



MEDITERRANEAN ACTION PLAN (MAP) REGIONAL MARINE POLLUTION EMERGENCY RESPONSE CENTRE FOR THE MEDITERRANEAN SEA (REMPEC)

Thirteenth Meeting of the Focal Points of the Regional
Marine Pollution Emergency Response Centre
for the Mediterranean Sea (REMPEC)

REMPEC/WG.45/8
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Agenda Item 8

DATA SHARING, MONITORING AND REPORTING

Note by the Secretariat

SUMMARY

Executive Summary: This document sets out an outline of progress made on data sharing, monitoring and reporting since the last Meeting of the Focal Points of REMPEC held in Malta in May 2017.

Action to be taken: Paragraph 45

Related documents: REMPEC/WG.32/5, REMPEC/WG.37/10, REMPEC/WG.38/5,
REMPEC/WG.41/9, REMPEC/WG.41/9/Corr.1, REMPEC/WG.41/INF.11,
REMPEC/WG.41/INF.12, REMPEC/WG.45/5, REMPEC/WG.45/10,
REMPEC/WG.45/12/1, REMPEC/WG.45/INF.4, REMPEC/WG.45/INF.5,
REMPEC/WG.45/INF.6, REMPEC/WG.45/INF.7, REMPEC/WG.45/INF.13,
UNEP(DEPI)/MED IG.22/28, UNEP(OCA)/MED IG.1/5, UNEP(DEPI)/MED
IG.23/23, PPR 5/INF.3

Background

1 The Nineteenth Ordinary Meeting of the Contracting Parties to the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean ("the Barcelona Convention") and its Protocols (COP 19) (Athens, Greece, 9-12 February 2016) adopted the Regional Strategy for Prevention of and Response to Marine Pollution from Ships (2016-2021)¹, hereinafter referred to as the Regional Strategy (2016-2021). It addresses issues related to data sharing, monitoring, and reporting in the following Specific Objectives:

- Specific Objectives 15: To examine the possibility of designating the Mediterranean Sea or parts thereof as SO_x emission control area under MARPOL Annex VI and effectively implement the existing energy efficiency measures;
- Specific Objective 17: To enhance the levels of pre-positioned spill response equipment under the direct control of Mediterranean coastal States; and
- Specific Objective 19: To improve the quality, speed and effectiveness of decision-making process in case of marine pollution incidents through the development and introduction of technical and decision support tools.

¹ UNEP(DEPI)/MED IG.22/28, Decision IG.22/4.

2 The Twelfth Meeting of the Focal Points of the Regional Marine Pollution Emergency Response Centre for the Mediterranean Sea (REMPEC) (St. Julian's, Malta, 23-25 May 2017), considered document REMPEC/WG.41/9 that provided information on the challenges and opportunities related to data sharing, monitoring, and reporting.

3 The Meeting acknowledged the valuable effort made towards reducing the workload related to reporting procedure and introducing a more streamlined reporting process within the Barcelona Convention. It agreed that further **synergies between and integration of the regional and European databases were still required to avoid duplications**, specifically concerning accidental marine pollution reports. The Meeting welcomed the progress made to interconnect existing databases on response equipment.

4 Further to the submission of the draft revised reporting format for the implementation of the Protocol concerning Cooperation in Preventing Pollution from Ships and, in Cases of Emergency, Combating Pollution of the Mediterranean Sea ("the 2002 Prevention and Emergency Protocol"), the Meeting agreed, as appropriate, **to consider any additional measures to further streamline and rationalise the Contracting Parties to the Barcelona Convention reporting obligations**, and liaise with their respective Focal Points of the Mediterranean Action to contribute to the testing of the revised reporting format reproduced in the Appendix to document REMPEC/WG.41/INF.11.

5 The Meeting encouraged all Contracting Parties to the Barcelona Convention **to** regularly check and **update their details held on:**

- .1 their **REMPEC Country Profile**;
- .2 the Mediterranean Integrated Geographical Information System on Marine Pollution Risk Assessment and Response (**MEDGIS-MAR**);
- .3 the Member Profile of the information system of the Mediterranean Network of Law Enforcement Officials relating to the International Convention for the Prevention of Pollution from Ships (MARPOL) within the framework of the Barcelona Convention (**MENELAS**); and
- .4 the Barcelona Convention Reporting System (**BCRS**).

6 The Meeting also requested the Secretariat (REMPEC), in consultation with the Contracting Parties to the Barcelona Convention, to:

- .1 re-issue the request to each Mediterranean coastal State **to confirm its position concerning the visualisation rights on national data**, before the next Meeting of the UNEP/MAP Focal Points;
- .2 send a reminder prior to each Meeting of the Focal Points of REMPEC, **to update the information contained in MEDGIS-MAR, in particular, to report accidents causing or likely to cause pollution of the sea by oil and other harmful substances and REMPEC Country Profile** to ensure their regular update; and
- .3 continue to explore, with the support of the MAP-Barcelona Convention Secretariat and other Regional Activity Centres, in particular, the Regional Activity Centre for Information and Communication (INFO/RAC), the best way forward **to reach a consensus on the access rights of national data**, including information related to accidents and response means and any other requirements, with a view to improving the quality, speed and effectiveness of decision-making process in case of marine pollution incidents.

7 The Meeting noted the information provided on the development of a quality assurance programme for data reporting and collection, in accordance with Article 5 of the 2002 Prevention and Emergency Protocol, as well as the development of the 2017 Quality Status Report for the Mediterranean (2017 MED QSR) presented in documents REMPEC/WG.41/9 and REMPEC/WG.41/9/Corr.1.

8 The Meeting took note of the Integrated Monitoring and Assessment Programme of the Mediterranean Sea, and Coast and Related Assessment Criteria (IMAP)², adopted by COP 19 and of the gap analysis as well as the conclusions and recommendations set out in the Consultancy Report, as presented in document REMPEC/WG.41/INF.12.

9 The Meeting agreed upon the draft IMAP Indicator Guidance Factsheet for the Common Indicator 19: Occurrence, origin (where possible), extent of acute pollution events (e.g. slicks from oil, oil products and hazardous substances), and their impact on biota affected by this pollution, hereinafter referred to as EO9 C119, as well as the draft 2017 MED QSR Assessment Factsheet for EO9 C119, as set out respectively in documents REMPEC/WG.41/9/Corr.1 and Annex III to document REMPEC/WG.41/9.

10 In the context of the discussion concerning cooperation in the Mediterranean region to prevent and combat marine pollution from ships, the Meeting requested the Secretariat to liaise with the European Maritime Safety Agency (EMSA) to seek **clarification on the level of access the Secretariats of the regional agreements and non-EU countries are allowed to EMSA's Integrated Maritime Services (IMS) and other services including CleanSeaNet and SafeSeaNet.**

11 The Secretariat invited the Mediterranean Action Plan (MAP) of the United Nations Environment Programme (UNEP) in consultation with INFO/RAC, the International Maritime Organization (IMO) and the European Commission to submit individual information documents describing their own data sharing, monitoring and reporting procedures to the present meeting. The invitation was made in order to provide the Contracting Parties to the Barcelona Convention with a comprehensive overview of data sharing, monitoring, and reporting procedures within the Mediterranean region, in accordance with the obligations arising from the Barcelona Convention, the 2002 Prevention and Emergency Protocol, relevant international conventions and European Union legislation, as set out in Appendix 2 to the Regional Strategy (2016-2021).

REMPEC data sharing, monitoring and reporting on marine pollution from ships

12 With a view to assisting the Contracting Parties to the 2002 Prevention and Emergency Protocol, in the process of implementing its Article 7 on Dissemination and exchange of information, REMPEC developed, over the years, a set of tools, as referred to in documents REMPEC/WG.32/5, REMPEC/WG.37/10 and REMPEC/WG.41/9 submitted respectively to the Tenth Meeting of the Focal Points of REMPEC (Malta, 3-5 May 2011), the Eleventh Meeting of the Focal Points of REMPEC (Malta, 15-17 June 2015) and the Twelfth Meeting of the Focal Points of REMPEC (Malta, 23-25 May 2017). These tools are briefly introduced in the following paragraphs:

- .1 **REMPEC Country Profile** (<http://www.rempec.org/country.asp>): The Country Profiles contain detailed information on the implementation of the 2002 Prevention and Emergency Protocol. With a view to helping Mediterranean coastal States to fulfil their obligations “to use their best endeavours to render assistance to the other Parties who so request in case of emergency”³, REMPEC’s function is to collect and disseminate information concerning “experts, equipment and installations in each coastal State”. This knowledge, under certain conditions, can be made available at the disposal of the States upon their requests, in case of emergency⁴. The Country Profile of each Contracting Party to the Barcelona Convention shares knowledge on preparedness for and response to marine pollution, such as Contact list of the National Competent Authorities, the status of ratification of relevant conventions and protocols, national and regional system, response strategy, available expertise, trans-boundary arrangements and training. It also contains information concerning the prevention of marine pollution from ships, i.e. Contact list for the National competent authorities, the status of ratification and implementation of relevant international conventions. The information available in the Country Profiles pages is updated solely by the Contracting Parties to the Barcelona Convention and validated by REMPEC, except for the status of ratification of Conventions and Protocols as these are regularly updated by REMPEC based on information provided by the IMO. Additional information made directly available to REMPEC by the Contracting Parties to the Barcelona Convention is also updated. The list of companies offering services in the Mediterranean region in case

² UNEP(DEPI)/MED IG.22/28, Decision IG.22/7.

³ Article 12 of the 2002 Prevention and Emergency Protocol.

⁴ UNEP(OCA)/MED IG.1/5, Annex V, Appendix 1, pages 1-3), Function A(ii) of the amended Annex to Resolution 7 “Objectives and functions of the Centre.

of emergency is exclusively provided by the Contracting Parties to the Barcelona Convention with no exceptions.

- .2 MIDSIS TROCS (<http://midsis.rempec.org>): The Maritime Integrated Decision Support Information System on Transport of Chemical Substances (MIDSIS-TROCS) contains response options presented in a decision-tree format, reinforced by tables, matrices and diagrams, some of which represent actual experiences at the marine incident sites. The decision-trees are based on the behaviour classification system for chemicals spilled at sea which is accepted by the IMO and other regional arrangements for combating accidental marine pollution. Other sections have been included which contain information on the behaviour of commonly transported chemicals, the compatibility of chemicals, the resistance of equipment material to chemicals and safety precautions when entering the spill sites. The chemical data gathered in this tool has been updated to reflect the developments which took place at the international level mainly concerning the classification of chemicals and their related GESAMP profiles. Further to the recent approval of the two-year (2019-2020) Western Mediterranean Region Marine Oil & HNS Pollution Cooperation (West MOPoCo) Project co-funded by the Directorate-General for European Civil Protection and Humanitarian Aid Operations of the European Commission, the Inter-regional Hazardous and Noxious Substances (HNS) Response Manual, referred in document REMPEC/WG.45/12/1, will ultimately be incorporated in the MIDSIS-TROCS.
- .3 Waste Management Decision Support Tool (<http://www.rempec.org/rempecwaste>)
The Waste Management Decision Support Tool was developed by REMPEC to support Mediterranean coastal States when establishing or revising their national waste management strategy for oily waste resulting from accidental marine pollution. The tool aims at facilitating the determination of the most suitable techniques for the countries and at highlighting, where necessary, regulatory amendments. It focuses on oil spill waste recovered after an accidental oil spill. The "Mediterranean Oil Spill Waste Management Guidelines" endorsed by the Tenth Meeting of Focal Points of REMPEC (Malta, 3-5 May 2011) was used to develop the internet application consisting on the Decision Support Tool. All Mediterranean coastal States have been provided with individual credentials to allow them to input their national information in the application in order to create all potential sections of an Oil Spill Waste Management. The application assists the user to dynamically build waste streams, depending on the types of waste to be treated. Knowing the type of waste, the Application can propose to the user what possible treatments and potential installations to implement the treatment(s). Knowing the facilities, the Application can identify treatments available and the acceptable kinds of waste for these facilities.
- .4 MEDGIS-MAR (<http://medgismar.rempec.org>): The Mediterranean Integrated Geographical Information System on Marine Pollution Risk Assessment and Response (MEDGIS-MAR) contains national data (response equipment, accidents, oil and gas installations, and oil handling facilities) updated by and restricted to each Mediterranean coastal State provided with personalised credentials. The platform also contains public data including shoreline type layers, environmental layers (i.e. Alboran areas, Cetaceans, Coral, Environmentally or Biologically Significant Areas, Fisheries restricted areas, Monk seal, Natura 2000, Pelagos sanctuary, Seabirds, Seagrass, Loggerhead sea turtles, Green sea turtles, Specially Protected Areas of Mediterranean Importance (SPAMIs), bathymetry), socio-economic layers (i.e. Desalination plants, Power plants, Ports and Marinas) as well as maritime traffic layers gathered from various sources. To support the definition of strategies to respond to oil and HNS incidents, MEDGIS-MAR allows for the display of customized vulnerability maps. Following the setting by the user of the vulnerability of the different socio-economic and environmental criteria available, a unique and personal vulnerability map is obtained, featuring areas from low to high vulnerability all around the Mediterranean. In 2018, MEDGIS-MAR was upgraded with fifteen (15) new features added, including a layer related to illicit discharges, a responsive interface with additional filters, customised access and update by Mediterranean coastal States. MEDGIS-MAR is now connected to WITOIL ("Where Is The Oil"), a service to deliver and disseminate the prediction of the transport and transformation of actual or hypothetical oil spills in the Mediterranean Sea. The oil spill prediction is simulated by

the oil spill model MEDSLIK-II as a freely available community model (<http://www.medslk-ii.org>).

- .5 MENELAS Information System (<http://www.menelas.org>): The Mediterranean Network of Law Enforcement Officials relating to MARPOL within the framework of the Barcelona Convention (MENELAS) information system is an internet-based tool comprising of a public interface and a “forum/hotline”. The public interface provides general information on how to raise awareness on the problem of illicit discharges from ships at sea, the aim of the network, its participating and associate members, its activities and achievements. The public part also contains information on the legislative framework and procedural requirements in the participating members related to the prosecution of illicit discharges offenders. Statistical data are expected to be made available in the future. The “forum/hotline” is a restricted area aimed to facilitate the exchange of information only between participating members. In this area requests for specific information are made, restricted data can be shared, i.e legal frameworks, tips for investigators, special techniques/devices/tools, evidence gathering/procedures, lessons learnt, post-case analyses. This space also allows alerting the participating members to a specific emergency, through a hotline with the possibility to interact with each other accordingly.
- .6 MedERSys: The Mediterranean Guide on Cooperation and Mutual Assistance in Responding to Marine Pollution Incidents⁵ was adopted by the Twentieth Ordinary Meeting of the Contracting Parties to the Barcelona Convention and its Protocols (Tirana, Albania, 17-20 December 2017) (COP 20). It is a tool designed and developed by REMPEC with a view to assisting the Contracting Parties to the Barcelona Convention and its Protocols in managing requests and offers of assistance from other countries and organisations when confronted with large, complex or significant marine pollution incidents. The Guide contains the guidance and the minimum set of information required by national competent authorities in need to access it rapidly in case of emergency. The Guide is completed by a set of annexes including fiches, lists, directories, inventories, and existing principles and guidelines on cooperation and mutual assistance (Annex I), forms for pollution reporting, request for and offers of assistance, acceptance/non-acceptance of offer of assistance (Annex II) also procedures for the preparation and submission of claims (Annex III). In line with the Decision IG.23/11, the Secretariat explored financial resources required to develop an electronic version of the operational part of the Guide, which would facilitate requests for assistance. To this effect a Beta version of the electronic version of the Guide has been developed which will be further tested and enhanced in the framework of the West MOPoCo Project. It consists of a platform containing a range of menus and submenus which correspond to the various parts, chapters, and subchapters of the Guide. The menus and submenus facilitate access to the relevant information accessed in an event of the emergency, and to the Communication System, titled “*Mediterranean Emergency Reporting System (MedERSys)*”. This is to ensure systematic and smooth communication during an emergency situation through the usage of the forms adopted by COP 20, as reproduced in the above mentioned Annex I, Annex II and Annex III of the Guide.

13 Despite repeated reminders, the Centre recorded only a minimal number of reports, revisions and updates through the above decision support tools. To improve the situation, the Centre communicated individual and unique username and password to all relevant REMPEC Focal Points (i.e. Prevention and OPRC Focal Points) and set-up a procedure to ensure that newly designated Focal Points are provided with their personalised credential to access and update REMPEC Country Profile, the Waste Management Decision Support Tool, MEDGIS-MAR, and MENELAS Information System.

14 It is recalled that all Contracting Parties to the Barcelona Convention have an obligation to report accidents causing or likely to cause pollution of the sea by oil and other harmful substances, in particular, accidents above 50m³ according to the threshold defined within MARPOL. It is brought to the attention of Meeting that the Eleventh Meeting of the Focal Points endorsed MEDGIS-MAR and agreed to discontinue the database on alerts and accidents in the Mediterranean Sea, which has been replaced by MEDGIS-MAR.

⁵ UNEP(DEPI)/MED IG.23/23, Decision IG.23/11.

15 As detailed in the document REMPEC/WG.45/10, the forms referred to in the paragraph 12.6 above were used in the real incidents (e.g. AGIA ZONI II, 2017 and ULYSSE/VIRGINIA, 2018), exercises (i.e. TOMMASSOS (Israel, November 2018), and NEMESIS 2018 (Cyprus, September 2018)) and have been integrated in the Sub-Regional Contingency Plan between Algeria, Morocco and Tunisia, and in the Sub-Regional Contingency Plan between Cyprus, Greece and Israel.

16 In line with Decision IG.23/11, the Secretariat proposes that the Contracting Parties to the Barcelona Convention are further:

- .1 urged to take the necessary measures to incorporate the procedures defined in the Guide into their national, bilateral and multilateral systems for preparedness and response to marine pollution; and
- .2 advised to regularly test those procedures during communication and full-scale exercises.

17 It is worth noting that the Second Meeting of MENELAS which took place in Valletta, Malta, between 28-29 November 2017 (see report in the document REMPEC/WG.45/INF.13), was seized by some of the observations from the Secretariat's preliminary analysis of the information provided by Mediterranean coastal States to the IMO through the mandatory reporting system under MARPOL (MEPC/Circ.318), and requested the Secretariat to finalise its analysis as well as present its findings to the next meeting of MENELAS with a view to establishing a MENELAS database on illicit ship pollution discharges in the Mediterranean. The Second Meeting of MENELAS reminded, in this respect, the Contracting Parties to the Barcelona Convention, which are also Parties to MARPOL, to submit their annual reports to the IMO, by 31 December of each year, using the revised reporting format set out in MEPC/Circ.318. In the meantime, in the context of the upgrade of MEDGIS-MAR, REMPEC introduced a temporary reporting platform, based on a "simple reporting format" proposed by the Secretariat at the First Meeting of MENELAS (Toulon, France, 29 September – 1 October 2015) under the document REMPEC/WG.38/5, for further discussion to the Third Meeting of MENELAS (Valletta, Malta, 8-9 October 2019).

18 In this context, the Secretariat proposes that Contracting Parties to the Barcelona Convention:

- .1 are urged to regularly update their Country Profile, MEDGIS-MAR, MENELAS;
- .2 are encouraged to use the Waste Management Decision Support Tool to establish or review their national waste management strategy for oily waste resulting from accidental marine pollution;
- .3 are advised to liaise with the respective MENELAS Designated Representative to contribute to the discussion on the MENELAS database on illicit ship pollution discharges in the Mediterranean; and
- .4 which are also Parties to MARPOL, are invited to submit their annual reports to the IMO, by 31 December of each year, using the revised reporting format set out in MEPC/Circ.318

European Union data sharing, monitoring, and reporting on marine pollution from ship

19 The document REMPEC/WG.45/INF.6 provides information on the European Union data sharing, monitoring and reporting policy and procedures related to marine pollution from ship, which concern eight (8) out of twenty-one (21) Mediterranean coastal States. The document provides clarification on the access by the Secretariats of the regional agreements and by non-EU countries to EMSA's Integrated Maritime Services (IMS) and other services including CleanSeaNet and SafeSeaNet, as well as the Common Emergency Communication and Information System (CECIS).

Global Integrated Shipping Information System (GISIS)

20 The IMO data sharing, monitoring and reporting on marine pollution from ships, as presented in the document REMPEC/WG.45/INF.4, provides a comprehensive overview of the IMO data sharing, monitoring and reporting procedures conducted through the Global Integrated Shipping Information System (GISIS). The IMO Secretariat developed GISIS in compliance with the decisions by the IMO Members requesting public access to sets of data collected by the Secretariat and stored in the off-line

databases. GISIS aims to allow online access to information supplied to the IMO Secretariat by Maritime Administrations, in compliance with IMO's instruments. National Maritime Administrations maintain and update the databases either directly or by submission to the Secretariat.

21 In the context of data sharing and in accordance with REMPEC's scope of work – the document REMPEC/WG.45/INF.4 focuses primarily on presenting the non-exhaustive list of public Modules, i.e: Contact Points, Port Reception Facilities, MARPOL Annex VI, Member State Audits, Marine Casualties and Incidents, Recognized Organizations, Pollution Prevention Equipment and Anti-fouling Systems, Facilitation of International Maritime Traffic, Ballast Water Management, and Ballast Water Chemicals, related IMO Secretariat Modules, and others focused on the Country Maritime Profile (CMP) and Greenhouse Gas Emissions.

22 During Fifth session of the IMO Sub-Committee on Pollution Prevention and Response (PPR) (London, UK, 5-9 February 2018), the Centre submitted, in the form of an information document⁶, a draft Mediterranean Guide on Cooperation and Mutual Assistance in Responding to Marine Pollution Incidents. The document contained relevant information and practical elements and was submitted in a view to contributing to the preparation of the Guide on practical methods for the implementation of the OPRC Convention and the OPRC-HNS Protocol. The Centre also informed PPR about the development of the electronic version of the Guide and the related Communication System (MedERSys).

23 More recently, the Sixth Session of the PPR Sub-Committee (18-22 February 2019) considered a document submitted by REMPEC as PPR 6/15/2. The document provided a summary of the outcomes of the regional workshop on response to spill incidents involving hazardous and noxious substances (HNS) (MEDEXPOL 2018). The Sub-Committee took note of the information provided, in particular, the ongoing development of the above mentioned Joint HNS Response Manual and the future upgrade of MIDSIS-TROCS. It also agreed to consider ways of circulating pollution incident reports, including, but not limited to, regular reporting to the Sub-Committee, to enhance knowledge of responding to spill incidents, potentially supporting additional ratification to the OPRC-HNS Protocol and the HNS Convention.

24 In light of the above, the Secretariat proposes that the Contracting Parties to the Barcelona Convention request the Centre to continue promoting its work under relevant agenda items of the PPR Sub-Committee at future sessions and to report to follow-up development on the proposed ways of exchanging pollution incident reports referred in paragraph 23 of the present document.

UNEP/MAP data sharing, monitoring and reporting policy and procedures

25 Data sharing, monitoring and reporting of the Mediterranean Action Plan of the United Nations Environment Programme (UNEP/MAP) was considered in the wider context of the UNEP/MAP Mid-Term Strategy (MTS) (2016-2021)⁷, as adopted by COP 19, which sets up a strategic framework to ensure consistency, continuity, increased efficiency, effectiveness, and relevance of the MAP/Barcelona Convention system and ensures contribution to the sustainable development goals of the Mediterranean region for the period 2016-2021. In the framework of the MTS Strategic Outcome 1.5 (MAP knowledge and MAP information system enhanced and accessible for policy-making, increased awareness and understanding) an Info/MAP platform and platform for the implementation of IMAP is expected to be fully operative, and in a scope of further development, connected to MAP components' information systems and other relevant regional knowledge platforms. Such connection will facilitate access to knowledge for managers and decision-makers, as well as stakeholders and the general public.

26 In the context of data sharing, it should be mentioned that COP 20 adopted the revised reporting format for the implementation of the Barcelona Convention and its Protocols⁸ as referred in paragraph 4 of the present document. This development resolved the long-standing issue, which was on the agenda of the Meeting of Focal of REMPEC since 2011, to reduce the burden related to reporting procedure through a more streamlined reporting process within the Barcelona Convention using the BCRS and the REMPEC's tools as referred in the paragraph 12 of the present document.

⁶ PPR 5/INF.3.

⁷ UNEP(DEPI)/MED IG.22/28, Decision IG.22/1.

⁸ UNEP(DEPI)/MED IG.23/23, Decision IG.23/1.

27 In this regard, the Secretariat proposes that the Contracting Parties to the Barcelona Convention liaise with the respective MAP Focal Points to report on the implementation of the 2002 Prevention and Emergency Protocol, through the BCRS.

28 In addition, REMPEC has provided INFO/RAC with a complete description of its data sharing, monitoring and reporting on marine pollution from ships, available through the Centre's decision support tools detailed in paragraph 12 of this document, for future integration of these data within the Info/MAP platform. To facilitate the integration, all REMPEC's decisions support tools referred above were moved from a range of hosting platform into INFO/RAC servers. Furthermore, the INFO/RAC is currently providing technical support in the process of upgrading Centre's website with an expected completion and launch before the end of 2019.

29 The document REMPEC/WG.45/INF.5 submitted by INFO/RAC provides a comprehensive overview of the MAP Data Management Policy, previously reviewed by the National Focal Point Meeting of INFO/RAC for the MAP Communication Task Force (16 April 2019, Rome, Italy), in view of having it approved at the next Meeting of the MAP Focal Points prior to its submission, for adoption, to the Twenty-first Ordinary Meeting of the Contracting Parties to the Barcelona Convention and its Protocols. The document addresses a broad spectrum of issues ranging from legal framework, sharing environmental information principle, authentication, authorisation, and accounting, to data collection, data granularity, data policy model and capacity building to support data policy.

30 In light of the request of the Contracting Parties referred to in the paragraph 6 of the present document, the Secretariat proposes for the Contracting Parties to the Barcelona Convention.

- .1 to explore the best way forward to reach a consensus on the access right of national data, including information related to accidents and response means and any other requirements, with a view to improving the quality, speed and effectiveness of decision-making process in case of marine pollution incidents; and
- .2 to liaise with the respective UNEP/MAP Focal Points to contribute to the revision of InfoMAP Data Management Policy.

31 Reference is made to the paragraph 7 to 9 above related to the 2017 MED QSR and the IMAP and to the document REMPEC/WG.45/5, which provides an update on associated developments within UNEP/MAP.

32 The MTS 2016-2021 Strategic Outcome 1.4 reads: "Knowledge and understanding of the state of the Mediterranean Sea and coast enhanced through mandated assessments for informed policy-making". It stated in the Indicative Key Output 1.4.1: "Periodic assessments based on DPSIR approach and published addressing, among other things, status quality of marine and coastal environment, the interaction between environment and development as well as scenarios and prospective development analysis in the long run. These assessments include climate change related vulnerabilities and risks on the marine and coastal zone in their analysis, as well as knowledge gaps on marine pollution, ecosystem services, coastal degradation, cumulative impacts and impacts of consumption and production".

33 The MTS Strategic Outcome 1.4 and the Indicative Key Output 1.4.1 convert into the preparation of three distinct assessments, namely the 2017 MED QSR addressing status quality of marine and coastal environment, the 2019 State of the Environment and Development Report (SoED 2019 addressing the interaction between environment and development) and, the MED2050 Foresight Study on the Environment and Development in the Mediterranean (scenarios and prospective development analysis in the long run).

Mediterranean 2017 Quality Status Report

34 On the occasion of the 2017 MED QSR (<https://www.medqsr.org/>) launched at COP 20, the Contracting Parties to the Barcelona Convention endorsed the critical findings of the report welcoming its recommendations. The 2017 MED QSR is a vital achievement accomplished through joint and integrated efforts of the Contracting Parties to the Barcelona Convention, the Partners, and the MAP Secretariat and Components. It provides a unique contribution to assessing the status of the Mediterranean ecosystem and the progress towards the achievement of its Good Environmental Status (GES). The 2017 MED QSR represents the current progress in the development of an integrated monitoring programme for the Mediterranean. This is a crucial element in the implementation of the

Ecosystem Approach Roadmap adopted in 2008, and of IMAP adopted in 2016. It should be highlighted that IMAP is based on 11 Ecological Objectives for the Mediterranean and defines 27 indicators.

35 The 2017 MED QSR is the result of significant contributions of the Contracting Parties to the Barcelona Convention, as well as the broad participation of other stakeholders. It will serve as the baseline to define the progress towards GES or maintaining GES and to sharpen and target national monitoring programmes to fill existing gaps. Indications on concrete measures to be taken to achieve GES are contained in the Report and will guide the work for filling knowledge gaps towards the 2019 State of Environment Report and the next 2023 Mediterranean Quality Status Report. Finally, the 2017 Mediterranean Quality Status Report not only brings together national data and information to the regional level, but also contributes to the current work at the global level including the Regional Process on a Second World Ocean Assessment and the implementation of the 2030 Agenda for Sustainable Development, especially its ocean-related Sustainable Development Goals (SDGs).

36 To facilitate the deliberations of the Meeting, the 2017 MED QSR Conclusions on the Common Indicator 19 (CI19): Occurrence, origin (where possible), extent of acute pollution events (i.e. slicks from oil, oil products and hazardous substances), and their impact on biota affected by this pollution, are reproduced in the **Annex I** of the present document.

37 Similarly, the recommendations on Environmental Monitoring and Reporting from Shipping Activities extracted from the report for the Development of a Quality Assurance Programme for Data Reporting and Collection, in accordance with Article 5 of the 2002 Prevention and Emergency Protocol, as well as the development of the 2017 MED QSR are presented in the **Annex II** of the present document.

38 The Secretariat welcomes the submission by the Greek Government of the information document REMPEC/WG.45/INF.7, which provides a detailed set of studies on environmental impact assessment of the AGIA ZONI II oil spill incident.

39 In light of such conclusions and recommendations which underpinned that monitoring initiatives should not be necessarily limited to EO9 CI19 (oil and HNS), the Secretariat proposes that within their national monitoring programme, the Contracting Parties to the Barcelona Convention continuously monitor the following:

- .1 illicit discharges occurrences and its cumulative effects and impacts;
- .2 accidental post-spill consequences on biota and ecosystem;
- .3 non-indigenous species (NIS) invasion; and
- .4 underwater noise from commercial shipping.

40 When working towards a standardised monitoring and reporting format for the pollution from ships, it is further proposed to request the Secretariat to:

- .1 carry out (at international and regional level) a comparative exercise between already existing reporting procedures and formats to, as much as possible, avoid duplication and to ensure the format retained is in line with the one already developed; and
- .2 review, as required, relevant IMAPs Assessment Fact Sheet.

The 2019-State of the Environment and Development Report

41 The SoED 2019 aims at presenting a comprehensive and updated assessment of the environmental status, trends and main sustainability issues related to the environment and development in the Mediterranean region, in the context of the mandate of the MAP - Barcelona Convention system.

42 COP 20 agreed to include the preparation of the SoED 2019, in UNEP/MAP Programme of Work and Budget for 2018-2019. Under the overall supervision of the MAP Coordinating Unit, Plan Bleu is responsible for the SoED 2019 elaboration process with the support of all MAP Components. In this context, REMPEC was mandated to participate in the preparation of the section on maritime transport.

43 The Secretariat proposes that the Contracting Parties to the Barcelona Convention contribute to the development of the said SoED 2019, primarily by reviewing the draft section on maritime transport, which is set out in the **Annex III** to the present document, providing comments and suggestions for its revision and finalisation.

2023 Mediterranean Quality Status Report

44 With a view to contributing to the preparation of the 2023 Mediterranean Quality Status Report, and in light of the gaps identified in the present document and related assessment exercise, the Secretariat proposes to update existing information to prepare a Study on marine pollution from ships (accident and operational pollution, marine litter, air pollution, etc...) and maritime traffic trends in the Mediterranean.

Actions requested by the Meeting

45 **The Meeting is invited to:**

- .1 **take note** of the information provided in the present document; and
- .2 **consider** the proposals put forward by the Secretariat, as laid down in paragraphs 16, 18, 24, 27, 30, 39, 40, 43, and 44.

Annex I

Development of the 2017 Quality Status Report for the Mediterranean

Conclusions on Common Indicator 19 (CI19):

Occurrence, origin (where possible), extent of acute pollution events (e.g. slicks from oil, oil products and hazardous substances), and their impact on biota affected by this pollution

Conclusions (brief)

The rates of accidents have gone down globally and regionally despite the increase in shipping transportation and it can be concluded that the impact of the international regulatory framework adopted through the IMO regulatory framework as well as technical cooperation activities undertaken at regional level is very positive, especially as far as prevention of accidental pollution is concerned. However, risks associated with the transport by ships of oil and HNS with possible harmful consequences on biota and ecosystems cannot be completely eliminated, especially in vulnerable areas such as the Mediterranean Sea. In addition, efforts have to be made to strengthen monitoring and reporting of illicit discharges from ships.

Conclusions (extended)

Decrease of pollution occurrences globally.

Accidents rates have gone down globally and regionally despite the increase in shipping transportation. Accidental pollution from both oil and HNS has decreased which can be related to the adoption and implementation of environmental maritime conventions addressing oil and HNS pollution prevention, preparedness and response. Indeed, statistical analysis indicates that there is a correlation between the period where the IMO regulatory framework was put in place (in the 70') and the years when this downward trend started to happen (in the 80'). It can therefore be concluded that the impact of the international regulatory framework adopted through the IMO as well as technical cooperation activities undertaken at regional level is very positive, especially as far as prevention of accidental pollution is concerned. However, the issue of illicit discharges from ships remains of concern, especially in semi-enclosed areas where the ability of the marine environment to regenerate is less likely to happen.

Oil pollution long-term effects.

It is also important to keep in mind that recovery of habitats following an oil spill can take place from between a few seasonal cycles (plankton) to several years (within one to three years for sand beaches and exposed rocky shores; between 1 and 5 years for sheltered rocky shores; between 3 and 5 years for saltmarshes; and up to 10 years or greater for mangrove).

According to ITOPF, while considerable debate exists over the definition of recovery and the point at which an ecosystem can be said to have recovered, there is broad acceptance that natural variability in ecosystems makes a return to the exact pre-spill conditions unlikely. Most definitions of recovery instead focus on the re-establishment of a community of flora and fauna that is characteristic of the habitat and functions normally in terms of biodiversity and productivity.

Therefore, despite the progress achieved in mitigating oil spill incidents from ships, it is clear that continuous monitoring of illicit discharges occurrences as well as cumulative effects and impacts, and continuous monitoring of accidental post-spill consequences on biota and ecosystems are needed.

Annex II

Development of a Quality Assurance Programme for Data Reporting and Collection, in accordance with Article 5 of the 2002 Prevention and Emergency Protocol

Recommendations on Environmental Monitoring and Reporting from Shipping Activities¹

1 The IMO international conventions and instruments do not address monitoring and reporting activities aimed at assessing the state of the marine environment, but rather look at monitoring and reporting issues from a compliance perspective. With ships being a pollution source point (and not a pollutant *per se*), it is somehow difficult to conceive an environmental monitoring and reporting system that would target specifically pollution from ships. Indeed, ship-generated pollutants are relevant to several Common Indicators (10 in total). In addition, the fact that ships can cause massive instantaneous pollution (especially oil and other liquid chemical transported in bulk) makes it difficult in principle to include accidental pollution from ships in a routine environmental surveillance and monitoring programme.

2 The way pollution from shipping is approached by the international regulatory framework presents a challenge for UNEP/MAP and IMAP's objectives to develop an integrated comprehensive monitoring and reporting system, since environmental monitoring and reporting systems aimed at assessing the state of the environment focus on pollutants (chemicals, invasive species, litter, etc.) rather than on activity/source of pollution. One way to address this tricky issue was to adopt an indicator for oil and HNS specifically, i.e. EO9 C119. It is however important to keep in mind the limits of such approach, especially when using this indicator to assess marine ecosystems health and changes (deterioration/improvement).

3 **Monitoring activities:** as environmental monitoring activities are primarily undertaken at national level, there could be an added-value in undertaking an assessment of monitoring initiatives undertaken by Mediterranean coastal States (especially under their R&D projects and programmes), to get a picture of the state of play in the region with respect to marine pollution from ships. This should not be necessarily limited to EO9 C119 (oil and HNS) and should include monitoring of NIS invasion and underwater noise from commercial shipping. In these last two instances, where direct links can be established between ships and impacts, it is certainly sensible to undertake ship-specific environmental monitoring activities. If such an assessment is viewed positively, then REMPEC should be the MAP repository to collect this data using its network of Prevention and OPRC Focal Points (a questionnaire to be filled in could be developed for that purpose).

4 **Measuring trends:** data reporting and collection for IMAP can rely on the Mediterranean Alerts and Accidents Database maintained by REMPEC to measure trends from a risk assessment perspective. However, since the Contracting Parties to the Barcelona Convention are also reporting on ship-generated pollution incidents at international level (IMO/GISIS) and at European level (EMSA has an obligation to provide a yearly overview of maritime casualties and incidents and produces a casualty report every year), it is recommended, when working towards a standardised monitoring and reporting format for pollution from ships, to carry out a comparative exercise between already existing reporting procedures and formats in order to, as far as possible, avoid duplication and ensure the format retained is in line with the ones already developed.

¹ REMPEC/WG.41/INF.12.

Annex III

Draft Section on Maritime Transport The 2019-State of the Environment and Development Report

Sustainable Maritime Transport in the Mediterranean: Status and Challenges

1. An analysis of the sector

1.1 The shipping sector in the Mediterranean

Global economic role and value.

Maritime transport is the backbone of trade and economic development - it is commonly estimated that between 80% to 90% of goods are moved by maritime transportation. Because it is cross-cutting and permeates other sectors (fisheries, tourism, offshore energy); maritime industries (shipbuilding, ship demolition, shipyards and maintenance facilities); and activities (insurance, banking, brokering, classification, consultancy), maritime transport generates direct and indirect employment, income and revenue, and fosters infrastructure (merchant sea ports and intermodal hubs, cruise terminals, yards and marinas developments).

Growth. Global seaborne trade volume¹ and demand for shipping services have been in constant although moderate growth after the 2008-2009 economic crisis. In 2015, for the first time, the world seaborne trade volumes exceeded 10 billion tons (UNCTAD, 2016). In 2017 the world fleet continued to grow (+3.15 % in terms of deadweight tonnage (dwt) or + 2.47% in terms of number of vessels) compared to 2016 – but growth has been decelerating since 2011 (UNCTAD, 2017a).

Shipping routes crossing the Mediterranean Sea. As shown in the map below (**Figure 1**), maritime routes are a function of obligatory points of passage, which are strategic locations that act as chokepoints (Jean-Paul Rodrigue, 2017). The Mediterranean Sea is strategically located at the crossroads of three major maritime passages, namely the Strait of Gibraltar, opening into the Pacific Ocean and the Americas, the Suez Canal, a main shipping gateway which connects via the Red Sea - to Southeast Asia, and the Bosphorus Strait, leading to the Black Sea and Eastern Europe/Central Asia.



Figure 1: Main Maritime Shipping Routes, Source: (Jean-Paul Rodrigue, 2017)

¹ Trade volume is trade in value terms but adjusted to account for inflation and exchange rate movements.

Recent infrastructure developments influencing maritime traffic in the Mediterranean.

- **Suez Canal expansion:** The Suez Canal connects the Red Sea with the Mediterranean Sea, offering ships a shorter route than travelling around Africa's southern tip. In 2015, Egypt launched a project to enhance the Suez Canal capacity and reduce transit time. The project included a new lane allowing two-way traffic and increased the canal's capacity by 50 percent. The Canal can now accommodate the transit of 97 ships per day versus a reported average of 47 ships per day (Boske & Harrison, 2017), with expected traffic growth via the Mediterranean Sea (North and South). However, the latest statistics (2017) made available by the Suez Canal Authority show there was almost no increase in traffic (both in number of ships and volume) between 2015 and 2017 (Suez Canal Authority, 2017).
- **Panama Canal expansion:** In June 2016, the Panama Canal completed its expansion with deeper docks, allowing larger ships to transit the Canal which makes about 79 percent of total deadweight tonnage in the global fleet able to use the Panama Canal (Boske & Harrison, 2017). This increased the competition with the Suez Canal for cargo movements between Asia and North America east coast via the Red and Mediterranean Seas. Ships previously unable to transit through the Panama Canal have now an option for a shorter route and reduced delivery time from Asian ports located in the Pacific Ocean (East of Hong Kong). However, the Suez Canal can still accommodate larger ships comparing with the Panama Canal and the route via the Suez Canal is the shortest one between North America and Asian ports located east of Hong Kong.

Shipping movements patterns. With its strategic location, the Mediterranean hosts an important transit lane and transshipment activities² for international shipping. It is also a busy traffic area due to Mediterranean seaborne traffic (ship movement between a port within and a port outside the Mediterranean Sea area), and short sea shipping activities (ship movement connecting two Mediterranean ports).

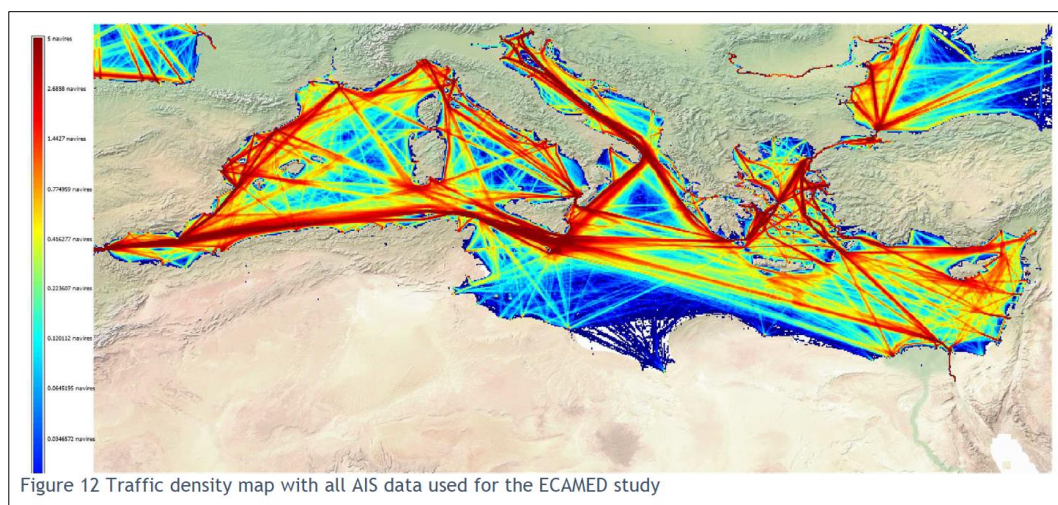


Figure 2: Traffic density in the Mediterranean Sea Area; Source: (INERIS, 2019)

In terms of connections with the rest of the world, Europe (European port calls) is by far Mediterranean main shipping connection, receiving about 40-50% of total extra (ports outside the Mediterranean) Mediterranean traffic (Arvis, Vesin, Carruthers, Ducruet, & Peter, 2019) as shown in **Figure 3**.

² Transshipment means the transfer of goods (containers) from one carrier to another or from one mode to another.

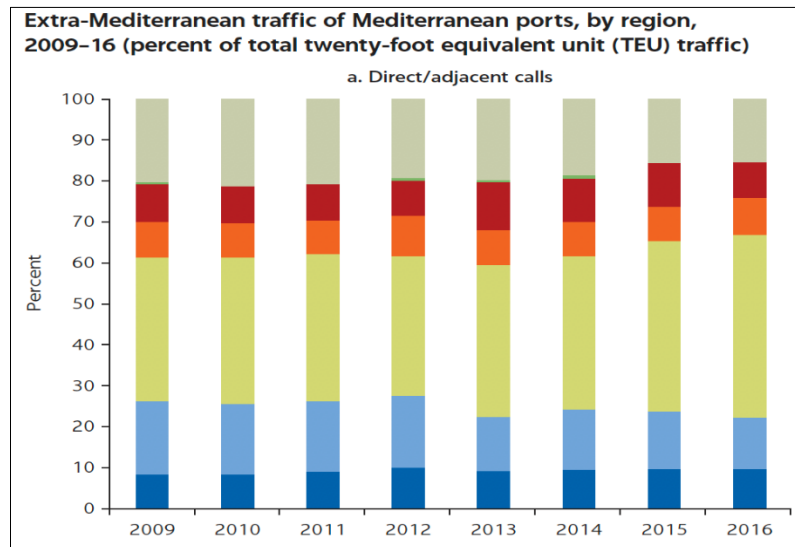


Figure 3: Extra Mediterranean traffic (ship movements between Mediterranean ports and ports outside the Mediterranean; direct adjacent calls³); Source: (Arvis et al., 2019)

■ Africa ■ East Asia ■ Europe ■ Latin America ■ North America
■ Oceania ■ West Asia

Source: World Bank calculations based on data from Lloyd's List Intelligence (see annex 2A).
Note: Data for 2016 cover only May and June.

Short sea shipping. Short sea shipping of goods between main European Union (EU) ports and ports located in the Mediterranean Sea area⁴ came to almost 611 million tonnes in 2016. This amounted to 29 % of the total EU short sea shipping tonnages for all sea regions in 2016 (**Figure 4**).

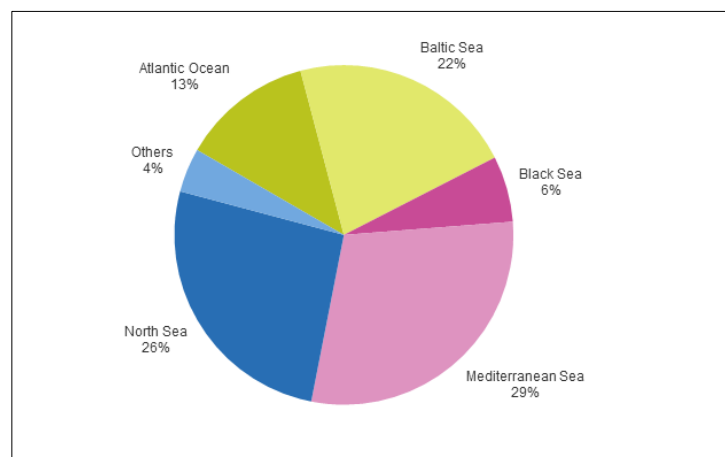


Figure 4: EU-28 Short Sea Shipping (SSS) of goods by sea region of partner ports⁵ in 2016 (in % of total gross weight of goods transported); Source: (EUROSTAT, 2018)

³ "Direct/adjacent calls" refers to a way to characterize a port in a network. Direct/adjacent calls are port calls along the voyage of individual ships (chain) vs. "all links" which refer to all connections among ports linked by the same vessel voyage. The first approach is useful to analyse hub-and-spoke systems because it gives more importance to port node neighbourhood—that is, to local-level connectivity with adjacent neighbours, while the second approach is useful to analyse global trade coverage and specialization of port nodes beyond their sole local environment. This typology allows the foreland connectivity (or overseas traffic distribution) of every port to be studied and broken down by world region, which would be impossible with the topology based on the direct/adjacent.

⁴ The Mediterranean, for the purpose of this statistics, is defined by Eurostat as composed of Albania, Algeria, Bosnia –Herzegovina, Egypt, Israel, Lebanon, Libya, Morocco, Occupied Palestinian territory, Syria, and Tunisia.

⁵ "Partner ports" refers to ports situated in geographical Europe or in non-European countries on the Mediterranean and the Black Sea.

As for intra-Mediterranean traffic, its proportions in the total Mediterranean traffic rose from 49 percent in 2009 to approximately 58 percent in 2016. This increase was attributed to either transshipment growth, coastal or short-sea growth (Arvis et al., 2019).

International shipping growth. Seaborne trade volume⁶ and demand for shipping services has been in constant - although moderate - growth after the 2008-2009 economic crisis. In 2015, for the first time, the world seaborne trade volumes exceeded 10 billion tons (UNCTAD, 2016). In 2017 the world fleet continued to grow (+3,15 % in terms of deadweight tonnage (dwt) or + 2,47% in terms of the number of vessels) compared to 2016 – but growth has been decelerating since 2011 (UNCTAD, 2017a).

Flag registries. In terms of flag registries, no Mediterranean coastal State is amongst the top 5 major flags of registration flags (UNCTAD, 2017b) but 6 of them are amongst the top 35 ship-owning countries (by vessels' dwt⁷) (UNCTAD, 2017a) as shown below in **Figure 5**.

Country	Rank	Vessels dwt
Malta	6 th	99 million
Greece	9 th	75 million
Cyprus	12 th	34 million
Italy	17 th	16 million
Turkey	26 th	8 million
France	30 th	4 million

Figure 5: Flag registries- Ranking of Mediterranean Coastal States; Source: (UNCTAD, 2017a)

Malta (1st), Greece (2nd) and Cyprus (3rd) are the three top flag registries in Europe.

Ships registered under a national flag of all Mediterranean coastal States represent approximately 13,34 % dwt of the total world dwt in 2017, largely owing to Malta (5,43%) and Greece (3,88%), followed by Cyprus (1,81%); Italy (0,86%) and Turkey (0,43%). Together these 5 countries account for 12,41% dwt of ships registered under Mediterranean Coastal States national flags.

Ship-owning countries. In terms of fleet ownership, Greece classifies as the top ship-owning country worldwide, followed by Japan, China, Germany and Singapore (UNCTAD, 2017a). These five countries accounted for 49,5% of the world's dwt in 2017. Aside from Greece, 5 Mediterranean coastal States are amongst the top 35 ship-owning countries (by vessels' dwt), as shown in the **Figure 6** below.

Country	Rank	Percentage of fleet registered under a foreign flag
Monaco	14 th	100%
Turkey	15 th	71,57%
Italy	20 th	29,36%
France	28 th	69,93%
Cyprus	31 st	63,95%

Figure 6: Ship-owning Countries- Ranking of Mediterranean Coastal States; Source: Table developed based on data from UNCTAD 2017 *Review of Maritime Transport* (UNCTAD, 2017a)
Fleet of the Mediterranean countries by main ship types:

⁶ that is trade in value terms but adjusted to account for inflation and exchange rate movements.

⁷ *Dead weight tonnage* (dwt) is considered the relevant indicator for shipping trade versus *number of ships* because it is indicative of how much cargo a ship can carry.

- **Oil tankers:** Altogether the Mediterranean Coastal States have an oil tankers' capacity of 92 771,3 dwt, which represents **17,34%** of the total worldwide oil tankers' capacity (534 855 dwt in 2017). Greece has the greatest oil tankers' capacity (45 777,5 dwt), followed by Malta (29 198,8 dwt).
- **Bulk carriers:** Altogether the Mediterranean coastal States have a bulk carriers' capacity of 103 764,5 dwt, which represents **13%** of the total worldwide bulk carriers' capacity (796 581 dwt in 2017). Malta has the greatest bulk carriers' capacity (46 928,2 dwt in 2017), followed by Greece and Cyprus almost equally (23 079,1 dwt and 22 493,9 dwt respectively).
- **General cargo ships:** Altogether the Mediterranean coastal States have a general cargo ships' capacity of 7688,3 dwt, which represents **10,27%** of the total worldwide general cargo ships' capacity (74 823 dwt in 2017). Malta has the greatest general cargo ships' capacity (2 228,8 dwt), followed by Italy (1 700,2 dwt).
- **Container ships:** Altogether the Mediterranean coastal States have a container ships' capacity of 25 923,4 dwt, which represents **10,55%** of the total worldwide container ships' capacity (245 609 dwt in 2017). Malta has the greatest container ships' capacity (16 197,9 dwt), followed by Cyprus (4 636,1 dwt) and France (2 341,2 dwt).
- The **total capacity** of all Mediterranean Coastal States national fleet (all ship types, which includes the above categories other ship types such as gas/chemical carriers and ferries/passenger ships) accounts for 248 303,8 dwt, which represent **13,33%** of the total worldwide ships' capacity.

Fleet capacity growth rate. Most Mediterranean coastal states national fleets capacity have been steady or have grown in 2017. The most notable fleet capacity decreases in 2017 were recorded in Albania (-7,5%); Lebanon (-5,2%) and Turkey (-4,6%).

Capacity of Mediterranean coastal States' fleet (2017 in dwt)	Capacity in dwt	Mediterranean/World %
Total capacity	248, 303.8	13.33%
Oil tankers capacity	92,771.3	17.34%
Bulk carriers	103 ,764,5	13%
General cargo ships	7, 688.3	10.27%
Container ships	25, 923.4	10.55%

Figure 7: Summary Mediterranean countries' fleet by main ship types; Source: (UNCTAD, 2017b)

Oil transport. The Mediterranean is host to major oil transportation lanes, notably with oil shipments through 2 of the 6 major oil checkpoints worldwide. These are:

- (i) the Suez Canal/SUMED Pipeline with 5.4 million barrels per day (b/d) of crude oil and petroleum in 2015, equivalent of about 9% of the world's seaborne oil trade, and
- (ii) the Turkish Bosphorus and Dardanelles straits with 2.4 million b/d of crude oil and petroleum products in 2015 (U.S. Energy Information Administration (EIA), 2017). Together, the Suez Canal/SUMED Pipeline and the Turkish Straits accounted for 13.24% of the world's seaborne oil trade in 2015.

A fast-emerging cruise industry. The Mediterranean region has seen a significant and rapid raise in cruise ship movements over the last two decades: the number of single cruise passengers in 2017 was 4,1% higher than the number of passengers that cruised the previous year and more than double compared to 2006, when 12 million passengers cruised (MedCruise Association, 2018). Today, the region stands as the second biggest cruising region in the world (15.8% of global cruise fleet deployment in 2017⁸), after the Caribbean. Combined, the two major cruise regions, Caribbean and the

⁸ MedCruise Association, 2018.

Mediterranean, host 51,2% of the global cruise fleet capacity (MedCruise Association, 2018) as shown in **Figure 8**.

Because of this continuous growth, ports are facing the challenge of providing proper infrastructure to accommodate large cruise ships and upgraded facilities to be able to accommodate an ever-growing number of cruise passengers as well as to collect and dispose of related waste.

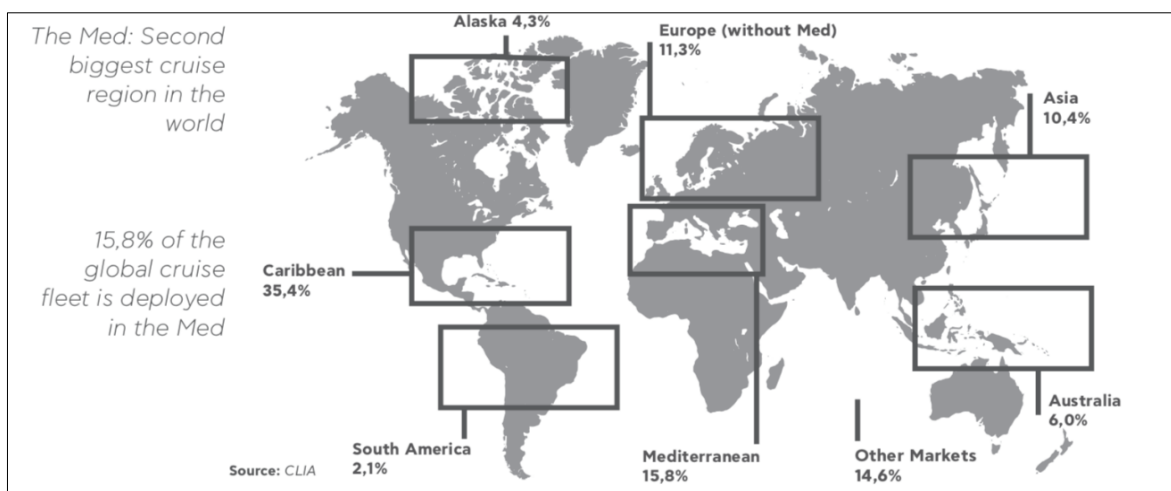


Figure 8: Global cruise fleet deployment shares in 2017; Source: (MedCruise Association, 2018)

Ports accommodating more than 120,000 cruise passengers a year are considered major ports. 36 ports in the Mediterranean fall under this category, 25 of which being located in the Western Mediterranean area, 7 ports in the Adriatic and 4 ports in the Eastern Mediterranean area. Ports with fewer than 120,000 cruise passenger traffic in 2017 include 15 Western Mediterranean ports, 11 Eastern Mediterranean ports and 6 ports located in the Adriatic (MedCruise Association, 2018).

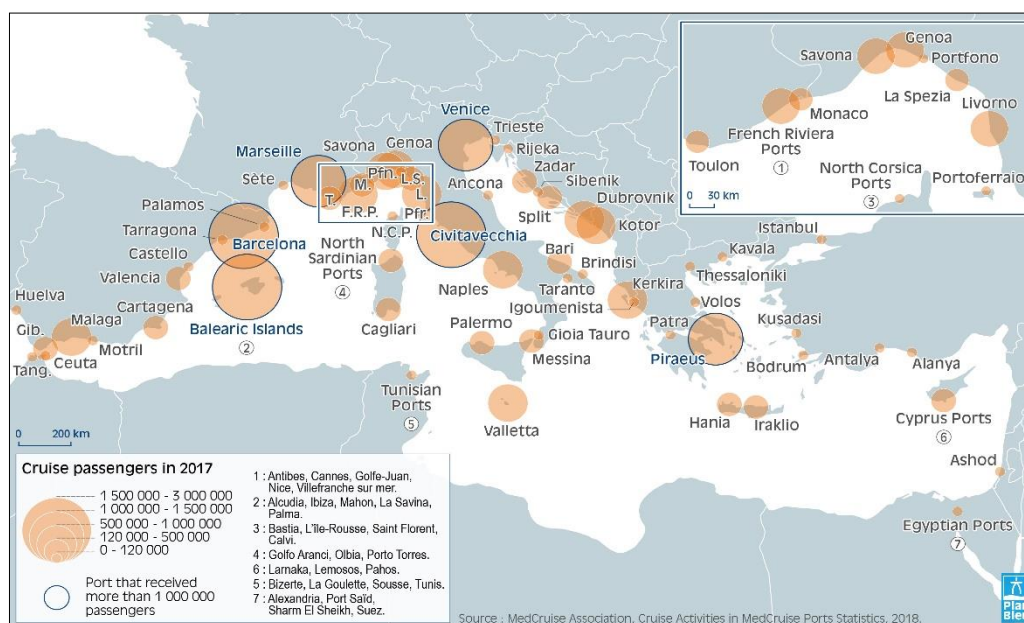


Figure 9: Cruise passengers per cruise call in the Mediterranean (2017); Source: (Blue Plan, 2018)

For three years in a row, Mediterranean cruise ports hosted, on average, more than 2000 cruise passengers per cruise (**Figure 10**). The increase observed from previous years is an indication of the continuous increase in the cruise shipping business in the Mediterranean region, but also of the increase in size of cruise vessels sailing through the Mediterranean (MedCruise Association, 2018).

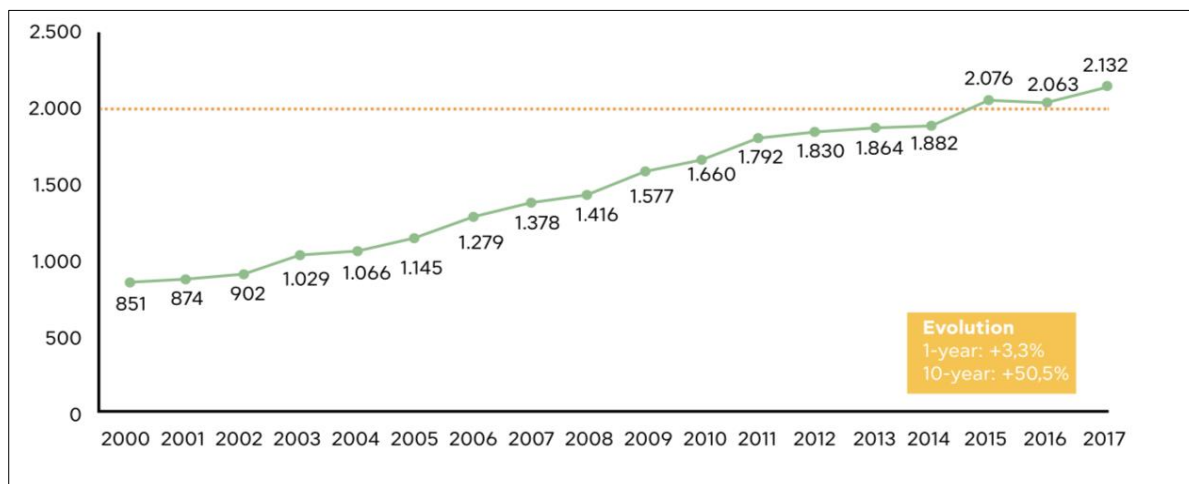


Figure 10: Average number of cruise passengers per cruise call in the Mediterranean (2000-2017); Source: (MedCruise Association, 2018)

1.2 Environmental impacts

Increasing shipping and maritime activities are significant drivers for anthropogenic pressure on the marine environment in the Mediterranean Sea. Pressures from the maritime transport essentially include:

- (1) potential accidental pollution resulting from oil and hazardous and noxious substances (HNS) accidental release;
- (2) operational discharges, including marine litter and oily discharges;
- (3) non-indigenous species introductions;
- (4) air emissions from ships;
- (5) underwater noise and marine mammal disturbance; and
- (6) land take and artificialization of the coastline through port infrastructure.

While accidental pollution and operational oil discharges have historically been the focus and appear to be under control due to a series of technical and regulatory measures implemented over the last two decades, marine bio-invasions, air pollution from ships and marine litter are today emerging as the three more pressing environmental challenges. Recently, underwater noise and marine mammal disturbance have been the subject of increasing international attention and action.

Accidental pollution: Incident rates, and notably incidents involving oil, have decreased globally including the Mediterranean, despite a steady increase in oil and other cargo volumes moved by ships. This can be attributed to the adoption and implementation of international maritime conventions addressing safety of transportation as well as preparedness and response to accidents, following the Torrey Canyon oil pollution disaster in 1967.

Between 1 January 1994 and 31 December 2013, approximately 32,000 tons of oil have been released into the Mediterranean Sea as a result of incidents. The number of incidents involving oil spills dropped from 56% of the total number of incidents for the period of 1977–1993, to 40% for the period of 1994–2013. 61 % of these incidents resulted in a spillage of less than 1 tonne (REMPEC, 2014). In the Mediterranean, the quantities of HNS accidentally spilled have considerably decreased during the period of 1994–2013. Since 2003, the release of HNS has become insignificant compared to the period 1994 – 2002.

According to the findings of the Regional Marine Pollution Emergency Response Centre for the Mediterranean Sea (REMPEC)⁹, showing as **Figure 11 overleaf**, the majority of incidents occurred in the Eastern Mediterranean area (REMPEC, 2014).

⁹ REMPEC maintains an Alerts and Accidents Database where ship incidents are recorded.

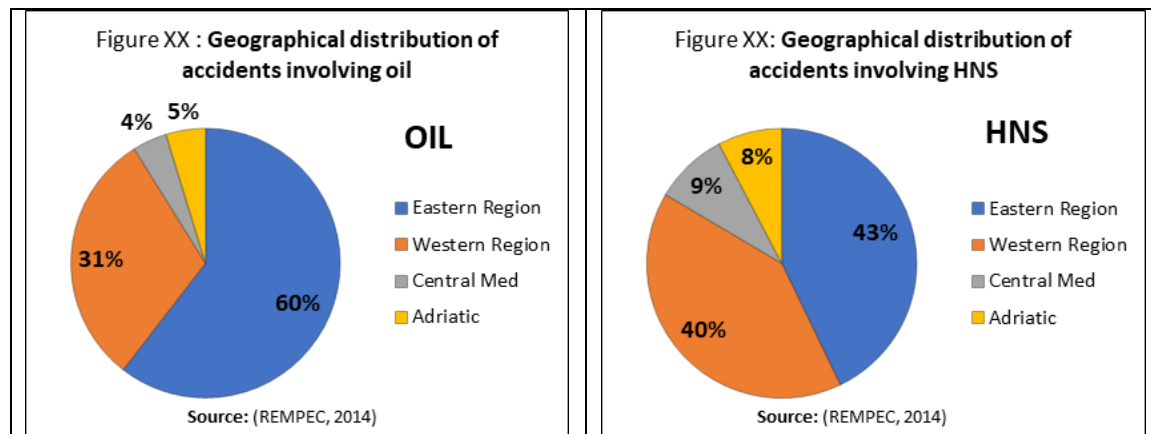


Figure 11: Geographical Distribution of accidents involving oil (left) and HNS (right); Source: (REMPEC, 2014)

Operational discharges: sustained efforts to control the illicit oil ship pollution discharges are needed. Strict discharge regulations as well as the introduction of mandatory equipment and management procedures (required under the *International Convention for the Prevention of Pollution from Ships- MARPOL*) have addressed operational discharges from ships such as sewage, garbage and cargo residues. However, illicit ship pollution discharges of oily water remain an issue, although increased regional cooperation for ship surveillance, data sharing, prosecution and port state control have proven effective.

REMPEC's Alerts and Accidents Database contains a category for "Illicit Discharges". Only 5 cases were reported (1 in 2012, 1 in 2013 and 3 in 2015). The use of satellite imagery provides a better picture of the number of spills from ships. In 2016, the CleanSeaNet¹⁰ platform of the European Maritime Safety Agency (EMSA) recorded, based on satellite imagery, a total of 1586 of detections of probable pollution occurrences, and a total of 1582 detections of possible pollution occurrences in EU coastal States, Iceland, Norway, Turkey and Montenegro. According to EMSA, the overall trend over most of the past decade has been a year-on-year reduction in the number of possible spills detected per million km² monitored. In 2016 this trend reversed, with an increase in the number of possible spills detected (EMSA, 2017). It is expected that sustained efforts and cooperation among the Mediterranean States towards a better enforcement will contribute to minimizing the occurrence of the ship pollution illicit discharges.

Marine litter: Although most of marine litter in the Mediterranean originates from land-based sources (especially beach litter), ship sources contribute to the accumulation of floating debris and litter. Studies assessing floating debris, focusing on the Mediterranean seafloor, have suggested that litter accumulated in the Blanes canyon, with high proportions of plastics, has a predominantly coastal origin, while litter collected on the open slope, dominated by heavy litter, is mostly ship-originated, especially at sites under major shipping routes (Ramirez-Llodra, De Mol, Company, Coll, & Sardà, 2013). Commercial fishing has been recognised as a sea-based source of litter, particularly derelict fishing gear (UNEP/MAP, 2015). For example, fishing (and aquaculture) activities have been suggested as important sources of lost or discarded fishing gears and styrofoam (from styrofoam fish boxes) in the marine environment. A survey conducted in the Mediterranean region observed a high proportion of styrofoam in the Adriatic Sea, where around 10,000 fishing vessels operate (Suaria & Aliani, 2014).

Marine bio-invasions: The Mediterranean biodiversity at risk. Marine bio-invasions from shipping activities are major threats to the Mediterranean ecosystem, with shipping being a pathway for the introduction of the non-indigenous species in the Mediterranean Sea via both ships' ballast water and ships' hull biofouling. A recent study (Wang, Wang, & Ma, 2018) analysed bio invasion risk in 100 ports and identified, based on big data analysis, two bio invasion risk intensive regions, namely the Western Europe (including the Western European margin and the Mediterranean) and the Asia-Pacific, as shown in the figure below (**Figure 12**).

¹⁰ CleanSeaNet is the European satellite-based Oil Spill Monitoring and Vessel Detection service. The service analyses images, mainly from SAR but also from optical missions, to detect possible oil spills on the sea surface, and identify potential polluters. EMSA cautions that given the limitations of radar detection for the identification of spills, it is important to note that CleanSeaNet does not detect 'oil spills' but 'possible oil spills'. Other substances with a similar effect include, for example ice, algae, sandbanks or low wind areas. The system does not discriminate vegetable or fish from mineral oil.

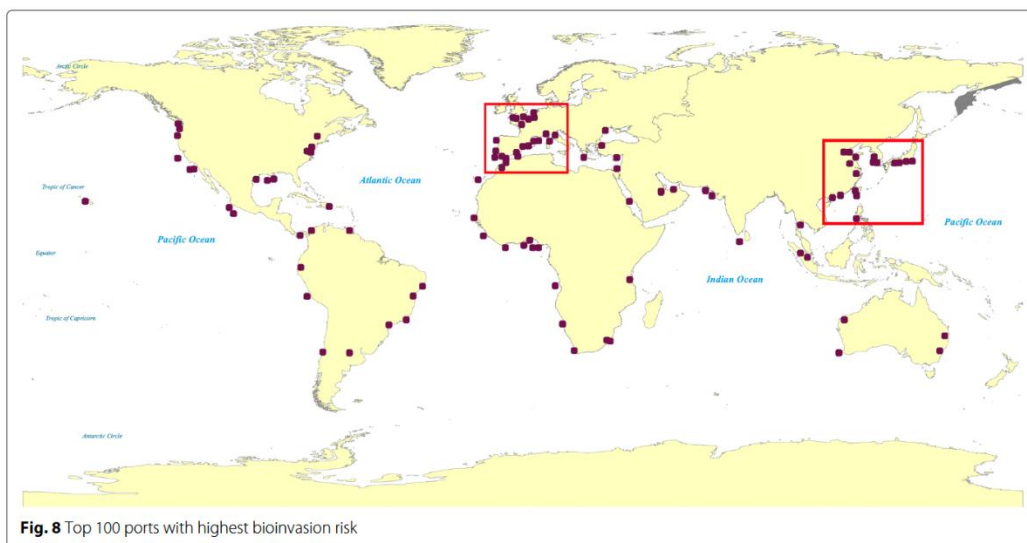


Figure 12: Regions with intensive bio invasion risks; Source: (Wang et al., 2018)

Air Pollution and climate change. Shipping activities have increased significantly over the last century, and, as such, are a known contributor to the global emissions of air pollutants and greenhouse gases (GHG). Ship emissions contain toxic gases and particulates like sulphur oxides (SO_x) and nitrogen oxides (NO_x). These, when released into the atmosphere, have adverse effects on the human health and cause acidification of soil and aquatic environment, impairing the life of fauna and flora. The forthcoming application of the IMO global regulations establishing a sulphur cap in 2020 are expected to curb air emissions, fostering low-sulphur and alternative fuels and energy. GHG from ships, particularly carbon dioxides (CO₂) contribute to climate change. According to the 2014 third GHG study published by the IMO, shipping accounted in 2012 for 2,2 % of global CO₂ emissions (International Maritime Organization (IMO), 2015). A recent study published by the International Council on Clean Transportation (ICCT) shows that shipping contribution to global CO₂ emissions has slightly increased (2,6% in 2015) (Olmer, Comer, Roy, Mao, & Rutherford, 2017), and still less than the 2.8% contribution of the global emissions of CO₂ accounted in 2007. However, predictions in the same IMO study indicates that by 2050, CO₂ emissions from international shipping could grow by between 50% and 250%, depending on future economic growth and energy developments (International Maritime Organization (IMO), 2015).

Underwater noise from shipping. It is widely recognized that anthropogenic underwater noise has adverse consequences on mammals and marine life and that shipping is one of the main contributors to it. Noise from commercial ships is mainly generated by propeller cavitation and onboard machinery (Nolet, 2017). Given the significance of shipping traffic taking place in the Mediterranean Sea area, several attempts to predict or assess noise levels from vessels in the region have been carried out. A recent study published by ACCOBAMS¹¹ has identified and mapped several areas of high anthropogenic pressure in the Mediterranean region (*noise hotspots*)¹² including noise from shipping and port activities (A. Maglio, G. Pavan, M. Castellote, 2016).

Collisions involving marine mammals. A collision between a ship and a marine mammal can be caused directly by a ship which route crosses a mammal in motion but it can also be caused by underwater noise from shipping activities, acting as sound masking interfering with mammals communication and echolocation (E.R. Gerstein; J.E. Blue; S.E. Forysthe, 2006; Nolet, 2017). The risk of collision between ships and marine mammals is high in some parts of the Mediterranean Sea where intense shipping traffic is documented (IUCN, 2012). Areas of particular risk for collision with cetaceans are the central part of the Ligurian Sea, areas off the Provencal coasts (Alleaume & Guinet, 2011) and the southern area of the Pelagos Sanctuary, the only pelagic Marine Protected Area (MPA) for marine mammals in the Mediterranean Sea (Pennino et al., 2017).

¹¹ Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and contiguous Atlantic Area (ACCOBAMS).

¹² Activities considered are: commercial and recreational marine traffic, harbour activities, commercial and scientific seismic surveys, oil and gas drilling activities, wind farms projects, military exercises.

1.3 Are we moving towards a green/blue economy?

Shipping and the UN Sustainable Development Goals (SDG). Shipping, compared to road, rail and aerial modes of transportation, is a low-cost, energy efficient and safe mode of transportation. As such, it has an essential role to play in achieving sustainable development and reaching the UN Sustainable Development Goals (SDGs) and targets to promote economic prosperity, while protecting the planet. The IMO has established clear linkage between its work and the SDGs. The shipping industry has also embraced sustainable development by participating in the UN Global Compact initiative, a UN led corporate sustainability movement in support of achieving the SDGs by 2030, and mapping opportunities for the sector to contribute to the SDGs (DNV-GL, 2017).

Integrated Ocean Management. This approach calls for a participatory process for decision making to prevent, control, or mitigate adverse impacts from human activities in the marine and coastal environment, and to contribute to the restoration of degraded coastal areas. Marine Spatial planning (MSP) and IMO's Special Areas and Particularly Sensitive Sea Areas (PSSA) are effective tools to manage oceans.

- **Marine Spatial Planning** provides a framework for arbitrating between competing marine human activities, including shipping, and managing their impact on the marine environment. The work achieved for further conservation and sustainable use of marine biodiversity in areas beyond national jurisdiction (BBNJ) through the development of a new legally binding instrument under the United Nations Convention on the Law of the Sea (UNCLOS) is certainly relevant to fill in the gaps in the management and use of biodiversity beyond national jurisdiction. This work is expected to conclude in 2020.
- **Special Areas and Particularly Sensitive Sea Areas (PSSA)** are marine areas with special protective status granted by the IMO to manage shipping navigation in a safe and environmental manner. In the Mediterranean, the Canary Island in Spain have been designed as a PSSA in 2005. In addition, ship routeing traffic measures (such as establishing traffic lanes; recommended routes or areas to be avoided by traffic) can be established either as the standalone measures or as the associated protective measures under a PSSA status, to reduce the risk of a maritime casualty and potential harm to the sensitive marine environment. A difference between measures adopted under IMO instruments and other marine planning tools such as MPAs or MSPs is the first are sectoral initiatives, while MSPs are overcoming the single-sector approach that focuses on a particular use of the sea.

Under the Barcelona Convention, intersectoral collaboration toward ocean management in the Mediterranean would involve collaborative work between REMPEC and RAC/SPA to exchange information and to draft joint statements for consideration of the Parties concerning common issues, such as the ship routeing and the possible need for new PSSAs, considering the conservation of biological diversity and the sustainable use of the sea (Regional Activity Centre for Specially Protected Areas (RAC/SPA), 2017).

Marine litter from fishing vessels. The IMO has supported a series of initiatives that will help addressing this issue. An example is the development of *Voluntary Guidelines for the Marking of Fishing Gear* which call for all fishing gear to be marked, so that, if abandoned, lost or discarded, these can be traced back to its original owner. In addition, marine litter from shipping has gained attention with the IMO's Marine Environment Protection Committee (MEPC) adding this issue as a new item on its agenda. The Contracting Parties to the London Convention and Protocol, have also included this issue on their meeting agendas and reviewed how wastes dumped at sea may contribute to the presence of marine litter, especially abandoned or drifting fish aggregating devices (FADs), as well as polystyrene and styrofoam buoys used in aquaculture.

Port Reception Facilities. In the Mediterranean, ahead of the adoption of the IMO action plan to address marine plastic litter from ships in 2018, sustained work has been carried out over the past decade to address ship generated waste, as follows:

- First, by prohibiting any discharge of garbage – under MARPOL Annex V special status and oily wastes, in accordance with MARPOL Annex I, into the Mediterranean Sea area.

- Second, by promoting the availability of port reception facilities so that ships can dispose on shore of their wastes for further collection, treatment, if needed, and final disposal.
- Third, following the adoption in 2013 of the Regional Plan for the Marine Litter Management of the Mediterranean (UNEP(DEPI)/MED IG.21/9), by promoting, within the framework of the EU-funded “Marine Litter-MED” Project, the application of charges at reasonable costs or, as applicable, a No-Special-Fee system for the use of port reception facilities by ships calling the Mediterranean ports – whether they use port reception facilities or not. This is in line with the EU Directive 2000/59/EC (Directive 2000/59/EC of the European Parliament and of the Council of 27 November 2000 on port reception facilities for ship-generated waste and cargo residues, 2000) applicable to EU ports.

As shown in **Figure 13** below, some EU ports in Mediterranean Sea countries use a cost recovery system, either based on administrative fees (ADM) that are partly established based on the amount of waste delivered, or a Non-System Fee (NSF) that is charged to ships irrespective of their use of facilities, or direct fees that are only established based on the volumes of waste discharged.

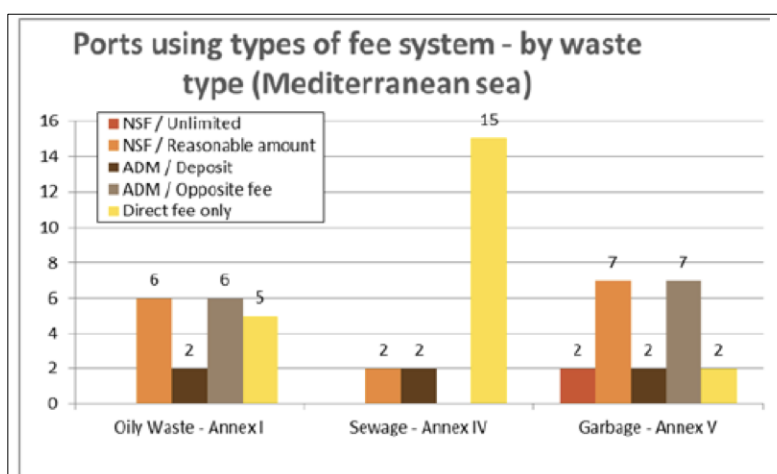


Figure 13: Types of fee systems used in EU ports located in the Mediterranean region;
Source: (UNEP/MAP, 2018)

Operational cooperation to address ship pollution illicit discharges in the Mediterranean. Cooperation amongst Mediterranean countries is key to address, in a coherent and effective way, ship pollution illicit discharges in the region. In recent years, joint work included coordinated aerial surveillance operations and reporting, as well as agreeing on common methods for collecting, recording and documenting evidence. A Mediterranean Network of Law Enforcement Officials relating to MARPOL within the framework of the Barcelona Convention (MENELAS) was established in 2015 and an information system made available (<http://www.menelas.org/>) The challenge is to engage all Mediterranean countries in the operational cooperation, which is subject to the availability of expertise and funding.

Alternative fuels and energy. There are emerging promising alternative fuel and energy options for potential GHG emission reductions (**Figure 14**) overleaf. Although not all of these alternatives are mature or readily available on the market. Ships are increasingly looking at these especially for new builds or retrofitting. The 2020 sulphur cap, which will reduce the allowed sulphur content in ship fuel from 3.50% to 0.50% will increase maritime transport costs. This, in turn, will increase the attractiveness of lower-carbon ships and alternative fuel types such as LNG powered ships.

Alternative fuel type	Potential CO ₂ emission reductions
Advanced biofuels	25-100%
LNG	0-20%
Hydrogen	0-100%
Ammonia	0-100%
Fuel Cells	2-20%
Electricity	0-100%
Wind	1-32%
Solar	0-12%

Figure 14: Alternative fuels and potential energy and corresponding CO₂ emission reductions;
Source: (OECD/ITF, 2018).

1.4 Knowledge gaps

Integrated maritime data with a specific focus on the Mediterranean Sea remains scarce. Economic and shipping data (such as UNCTAD data or Eurostat data and other databases and data analysis) often do not consider the Mediterranean as a whole. In most cases, Mediterranean coastal States are distributed among different geographical groups (Europe; Africa; Middle East) or are classified in groups according to their level of economic development.

Another challenge is to keep databases and information systems up-to-date, given that maritime traffic characteristics (type of cargo transported; number, type and size of ship movements), port infrastructure developments and volumes of goods and passengers calling at ports can vary significantly over the years. There is also a gap in research and studies addressing all sources of pollution from ships and their specific impact on the Mediterranean Sea and coastal ecosystems, as defined in the Barcelona Convention. This lack of knowledge may be a challenge to shaping policy that would adequately address maritime transportation and its interaction with the marine and coastal ecosystem in the region.

2. Specific analysis and policy responses

2.1 Impact of maritime transport on human health

Harmful air emissions from ships are a major threat to the Mediterranean Sea environment and climate and have significant impacts on human health. Sulphur oxides (SO_x) are directly harmful to human health and can be fatal at a certain atmospheric concentration. An exposure to high concentrations of SO_x may cause chest pain, breathing problems, eye irritation and a lowered resistance to heart and lung diseases. A secondary effect of SO_x is the formation of sulphates in the form of fine airborne particles (particulate matter) that have been linked to increased asthma attacks, heart and lung disease and respiratory problems in susceptible population groups. Particulate matter (PM) has been specifically associated with cardiopulmonary and lung cancer in exposed populations. Nitrogen oxides (NO_x) are also associated with adverse effects on human health as high concentrations cause respiratory illnesses (EGSA, 2016; OECD, 2013). Shipping related PM emissions from marine shipping contribute to approximately 60,000 deaths annually at a global scale, with impacts concentrated in coastal regions on major trade routes (Corbett & Lauer, 2008).

In response to this issue, the IMO has established worldwide limitations for the maximum sulphur content of fuel oils (SO_x and PM emissions being proportional to sulphur content in the fuel). These limits vary: inside the so-called Emission Control Areas (ECA), limits are more stringent than those applicable globally outside such areas. The Mediterranean countries members of the EU have been subject, since January 2010, to a sulphur limit of 0.1% in fuels used by ships when at berth in EU ports.

On 1st January 2020, the maximum sulphur limit in marine fuels used across the world (except for ships using exhaust gas cleaning equipment or alternative fuels) will decrease from 3.5% to 0.5% (**Figure 15**). This will result in significant reductions in sulphur oxides, particulate matter, and black carbon emitted by maritime transport operating across the globe.

Outside an Emission Control Area	Inside an Emission Control Area
0.5% m/m* (starting 1st January 2020)	0.1% m/m

Figure 15: Global Sulphur Limits applicable to marine fuel
*per mass.

So far, four ECAs have been established around the world:

1. Baltic Sea area (SO_x);
2. North Sea area (SO_x);
3. North American area (SO_x, NO_x and PM); and
4. United States Caribbean Sea area (SO_x, NO_x and PM).

On 1st January 2019, amendments to MARPOL Annex VI to designate the North Sea and the Baltic Sea as ECAs for NO_x entered into force. Both ECAs will take effect on 1st January 2021 and will result in considerably lower emissions of NO_x from international shipping in those sea areas. In NO_x emission control areas, ships are subject to so-called “Tier III” controls to limit NO_x emissions.

In the Mediterranean region, some work has been initiated regarding the possibility of establishing an ECA. This initiative is taking place under the Protocol concerning Cooperation in Preventing Pollution from Ships and, in Cases of Emergency, Combating Pollution of the Mediterranean Sea (“the 2002 Prevention and Emergency Protocol”) to the Barcelona Convention, and the Regional Strategy for Prevention of and Response to Marine Pollution from Ships (2016-2021) (UNEP(DEPI)/MED IG.22/28).

Recently, REMPEC coordinated the development of a technical and feasibility study on the possible designation of the Mediterranean Sea, or parts thereof, as a SO_x ECA. The ECA would set tougher limits of 0.1% sulphur content for marine fuel in the Mediterranean than the planned global sulphur cap of 0.5% from 2020 and the current level in the region of a maximum of 3.5% sulphur, except for the EU ports in the Mediterranean, as explained above. Findings are expected to be delivered in the Spring of 2019. According to preliminary results released in September 2018 (REMPEC, 2018), implementing ECA requirements in the Mediterranean would significantly reduce SO_x emissions and PM. In the study, the baseline SO_x and PM_{2.5} emissions¹³ are estimated to be 681,000 and 97,500 MT in 2016. Under the study’s MARPOL VI 2020 scenario based on regulations outlined in **Figure 14**, emissions of SO_x and PM_{2.5} fall by 75.3% and 50.7% respectively. The Med ECA 2020 scenario for SO_x and PM_{2.5} predicts further reductions by 78.7% and 23.7% compared to the 2020 sulphur cap scenario. Preliminary results based on the use of models also show that designating an ECA for the Mediterranean region would result in reducing lung cancer and cardiovascular disease mortality, as well as childhood asthma morbidity.

2.2 GHG emissions and climate change

Climate change risks and effects on the Mediterranean Sea and its coastal ecosystems have been documented. Shipping contributions represent around 2.6% of total global GHG emissions, but this share could more than triple by 2050 if no measures are taken (3rd IMO GHG study). According to the International Transportation Forum (ITF), using a baseline scenario without additional policy measures introduced, carbon emissions from global shipping are projected to reach approximately 1090 million tons by 2035. This would represent a 23% growth of emissions by 2035 compared to 2015 (OECD/ITF, 2018). **Figure 16** is a visualisation of CO₂ Emissions projections across shipping routes in 2015.

The ITF study identified a set of measures that could decarbonise international shipping by 2035. The use of **alternative fuels and renewable energy** (which include using biofuels, complemented by other natural or synthetic fuels such as methanol, ammonia and hydrogen, and wind assistance and electric propulsion to bring additional reductions), **technological measures** to improve energy efficiency of ships such as hull design improvements, air lubrication and bulbous bows, and **operational improvements** such as slower ship speeds, smoother ship-port coordination and use of larger, more efficient ships. Port solutions to reduce GHG emissions, such as green port fees (i.e. fees that take into account environmental performance of ships), alternative energy/clean burning fuels

¹³PM_{2.5} emissions refer to fine particles with a diameter of less than 2.5 micrometers. PM_{2.5} include very fine and ultrafine particles and penetrate the pulmonary alveoli.

incentives, green procurements or shore power facilities, can also help to reduce GHG emissions of ships (OECD/ITF, 2018b).



Figure 16: Visualisation of CO₂ Emissions projections across shipping routes in 2015;
Source: ITF - *Decarbonising Maritime Transport - Pathways to Zero-Carbon Shipping by 2035* — OECD/ITF 2018.

At the global level, to date, no GHG sector emission reduction target has been established for maritime transportation, as for other sectors, under the United Nations Framework Convention on Climate Change (UNFCCC). In 2011, the IMO adopted mandatory energy efficiency measures for shipping that entered into force in 2013. These measures consist of technical, design and operational requirements for new and existing vessels. According to the regulation, by 2025, new ships must be 30% more energy efficient than those built in 2014 (reference line). Statistical analysis based on the IMO data concluded that a substantial share of the new build fleet already complies with or exceeds current and future (2025) design efficiency requirements (Transport & Environment, 2017).

In addition to the above requirements, a mandatory data collection system for fuel oil consumption of ships was adopted at the IMO and entered into force in March 2018. This initiative is aimed at providing robust data to base future policy decisions on additional measures. In April 2018, the IMO adopted a specific strategy aimed at reducing GHG emissions. Under this strategy, the IMO members undertake to *reduce the total annual GHG emissions by at least 50% by 2050 compared to 2008*. This strategy is due to be revised by 2023. It is also expected that the implementation of the shipping GHG emissions reduction measures will be supported by the international technical cooperation projects, such as the IMO GloMEEP Partnership Project (<https://glomeep.imo.org>).

2.3 Introduction of alien species via maritime transportation

Shipping is a pathway for non-indigenous species introduction in the Mediterranean Sea via both ships' ballast water and ships' hull biofouling¹⁴. Translocation via ships' ballast water and sediments has been the focus area of action, and with the recent entry into force of the IMO mandatory regulations there is an expectation that introduction of such invasive species will be minimised by 2024, when all ships globally will have to be equipped with the required ballast water treatment systems. Biosafety risks from ship biofouling have so far been neglected despite the fact that the relationship between ship's biofouling and non-indigenous species introduction in marine ecosystems has been known for a long time.

Studies suggest that vessel biofouling accounts for more than 40% of all marine invasions and is therefore a major pathway for the introduction of the non-indigenous species. Specifically, it was estimated that at least 55% of the 1780 recognised non-indigenous species detected around the world have a life history characteristics that make them likely to be associated with biofouling on vessel hulls (Hewitt & Campbell, 2010), as shown in the **Figure 17** below.

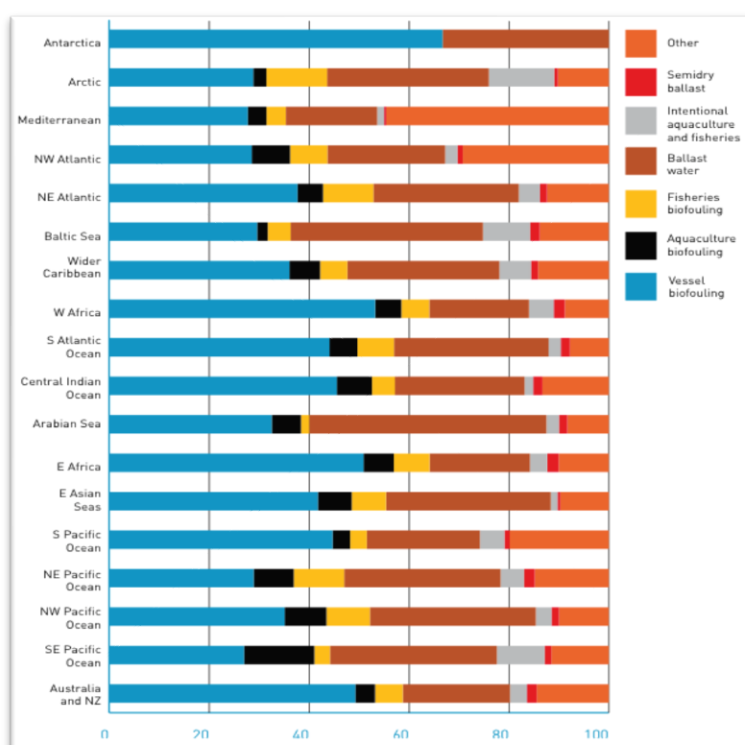


Figure 17: Percentage of marine bio-invasions by regions according to contribution of specified transport mechanisms; Source: Hewitt & Campbell (2010).

While international measures (*International Convention for the Control and Management of Ships' Ballast Water and Sediments*) entered into force in September 2017, with a requirement for shipowners to equip their ships with a ballast water treatment system, there is no mandatory international framework to address marine bio invasions from ship fouling. The IMO has adopted *Guidelines on biofouling (2011 Guidelines for the control and management of ships' biofouling to minimize the transfer of invasive aquatic species)* that set out best practices to prevent, monitor and clean biofouling but these are voluntary, and implementation is left to the good will of countries and the industry. However, this issue is gaining attention at the IMO given that some countries have either developed or are developing domestic regulations to address bio invasion risks from ship hull biofouling.

¹⁴ Ship biofouling refers to species or organisms attached to underwater or wetted surfaces of the ship, i.e. the hull of the ship and submerged equipment and apparatus. Vessels are capable of translocating non-indigenous species via a variety of mechanisms, including: release of eggs, larvae and adults through ballast and bilge water discharges; reproduction, dislodgement and voluntary departure of biofouling organisms; and organisms attached to anchors and chains.

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