisher organizations, but also specialized shops and public administrations – in their environmental awareness-raising programs. Charters or codes of good practice can be agreed in a participatory way to that end, distributed and even signed as a 'moral' contract.



Recreational fisheries in Greece (WWF Greece, 2015).

- Involve recreational fishers along with other stakeholders such as scuba divers and particularly small-scale fishers in management.
- Implement different types of management measures when the fishing effort is too high. Limitations include bans on fishing at night, catch limitations to reduce fishing effort, minimum landing sizes, prohibition of particular fishing gears, prohibition of competitions etc.

As far as recreational fisheries in Greece are concerned, a very important step towards the conservation of fish stocks in general would be the re-establishment of a licensing system as the basis for their proper monitoring, control and management. The obligation to report all catches, together with marine conservation awareness raising for recreational fishers would further the assessment and the lessening of the impacts of fisheries on fish stocks.

MARITIME TRANSPORT

In order for the impacts of maritime transport to be prevented – or at least minimized – in Marine Protected Areas, national authorities should:

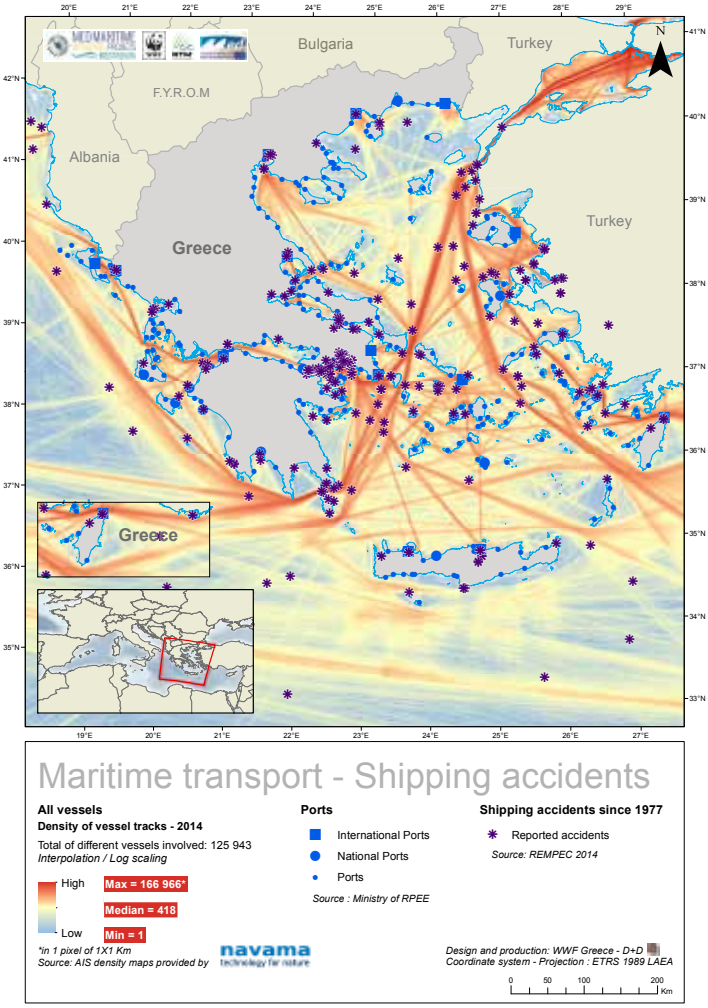
- Through Maritime Spatial Planning (MSP), make use of tools such as Particularly Sensitive Sea Areas (PSSAs), Areas To Be Avoided (ATBAs) and Traffic Separation Schemes (TSSs) to protect MPAs from the risks of maritime traffic accidents and reduce the chances of collisions with cetaceans. National authorities should coordinate monitoring programs on marine mammal range and routes, to support MSP processes. In the case of transboundary MPAs, states should participate actively in the IMO and coordinate joint proposals at IMO level for routing systems and PSSAs.
- Utilize MSP processes that can prevent anchoring impacts by introducing voluntary no-anchoring zones, adopting zoning plans indicating sensitive areas as well as suitable anchoring areas, and by including MPA boundaries and anchor-sensitive areas on nautical charts.
- Introduce area-based regulations, such as banning the transit of dangerous goods in important marine areas to prevent severe accidents, or mandating the use of technical solutions to prevent collisions with cetaceans. In addition, authorities should ensure the implementation of the Ballast Water Management Convention, particularly through inspections and monitoring activities.
- Implement joint cross-border actions for navigation monitoring and safety to ensure environmental impacts are avoided or minimized. These may include coordinated governance systems (a joint action plan) and innovative surveillance methods. Participation in coordinated response and contingency plans for oil spills and other pollution events at cross-border, sub-regional and regional levels is essential.
- Collaborate with neighboring states to establish MPAs on the high seas. These are necessary to protect sensitive marine areas that are not currently under the jurisdiction of national states, either due to the lack of an official EEZ or to uncertain navigational rights.

Local authorities can play a significant role in reducing the impact of maritime traffic by:

- Collaborating with local maritime companies, identify and implement piloting solutions to avoid accidents in particularly sensitive areas, enforce international and national standards and requirements in ports, use innovative procedures and technologies, such as collision avoidance devices.
- In the case of port authorities, enforcing international and national standards and requirements, for example through ship inspections. Coordination mechanisms involving port authorities and port states such as the Mediterranean MoU are particularly useful in order to avoid 'ports of convenience' in the region.
- Regarding Coastguards, using innovative procedures, tools and technologies, such as risk assessment and spills modelling, to reduce the risks and mitigate the impacts of oil spills. In addition, they should support and promote the establishment of volunteer rescue and cleaning patrols and rescue centers. Coastguards should also patrol MPAs regularly and ensure the compliance of ships through enforcement actions such as board-and-search and even arrest.
- Collaborating with MPA management bodies to develop joint solutions – including monitoring, modelling and vulnerability assessments – to monitor the impact of maritime traffic and mitigate the impact of pollution from port operations.

Regional ocean governance bodies such as the Barcelona Convention can contribute to safeguarding MPAs from the impacts of maritime transport through:

- Establishing stronger enforcement and compliance mechanisms, including the Protocol Concerning Co-operation in Preventing Pollution from Ships and, in Cases of Emergency, Combating Pollution of the Mediterranean Sea and the Protocol on the Prevention of Pollution in the Mediterranean Sea by Transboundary Movements of Hazardous Wastes and their Disposal.
- Regional governance mechanisms that further support the designation of the Mediterranean as an Emission Control Area, particularly for nitrogen and sulphur oxides, to the benefit of all marine ecosystems in the region. They can facilitate increased engagement by regional states, and underpin the development of proposals to the IMO as part of MARPOL Annex VI.
- The implementation of ecosystem-based marine and coastal planning tools, such as MSP and ICZM, should be prioritized across the whole region. All Mediterranean countries should ratify and implement the ICZM Protocol, as this will support ecosystem-based planning processes which consider all possible interactions within an



Maritime transport and accidents (WWF Greece, 2015).

ecosystem, including the potential environmental risks related to maritime traffic activities. The ICZM Protocol should integrate a regional framework for ecosystem-based MSP.

- The further development of transboundary oil spill contingency plans, early warning systems and decision support systems - in collaboration with national authorities. These tools are much needed in the region, particularly in maritime transportation hotspots such as the Aegean Sea, the Adriatic and the Sicily Channel/Tunisian Plateau. Regional governance mechanisms can foster collaboration among countries to develop such tools.
- Coordinated regional initiatives aiming to increase surveillance at sea, using aerial surveys and radar satellite imagery, which also represent important means of avoiding and controlling spills in the Mediterranean region.

As far as transportation in the Greek Seas is concerned, Greek national authorities should engage with the International Maritime Organization and submit proposals for the adoption of effective routing measures so as to achieve coherent protection of the marine environment and species both in the 6nm within its national jurisdiction and beyond, on the high seas. This is particularly urgent for the protection and conservation of sperm whales in the Hellenic Trench where routing measures need to be adopted to mitigate the risk of ships and whales collision. Regarding Greek MPAs, area-based regulations such as banning the transit of dangerous goods or routing measures (including speed reduction) should be included in the regulatory framework for MPAs and their management plans. Real-time positioning systems are also important tools to prevent collisions between ships and cetaceans and should be adopted within MPAs or adjacent areas including straits. Furthermore, MPA Management Bodies should design, run or participate in monitoring programs and research studies to increase knowledge on the interactions between MPAs and the maritime transport sector, and its impacts on habitat and species. Finally, given that Greek shipowners control the largest fleet in the world (Lloyd's, 2018), national authorities should engage and collaborate with maritime transport companies to promote innovative procedures and technologies, raising of awareness, training of seafarers, compliance with best operational and navigational practices etc.

Regarding Greek port authorities, considering the fact that Piraeus is developing into the most important hub for maritime transport in the Mediterranean, authorities should ensure that visiting vessels comply with IMO regulations (including the Ballast Water Management Convention) and other national and international standards through robust port state control measures and inspections. Additionally, port authorities need to ensure that port regulations prohibit the stop-over and anchorage of large vessels especially in small ports with inadequate facilities and in areas with sensitive and fragile ecosystems including MPAs. In general, the Aegean Sea is an area with an extremely high marine safety risk, largely because of the increase of tanker traffic from the Black Sea (Giannakopoulos, 2015). The map above provides a glimpse into of traffic density in 2015 and the marine accidents since 1977, making the danger of accidents, oil spills and damage to MPAs and the marine environment of the Greek Seas more than obvious.

CRUISE

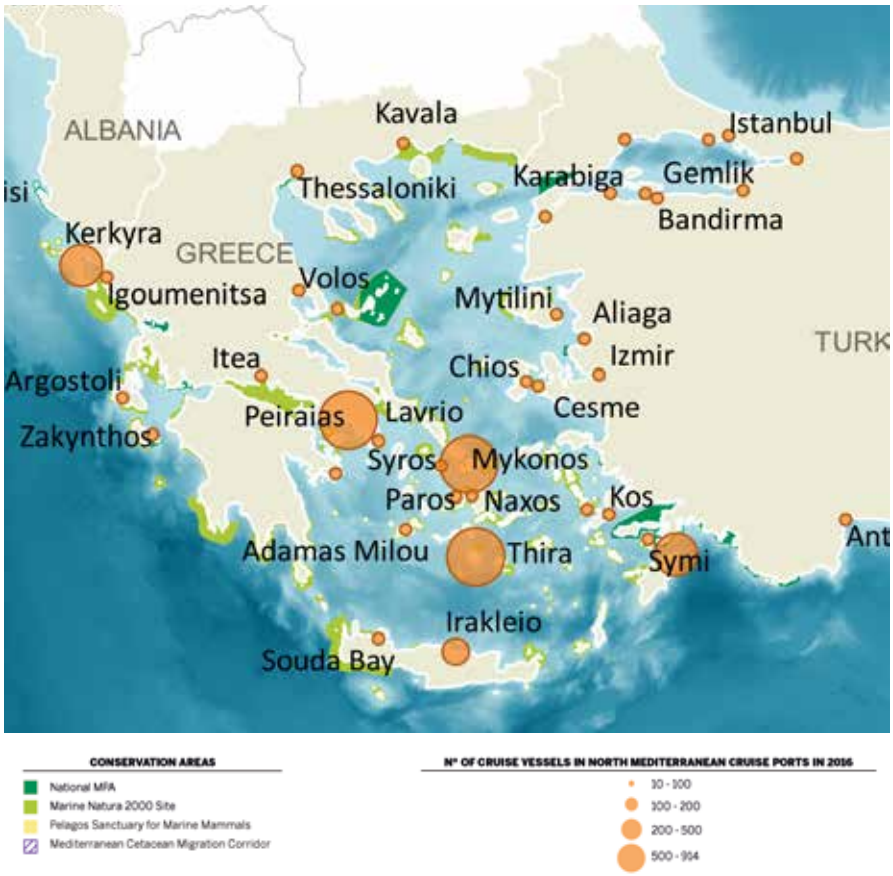
National and local authorities can play a key role in reducing to the minimum possible the cruise sector's accident risks and environmental impacts on MPAs, by

- Establishing strict limitation and buffer zones regarding the minimum distance cruise ships are allowed to navigate, moor or stop from the borders of MPAs.
- Promoting continuous monitoring of cruise activities, with close cooperation between MPA managers and relevant public authorities.
- Regulating the granting of authorization for navigation in highly sensitive natural areas as a well-informed process, with the close involvement of MPA managers to help limit the risks.
- Implementing speed restrictions to mitigate collision risk. In addition, lower speeds reduce potential acoustic impacts and emissions of air pollutants.
- Utilizing Maritime Spatial Planning tools such as IMO Particularly Sensitive Sea Areas (PSSAs), which can prevent accidents and consequent environmental impacts.

Furthermore, cooperation between public authorities beyond territorial waters is essential in order to:

- Promote through regional regulations stricter controls on airborne emissions from the cruise industry, which are needed to limit impacts on ecosystems, both in MPAs and at the level of eco-regions and regional seas.
- Prevent or minimize the impacts of cruise ships on MPAs and beyond, fostering regional cooperation by using the Barcelona Convention as guidance to Contracting Parties.
- Better regulate the cruise sector's operations in relation to marine conservation should be urgently created, adopted and implemented under the Barcelona Convention, through a specific regional action plan.

As projections indicate an increase in cruise tourism in Greece (especially in Attica, South Aegean and Ionian Sea), its impacts regarding organic, chemical, noise and air pollution will also have a bigger negative effect on the marine and coastal environment (WWF Greece, 2015). Greek authorities must promote and enforce stricter monitoring and regulations to safeguard MPAs and important marine ecosystems from the cruise sector's operations.



Potential locations
SOURCE: MedTrends (2015)
Windfarm project
SOURCE: EMODNET (2017), revised by WWF

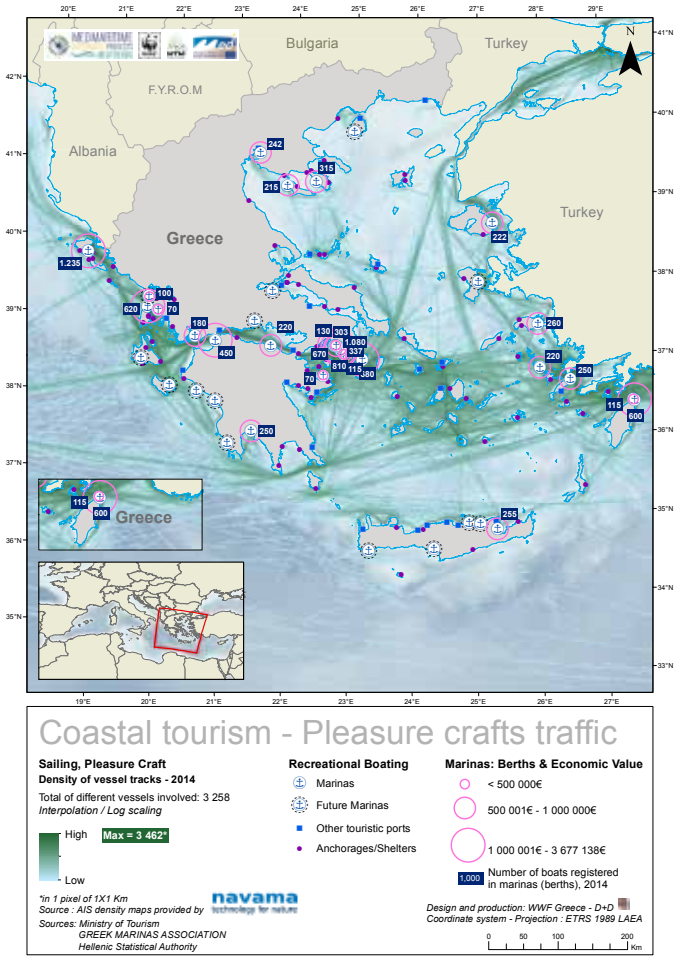
LEISURE BOATING

Public authorities can play a major role in minimizing the leisure boating sector's impacts on MPAs by:

- Establishing environmental monitoring programs which shall analyze numbers and types of recreational boats berthing in marinas and use patterns, visiting patterns in nearby MPAs, anchoring patterns and impacts on fragile habitats such as Posidonia meadows, presence of water and air pollutants in marinas and at sea, invasive species and any other significant factors, such as the presence of marine fauna, especially cetaceans, and reported collisions.
- Developing proactive management measures based on the above monitoring and the key issues it will identify, such as designation of no-mooring areas or the scaling-up of port facilities
- Defining a leisure boating spatial strategy at national level to ensure sustainable use of the sea and avoid potential negative impacts regarding conflicts with other users, and set a regulatory framework for marinas, mooring areas, pollution and other impacts.

More specifically for MPAs, a step-by-step approach is the best way to develop regulatory frameworks to promote eco-friendly boating regarding access (boats that are fully equipped to avoid all discharge of waste at sea, MPA permits with maximum number, boats less than 24m long), navigation (speed restrictions, ban of 2-stroke engines and high-speed boats) and general practices (overnight stay prohibitions, eco-friendly antifouling paints and cleaning agents, responsible leisure boating courses and awareness strategies). The importance of control and surveillance of activities cannot be overemphasized.

A priority for Greece regarding safeguarding important habitats such as Posidonia meadows in MPAs and Natura 2000 areas would be the establishment of no-mooring zones and designated permanent mooring areas, which should include ecological mooring systems that avoid impacts on fragile bottoms.



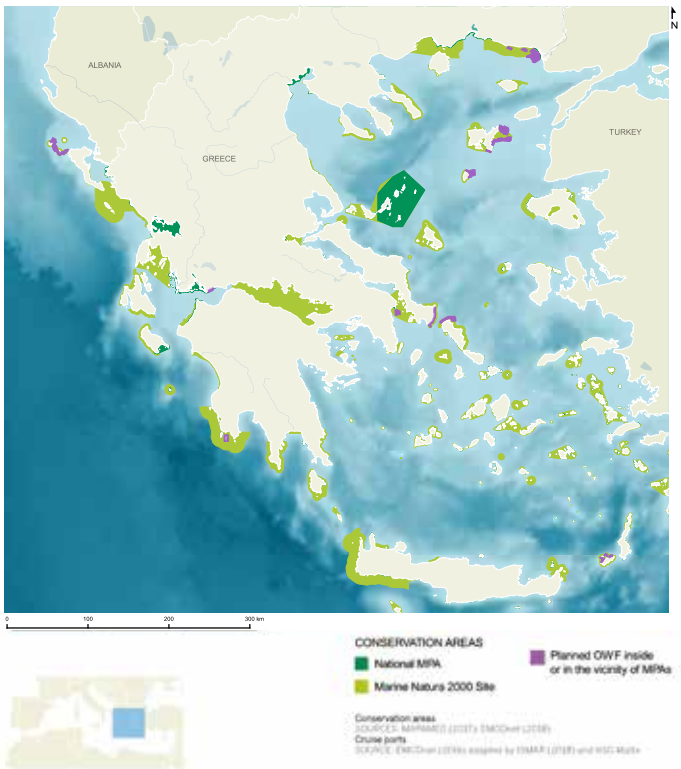
Leisure boating in Greece (WWF Greece, 2015).

OFFSHORE WIND ENERGY

In order for MPAs to be safeguarded from the impacts of the offshore wind energy sector (OWF), public authorities should ensure that:

- Maritime Spatial Planning follows the ecosystem approach to reach or maintain Good Environmental Status, as well as Favorable Conservation Status. This needs strong strategic environmental assessments (SEAs) to identify potential future locations for OWFs which as far as possible avoid ecologically sensitive areas in general and MPAs in particular. MSP should also consider cumulative impacts and assess them more broadly.
- Decision-making processes regarding future locations for OWFs reflect conservation priorities and aim to avoid ecologically valuable and protected areas. Effective, ecosystem-based MSP and SEAs should as far as possible ensure that OWFs are not deployed in areas that contain habitats, species and/or ecological processes that are particularly sensitive to their impacts, whether during construction or operation. Sensitivity mapping is one of the most valuable tools for effective OWF planning, helping developers and regulators in the early stages of decision-making.
- In countries where OWF deployment already lies within MPAs or which are at the stage of environmental impact and appropriate assessment, developments should be robustly assessed on a case-by-case basis in line with relevant nature conservation legislation, taking a precautionary approach to ensure that site conservation objectives are met.
- When OWFs are planned in sensitive areas, including MPAs, where projected information on their impacts is lacking, commercial production should only begin on a small scale (10-20 turbines). This will enable monitoring of environmental impacts and provide data to define the no-go criteria for further development. To ensure environmental conservation objectives are met, specifications for small-scale OWF proposals should be set by a national scientific expert group which includes MPA managers.
- When avoidance is impossible, impact mitigation measures must be implemented by the competent authority. Ultimately, ecological compensation may be needed if there are still significant residual impacts – this could include measures to restore degraded habitat or create new habitat areas.
- Cooperation between countries and areas sharing sea space or trans-border MPAs is essential for the exchange of information, and for setting unified conservation goals, monitoring concepts and action plans.
- No overlap with MPAs exists. More specifically, authorities must ensure that OWFs are absolutely not developed in areas which host sensitive habitats, species and/or ecological processes, and in particular in MPAs. In the event OWFs are already planned to be deployed in ecologically sensitive areas or MPAs, developments should be robustly assessed on a case-by-case basis according to the relevant environmental legislation and based on the precautionary approach, commercial production should only start on a small scale in order to monitor environmental impacts, and as a last resort impact mitigation measures must be implemented including ecological compensation.

The Greek state has initiated the process of amending the Special Spatial Planning for Renewable Energy including the development of off-shore wind farms. In this framework, a Strategic Environmental Assessment will be conducted and it is therefore important that this SEA follows the first recommendation regarding MSP following the ecosystem approach to reach or maintain Good Environmental Status, as well as Favorable Conservation Status. In the framework of this process, sensitivity mapping should be used as tool for effective OWF planning in the Greek Seas. The SEA and the Spatial Planning should identify ecologically sensitive areas in general and MPAs in particular where the development of OWF should be avoided/prohibited.



In conclusion, beyond the sector-specific proposals, the PHAROS4MPAs project recommends that in order for marine protected areas to be safeguarded, new and/or significant pressures on MPAs should be avoided through Maritime Spatial Planning. Furthermore, ecosystems should be protected beyond MPA borders with sustainable management measures. Additionally, the carrying capacity of ecosystems must be the guide for activities that take place within MPAs. Finally, sustainable practices and prerequisites regarding how economic sectors operate should constitute the basis and framework for Blue Growth. As far as Greece is concerned, the Greek state still has to take brave steps towards safeguarding MPAs. It is of utmost importance that the organizational financing and human resources problems of Management Bodies of Greek Protected Areas be resolved. Furthermore, Greek MPAs must absolutely operate under formally adopted and long-term Management Plans, clearly set goals, conservation objectives and targeted Plans of Action. In addition, the diffused and dispersed responsibilities that pertain to the management of MPAs, maritime and coastal activities need to be well coordinated if effective management is to be achieved. The recommendations of the PHAROS4MPAs project should also be taken into consideration for the development of the legal and institutional protective framework for MPAs, as part of the EU-funded project "Technical and Scientific Coordination of the preparation of SES, Presidential Decrees and Management Plans for the Natura 2000 sites in Greece". The project was contracted by the Greek Ministry of Energy and Environment (General Directorate of Environmental Policy/ Directorate of Biodiversity and Natural Environment Management/Department of Protected Areas) and will lead to the enactment of presidential decrees regulating the activities and uses in these areas and the drafting of management plans by 2021. The PHAROS4MPAs recommendations are also important for the development of Maritime Spatial Plans as required by the MSP Directive 2014/89/EU, considering that spatial planning for the Greek Seas must be finalized by 2021. Given the complexity of the issues and the sectors' overlap, the Greek State should ensure coordination within authorities in this case as well. Ratifying the Protocol to the Barcelona Convention on Integrated Coastal Zone Management (ICZM) is another step that Greece has yet to take given the interactions between coastal and marine activities. Finally, regarding the proper implementation of the Marine Strategy Framework Directive (MSFD) and the achievement of Good Environmental Status (GES) for the Greek marine environment by 2020, brave steps and authorities' coordination are again necessary. The challenge of a sustainable Blue Economy lies in the very nature of the marine environment and the human activities within it: a web of interactions which in the case of economic development leads to environmental impacts and most often to sectors conflicting for space and resources.

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THE PHAROS4MPAs PROJECT IN NUMBERS

7.14% of the Mediterranean Sea is under some form of **protection**, 1,231 MPAs and OECMs covering **179,798** km²

With **€395** bn Gross Marine Product (GMP) the Mediterranean Sea economy is the **5th largest** in the region

7
MARITIME SECTORS

17 PARTNERS / **10** COUNTRIES

- MARITIME TRANSPORT
- LEISURE BOATING
- RECREATIONAL FISHERIES
- CRUISE
- OFFSHORE WIND FARMS
- AQUACULTURE
- SMALL SCALE FISHERIES

PHAROS4MPAs' core partners

WWF
PAP/RAC
REGIONAL DEVELOPMENT FUNDS of the N. AEGEAN REGION
AKZM NATIONAL AGENCY OF PROTECTED AREAS
INSTITUTE OF THE REPUBLIC OF SLOVENIA FOR NATURE CONSERVATION
CNR Consiglio Nazionale delle Ricerche
ISMAR Istituto di Scienze Marine
Universitat de Girona

PHAROS4MPAs' associated partners

WWF
MedPAN
France Energie Eolienne
UN environment
SPA/RAC
REMPEC
EUROPEAN BOATING INDUSTRY
AGENCE FRANÇAISE POUR LA BIODIVERSITÉ
ÉTABLISSEMENT PUBLIC DE L'ÉTAT
CPMR INTERMEDITERRANEAN COMMISSION

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EUROPEAN UNION
PHAROS4MPAs