



Risks from maritime traffic to biodiversity in the Mediterranean Sea

Identification of issues and possible responses



*Ministero dell'Ambiente
e della Tutela del Territorio
e del Mare*

Risks from maritime traffic to biodiversity in the Mediterranean Sea

Identification of issues and possible responses

Risks from maritime traffic to biodiversity in the Mediterranean Sea

Identification of issues and possible responses

This report was written by Lorenzo Schiano di Pepe and Christopher J. Tribe,
with the support of Philomène Verlaan,
Nilufer Oral (Commission on Environmental Law–Oceans, Coasts and Coral Reefs Specialist Group)
and François Simard.

2009

1	3	6	
	4		
2	5	7	8

Cover photos:

- 1 Bosphorus strait and Istanbul. Astronaut photograph ISS008-E-21752, April 16, 2004.
<http://earthobservatory.nasa.gov/>
- 2 *Mobula mobular* (Bonnaterre, 1788). West Atlantic and mediterranean devil ray. © M.Wurtz-Artescienza s.a.s.
- 3 Port and Suez Canal. Astronaut photograph ISS016-E-19375, December 30, 2007.
<http://earthobservatory.nasa.gov/>
- 4 Mediterranean Sea. International Straits and Shipping Lanes. © Juan L. Suárez de Vivero, Department of Human Geography, University of Seville.
- 5 © Ameer Abdulla.
- 6 *Delphinus delphis* Linnaeus, 1758. Common dolphins crossing the Strait of Gibraltar. © Herwarth Voigtman, A picture from «The Last Giants», a documentary by Daniele Grieco, 2009. Courtesy Stella Maris Film, Cologne. <http://www.thelastgiants.com/>
- 7 Strait of Gibraltar. © François Simard.
- 8 © François Simard.

The designation of geographical entities in this book, and the presentation of the material, do not imply the expression of any opinion whatsoever on the part of the Italian Ministry of Environment, Land and Sea, or IUCN concerning the legal status of any country, territory, or area, or of its authorities, or concerning the delimitation of its frontiers or boundaries.

The views expressed in this publication do not necessarily reflect those of Italian Ministry of Environment, Land and Sea or IUCN.

This publication has been made possible by funding from the Italian Ministry of Environment, Land and Sea.

Published by:
 IUCN, Gland, Switzerland and Malaga, Spain.

Copyright:
 © 2009 International Union for Conservation of Nature and Natural Resources.

Reproduction of this publication for educational or other non-commercial purposes is authorized without prior written permission from the copyright holder provided the source is fully acknowledged.
 Reproduction of this publication for resale or other commercial purposes is prohibited without prior written permission of the copyright holder.

Citation:
 IUCN (2009). *Risks from maritime traffic to biodiversity in the Mediterranean Sea: Identification of issues and possible responses*. Malaga, Spain: IUCN Centre for Mediterranean Cooperation.

ISBN:
 978-2-8317-1213-0

Layout & Printing: Multiprint, MC 98000 Monaco.

Produced by:
 IUCN Centre for Mediterranean Cooperation.

Available from:
 IUCN Centre for Mediterranean Cooperation
 C/ Marie Curie 22
 29590 Campanillas, Malaga, Spain
 Tel: +34 952 028430
 Fax: +34 952 028145
<http://www.iucn.org/mediterranean>

or IUCN Publications Services,
<http://www.iucn.org/publications>

A catalogue of IUCN publications is also available.

The text of this book is printed on ecological paper.

Table of contents

LIST OF ACRONYMS.....	8	5. Specific threats and possible responses	17
1. Foreword	9	5.1. SHIP STRIKES ON CETACEANS AND TURTLES	17
2. Aims and scope.....	9	5.2. DAMAGE CAUSED BY ANCHORING AND GROUNDING.....	17
3. General considerations	10	5.3. INVASIVE ALIEN SPECIES	17
3.1. IDENTIFYING AND ADDRESSING SOURCES OF IMPACTS	10	5.4. OPERATIONAL OIL DISCHARGES	18
3.2. MARITIME TRAFFIC.....	10	5.5. ACCIDENTAL OIL DISCHARGES	18
3.3. BIODIVERSITY	11	5.6. HAZARDOUS AND NOXIOUS SUBSTANCES.....	19
3.4. LEGAL REGIMES	11	5.7. THERMAL DISCHARGES.....	19
4. General issues and threats related to biodiversity, and possible responses	12	5.8. UNDERWATER NOISE.....	19
4.1. LACK OF INFORMATION	12	6. Summary and conclusions.....	20
4.2. LACK OF AWARENESS.....	13	ANNEX 1: LIST OF WORKSHOP PARTICIPANTS (IN ALPHABETICAL ORDER)	23
4.3. ENHANCEMENT AND ENFORCEMENT OF THE LEGAL REGIME IN GENERA.....	14		
4.4. EXCLUSIVE ECONOMIC ZONES	14		
4.5. PORT STATE CONTROL.....	15		
4.6. PSSAS, MPAS AND SPAMIS.....	15		
4.7. OTHER MARITIME TRAFFIC GOVERNANCE MECHANISMS	16		
4.8. ENHANCED COOPERATION	16		
4.9. TECHNOLOGY.....	16		

LIST OF ACRONYMS

ACCOBAMS	Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and contiguous Atlantic Area
EEZ	Exclusive Economic Zone
EPZ	Ecological Protection Zone
EU	European Union
HNS	Hazardous and Noxious Substances
IAS	Invasive Alien Species
IUCN	International Union for Conservation of Nature
IMO	International Maritime Organization
LNG	Liquefied Natural Gas
MAP	Mediterranean Action Plan
MARPOL	International Convention for the Prevention of Pollution from Ships
MOU	Memorandum of Understanding
MPA	Marine Protected Area
OPRC	Oil Pollution Preparedness, Response and Cooperation
OSPAR	Oslo Paris Convention
PSC	Port State Control
PSSA	Particularly Sensitive Sea Area
REMPEC	Regional Marine Pollution Emergency Response Centre for the Mediterranean
SPAMI	Specially Protected Area of Mediterranean Importance
UNCLOS	United Nations Convention on the Law of the Sea
UNEP	United Nations Environment Programme

1. Foreword

This document is the result of discussions among a large number of experts on maritime issues in the Mediterranean Sea and draws on the conclusions of a workshop held in Istanbul in September 2007¹. The discussions were informed in part by a series of papers subsequently published by IUCN as *Maritime traffic effects on biodiversity in the Mediterranean Sea. Volume 1: Review of impacts, priority areas and mitigation measures* (Ameer Abdulla and Olof Lindén, eds); *Volume 2: Legal mechanisms to address maritime impacts on Mediterranean biodiversity* (Nilufer Oral and François Simard, eds) Gland, Switzerland and Málaga, Spain: IUCN, 2008. Financial support for this initiative was provided by the Italian Government, in response to Resolution 3.070 of the Third IUCN World Conservation Congress (Bangkok, 2004). The ideas expressed here do not necessarily reflect the official position of IUCN.

2. Aims and scope

The aims of this document are:

- To identify threats to biodiversity resulting from shipping activities in the Mediterranean Sea;
- To propose appropriate responses to eliminate or mitigate these threats; such responses include specific pilot actions, as well as recommendations that may be submitted to relevant international and regional organizations.
- The threats and proposed responses are examined in the context of the existing Mediterranean governance framework and international agreements on marine environmental protection and biodiversity conservation.

The primary focus of the document is on the impacts of international shipping and the transport of hazardous cargoes through the Mediterranean Sea (i.e. transit traffic), rather than those of domestic traffic. Local traffic, however, such as passenger ferries and, to a lesser extent, fishing vessels, constitutes a supplementary risk, especially in straits and other areas where it may conflict with transit traffic. Fishing as an activity is not specifically addressed in this document.

¹ See Annex 1 for the list of participants in the workshop.

3. General considerations

3.1. IDENTIFYING AND ADDRESSING SOURCES OF IMPACTS

Shipping is not the only source of impacts on Mediterranean biodiversity. A range of activities, including urbanization, coastal management, land reclamation, waste water, development of port infrastructure (especially with the proliferation of commercial ports and marinas), fishing and aquaculture, all have impacts on the marine environment.

The circumstances in which an activity may be described as either an actual or a possible and a present or future threat depend on a number of factors that go beyond that activity's intrinsic features. Such extrinsic factors include the scale and duration of the activity, as well as the specific sensitivity of, and responses by, particular environments to the activity. For an activity to be identified as a threat to marine biodiversity, all relevant extrinsic features must also be taken into account.

The precautionary principle should be applied when specific threats are geographically isolated as opposed to widespread. In particular, in the Mediterranean context there may be important elements and factors operating at the subregional level, making it difficult to delineate threats that apply to the whole basin.

In view of all the above considerations, it is preferable to highlight the totality of the threats, rather than to attempt to prioritize them (either in terms of severity, or regionally or subregionally, for example). A better understanding of the relative risks is needed before any effective prioritization can take place.

The impacts on Mediterranean biodiversity should therefore be addressed by a holistic approach that takes into account threats from both maritime traffic and related activities, because an integrated assessment of the consequences of all such activities will help in determining and prioritizing the level of the various threats and their effects.

The need for a holistic approach, however, must not prevent action from being taken in the meantime to mitigate the various threats.

3.2. MARITIME TRAFFIC

There is a significant imbalance in maritime traffic densities between the northern and southern coasts of the Mediterranean, with European ports receiving the majority (at least 75 percent) of ship calls. European Mediterranean ports are on average much smaller than ports in northern Europe. The major traffic hotspots in the Mediterranean are straits and canals: the three main routes being the North Africa/Europe passage through the Straits of Gibraltar, the Suez Canal passage and the Black Sea–Mediterranean passage through the Turkish Straits. Liquid bulk and container traffic especially appears to be on the rise, largely because of traffic from Asia. The situation is changing very rapidly and will continue to do so, not least in view of widespread, ongoing infrastructure expansion.

Despite growth in the oil trade, the number of recorded tanker spills due to accidents at sea has fallen in recent years. This is largely a result of the combined efforts of the shipping industry and national governments through the International Maritime Organization (IMO). However, whilst larger spills are less numerous than they used to be, smaller ones remain a problem. Both tend to be concentrated in specific areas.

Straits and certain other biodiversity and/or traffic hotspots require special measures because of their high concentration of traffic and the potential for accidents between transit and local traffic. Pilotage plays a crucial role in avoiding accidents in the Turkish Straits, and the use of professional pilots in those waters needs to be increased. Navigational measures, including traffic separation schemes and speed limits, have been introduced in the Cabo de Gata area, the Turkish Straits and the Strait of Gibraltar.

The effects of shipping in the Mediterranean are not environmentally benign. The impacts of maritime traffic and of other factors, such as coastal development and fisheries, may be cumulative and may become critical for an environment that is undoubtedly already very stressed.

3.3. BIODIVERSITY

Biodiversity is not uniform throughout the Mediterranean Sea but varies with, for example, longitude, depth in the water column and distance from the coast. Coastal regions and shallow waters have special features, and the western and eastern portions of the Mediterranean differ greatly in biodiversity richness. The Mediterranean Sea also hosts a large number of endemic species.

3.4. LEGAL REGIMES

Shipping is one of the most international activities and therefore requires international regulations. The legal regime for international shipping is structured primarily on conventions, regulations and codes adopted under IMO auspices. A complex set of international and regional legal regimes governs shipping and the protection of marine biodiversity in the Mediterranean, as well as the different coastal zones. Difficulties arise, in particular, in connection with straits used in international navigation.

The Regional Marine Pollution Emergency Response Centre for the Mediterranean Sea (REMPEC) plays an important role with regard to port facilities and measures to combat pollution. The Mediterranean Sea is classified as a 'special area' for the purposes of the IMO MARPOL Convention² Annexes I (Oil) and V (Garbage) and their implementation. Current cooperative efforts concentrate on giving effect to its special area status under Annex V.

For European Union (EU) Member States, the EU's Marine Strategy Framework Directive and the development of an EU maritime policy promote a more integrated approach to tackling the impact of maritime traffic on Mediterranean biodiversity.

² International Convention for the Prevention of Pollution from Ships 1973 and its 1978 Protocol, and as subsequently amended. See <http://www.imo.org>.

4. General issues and threats related to biodiversity, and possible responses

4.1. LACK OF INFORMATION

One of the key impediments to the conservation of biodiversity in the Mediterranean Sea is the lack of scientific and statistical information, both on the current state of biodiversity throughout the region and on the intensity and extent of the individual risks posed by maritime traffic. Further information is also urgently needed with regard to new and future threats.

Whilst some threats may be truly Mediterranean-wide (e.g. alien and invasive species and pollution), others may be geographically limited or localized to 'hotspots' (e.g. groundings and anchor damage). Specific knowledge is needed on these threats in many individual areas. Additional data must be gathered through new and especially interdisciplinary research projects.

Reliable, shared (i.e. pan-Mediterranean) tools must be implemented to collect, update and disseminate data relevant to the protection of biodiversity from maritime traffic in the Mediterranean Sea. The exact type of information required will first have to be discussed by stakeholders.

While bearing in mind the distinction between coastal and pelagic biological profiles, an ecosystem approach to conservation should be preferred to the more traditional focus on a (potentially very long) list of species. Researchers and decision-makers should think in terms of biological systems rather than — as usually happens — spatial areas defined in accordance with human priorities but not biological realities.

The 'ocean triads' concept, referring to three classes of physical processes — enrichment, concentration and retention — is useful in determining areas able to support high biodiversity.

Proposed pilot action: Mapping of biodiversity hotspots

A research priority should be the mapping of biodiversity hotspots, starting with a pilot study in highly sensitive subregions of the Mediterranean.

Proposed pilot action: Cumulative impacts of shipping

A cooperative project should be established in the central Mediterranean to assess the cumulative environmental impacts of shipping within major shipping lanes.

Such a project should involve stakeholders from the shipping sector and competent national authorities, as well as inter-governmental and research organizations active in the region.

4.2. LACK OF AWARENESS

Education and awareness-raising are essential. In particular, training and continuing education projects should be targeted not only at personnel involved in shipping, whether directly (e.g. crew members and ships' officers) or indirectly (e.g. land-based officers responsible for ship surveillance), but also at legal personnel (e.g. judges), in particular with regard to the need to vigorously prosecute offenders and impose severe penalties — up to the maximum permitted under the relevant legislation, i.e. at a level that cannot be easily written off as a business expense — for violations. If the relevant legislation sets the fines too low to deter violations, it is recommended that the legislation be reviewed and amended accordingly.

A number of substantial measures could be envisaged in the social sphere, particularly in relation to assessing the socio-economic situation of seafarers and those whose occupation or activity may affect Mediterranean marine biodiversity. Environmental awareness and the promotion of corporate social responsibility by shipping companies and their insurers, for example, should be strengthened.

Proposed pilot action:

State of the Mediterranean Sea environment

A report on the state of the Mediterranean Sea environment should be produced, drawing, inter alia, on experience gained in the development of the recent report on the state of the Arctic environment. This report would be invaluable for raising political awareness of the threats to the Mediterranean Sea.

Proposed pilot action: Integrated coastal management

Action should be taken to develop and harmonize measures for integrated coastal management, beginning with selected areas where marine biodiversity is particularly at risk. Such a policy instrument could focus initially on, but not be strictly, or solely, tied to ship-based threats to biodiversity. The emerging tool of marine spatial planning should be used in developing these pilot actions for the Mediterranean Sea.

4.3. ENHANCEMENT AND ENFORCEMENT OF THE LEGAL REGIME IN GENERAL

With regard to the applicable legal framework, support must be given to ongoing efforts aimed at strengthening the existing body of international institutions and organizations with competence in the protection of Mediterranean biodiversity from the adverse effects of maritime traffic.

Mediterranean nations must support, in particular, the IMO-administered international legal framework for the protection of the marine environment from the adverse effects of shipping by acceding to, implementing and enforcing the instruments that are already in force, as well as amending them as necessary. They must also ensure that, once adopted, international instruments such as the Ballast Water Convention are promptly ratified and enter into force. The same applies to instruments developed in the context of the Barcelona Convention system³.

4.4. EXCLUSIVE ECONOMIC ZONES

Exclusive Economic Zones (EEZs) give coastal states certain rights to impose marine environmental protection requirements up to 200 nautical miles, roughly speaking, from their coasts. If EEZs were established throughout the Mediterranean Sea, no area would fall beyond national jurisdiction (i.e. no area would be high seas). Not all Mediterranean coastal states have proclaimed an EEZ, however. The dense geography of the Mediterranean Sea makes it physically impossible for any one state to claim a full 200nm EEZ without overlapping that of another state. Many countries have long been reluctant to proceed in that direction, for economic reasons as well as the technical and political difficulties inherent in any delimitation exercise. Nevertheless, several Mediterranean states (including Cyprus, Egypt, Morocco, Syria and Tunisia) have proclaimed EEZs in recent years.

The current governance regime would be greatly improved if all Mediterranean coastal states proclaimed EEZs in accordance with international law. Such a move would immediately strengthen their authority by enabling them to make better use of provisions of the 1982 UN Convention on Law of the Sea (UNCLOS⁴) relating to protection of the marine environment and, consequently, the preservation of marine biodiversity.

Ecological Protection Zones (EPZs) have been established by some states (such as France and Italy), albeit with different competences. Croatia, for example, has a 'quasi-EEZ' — an Ecological and Fisheries Protection Zone proclaimed in 2003. Spain also has a Fisheries Protection Zone, as do Malta and Libya. Such 'hybrid' zones could also be considered by other states, as an alternative to 'standard' EEZs.

In any case, express provision should be made for coastal states to be compulsorily notified of the transit of ships carrying hazardous substances or wastes in their territorial seas.

³ In 1976, the parties to the Mediterranean Action Plan (MAP), the first regional sea programme to be implemented within the framework of the United Nations Environment Programme (UNEP), consisting of 16 Mediterranean countries and the European Economic Community, adopted the Convention for the Protection of the Mediterranean Sea Against Pollution ('Barcelona Convention'). In subsequent years seven protocols were finalized, dealing with specific aspects of Mediterranean environmental protection. In 1995, an amended version of the Barcelona Convention was adopted, under the new title 'Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean'. The 'new' Barcelona Convention has, at August 2009, 22 contracting parties. These and other details are available on the MAP website, at: <http://www.unepmap.org>. The Barcelona Convention, its Protocols, Action Plans and other implementing measures are referred to herein as the 'Barcelona Convention system'.

⁴ See <http://www.un.org/Depts/los/index.htm>.

4.5. PORT STATE CONTROL

Port state control (PSC) is a very successful tool, but it can be further improved for the Mediterranean Sea. What is missing, in particular, is an efficient way for information on substandard ships to be exchanged among ports within and beyond the Mediterranean Sea. Therefore, whilst there is a need to increase the effectiveness of the Mediterranean Memorandum of Understanding (Med MOU) on PSC, the interaction between different PSC MOUs, especially the Paris, Black Sea and Med MOUs, should also be strengthened. The European-based Paris MOU 'name and shame' approach could be usefully extended by devising appropriate legal measures applicable throughout the entire Mediterranean region. The risk of a 'race to the bottom' among ports outside the Paris MOU jurisdiction calls for more stringent harmonization of standards and penalties among the three PSC MOUs operating in the region, which must include the Black Sea MOU, given the geographical and biological linkage between the Black and Mediterranean Seas.

The European Maritime Safety Agency could be involved in a process to develop and implement collaborative projects within and outside EU Member States. The modalities by which PSC is conducted in practice should also be closely scrutinized and appropriately revised. An individual ship calling at a Paris MOU port currently undergoes a thorough check involving the ship's structure, navigational and safety equipment, the crew (particularly their number and qualifications and the language spoken), and evidence of discharges. However, a more focused and sophisticated 'targeting process' needs to be put in place. This should be complemented by use of the IMO model audit scheme, whereby independent auditors from maritime authorities undertake an audit of a ship's actual capacity to implement a range of IMO instruments.

The legally binding effect of PSC under EU law requires an additional level of control by Mediterranean states that belong to the EU, since they may be brought before the European Court of Justice and possibly sanctioned for any failure to abide by their obligations under the EU PSC Directive. Whilst the same mechanism cannot realistically be extended throughout the Mediterranean region on a short- or even medium-term basis, public awareness should be raised concerning the important function of PSC and the role played in this respect by the EU legal system to the benefit of all — not just EU — Mediterranean states.

PSC therefore needs to be improved, especially along the southern and eastern shores of the Mediterranean Sea, and generally in areas outside the geographical scope of application of the EU PSC Directive. Processes and practices relating to PSC need to be harmonized to the greatest possible extent, with a view to avoiding or at least minimizing the phenomenon of 'ports of convenience', and promoting some form of virtuous environmental competitiveness among ports.

Additional improvements within the EU PSC Directive are also possible. The possibility of PSC that also covers invasive alien species and ballast water issues should be closely scrutinized, in order to benefit from the expertise that port state officials have acquired during the years of application of the PSC regime, and to extend such expertise to different, though connected, fields.

Strategically, regional cooperation mechanisms among the various PSC regimes that apply to the Mediterranean area under various MOUs should also be put in place or strengthened, in order to maximize their combined efficiency. The existing Barcelona Convention system could be involved in this process as the operational regional coordinating centre.

Proposed pilot action:

Strengthening port state control in the Mediterranean

Since PSC is an important tool for promoting quality shipping, a project should be developed to strengthen the operational structure and enhance cooperation among the Mediterranean MOU, the Paris MOU, the Black Sea MOU and the EU.

4.6. PSSAS, MPAS AND SPAMIS

The Particularly Sensitive Sea Area (PSSA) concept has gained increasing use in past years as a tool to protect sensitive areas of the marine environment from the harmful impacts of shipping. There are, however, differing opinions on applying the PSSA concept within the Mediterranean Sea. In order to understand the extent of the measures that can be undertaken within different PSSAs, a distinction needs to be made between a basin-wide PSSA and regional/localized PSSAs.

One view is that local application of the PSSA concept may be useful in certain areas of the Mediterranean Sea since it would provide a platform for implementing other measures through appropriate coordination efforts. For example, a proposal for an Adriatic PSSA is currently under development and could be seen as a first step towards the institutionalization of Adriatic regional cooperation on environmental and maritime safety issues.

An alternative view is that PSSAs are unnecessary in the Mediterranean Sea, as the designation of PSSAs would not provide states with any additional statutory powers to adopt measures that are not available through IMO instruments already in place. Instead, according to this view, it would be preferable to improve the implementation of, for example, MARPOL and its Annexes. Furthermore, regional cooperation could be effectively achieved through close coordination under the UNEP Mediterranean Action Plan (MAP) and the Barcelona Convention system.

PSSA designation may play a useful role as a communication and awareness-raising tool on marine environmental issues within industry and the shipping sector. This has occurred in several PSSAs elsewhere, e.g. the Great Barrier Reef and the Florida Keys. This should not, however, be the basis for the establishment of a PSSA.

Whilst mariners recognise and abide by internationally accepted symbols for routing measures (e.g. areas to be avoided), this is not always the case for PSSAs, as there is no internationally recognised symbol for them. Therefore, it must be borne in mind that education and awareness-raising will have to be implemented in conjunction with the establishment of PSSAs.

PSSAs may provide international support for the position that navigational measures (such as compulsory pilotage) should be implemented for a specific area. In this respect, PSSAs may represent added value in countries where environmental responses are not well established, because they can assist in putting in place better operational responses and in convincing national authorities to devote more focused efforts to an environmentally particularly significant area.

In conclusion, PSSAs are one of a range of options for protection of marine areas from the effects of shipping. Additional study of the suitability and feasibility of PSSAs in the region is needed.

With regard to Marine Protected Areas (MPAs), it is important to effectively communicate their exact functional needs to those involved in maritime traffic. Whilst MPAs are frequently seen as an obstacle to economic activities such as fishing, shipping and tourism, it is important to recognise that, together with PSSAs, they are not intended to prevent these or other activities but, instead, to promote safety and environmental protection while enabling shipping and these other activities to continue.

In the Mediterranean context there is a need to establish a link between PSSAs and Specially Protected Areas of Mediterranean Importance (SPAMIs). PSSAs can bring added value to SPAMIs where the latter are created within the legal framework provided by the Barcelona Convention, and enforcement under certain circumstances may be binding only on states parties to that framework. If SPAMIs were to include PSSA measures, certain obligations could also be extended to IMO members that are not parties to the Barcelona Convention system. This aspect clearly deserves further investigation.

Alternatively, SPAMIs could serve as focal points for evaluating environmental impacts from shipping, while PSSAs would function as one of the tools to address threats from shipping.

Upon request by a country, the Regional Activity Centre for Specially Protected Areas (RAC-SPA) could help to identify which areas are under threat. Whilst the Pelagos Sanctuary, for example, has been mentioned as a potential area for PSSA designation, as yet there has been no request from the parties to commence such a process.

Also upon request by a country, RAC-SPA and REMPEC under the UNEP-MAP could cooperate in exploring the above PSSA-related options.

Proposed pilot action:

Application of the PSSA concept in the Mediterranean

The application of the PSSA concept in the context of the Mediterranean Sea deserves further consideration with particular regard to the establishment of a functional link between PSSAs and SPAMIs. IUCN should cooperate with REMPEC and RAC-SPA in identifying potential candidate sites for PSSA designation, with a particular focus on SPAMIs.

4.7. OTHER MARITIME TRAFFIC GOVERNANCE MECHANISMS

Maritime traffic governance could also be improved through the implementation of IMO-based instruments which address, for example, ships' routing systems, reporting systems, compulsory pilotage and vessel traffic services.

4.8. ENHANCED COOPERATION

Coastal states should improve their cooperation and communication on monitoring and enforcement efforts (e.g. by sharing technology and information). Experience from the fisheries sector demonstrates the risk that strict regulation in one zone may simply cause unwanted activities to be diverted to other, unregulated or less regulated areas. That is why regional cooperation is a key element in this respect, coupled with appropriately tailored subregional mechanisms.

Proposed pilot action:

Cooperation must also be enhanced between coastal and flag states.

4.9. TECHNOLOGY

Unwanted impacts on marine biodiversity could be reduced through technical improvements, such as ballast water and anti-fouling treatments.

A number of technical tools now available to monitor and control maritime traffic can also play a crucial role in minimizing its adverse effects on marine biodiversity. They include vessel traffic services and automated identification systems. Any pilot actions or support activities in this respect must be coordinated with measures taken within the legal or regulatory sphere.

Proposed pilot action:

Specific issues to be tackled by potential pilot actions and/or support activities include the enhancement of effective surveillance of ships (e.g. by employing unmanned aircraft for aerial surveys) and of means to control illegal and environmentally harmful activities at sea.

5. Specific threats and possible responses

5.1. SHIP STRIKES ON CETACEANS AND TURTLES

Ship strikes on cetaceans are quite common in Mediterranean waters, particularly in the Pelagos Sanctuary and adjacent waters, and are most likely the major cause of non-natural mortality for fin whales. The data suggest that injuries to cetaceans caused by ship strikes in the Mediterranean tend to be directly related to the speed of the ship, and are likely to be non-lethal at lower speeds (<10 knots). One difficulty, however, is that it is very hard for most vessel operators to detect a cetacean, even a substantially sized whale, before it is actually struck. The high likelihood of unreported fatal strikes combined with other anthropogenic threats suggests an urgent need for a comprehensive, basin-wide cetacean conservation strategy. Ship-strike mitigation requirements include real-time monitoring of whale presence and distribution in order to relocate ferry routes to areas of lower cetacean density, and ship speed reductions in areas of high cetacean density.

Sea turtles are also victims of collisions with ships. Despite a general shortage of data, it appears that, compared to fishing gear, ship strikes represent a lesser, yet not negligible, cause of death.

Proposed pilot action:

Collisions between ships and cetaceans

A project should be established to examine collisions between ships and large marine animals, in particular cetaceans, with the aim of proposing mitigation measures. This project would be developed in conjunction with the relevant international organizations, such as ACCOBAMS⁵.

5.2. DAMAGE CAUSED BY ANCHORING AND GROUNDING

It appears that beds of the endemic Mediterranean seagrass *Posidonia oceanica* are declining, partly because of damage done by boats anchoring or grounding in shallow waters.

Proposed pilot action:

Impacts of anchor damage on Posidonia beds

An experimental study should be undertaken to investigate the long-term effects of grounding and anchoring on Posidonia beds.

5.3. INVASIVE ALIEN SPECIES

Invasive alien species (IAS) are affecting biodiversity in the Mediterranean Sea as a result of maritime transport. Some of these organisms can spread rapidly and may be hard to detect, rendering control and eradication options difficult to pursue. The principal route for the introduction of IAS into the Mediterranean appears to be the Suez Canal, whilst shipping (commercial and recreational) and mariculture seem to be the primary vectors. Studies show that 188 metazoan species have been introduced to the Mediterranean by vessels and that the number is steadily rising. Secondary dispersion by vessels within the Mediterranean Sea is also an important issue. Because of the great connectivity of the sea and the dense international shipping network in the Mediterranean, there cannot reasonably be a 'regional' solution to the problem, which must therefore be tackled globally.

Hull fouling and discharge of ballast water are the two main mechanisms by which vessels introduce IAS into the Mediterranean. The possibility of enacting international rules on hull fouling has been raised within IMO and efforts are under way to examine the issue and develop potential regulations. Further information is needed on fouling biota in port and port-proximate areas. An urgent pilot study should be conducted specifically in southern Mediterranean ports in order to assess levels of fouling there, and, because very little information exists regarding fouling in eastern Mediterranean ports, data relating to this other subregion should be gathered as well.

⁵ 1996 Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and contiguous Atlantic Area.
See <http://www.accobams.org>.

While a significant proportion of IAS is dispersed via hull fouling, ballast water remains a critical issue, especially with regard to the spread of such species from one port to another. The priority must be to urge Mediterranean states to ratify the Ballast Water Convention. In any event it would be useful to invest in risk assessments of ballast water exchange zones, and to identify and propose appropriate zones in compliance with IMO requirements. This would also be in accordance with the Ballast Water Convention. Furthermore, the Barcelona Convention Secretariat and IMO could support this process (notably following similar experience within the Oslo-Paris Convention system, or OSPAR⁶). Coordination with the Globallast project should also be assured, with the assistance of REMPEC and the involvement of UNEP-MAP and the Barcelona Convention Secretariat.

Proposed pilot actions: Invasive alien species

Invasive alien species are clearly a significant threat to marine biodiversity in the Mediterranean. Both ballast water discharge and hull fouling are major pathways for IAS introduction. Two pilot actions are proposed regarding ballast water discharge:

A risk assessment of ballast water exchange zones throughout the Mediterranean should be conducted.

Appropriate zones should be identified and proposed in compliance with IMO requirements.

In terms of hull fouling, port and port-proximate areas need to be investigated for fouling biota. Specific pilot studies are urgently required to assess levels of fouling in southern and eastern Mediterranean ports, where little information is currently available.

5.4. OPERATIONAL OIL DISCHARGES

Compared with infrequent major accidents, there is less awareness of the impact of chronic oil discharges, notwithstanding the fact that ongoing, 'routine' discharges make a significant contribution to pollution inputs in the Mediterranean.

Although it has been designated a 'special area' under MARPOL Annex I, the Mediterranean Sea is still experiencing problems with illegal operational discharges. Modern technology (such as satellite-based monitoring and surveillance devices) is not yet performing adequately because, although it enables the detection of discharges, it does not give information on their source(s) and on the actual magnitude of a particular spill. The combination of different forms of surveillance for EU Member States is being studied at present; there will soon be an opportunity to assess how marine pollution aspects can be incorporated within these tools and to examine the issue further on that basis.

One specific sector in which cooperation between coastal states would be usefully enhanced relates to the establishment of a network of prosecutors, who would exchange information concerning rates of prosecution, convictions and penalties,

investigation efforts and methods, etc. REMPEC is currently examining this issue (while also taking UNCLOS provisions into account), with the objective of avoiding a situation where stricter monitoring and controls in one area of the Mediterranean have the effect of shifting the problem to non-monitored or less monitored parts.

Provision of port reception facilities for bilge water and other contaminants is an important issue in the region which needs to be addressed within all competent fora (e.g. IMO at the global level and the Barcelona Convention Secretariat regionally). Interested states and relevant industry sectors should cooperate in investigating how to enhance reception facilities and increase their use (in terms, for example, of their cost to the shipping industry and the improvement of waste disposal equipment), so as to prevent economic considerations from dictating environmentally irresponsible consequences.

Proposed pilot actions: Port reception facilities

Appropriate evaluations must be undertaken of the best available options for defraying the costs of using port reception facilities, and innovative methods for the financing of such facilities must be explored.

5.5. ACCIDENTAL OIL DISCHARGES

The main gap in relation to accidental discharges is insufficient contingency planning. Fourteen Mediterranean countries appear to have fully operational oil-spill contingency plans, whilst four (Lebanon, Malta, Montenegro, Syria) have not yet put one in place. Bosnia and Herzegovina has not done so either, since it does not have maritime traffic or a port of its own, but instead uses the Croatian port of Ploce. To enable the most effective response to a marine pollution incident, states must identify their priorities and establish a detailed response plan before incidents occur. If an incident occurs and no plan is in place, political leaders are likely to respond based on the media drivers and public pressure, regardless of technical and scientific advice. Plans are required both for search and rescue and for marine pollution. Industry, governments and scientists need to collaborate in this respect. Bilateral or trilateral agreements under the Barcelona Convention are among the best ways to promote preparedness and training in order to mitigate the effects of maritime emergencies on marine biodiversity in both the northern and the southern Mediterranean. The IMO's 1990 Oil Pollution Preparedness, Response and Cooperation (OPRC) Convention and its related 2000 Protocol concerning hazardous and noxious substances (HNS), together with their regional counterparts under the Barcelona Convention, could serve as a model to address actual and potential risks.

All stakeholders and competent agencies should be involved and the need to improve communication flows among such entities, as well as within individual Mediterranean states, will have to be addressed. Contingency planning will certainly be improved by the promotion of consultation mechanisms and opportunities among different national authorities, especially the Ministries of Environment, Transport and Employment, as well as with the scientific community and the maritime industry.

⁶ Convention for the Protection of the Marine Environment of the Northeast Atlantic (1993). See <http://www.ospar.org>.

Because of the problem of accidental discharges, particular sea routes may not be environmentally sustainable. There are situations in which, as a policy measure, land routes should be favoured so as not to exacerbate ballast water and other shipping-related environmental problems in the Mediterranean, particularly in the Adriatic Sea.

Proposed pilot actions: Contingency planning

Pilot actions and support activities are required to improve emergency plans and risk assessment exercises, or to introduce them where they are lacking, because both are crucial tools for combating threats from shipping to Mediterranean biodiversity.

5.6. HAZARDOUS AND NOXIOUS SUBSTANCES (HNS)

The loss at sea of containers carrying HNS represents a serious threat to biodiversity, but the lack of information on the issue makes it very difficult to define the nature and extent of the risks. The major problem with HNS is the variety of chemicals that may potentially be involved; these may behave in different ways once spilled and may require different anti-pollution measures (in contrast to oil, where the product itself and the post-spill processes are better understood, and the appropriate actions usually well defined and adequately implemented).

It is particularly important to urge all Mediterranean states to ratify the relevant IMO and Barcelona Conventions and Protocols with regard to HNS, not only because of the range of potentially polluting chemicals, but also because a substantial knowledge gap exists on HNS. Emerging challenges in this respect include, in particular, liquefied natural gas (LNG), offshore platforms and in-water recovery of hazardous substances.

Proposed pilot actions: Risks from HNS

Efforts must be made to close the knowledge gap on HNS. Research could usefully focus on LNG, offshore platforms and in-water recovery of hazardous substances.

5.7. THERMAL DISCHARGES

A relatively new issue concerns the possible effects of thermal discharges from LNG tankers into the local environment. This is associated with the anticipated growth in LNG use and the construction of LNG terminals in the Mediterranean. Construction is expected to begin shortly on an LNG terminal in the Croatian waters of the Adriatic Sea, bringing new tanker traffic to the area. LNG is carried at very low temperatures and during offloading this may lead to a temperature differential in the water surrounding the vessel and the local marine environment. The potential impacts on marine life of such an effect are currently unknown and more information on this issue is needed.

Proposed pilot action: Impacts of LNG transport and transfer

A research project should be undertaken on the effects on marine life of the temperature differentials that may potentially result from LNG offloading.

5.8. UNDERWATER NOISE

Underwater noise presents a risk to marine biodiversity, although specific data and examples are not available to assist in identifying policy options to address this threat. Further information is needed on noise distribution and trends in noise pollution, and its effects on different organisms. Among the various sources in the Mediterranean Sea, noise produced by maritime traffic — i.e. ship-source noise pollution — deserves further investigation.

Proposed pilot actions: Underwater noise

Systems for monitoring underwater noise trends and seasonality should be put in place in the Mediterranean.

Noise trends should be studied and related to biological factors such as species abundance, distribution and movements.

A 'noise budget' model should be developed, in which synergistic and cumulative effects are considered.

The concept of 'acoustic comfort' should be defined and models should be developed to define noise ranges that can be tolerated without negative effects.

Predictive noise maps should be prepared in order to evaluate the impact of new noise sources and the effect of mitigation measures.

Risk assessments should be carried out, examining the effects of noise on marine fauna and identifying mitigation measures for noise pollution in partnership with the industry sectors involved.

6. Summary and conclusions

One of the main problems for the management of biodiversity in the Mediterranean Sea is that relevant information is not being shared readily enough by decision-makers, industry and other stakeholders. Consequently there is a general lack of knowledge about the impact of maritime traffic on biodiversity in the region. This situation may be due to a combination of a lack of technical infrastructure and financial resources, and poor political commitment to a very important aspect of ocean management.

It is still possible, however, to deal with threats to Mediterranean biodiversity in general terms despite the lack of scientifically reliable information about specific threats, including at a subregional level. The precautionary approach must be adopted in addressing these threats, while the search for a broader and more thorough understanding of biodiversity values and priorities must continue.

It is clear that maritime traffic poses a threat to biodiversity within the Mediterranean basin. Because of the nature of and trends in shipping, existing and emerging threats are likely to increase. It is not yet possible, however, to achieve a full understanding of the adverse effects of shipping, delineate all sensitive areas, or present a complete picture of specific threats.

Several priority topics exist — as opposed to a single topic — that deserve attention with regard to the protection of biodiversity in the Mediterranean Sea from maritime traffic.

In respect of accidental impacts, there are close links between maritime safety and marine pollution. Although significant progress has been made in reducing accidental pollution, continued efforts should be made to protect marine biodiversity by setting and maintaining a high level of safety-related measures and quality shipping standards. Priority should be given to creating quality shipping throughout the Mediterranean Sea with zero tolerance for substandard ships that increase the risk of accidental and operational pollution of the marine environment. Operational issues such as acoustic pollution, the inadequacy of port facilities, IAS and garbage disposal are also having increasingly important negative effects on the marine environment.

Among the principal gaps to be filled are the lack of regulation of ship noise management and the lack of a joint or regional environmental impact assessment process to evaluate potential transboundary effects of ports, port infrastructure and port components (LNG storage appears to be the most critical emerging issue in this respect).

Issues relating to protection of the marine environment of the Mediterranean Sea from the risks posed by maritime traffic should be raised in the relevant fora wherever existing legal regimes are insufficiently effective, in order to improve and supplement the legal frameworks currently in place.

The inherently global nature of shipping requires regulatory responses to be put in place at multiple levels (international, regional, subregional and national). The wide range of relevant fora requires such a scenario. Experience demonstrates that global measures may well be triggered by regional action. In certain respects, however, the whole Mediterranean basin should not be treated as a uniform entity in itself. For example, two major traffic patterns exist in the Mediterranean Sea: transit traffic and traffic calling at Mediterranean ports. In the Adriatic Sea there is virtually no commercial transit traffic, as all commercial traffic is going to Adriatic ports. This means that in some areas of the Mediterranean Sea it may be possible to effectively rely largely on port state jurisdiction. This will require subregional coordination.

While some states are well prepared and positioned to deal with threats to biodiversity, others are far less prepared and have very limited technical capacity. Such a situation calls for better Mediterranean-wide cooperation and coordination in order to ensure more effective implementation of and compliance with applicable international and regional legal regimes. Furthermore, coastal states should be encouraged to act within the framework allowed by the UNCLOS⁷ regime as reflecting international law. The

coastal states of the Mediterranean, a semi-enclosed sea, should be urged to cooperate and, where required, reach agreement on proclaiming EEZs or more limited EPZs, for example. This would be a key initiative for the Mediterranean, as it would eliminate 'high seas' and thereby improve the rule of law in the basin if all Mediterranean coastal states took part.

With specific regard to MPAs, much greater coordination is needed among environment and transport agencies, industry and all relevant stakeholders. It is necessary to change the erroneous perception that MPA managers can directly regulate shipping and implement relevant measures accordingly. The PSSA concept is a potentially useful tool at the subregional and local level.

A number of measures of a more technical nature are available to Mediterranean states for the purpose of protecting biodiversity from maritime traffic. These range from the enhancement of PSC to a new and more efficient approach to the problem of port reception facilities, and to the improvement of emergency action plans.

⁷ Turkey is not a party to UNCLOS. The Turkish Ministry of the Environment and Forestry requests that Turkey's official position be noted that the Mediterranean is a semi-enclosed sea and that under international law the proclamation and establishment of all maritime zones, including EEZs and EPZs, require the consent of all adjacent and opposite coastal states.

Annex 1:

List of workshop participants (in alphabetical order)

NAME	INSTITUTION	COUNTRY
Ezio Amato	ICRAM	Italy
Cesare Alberti Di Catemaja	ENI Exp	Italy
Selin Birsel	Turmepa	Turkey
Sergio R. Carbonell	Salvamento Marítimo	Spain
Laure Fournier	TOTAL Corporate Foundation for Biodiversity	France
Sharelle Hart	IUCN Environmental Law Centre	Germany
Cahit Istikbal	Turkish Maritime Pilots' Association	Turkey
Lilia Khodjet	REMPEC	Malta
Ahmet Kideys	Black Sea Commission	Turkey
Cemorkun Kirac	Undersecretariat for Maritime Affairs (UMA)	Turkey
Valerie Lavaud	University of Montpellier	France
Eelco Leemans	North Sea Foundation	Netherlands
Mariantonia Lo Prete	SPLIT Inrets	France
Arzu Olgun	Tubitak/Marmara Research Center	Turkey
Anna Occhipinti	University of Pavia	Italy
Colleen O'Hagan	ITOPF	United Kingdom
Nilufer Oral	Istanbul Bilgi University/IUCN-CEL	Turkey
Luis Otero	Maritime Directorate	Spain
Oya Özçayır	IMO Member/Maritime Consultant	United Kingdom
Bayram Öztürk	Istanbul University/TUDAV	Turkey
Simone Panigada	Tethys Research Institute	Italy
Christine Pergent	RAC-SPA Scientific Director	Tunisia
Chedly Rais	ACCOBAMS Secretariat	Monaco / Tunisia
Julian Roberts	IUCN GMP	Switzerland
Onur Sari	Undersecretariat for Maritime Affairs	Turkey
Lorenzo Schiano di Pepe	University of Genova (Law)	Italy
Tullio Scovazzi	University of Milano-Bicocca (Law)	Italy
François Simard	IUCN Med	Spain
Stamatis Sivitos	EBCD	Greece
Despina Symons	EBCD	Greece
Ilaria Tani	University of Milano (Law)	Italy
Erim Taylanlar	BP Shipping	Turkey
Ana Tejedor Arceredillo	Ministry of Environment	Spain
Constantinou Triantafyllou	Helmepea	Greece
Murat Tuncer	Chamber of Shipping	Turkey
Nur Eda Topçu	Turkish Marine Research Foundation	Turkey
Philomène Verlaan	IUCN-CEL	Netherlands/United Kingdom/USA
Davor Vidas	Fridtjof Nansen Institute	Norway
Gert Verreet	EC-DGENV-D.2	European Commission
Maurizio Wurtz	University of Genova (Science)	Italy



**INTERNATIONAL UNION
FOR CONSERVATION OF NATURE**

IUCN-MED

Parque Tecnológico de Andalucía
Marie Curie, 22
29590 - Campanillas (Málaga)
iucnmed@iucn.org
Tel +34 95 202 84 30
Fax +34 95 202 81 45
www.iucn.org/mediterranean

Core support to the IUCN Centre for
Mediterranean Cooperation is provided by:

