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Athens, Greece, 27-28 June 2023

**Agenda Item 3: Review the draft content of the common 2023 Med QSR chapters**

# 2023 Mediterranean Quality Status Report (2023 Med QSR)



UNEP/MAP
Athens, 2023

**Note by the Secretariat**

In the framework of implementation of the Ecosystem Approach Roadmap adopted by the Contracting Parties at their COP 15 (Almeria, Spain, January 2008, Decision IG. 17/6), Decision IG. 22/7, adopted by COP 19 (Athens, Greece February 2016), provides for the development of six-yearly Assessment Reports of the Status of the Mediterranean Sea and Coast to demonstrate progress made towards Good Environmental Status and its related targets, as part of the Integrated Monitoring and Assessment Programme (IMAP).

In line with the above-mentioned decision, during the biennium 2016-2017 the UNEP/MAP system delivered the first ever Quality Status Report for the Mediterranean (2017 MED QSR). The 2017 MED QSR built on the structure, objectives and available data collected under IMAP, and provided an overview of the status of marine and coastal ecosystems in the Mediterranean, while also identifying knowledge gaps to be addressed. The 2017 MED QSR thus provided an important baseline for future assessments of the status of the Mediterranean Sea and Coast to be conducted based on further regular reporting of IMAP data by Contracting Parties.

COP 20 (Tirana, Albania, December 2017) endorsed the key findings of the 2017 MED QSR and requested the Secretariat to prepare, in cooperation with the Contracting Parties through the Ecosystem Approach governance structure, a Roadmap accompanied with a Needs Assessment identifying priority activities needed to successfully deliver the 2023 Mediterranean Quality Status Report (Decision IG.23/6).

The 2023 MED QSR Roadmap and Needs Assessment was developed during the 2018-2019 biennium and approved by COP 21 of the Contracting Parties to the Barcelona Convention in December 2019, Naples, Italy (Decision IG.24/4). It defined the vision for the successful delivery of the 2023 MED QSR, and outlined key IMAP-related processes, milestones and outputs to be undertaken in order to support it.

In line with the 2023 MED QSR Roadmap, the work of the UNEP/MAP system in the 2020-2021 and 2022-2023 biennia focused on the implementation of identified priority activities required for the successful delivery of the 2023 MED QSR. This included support to the implementation of IMAP-based national monitoring programmes; harmonization and standardization of monitoring and assessment methods through agreement on scales of monitoring, assessment and reporting and on methodological tools and assessment criteria for integrated assessment of GES; full operationalization of the IMAP Info System; strengthening of regional partnerships for data sharing; and effective regional cooperation with the Contracting Parties to the Barcelona Convention.

The present document presents the draft version of the integrated 2023 Med QSR report providing assessment finding for core IMAP Ecological Objectives, namely: Benthic Habitats (EO1), Cetaceans (EO1), Monk Seal (EO1), Marine Turtles (EO1), Marine Birds (EO1), Non-indigenous Species (EO2), Fisheries (EO3), Pollution (Contaminants, Eutrophication) (EO5 and EO9), Coast and Hydrography (EOs7 and 8), and Marine Litter (EO10). The 2023 MED QSR is based to a great extent on data submitted officially by the Contracting Parties to UNEP/MAP Secretariat through the region-wide IMAP InfoSystem database.

This document is submitted to the Integrated Meeting of the Ecosystem Approach Correspondence Groups (CORMONs) (Athens, Greece, 27-28 June 2023), with the aim to review the overall structure of the integrated 2023 Med QSR report, in order to be used as basis from the Secretariat to prepare an advanced version of the report for the consideration of the EcAp Coordination Group and MAP Focal Points Meetings, to be held respectively on 11 and 12-15 September 2023.

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## List of Abbreviations / Acronyms

**ACCOBAMS** Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area

**AChE** Acetylcholinesterase

**ADR** Adriatic Sea Sub-region

**AEGS** Aegean Sea sub-division

**AEL** Aegean and Levantine Seas Sub-region

**AIS** Automated Identification System

**ALBS** Alboran Sea sub-division

**AM** Arithmetic mean

**ASI** ACCOBAMS Survey Initiative

**AZ** Assessment Zone

**BAC** Background Assessment Concentrations

**BaP** Benzo(a)pyrene

**BAT** Best Available Technique

**BC** Background Concentration

**BChE** Butyrylcholinesterase

**BDL** Below Detection Limit

**BEP** Best Environmental Practices

**BFCOD** 7-benzyloxy-4-[trifluoromethyl]-coumarin-O-debenzyloxylase

**BV** Baseline Values

**BWQ** Bathing Water Quality

**C** Concentration

**CAS** Central Adriatic Sea sub-division

**CAT** Catalase

**CCI** Candidate Common Indicator (of IMAP)

**CDR** Central Data Repository

**CE** Carboxylesterase

**CEN** Central Mediterranean Sea Sub-region

**CENS** Central Mediterranean Sea sub-division

**CFU** Colony forming units

**CHASE+** Chemical Status Assessment Tool

**Chl *a*** Chlorophyll *a*

**CI** Common Indicator

**COP** Conference of the Parties

**CORMON** Correspondence Group on Monitoring

**CP** Contracting Party

**CR** Contamination Ratio

**CS** Contamination Score

**CW** Coastal waters monitoring zone

**CWMS** Central Western Mediterranean Sea sub-division

**D** Descriptor

**DD** Data Dictionary

**DIN** Dissolved Inorganic Nitrogen

**DL** Detection Limit

**dl** Dioxin like

**DP** Drivers and Pressures

**DPSIR** Driver, pressure, state, impact, response

**DS** Data Standard
**dw** Dry weight
**E. coli** Escherichia coli
**EAC** Environmental Assessment Criteria
**EC** European Commission
**EcAp MED III** EU-Funded Project "Mediterranean Implementation of the Ecosystem Approach, in Coherence with the EU MSFD"
**EcoQOs** Ecological Quality Objectives
**EDI** Estimated daily intake
**EEA** European Environmental Agency
**EIONET** European Environment Information and Observation Network
**EMODnet** European Marine Observation and Data Network
**EO** Ecological Objective
**EPR** Extended Producer Responsibility
**EQR** Ecological Quality Ratio
**EQS** Environmental Quality Standard
**ERL** Effects Range Low
**EROD** Ethoxyresorufin-O21 deethylase
**ESRI** Environmental Systems Research Institute
**ESRI** Environmental Systems Research Institute
**ETS** Electron Transport System
**EU** European Union
**EUNIS** European nature information system (of EEA)
**EUSeaMap** Modelled mapping product of seabed habitats for European marine regions (of EMODnet)
**EWI** Estimated weekly intake
**FAO** Food and Agriculture Organization of the United Nations
**FDA** Food and Drug Administration
**FML** Floating Marine Litter
**FRA** Fisheries Restricted Area (of GFCM)
**G/M** Good/moderate status boundary
**GES** Good Environmental Status
**GFCM** General Fisheries Commission for the Mediterranean
**GLY** Glycogen
**GM** Geometric mean
**GPML** Global Partnership on Marine Litter
**GPS** Global Position System
**GPx** Glutathione peroxidase
**GRd** Glutathione reductase
**GRID** Green, Resilient, Inclusive Development
**GSA** Geographical subarea (of GFCM)
**GSH** Glutathione
**GST** Glutathione-S-transferase
**HCB** Hexachlorobenzene
**HELCOM** Helsinki Commission
**HI** Total risk
**HQ** Hazard quotient
**ICES** International Council for the Exploration of the Sea
**ICZM** Integrated Coastal Zone Management
**IE** Intestinal enterococci

**IHO** International Hydrographic Organization

**IMAP** Integrated Monitoring and Assessment Programme of the Mediterranean Sea and Coast and Related Assessment Criteria

**IMO** International Maritime Organization

**INR** International Noise Register

**IONS** Ionian Sea sub-division

**JRC** Joint Research Centre

**LDH** Lactate dehydrogenase

**LEVS** Levantine Basin Sea sub-division

**LMS** Lysosomal Membrane Stability

**LOBE** Level of Onset of Biological Effects

**LPO** Lipid peroxidation

**MAP** Mediterranean Action Plan

**MARPOL** International Convention for the Prevention of Pollution from Ships

**MB** *Mullus barbatus*

**MDA** Malondialdehyde

**MED** Mediterranean

**MED POL** Programme for the Assessment and Control of Marine Pollution in the Mediterranean Sea

**MED QSR** Mediterranean Quality Status Report

**MedEAC** Mediterranean Environmental Assessment Concertation

**MEPC** Marine Environment Protection Committee

**MG** *Mytilus galloprovincialis*

**MN** Micronucleus Assay

**MP** Microplastic

**MPA** Marine Protected Areas

**MRL** Maximum residue limit

**MRU** Marine Reporting Unit

**MSFD** Marine Strategy Framework Directive

**MSs** Member States

**MT** Metallothionein

**MTS** Mid-Term Strategy

**NAPs** National Action Plans

**NAS** North Adriatic Sea sud-division

**NEAT** Nested Environmental Status Assessment Tool

**nonGES** not Good Environmental Status

**NPA** Non-Problem Area

**NRTT** Neutral red retention time

**OOAO** One Out All Out

**OSPAR** Oslo-Paris Commission, implementing the Oslo-Paris Convention for the Protection of the Marine Environment of the North-East Atlantic

**OW** Offshore waters monitoring zone

**OWG** Online Working Group

**PA** Problem Area

**PAHs** Polycyclic Aromatic Hydrocarbons

**PCB** Polychlorinated Biphenyl

**PCDD** Polychlorinated dibenzo-para-dioxins

**PCDD/Fs** Polychlorinated dibenzo-para-dioxins and dibenzofurans

**PCDF** Polychlorinated dibenzofurans

**PDBE** Polybrominated diphenyl ethers

**PET** Polyethylene terephthalate

**PFAS** Per- and polyfluorinated alkyl substances
**POPs** Persistent organic pollutants
**PPCP** Pharmaceuticals and Personal Care Products
**PUHA** Potentially Usable Habitat Area
**PWP** Plastic Waste Partnership (Basel Convention)
**QSR** Quality Status Report
**RC** Reference condition
**RSC** Regional Sea Convention
**SAS** South Adriatic Sea sub-division
**SAU** Spatial Assessment Units
**SCP** Sustainable Consumption and Production
**SD** Sub-division
**SOD** Superoxide dismutase
**SOPs** Standard Operations and Procedures
**SoS** Stress on Stress
**SPA/RAC** Special Protected Areas Regional Activity Centre (of UNEP/MAP)
**SUDS** Sustainable Urban Drainage Systems
**SUPs** Single-Use Plastics
**TEF** Toxic equivalency factor
**TG** Task group
**THQ** Target hazard quotient
**TM** Trace metals
**TP** Total Phosphorous
**TV** Threshold Value
**TYRS** Tyrrhenian Sea sub-division
**UHMWPE** Ultra-high Molecular Weight Polyethylene
**UNEA** United Nations Environmental Assembly
**UNEP** United Nations Environmental Program
**UNEP/MAP** United Nations Environment Programme – Mediterranean Action Plan-Barcelona Convention for the protection of the marine environment and coastal region of the Mediterranean
**USWM** Urban Storm Water Management
**VME** Vulnerable Marine Ecosystem
**VTG** Vitellogenin
**WFD** Water Framework Directive
**WHO** World Health Organization
**WMS** Western Mediterranean Sea sub-region
**WW** Wet weight
**WWTP** Wastewater Treatment Plants

**Executive Summary**
*[To be elaborated after the finalisation of the other sections of the document]*

The Mediterranean Sea: environmental characteristics, socioeconomics
*[750 words]*

The UNEP/MAP Barcelona Convention System
*[250 words]*

The Implementation of the Ecosystem Approach (EcAp) in the Mediterranean
*[250 words]*

Assessment Findings and Key Messages

## 0. Introduction

### 0.1 UNEP/MAP-Barcelona Convention: Vision, Goals, and Ecological Objectives

1. The regional cooperation for the Mediterranean Sea started in 1975 when the Mediterranean Action Plan (MAP) was launched as the first Regional Seas Programme within the framework of the United Nations Environment Programme (UNEP). A year later, in 1976, the countries bordering the Mediterranean adopted the Convention for the Protection of the Mediterranean Sea Against Pollution (Barcelona Convention), thus providing MAP with a legal basis constituting a framework allowing the Contracting Parties to unite their efforts for the preservation of the Mediterranean Sea as a common heritage of the peoples of the region.

2. Following a first period during which the efforts within MAP were mainly oriented to address pollution issues, the action under the Barcelona Convention has evolved towards a broader approach aimed at protecting and enhancing the Region's marine and coastal environment in line with a sustainable development vision. In this context, building on the global momentum created by the landmark 1992 Rio Conference, the MAP Coordinating Unit facilitated a consultation process that led to the adoption by the Contracting Parties, in June 1995, of the Action Plan for the Protection of the Marine Environment and the Sustainable Development of the Coastal Areas of the Mediterranean (MAP Phase II) and the amended Barcelona Convention, renamed “Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean”.

3. The alignment with the Sustainable Development orientation was reinforced in 2016 when the Barcelona Convention Contracting Parties adopted the Mediterranean Strategy for Sustainable Development (MSSD) 2016-2025. The MSSD provides an integrative policy framework and a strategic guiding document for all stakeholders and partners to translate the 2030 Agenda for Sustainable Development at the regional, sub regional and national levels. The Strategy is built around the following vision: A prosperous and peaceful Mediterranean region in which people enjoy a high quality of life and where sustainable development takes place within the carrying capacity of healthy ecosystems. This is achieved through common objectives, strong involvement of all stakeholders, cooperation, solidarity, equity and participatory governance. Thirty-four indicators have been agreed in relation to the following six objectives:

a. Ensuring sustainable development in marine and coastal areas
b. Promoting resource management, food production and food security through sustainable forms of rural development
c. Planning and managing sustainable Mediterranean cities
d. Addressing climate change as a priority issue for the Mediterranean
e. Transition towards a green and blue economy
f. Improving governance in support of sustainable Development

4. In 2021, the Contracting Parties adopted the UNEP/MAP Medium-Term Strategy 2022-2027 (MTS) (Decision IG.25/1, COP22, Antalya, Türkiye)as a key strategic framework for the development and implementation of the Programmes of Work of UNEP/MAP. It aims at achieving transformational change and substantial progress in the implementation of the Barcelona Convention and its Protocols, also providing a regional contribution to relevant Global processes[1].

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[1] In particular the 2030 Agenda for Sustainable Development and its Sustainable Development Goals (SDGs), the UN Decade on Ecosystem Restoration, the UN Decade of Ocean Science for Sustainable Development and the UNEP’s Medium-Term Strategy 2022-2025, approved at UNEA-5 in February 2021.

5. Today, the legal and institutional framework put in place over the years by the Contracting Parties to the Barcelona Convention have become an efficient cooperation instrument to which all the riparian countries adhere, despite the challenging geopolitical circumstances prevailing in the region. By adopting, in 2021, the UNEP/MAP Medium-Term Strategy (MTS 2022-2027), the Contracting Parties to the Barcelona Convention and its Protocols, agreed to orient their collaboration during the period 2022-2027 towards the following vision: "*Progress towards a healthy, clean, sustainable and climate resilient Mediterranean Sea and Coast with productive and biologically diverse marine and coastal ecosystems, where the 2030 Agenda for sustainable development and its SDGs are achieved through the effective implementation of the Barcelona Convention, its Protocols and the Mediterranean Strategy for Sustainable Development for the benefit of people and nature*". To this end, the Contracting Parties decided to further strengthen their collaboration to reach a dual long-term goal:

a) the achievement and maintenance of Good Environmental Status (GES) of the Mediterranean Sea and Coast, and
b) achieving sustainable development through the SDGs and living in harmony with nature.

**Overall Objectives of the MTS 2022-2027:**

- To drive transformational change in enhancing the impact of the "delivery as one" of the UNEP/MAP Barcelona Convention system, and its contribution to the region;
- To ensure that the Good Environmental Status (GES) of the Mediterranean Sea and Coast, the relevant SDGs and their targets, and the post-2020 global biodiversity goals and targets are achieved, through concrete actions to effectively manage and reduce threats and enhance marine and coastal resources;
- To contribute to strengthening Mediterranean solidarity and peoples' prosperity; and
- To contribute to the Building Back Better approach of the "UN framework for the immediate socio-economic response to COVID-19" and towards a "green recovery" of the Mediterranean by supporting new and sustainable business models, enabling a just and green transition to a nature-based solutions and circular economy.

6. In 2012, the Contracting Parties adopted 11 Mediterranean Ecological Objectives (EO) to achieve good environmental status (GES). These are presented in chapter 0.2.

## 0.2 Integrated Monitoring and Assessment Programme of the Mediterranean Sea and Coast

7. In 2008, the Contracting Parties to the Barcelona marked a new important milestone when they decided to progressively apply the ecosystem approach to the management of human activities that may affect the Mediterranean marine and coastal environment for the promotion of sustainable development. A process was therefore initiated for the gradual application of the ecosystem approach as an overarching principle cutting across all UNEP/MAP operations and applied through an agreed implementation roadmap made of seven steps starting with the definition of an ecological Vision for the Mediterranean: "*A healthy Mediterranean with marine and coastal ecosystems that are productive and biologically diverse for the benefit of present and future generations*". Under this vision, eleven Ecological Objectives reflecting common issues for the management of the Mediterranean marine and coastal environments were defined:

**Steps for the implementation of the Ecological Approach (EcAp) Roadmap in the Mediterranean:**

1. Definition of an ecological vision for the Mediterranean.
2. Setting of common Mediterranean strategic goals.
3. Identification of important ecosystem properties and assessment of ecological status and pressures.
4. Development of a set of ecological objectives corresponding to the Vision and strategic goals.
5. Derivation of operational objectives with indicators and target levels.
6. Revision of existing monitoring programmes for ongoing assessment and regular updating of targets.
7. Development and review of relevant action plans and programmes.

Table 1: Ecological objectives and their related Common Indicators and Candidate Indicators

| Ecological Objective | IMAP indicators |
|---|---|
| **EO 1 Biodiversity** | |
| Biological diversity is maintained or enhanced. The quality and occurrence of coastal and marine habitats and the distribution and abundance of coastal and marine species are in line with prevailing physiographic, hydrographic, geographic and climatic conditions. | Common Indicator 1: Habitat distributional range (EO1) to also consider habitat extent as a relevant attribute |
| | Common Indicator 2: Condition of the habitat’s typical species and communities (EO1) |
| | Common Indicator 3: Species distributional range (EO1 related to marine mammals, seabirds, marine reptiles) |
| | Common Indicator 4: Population abundance of selected species (EO1, related to marine mammals, seabirds, marine reptiles) |
| | Common indicator 5: Population demographic characteristics (EO1, e.g., body size or age class structure, sex ratio, fecundity rates, survival/mortality rates related to marine mammals, seabirds, marine reptiles) |
| **EO 2 Non-indigenous species** | |
| Non-indigenous species introduced by human activities are at levels that do not adversely alter the ecosystem | Common Indicator 6: Trends in abundance, temporal occurrence, and spatial distribution of non-indigenous species, particularly invasive, non-indigenous species, notably in risk areas (EO2, in relation to the main vectors and pathways of spreading of such species) |
| **EO 3 Harvest of commercially exploited fish and shellfish** | |
| Populations of selected commercially exploited fish and shellfish are within biologically safe limits, exhibiting a population age and size distribution that is indicative of a healthy stock | Common Indicator 7: Spawning stock Biomass (EO3); |
| | Common Indicator 8: Total landings (EO3); |
| | Common Indicator 9: Fishing Mortality (EO3); |
| | Common Indicator 10: Fishing effort (EO3); |
| | Common Indicator 11: Catch per unit of effort (CPUE) or landing per unit of effort (LPUE) as a proxy (EO3) |
| | Common Indicator 12: Bycatch of vulnerable and non-target species (EO1 and EO3) |
| **EO 4 Marine food webs** | |
| Alterations to components of marine food webs caused by resource extraction or human-induced environmental changes do not have long-term adverse effects on food web dynamics and related viability | To be further developed |

| Ecological Objective | IMAP indicators |
|---|---|
| **EO 5 Eutrophication** | |
| Human-induced eutrophication is prevented, especially adverse effects thereof, such as losses in biodiversity, ecosystem degradation, harmful algal blooms and oxygen deficiency in bottom waters. | Common Indicator 13: Concentration of key nutrients in water column |
| | Common Indicator 14: Chlorophyll-a concentration in water column |
| **EO 6 Sea-floor integrity** | |
| Sea-floor integrity is maintained, especially in priority benthic habitats | To be further developed |
| **EO 7 Alteration of hydrographical conditions** | |
| Alteration of hydrographic conditions does not adversely affect coastal and marine ecosystems. | Common Indicator 15: Location and extent of the habitats impacted directly by hydrographic alterations to also feed the assessment of EO1 on habitat extent |
| **EO 8 Coastal ecosystems and landscapes** | |
| The natural dynamics of coastal areas are maintained and coastal ecosystems and landscapes are preserved | Common Indicator 16: Length of coastline subject to physical disturbance due to the influence of human-made structures |
| | Candidate Indicator 25: Land use change |
| **EO9 Pollution** | |
| Contaminants cause no significant impact on coastal and marine ecosystems and human health | Common Indicator 17: Concentration of key harmful contaminants measured in the relevant matrix (related to biota, sediment, seawater) |
| | Common Indicator 18: Level of pollution effects of key contaminants where a cause-and-effect relationship has been established |
| | 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 |
| | Common Indicator 20: Actual levels of contaminants that have been detected and number of contaminants which have exceeded maximum regulatory levels in commonly consumed seafood |
| | Common Indicator 21: Percentage of intestinal enterococci concentration measurements within established standards |
| **EO10 Marine Litter** | |
| Marine and coastal litter do not adversely affect coastal and marine environment | Common Indicator 22: Trends in the amount of litter washed ashore and/or deposited on coastlines |
| | Common Indicator 23: Trends in the amount of litter in the water column including microplastics and on the seafloor |
| | Candidate Indicator 24: Trends in the amount of litter ingested by or entangling marine organisms focusing on selected mammals, marine birds, and marine turtles |
| **EO11 Energy including underwater noise** | |
| Noise from human activities cause no significant impact on marine and coastal ecosystems | Candidate Indicator 26: Proportion of days and geographical distribution where loud, low, and mid-frequency impulsive sounds exceed levels that are likely to entail significant impact on marine animal |
| | Candidate Indicator 27: Levels of continuous low frequency sounds with the use of models as appropriate |

8. The ultimate objective of the implementation of the Ecosystem Approach is to achieve and maintain Good Environmental Status (GES) of the Mediterranean Sea and coasts. A major component of the ecosystem approach is monitoring and assessment of the status of the marine and coastal environment. To this end, the Contracting Parties adopted the Integrated Monitoring and Assessment Programme (IMAP) whose objective is to perform regional assessments on the status of the Mediterranean Sea and coast. The IMAP sets out all the required elements to cover in an integrated manner, monitoring and assessment of biodiversity and fisheries, pollution and marine litter, and coast and hydrography. Accordingly, the Contracting Parties have established IMAP-based national monitoring programmes. The core of IMAP is the 23 regionally agreed common indicators and four candidate indicators, for which scientific knowledge and information is being developed to enable regional monitoring and assessment (Table 1). The monitoring in relation to each common indicator carried out at the national level by the Contracting Parties provides data and information enabling assessment at regional level, whether the GES related to the specific EO is met or not. Based on the assessments for each EO, the integrated assessment takes place on the state of the Mediterranean Sea and Coast and reflected in Quality Status Reports issued on a regular basis (Med QSRs).

9. In developing and implementing the steps of the Ecosystem Approach Roadmap in the Mediterranean, a special effort was made to ensure synergy and coherence where appropriate with the Marine Strategy Framework Directive (MSFD) adopted within the framework of the European Union (EU) with the objective to achieve a Good Environmental Status (GES).

## 0.3 Other relevant global and regional assessment processes

### 0.3.1 <u>The UN Secretary-General’s annual report on the Sustainable Development Goals</u>

10. At the global level, a reporting process started in 2016 to regularly provide an accurate evaluation of where the world stands in relation to the achievements of the 17 Sustainable Development Goals (SDGs) of the 2030 Agenda for Sustainable Development adopted by world leaders at the UN Summit of September 2015. From 2016 to 2022 seven annual reports have been issued about the global and regional progress towards the 17 SDGs with in-depth analyses of selected indicators for each Goal. SDG custodian agencies contribute to the process by the development of methodologies to measure indicators and collecting data from Member States.

### 0.3.2 <u>World Ocean Assessments</u>

11. The Regular Process for Global Reporting and Assessment of the State of the Marine Environment, including Socioeconomic Aspects is a global mechanism established in accordance with the recommendation of the United Nations World Summit on Sustainable Development of 2002 held in Johannesburg (South Africa). It aims at strengthening the regular scientific assessment of the state of the marine environment in order to enhance the scientific basis for policymaking.

12. The first cycle of the Regular Process (2010 to 2014) issued its report in 2016 and the second cycle covering five years from 2016 to 2020 led to the Second World Ocean Assessment (WOA II) published in 2021.

### 0.3.3 <u>The Global Environment Outlook</u>

13. The Global Environment Outlook (GEO) is an independent assessment of the state of the environment conducted by UNEP through a consultative and participatory process. UN Environment has produced six GEO reports. The process for the elaboration of the seventh report (GEO-7) started in 2022 and is expected be finalised in 2026. The categories of the GEO report are in line with the IMAP Ecological Objectives.

0.3.4 Mediterranean Strategy for Sustainable Development Dashboard (MSSD)

14. Whereas the IMAP indicators assess the state of the Mediterranean, the MSSD assesses the pressures and drivers.

15. In the framework of the monitoring of the implementation of the MSSD, indicator factsheets (Dashboard of the MSSD, Decision IG.24/3) were developed and regularly updated to inform about the progress made by the Mediterranean countries towards Sustainable Development. The Contracting Parties established the Simplified Peer Review Mechanism (SIMPEER) to facilitate the transposition, implementation and monitoring of the MSSD and SDGs at the regional and national level. They also mandated Plan Bleu in 2017 to launch a new foresight study on the environment and development in the Mediterranean by 2050. It is an ambitious foresight exercise designed as an original science-policy interface, aiming at mobilizing decision makers and stakeholders from the North and South of the Mediterranean, going beyond geographical and institutional borders. Its goal is to confront several possible visions of the Mediterranean future by 2050 (with an intermediate step at 2030) and co-construct solid and grounded transition paths towards common goals.

0.3.5 The EU Marine Strategy Framework Directive (MSFD)

16. The Marine Strategy Framework Directive (MSFD) was adopted in 2008 as a legal instrument of the European Union aiming to protect more effectively the marine environment across Europe and to protect the resource base upon which marine-related economic and social activities depend. In 2010 with the MSFD framework a Decision on GES was achieved, which was further revised in 2017 (Commission Decision (EU) 2017/848). Moreover, the MSFD at large is currently undergoing through a review process in consultation with the EU Member States.

17. MSFD requests EU Member States to take the necessary measures to achieve and/or maintain a Good Environmental Status (GES) of the marine environment. GES, as targeted by the MSFD, corresponds to the proper functioning of ecosystems (at the biological, physical, chemical and health levels) allowing the sustainable use of the marine environment.

18. A Common Implementation Strategy has been adopted within the MSFD framework, calling each EU Member State to prepare and implement a marine strategy for its marine waters, on a 6-year cycle, and currently undergo its second implementation cycle (2018-2023).

19. The Directive lists four European marine regions – the Baltic Sea, the North-east Atlantic Ocean, the Mediterranean Sea and the Black Sea. Cooperation between the EU Member States with neighbouring countries, is provided through the respective Regional Seas Action Plans and Conventions. Close and effective collaboration is in place to ensure harmonisation between the implementation of the MSFD, and the activities related to GES achievement undertaken within the framework of UNEP/MAP-Barcelona Convention, including through the mutual participation to the respective Technical Groups (TGs) and Ecosystem Approach Correspondence Groups (CORMONs).

20. The European Environment Agency (EEA) and the United Nations Environment Programme/Mediterranean Action Plan (UNEP/MAP) collaborated in the elaboration of the Horizon 2020 indicator-based technical report. The first regional assessment “Horizon 2020 Mediterranean report — Toward shared environmental information systems” was published in 2014 and the second. The second Horizon 2020 indicator-based technical report was jointly issued in 2021 by EEA and UNEP/MAP.

## 0.4 Approach and methodology for the preparation of the Mediterranean 2023 QSR

21. The first ever Quality Status Report for the Mediterranean (2017 Med QSR) built on the structure, objectives and available data collected under the IMAP (presented chapter 0.2). It provided an overview of the status of marine and coastal ecosystems in the Mediterranean, while also identifying knowledge gaps to be addressed. The 2017 Med QSR thus provided an important baseline for future assessments of the status of the Mediterranean Sea and Coast to be conducted based on further regular reporting of IMAP data by Contracting Parties.

22. The 2023 Med QSR Roadmap[2] focused on the implementation of identified priority activities required for the successful delivery of the 2023 Med QSR. This included support to the implementation of IMAP-based national monitoring programmes; harmonisation and standardisation of monitoring and assessment methods through agreement on scales of monitoring, assessment and reporting and on methodological tools and assessment criteria for integrated assessment of good environmental status (GES); full operationalisation of the IMAP Info System[3]; strengthening of regional partnerships for data sharing; and effective regional cooperation with the Contracting Parties to the Barcelona Convention.

23. Draft sections of the 2023 Med QSR were presented and reviewed by the relevant meetings of the Ecosystem Approach Correspondence Groups on Monitoring (Biodiversity & Fisheries, Pollution, Marine Litter and Coast & Hydrography), the Ecosystem Approach Coordination Group and the meetings of the respective MAP Components Focal Points (MED POL, PAP/RAC, REMPEC and SPA/RAC), and were revised accordingly.

### 0.4.1 Data

24. Since the 2017 Med QSR Contracting Parties have significantly increased their submission of national data to the IMAP Info System. The IMAP Info System has been developed by INFO/RAC as a platform to facilitate access to knowledge for managers and decision-makers as well as stakeholders and the general public, in close consultation with UN Environment/MAP Components. The IMAP Info System is able to receive and process data according to the Data Standards and Data Dictionaries that set the basic information on data reporting within IMAP.

25. The assessment approach followed for the 2023 Med QSR was to use all available data in the IMAP Info System for the IMAP Common and Candidate Indicators and to complement and address data gaps with inputs from numerous diverse sources where appropriate. Each Ecological Objective assessment in Chapter 2 provides details of the sources of data and information used, the assessments, reports and publications provided by the Contracting Parties and other scientific partners. This includes information related to national reports on the implementation of the Barcelona Convention and its Protocols, implementation of the National Action Plans (NAPs), ICZM demonstration projects, as well as the results of regionally and nationally driven implementation of relevant policies, programmes and projects.

### 0.4.2 Assessment Methods

26. The main assessments in Chapter 2 are provided in chapters per Cluster: Pollution & Marine Litter; Biodiversity & Fisheries; and Coast & Hydrography. These are based on assessments of Common Indicators (CIs) and some Candidate Common Indicators (CCIs) within Ecological Objectives (EO) (Table 1). Where feasible and where data permit, indicators have been integrated within EOs and across EOs. The detailed methodologies for assessing each CI are described in the relevant Cluster.

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[2] The 2023 Med QSR Roadmap and Needs Assessment (Decision IG.24/4)
[3] http://www.info-rac.org/en/infomap-system/imap-pilot-platform

27. The assessments provided under Chapter 2 present the status of implementation of the appropriate assessment methods; identify the available information necessary for assessing the status of marine and coastal ecosystems where possible; and identify the trends as appropriate. They also describe the knowledge gaps and define key directions to overcome them for future assessments.

0.4.3 Drivers, Pressures, State, Impact and Response (DPSIR)

28. The 2023 Med QSR is a step towards the analytical model of Drivers, Pressures, State, Impact, Response (DPSIR) in the marine environment. A DPSIR framework uses indicators of environmental quality to inform the decisions of policymakers of the likely impact of their choices. The framework is based on a causal-chain starting with drivers (e.g., economic sectors, human activities) and pressures (e.g., emissions, waste). These cause the current state of the environment which can be physical, chemical and biological, that result in impacts on the environment, ecosystems and ultimately human health. The policy responses could for example be to adopt new measure or set targets. DPSIR in the marine environment can be challenging because environmental changes are usually the result of multiple and cumulative causes and there is a natural lag-time in environmental responses to measures.

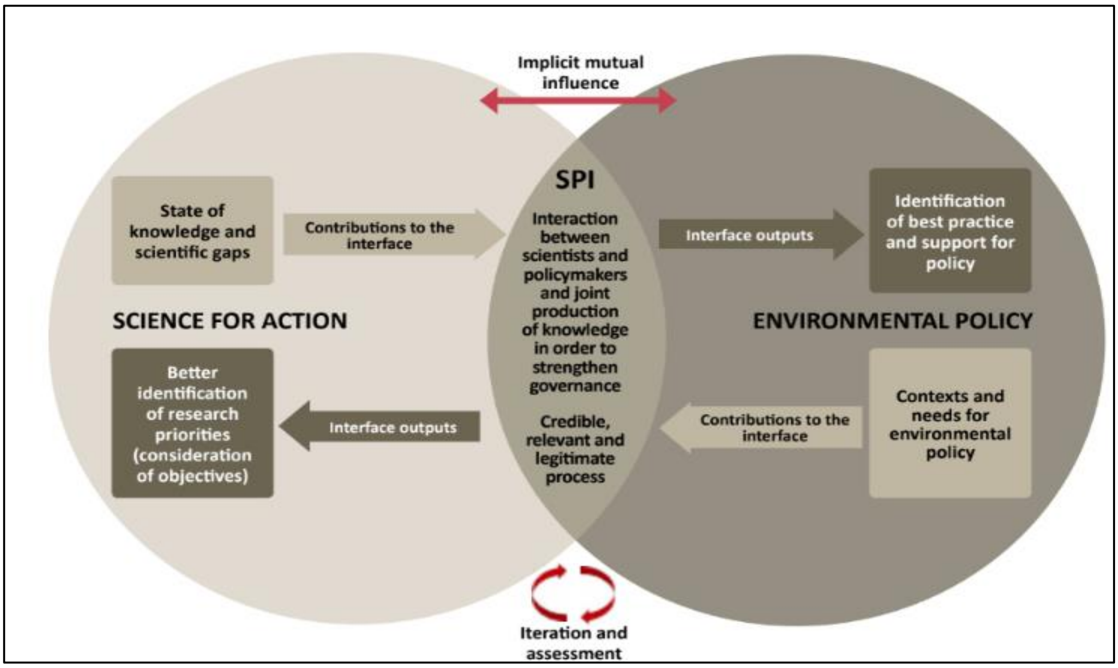
0.4.4 Science Policy Interface

29. A prerequisite for the successful design of IMAPs to monitor the implementation of the EcAp for the management of human activities that may affect the Mediterranean marine and coastal environment, is bridging the existing gaps between the scientific and policy-making spheres by promoting a stronger science-policy interface (SPI).

30. Strengthening SPI ensures that:

(i.) Outcomes of scientific projects resulting in data collection/harvesting are reflected in the design and implementation of national and regional IMAPs to develop evidence-based environmental policies;
(ii.) The policy process supports the articulation of policy challenges and defines priorities and needs where monitoring and scientific input is necessary.

31. Through this process, policy-making and scientific communities are made aware of mutual needs and challenges to develop efficient sub-regional and regional monitoring policies.



*Source: Plan Bleu, 2018*

# 1. The Mediterranean Sea

## 1.1 Environmental characteristics

### 1.1.1 <u>The Mediterranean marine and coastal environment</u>

32. The Mediterranean is a semi-enclosed sea located between Africa, Asia and Europe and is bordered by twenty-one countries. It is connected to the Atlantic through the Strait of Gibraltar, to the Black Sea through the Strait of Dardanelles, and to the Red Sea through Suez Canal.

33. Although representing only 0.82% of the surface area of all oceans, with a total surface area of about 2.9 million square kilometres, the Mediterranean is the largest enclosed sea on Earth. According to the Barcelona Convention, the Mediterranean Sea is "bounded to the West by the meridian passing through Cape Spartel lighthouse, at the entrance of the Straits of Gibraltar, and to the East by the southern limits of the Straits of the Dardanelles between Mehmetcik and Kumkale lighthouses".

34. The Western Basin of the Mediterranean Sea has a narrow and fragmented continental shelf and a maximum depth of 2850 m, while the Eastern Basin is characterized by a relatively wide continental shelf, and it includes the deepest part of the Mediterranean (5267 m).

35. Apart from the coastal plains along the eastern Mediterranean coasts of Egypt, Libya and Tunisia, and the deltaic zones of large rivers (e.g., Ebro, Rhone, Po and Nile), the geomorphology of the Mediterranean coasts is characterised by an irregular, deeply indented coastline, especially in the north, and the presence of mountain ranges: the Atlas, the Rif, the Baetic Cordillera, the Iberian Cordillera, the Pyrenees, the Alps, the Dinaric Alps, the Hellenides, the Balkan, and the Taurus.

36. The most striking feature of the underwater geomorphology of the Mediterranean Sea is the presence of abrupt submarine canyons linking the coastal areas to the deep sea. They facilitate exchanges between coastal waters and deep waters and form essential habitats for several species by providing a place of refuge, nursery and export to the continental shelf for many species (fish larvae, decapods, cetaceans, etc.).

37. The presence of numerous islands is another striking characteristic of the Mediterranean. According to some reports there are about ten thousand islands in the Mediterranean, most of them are in the Aegean Sea. The largest islands are Sicily, Sardinia, Corsica, Cyprus, and Crete, and the major island groups include the Balearics off the coast of Spain and the Ionian, Cyclades, and Dodecanese islands off Greece.

### 1.1.2 <u>Sea water masses and circulation</u>

38. The average annual sea surface temperature in the Mediterranean show strong gradients from west to east and from north to south, as well as a strong seasonal variation between 10 and 28°C, reaching 30°C in summer. This sea is considered a warm temperate sea. It is characterized by high salinities, temperatures and densities. Its deep waters have a constant temperature around 13°C with an average salinity of 38‰. The Mediterranean water column is made of a surface layer, an intermediate layer and a deep layer that sinks to the bottom. The evaporation water losses are partially compensated by the rivers that flow into the Mediterranean and a surface current from the Black Sea through the Bosporus, the Sea of Marmara, and the Dardanelles. The main compensation of evaporation losses is provided by a continuous inflow of surface water from the Atlantic Ocean through the Strait of Gibraltar. The current it generates is the main driver of the water circulation in the Mediterranean. It flows eastward along the southern coasts of the western basin, then across the Sicily Strait and continues along the southern coasts of the eastern basin.

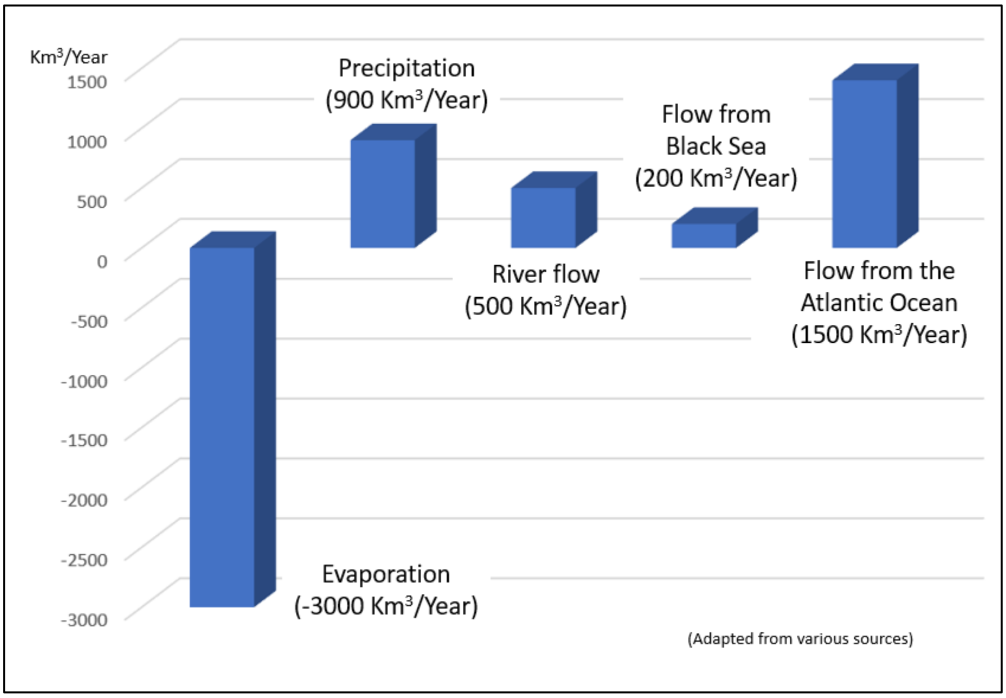



Figure 1: Annual hydrological balance of the Mediterranean Sea

39. With a low amplitude of semi-diurnal tides (30-40 cm), except for the northern Adriatic and the Gulf of Gabes where it can reach up to 150 and 180 cm, respectively, the Mediterranean Sea is considered a medium microtidal sea by global ocean standards.

1.1.3 Trophic level

40. In terms of nutrients, the Mediterranean is among the most oligotrophic oceanic systems. The most eutrophic waters are located on the north shore in the western basin and Adriatic at the mouth of the large rivers Rhone, Ebro and Po. However, riverine nutrient inputs are relatively low, as most river systems discharging in the Mediterranean Sea are small. The main source of nutrients in the Mediterranean lies in the inflowing Atlantic surface waters at the level of the Gibraltar Strait. As the waters move eastwards from the Gibraltar Strait, they become depleted in nutrients. By the time they reach the Egyptian coasts, their nutrient signature has almost disappeared. Additionally, the Nile River nutrient signature has disappeared due to the 1960s Nile Dam construction. All this contributes towards making the Levantine Basin (at the eastern part of the Mediterranean Sea) one of the most oligotrophic areas in the world ocean. The outflow of Black Sea surface waters constitutes another source of nutrients to the Mediterranean, but its influence is limited to the north Aegean zone.

1.1.4 Biodiversity

41. Home to 17,000 species of fauna and flora representing respectively 7.5% and 18% of the world's marine flora and fauna, the Mediterranean Sea is a hotspot of biodiversity. The evolution of the Mediterranean marine fauna and flora over millions of years in a unique mixture of temperate and subtropical species gives this almost closed sea the second place in the world in terms of endemic species richness with more than a quarter of its species found nowhere else on Earth.

42. The species diversity of the Mediterranean, although unevenly distributed between the eastern and western basins, is higher than in most other regions of the world, due to the geological history of this sea, its close communication with the Atlantic and its position at the junction of three continents Europe, Asia and Africa which make it a melting pot of biodiversity.

43. The uniqueness of the Mediterranean biotope comes from a combination of morphological, chemical and biotic characteristics reflected by the presence of certain ecosystem building species and assemblages. The meadows formed by *Posidonia oceanica* and the bioconcretions of the coralligenous assemblages are among the most important marine ecosystems of the Mediterranean Sea. They provide a wide range of ecosystem services and sustain many human activities such as fisheries and tourism. They are, however, particularly sensitive and vulnerable to coastal urbanization, pollution, turbidity, anchorages, trawling, etc.

44. The shallow coastal waters are home to key species and sensitive ecosystems such as seagrass beds and coralligenous assemblages, whilst the deep waters host a unique and fragile fauna. Many of these species are rare and/or threatened and are globally or regionally classified by IUCN as "endangered" or "critically endangered", such as the monk seal *Monachus monachus*, the Mediterranean shellfish *Pinna nobilis* and cartilaginous fish species (sharks and rays). Many other species have strongly regressed during the 20th century.

45. Non-indigenous and invasive species (NIS) are increasingly present in the Mediterranean Sea. As of 2020, more than 1,199 non-indigenous species have been reported in the Mediterranean Sea, 513 of which are considered as established. The highest number of established alien species has been reported in the eastern Mediterranean, whereas the lowest number was recorded in the Adriatic Sea. Of those established species, 107 have been flagged as invasive.

46. The NIS in the Mediterranean Sea are linked to four main pathways of introduction: the corridors, shipping (ballast waters and hull fouling), aquaculture, and aquarium trade. Corridors are the most important pathway of introduction (33.7%) followed by shipping (29%) and aquaculture (7.1%).

47. The vast majority of the marine NIS recorded in the Mediterranean have their native distribution in the Western and Central Indo-Pacific and Red Sea, being mostly associated with introductions into the Mediterranean Sea through corridors.

48. In 2021, the number of Marine and Coastal Protected Areas (MCPAs) recorded in the MAPAMED (Figure *2*) database reached 1,126 sites covering 209,303 km², including only 0.06% of strictly protected areas. There are no other effective area-based conservation measures (OECMs) reported for the Mediterranean to date; however, combining areas that could be potential OECMs (i.e., 1 Particularly Sensitive Sea Area and 8 Fisheries Restricted Areas) the total MCPA and potential OECM coverage currently stands at 9.3% of the Mediterranean Sea. As shown in Figure *2*, there is a large disparity in MCPA coverage between countries, with the majority of MCPAs occurring in the western Mediterranean Sea and 90.05% occurring in in the northern part of the Mediterranean. In addition to geographical representation, there is also uneven distribution of MPAs according to sea depth, with less than 4% of depths greater than 1,000 m covered by MPAs. As the region now faces new targets, not only is coverage expected to increase, but it is essential that coverage is more equitably represented across Contracting Parties and the different ecosystems.

*[Map to be inserted]*
Figure 2: MAPAMED, the database of MArine Protected Areas in the MEDiterranean. 2019 edition, version 2. © 2022 by SPA/RAC and MedPAN (*Source:* *https://mapamed.org/*)

### 1.1.5 Climate change

49. The Mediterranean region climate is characterized by mild winters and hot and dry summers. From the West, the Atlantic Ocean regimes have a great intra-seasonal and interannual variability influences in the Mediterranean reaching mainly the northeast part of the Mediterranean land and sea, whilst the Eastern and Southern climatic regimes provide the characteristics of the southern Mediterranean areas.

50. Climate change is one of the most critical challenges that the Mediterranean region is facing. In its Sixth Assessment Report the IPCC concluded that "during the 21st century, climate change is

projected to intensify throughout the region. Air and sea temperature and their extremes (notably heat waves) are likely to continue to increase more than the global average (high confidence)". The report predicted (i) a decrease in precipitation in most areas by 4–22%, depending on the emission scenario, (ii) a further rise in the Mediterranean Sea level during the coming decades and centuries, likely reaching 0.15 to 0.6 m in 2050 and 0.6 to 1.1 m in 2100 (relative to 1995–2014) and the process is irreversible at the scale of centuries to millennia; (iii) coastal flood risks will increase in low-lying areas along 37% of the Mediterranean coastline with an increase in the number of people exposed to sea level rise, especially in the southern and eastern Mediterranean region, and may reach up to 130% compared to present in 2100; (iv) ocean warming and acidification will impact marine ecosystems, with however uncertain consequences on fisheries.

51. For the marine environment, the available data indicates that since the 1980's, documented impacts on marine Mediterranean species and habitats were attributed to climate change. These included frequent and drastic mortalities of sessile benthic species of the infralittoral and circalittoral communities. For the deeper Mediterranean ecosystems, recent scientific articles reported that in the 1990's, Climate change caused an accumulation of organic matter on the deep-sea floor and altered the carbon and nitrogen cycles.

52. By affecting all trophic levels, the Climate Change may alter the distribution of some species as a response to changes in the availability of their preys. Indications were reported about shifts in the distribution and density of cetacean species in relation to variations of sea surface temperature (SST). Furthermore, the rise in seawater temperature has the potential to favour pathogen development and transmission. It is also an accelerating factor for the introduction and spread of non-indigenous species. The thermal stress it generates on the native species make them weaker competitors which favours the establishment and growth of non-indigenous species populations in their habitats.

## 1.2 Socioeconomic characteristics

### 1.2.1 Unsustainable consumption and production patterns are the main drivers of environmental change in the Mediterranean

53. Current consumption and production patterns in the Mediterranean are characterised by high resource consumption combined with low recycling rates and unsatisfactory waste management. They are unsustainable overall and lead to considerable environmental degradation in the Mediterranean region, including land take and degradation, water scarcity, noise, water and air pollution, biodiversity loss and climate change (UNEP/MAP and Plan Bleu, 2020).

54. Achieving a high level of development is historically linked to environmental trade-offs. [Figure] to be numbered] shows that none of the Mediterranean countries has both a high level of human development and an Ecological Footprint that lies within the planetary boundaries. The challenge ahead is to move all countries into the Sustainable Development Quadrant of the figure. Strategies to achieve this goal need to be differentiated: countries with a low Ecological Footprint and low Human Development Index (HDI) need to find solutions to increase HDI without increasing their Ecological Footprint. Countries with a high HDI and high Footprint need to find solutions to maintain high HDI but decrease their Footprint[4].

[4] Note that [Figure] does not make indications about the state of the rule of law, respect of civil rights and equality, that should also be included in a measure of inclusive sustainable development and resilience.

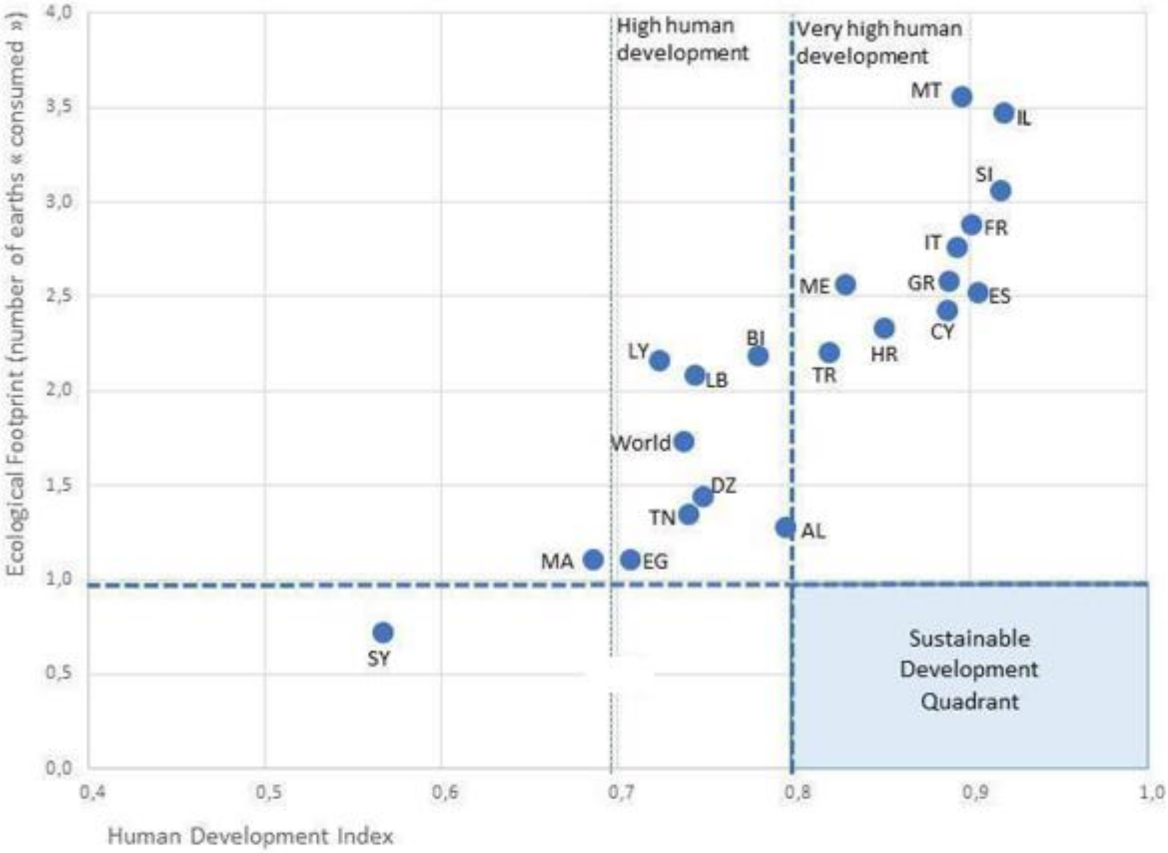



Figure 3: Ecological Footprint 2017 and Human Development Index (HDI) 2019 in Mediterranean countries (*Source: Graph by Plan Bleu, inspired by Wackernagel et al., 2017. Data from Global Footprint Network, 2021 and UNDP*, *Human Development Report 2020*).

1.2.2 Ecological Footprint

55. The ecological deficit in the Mediterranean countries is twice as high as the global average, meaning that Mediterranean countries consume approximately 2.5 times more natural resources and ecological services than the region's ecosystems can provide (Akcali et al, 2022). The gap between the Mediterranean and the world averages remained substantial: an Ecological Footprint[5] of 3.4 global hectares per capita is found in the Mediterranean, as compared to 2.8 globally in 2018.

56. Ecological Footprint ranges from 1.1 to 5.5, with ecological deficits assessed for all Mediterranean countries. Countries with the highest ecological deficit are the two island states (Malta and Cyprus), but also Israel, Italy and Slovenia. Over the past 15 years, the Ecological Footprint has been mainly on the rise in southern and eastern Mediterranean countries (SEMC), with the exception of Syrian Arab Republic and Libya, as well as in Bosnia and Herzegovina and Montenegro, and declining in the EU Mediterranean countries, most notably in Cyprus, Spain, Italy and Greece, as well as in Israel. A slight decline was also seen in other EU countries, whereas stagnation was recorded in Egypt, Albania and Tunisia.

[5] The Ecological Footprint measures how much biocapacity humans demand, and how much is available. It does not address all aspects of sustainability, nor all environmental concerns. Biocapacity is the area of productive land available to produce resources or absorb carbon dioxide waste, given current management practices. Global hectares (gha) is a unit of world-average bioproductive area, in which the Ecological Footprint and biocapacity are expressed.

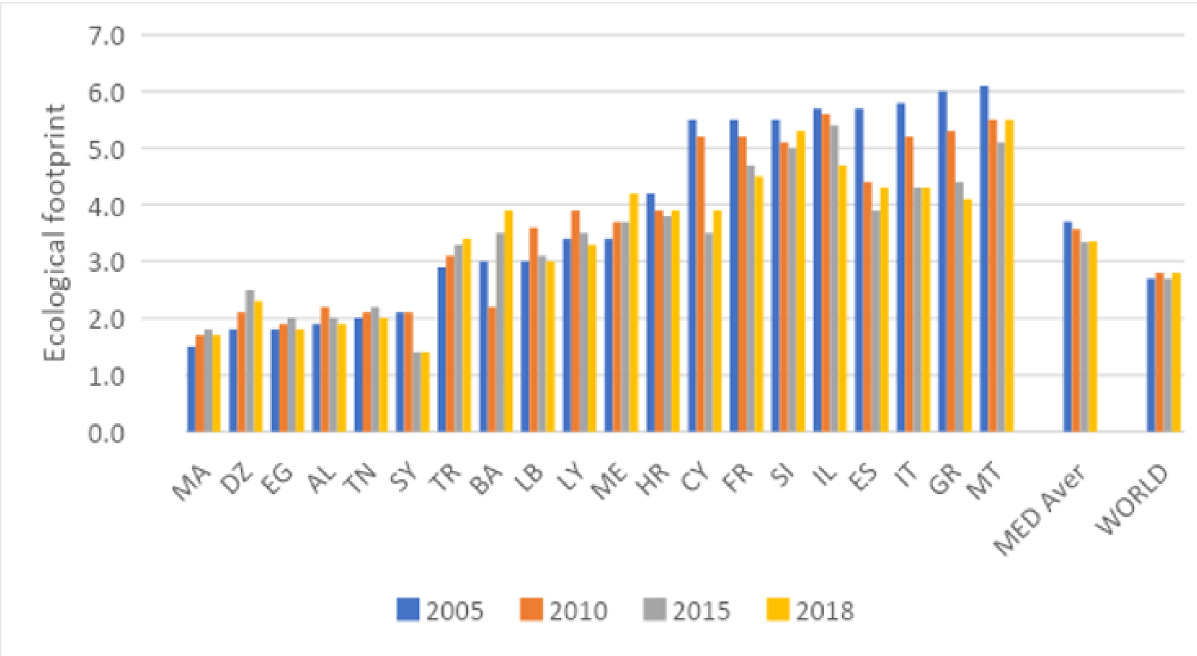



Figure 4: Ecological Footprint of the Mediterranean countries 2005 – 2018. (*Source: Global Footprint Network, York University, FoDaFo (2022). National Footprint and Biocapacity Accounts, 2022 Edition*)

### 1.2.3 Human development and gender equality

57. Sixteen Mediterranean countries rank at or above the world average of human development as measured by the HDI (world average of 0.732). Countries with the highest HDI values include Israel, the EU Mediterranean and Western Balkan countries and Türkiye, followed by Algeria, Egypt and Tunisia. Libya, Lebanon, Morocco and the Syrian Arab Republic have HDIs lower than the world average, ranking between 104$^{th}$ and 150$^{th}$.

Table 2: Human development and gender inequality indexes (GII) with related indicators, 2021. SDG: Sustainable Development Goals.

| **Countries** | **Human Development Index (value)** | **HDI rank** | **Mean years of schooling (SDG 4.4)** | **Gender inequality index (value)** | **GII rank** | **Adolescent birth rate [a)] (SDG 3.7)** | **Share of parliament seats held by women (SDG 5.5)** |
|---|---|---|---|---|---|---|---|
| AL | 0.796 | 67 | 11.3 | 0.144 | 39 | 14.5 | 35.7 |
| DZ | 0.745 | 91 | 8.1 | 0.499 | 126 | 11.7 | 7.5 |
| BA | 0.780 | 74 | 10.5 | 0.136 | 38 | 9.9 | 24.6 |
| HR | 0.858 | 40 | 12.2 | 0.093 | 26 | 8.6 | 31.1 |
| CY | 0.896 | 29 | 12.4 | 0.123 | 35 | 6.8 | 14.3 |
| EG | 0.731 | 97 | 9.6 | 0.443 | 109 | 44.8 | 22.9 |
| FR | 0.903 | 28 | 11.6 | 0.083 | 22 | 9.5 | 37.8 |
| GR | 0.887 | 33 | 11.4 | 0.119 | 32 | 8.5 | 21.7 |
| IL | 0.919 | 22 | 13.3 | 0.083 | 22 | 7.6 | 28.3 |
| IT | 0.895 | 30 | 10.7 | 0.056 | 13 | 4.0 | 35.3 |
| LB | 0.706 | 112 | 8.7 | 0.432 | 108 | 20.3 | 4.7 |
| LY | 0.718 | 104 | 7.6 | 0.259 | 61 | 6.9 | 16.0 |
| MT | 0.918 | 23 | 12.2 | 0.167 | 42 | 11.5 | 13.4 |
| MC | -- | -- | - - | -- | -- | -- | -- |
| ME | 0.832 | 49 | 12.2 | 0.119 | 32 | 10.4 | 24.7 |

| Countries | Human Development Index (value) | HDI rank | Mean years of schooling (SDG 4.4) | Gender inequality index (value) | GII rank | Adolescent birth rate [a)] (SDG 3.7) | Share of parliament seats held by women (SDG 5.5) |
|---|---|---|---|---|---|---|---|
| MA | 0.683 | 123 | 5.9 | 0.425 | 104 | 25.9 | 20.4 |
| SL | 0.918 | 23 | 12.8 | 0.071 | 18 | 4.5 | 21.5 |
| ES | 0.905 | 27 | 10.6 | 0.057 | 14 | 6.3 | 42.3 |
| SY | 0.577 | 150 | 5.1 | 0.477 | 119 | 38.7 | 11.2 |
| TN | 0.731 | 97 | 7.4 | 0.259 | 61 | 6.7 | 26.3 |
| TR | 0.838 | 48 | 8.6 | 0.272 | 65 | 16.9 | 17.3 |
| | | | | | | | |
| **WORLD** | **0.732** | -- | **8.6** | **0.465** | **--** | **42.5** | **25.9** |

NOTES: a) Births per 1,000 women ages 15–19. (Source: https://hdr.undp.org/data-center/documentation-and-downloads (accessed November 2022)).

58. Women disproportionately suffer the impacts of climate change and other environmental hazards, especially in developing countries. To achieve inclusive sustainable development, it is vital to achieve gender equality. A gender gap persists in all Mediterranean countries. Gender inequality, as measured by the Gender inequality index (GII)[6], is highest in Algeria, Syrian Arab Republic, Egypt, Lebanon and Morocco. Mediterranean countries that get closest to gender equality, without however reaching equality, are Italy, Spain and Slovenia. A third or more seats in the national parliaments are held by women in just a few countries – Spain, France, Albania and Italy (SDG indicator 5.5). Among the SEMC, relatively high participation of women in the national assemblies is found in Israel, Tunisia, Egypt and Morocco. The share of female members of parliament is relatively low in Cyprus and Malta. The highest adolescent birth rates (SDG indicator 3.7) are found in Egypt.

1.2.4 Population as a multiplier of pressures on the coastal and marine environment

59. Population in the Mediterranean countries reached 531.7 million in 2021, increasing by close to 20 million people in only 3 years between 2018 and 2021 (UN DESA Population Division, 2022). An overall increase of 41.4% was recorded between 1990 and 2021, while decade-on-decade growth accelerated (from a rate of 12.5% between 1990 and 2000, to 13.5% between 2000 and 2010 and 17.2% for the last decade). Human-caused pressures on the coastal and marine environment are stemming from unsustainable production and consumption patterns, and a growing population multiplies these pressures, unless incremental population increase comes with sustainable lifestyles.

60. The most populated countries are Egypt (109.3 million in 2021) followed by Türkiye (84.8 million), France (64.5 million), Italy (59.2 million) and Spain (47.5 million). Montenegro, Malta and Monaco count less than a million inhabitants. Monaco is the most densely populated country with 24,622 inhabitants per square kilometer. Other densely populated countries are Malta, countries of the east Mediterranean coast (Lebanon and Israel), and Italy. Low population density (of 100 inhabitants per $km^2$ or less) is found in Spain, Morocco, Greece, Tunisia, Croatia, Bosnia and Herzegovina, Montenegro, Algeria (18 inhabitants/ $km^2$) and Libya (4 inhabitants/ $km^2$). These are national averages, and it must be noted that settlements tend to concentrate in the coastal zones of Mediterranean countries, where population density is thus generally higher than the national average. In this sense, population can be seen as a concentrator of human pressures on the coastal and marine environment.

[6] GII is a composite metric of gender inequality using three dimensions: reproductive health, empowerment and the labour market. A low GII value indicates low inequality between women and men, and vice-versa.

Table 3: Key demographic data, 2021.

| **Countries** | **Median age of population (years)** | **Population change prev. yr., (in 000)** | **Population density (inhab./ km²)** | **Total population (in 000)** | **Popul. % change '21/'01** | **Total net-migration (in 000)** | **Life expectancy at birth (years)** |
|---|---|---|---|---|---|---|---|
| AL | 37.27 | -13.71 | 104.19 | 2,854.71 | -9.5 | -10.61 | 76.46 |
| DZ | 27.80 | 731.25 | 18.55 | 44,177.97 | 41.6 | -18.80 | 76.38 |
| BA | 41.82 | -49.80 | 63.89 | 3,270.94 | -22.0 | -25.87 | 75.30 |
| HR | 43.73 | -37.93 | 72.64 | 4,060.14 | -9.9 | -10.40 | 77.58 |
| CY | 37.59 | 5.78 | 134.65 | 1,244.19 | 29.0 | 2.00 | 81.20 |
| EG | 23.94 | 1,741.26 | 109.76 | 109,262.18 | 50.0 | -32.37 | 70.22 |
| FR | 41.59 | 58.20 | 117.04 | 64,531.44 | 9.3 | 20.61 | 82.50 |
| GR | 44.74 | -71.51 | 79.85 | 10,445.37 | -5.7 | -14.81 | 80.11 |
| IL | 29.04 | 141.35 | 411.22 | 8,900.06 | 42.7 | 16.86 | 82.26 |
| IT | 46.83 | -241.86 | 200.15 | 59,240.33 | 3.9 | 28.02 | 82.85 |
| LB | 28.27 | -77.39 | 546.69 | 5,592.63 | 27.4 | -115.12 | 75.05 |
| LY | 26.27 | 78.84 | 4.02 | 6,735.28 | 27.7 | -0.70 | 71.91 |
| MT | 39.01 | 11.25 | 1,672.22 | 526.75 | 31.0 | 10.41 | 83.78 |
| MC | 54.52 | -0.25 | 24,621.48 | 36.69 | 13.1 | 0.21 | 85.95 |
| ME | 38.19 | -0.69 | 45.46 | 627.86 | -0.8 | -0.10 | 76.34 |
| MA | 28.67 | 375.77 | 83.08 | 37,076.59 | 28.2 | -46.24 | 74.04 |
| SL | 43.20 | 0.76 | 105.24 | 2,119.41 | 6.9 | 4.57 | 80.69 |
| ES | 43.88 | 178.55 | 94.53 | 47,486.94 | 15.9 | 275.02 | 83.01 |
| SY | 20.94 | 530.44 | 116.08 | 21,324.37 | 27.5 | 212.19 | 72.06 |
| TN | 31.74 | 91.50 | 78.90 | 12,262.95 | 22.7 | -9.19 | 73.77 |
| TR | 30.93 | 632.46 | 110.15 | 84,775.40 | 30.3 | -69.73 | 76.03 |
| **TOTAL MED** | | | | **531,685.56** | 24.3 | | |

*Source: UN DESA, Population Division (2022); own calculations*

*[Map to be inserted]*

Figure 5: Population density by administrative region and main cities in the Mediterranean catchment area. (Source: UNEP/MAP and Plan Bleu, 2020 (based on EUROSTAT, 2018; National statistics departments, 2011-2018; UNDESA, World Urbanization Prospects: The 2018 Revision).

61. Decreases in population (on a year-by-year basis) have been recorded for some time sequences or the entire period since 2000 in some of the Mediterranean countries. The downward population trend has been most consistent in Albania, Bosnia and Herzegovina (since 2002), Croatia (since 2005) and Montenegro (almost all years in the observed period), as well as in Greece (since 2005). Periodic population decreases during the last 20 years also characterise a few SEMC (Lebanon, Libya, Syrian Arab Republic) and can be correlated with periods of conflicts and crises[7]. Negative population growth was also seen in Italy (since 2014), Spain (in the period 2012 – 2015) and Monaco. In other Mediterranean countries, annual population changes during the past two decades were positive. With dominantly unsustainable lifestyles that are linked to negative environmental externalities (resource depletion, waste generation, etc.), fluctuations of population generally impact the weight of overall pressures on the coastal and marine environment, at varying levels depending on the per capita environmental footprint.

[7] E.g., Lebanon since 2015; Libya had a negative population balance of 0.74 million in 2011; Syrian Arab Republic in particular in the period 2012 – 2015.

62. Cumulative population change rates 2001 – 2021 indicate population declined in Bosnia and Herzegovina (-22%), as well as in Croatia, Albania, Greece and Montenegro (by less than 10% and in case of Montenegro by less than 1%). Countries with the highest population growth (around 60% to 40% respectively) were Egypt, Israel and Algeria; growth rates above the Mediterranean average (of 24.3%) were also recorded in Malta, Türkiye, Cyprus, Morocco, Libya, Syrian Arab Republic and Lebanon. Migration flows influence population numbers and move environmental pressures from one place to the other. In addition, human and natural disasters can cause spontaneous movement and displacement of large numbers of people. This may have significant impacts on the environment, such as deforestation and soil erosion, as well as depletion and pollution of water resources, impacting also the coastal and marine environment (UNHCR website, 2023).

### 1.2.5 Human activities interact with the marine environment

63. The relationship between maritime economic activities and the marine and coastal environment is characterised by impact and dependence. The maritime economy can foster the development of sustainable practices for livelihoods that depend on the sea and its resources. At the same time, if not properly managed, it can have environmental impacts that cause marine and coastal ecosystem degradation and hinder achievement of good environmental status (GES). In turn, degraded marine and coastal ecosystems provide fewer economic opportunities for those activities that depend on healthy ecosystems (fisheries, tourism, …). Other economic activities that heavily impact the marine environment can function independently from the state of the marine environment (maritime transport, offshore oil and gas, etc.).

64. In most Mediterranean countries, the regulation of maritime activities is still insufficient to make the maritime economy a sustainable blue economy, whether through legislation, monitoring or policing. This economic "openness" stands in contrast with the biological semi-closed character of the Mediterranean Sea (water renewal time of around 80 years). The fragmentation of policies, including within countries, and the persistence of insufficiently rigorous international standards, are hindering the implementation of regulation, monitoring and sanctioning measures, essential for the sustainable use of common resources.

65. A knowledge gap remains when it comes to measuring the sustainability of maritime economic activities and their individual contribution to the degradation of the environment. This chapter provides a qualitative analysis of this link, while further work on the monitoring and observation of the pressures caused by the maritime economy needs to be conducted, linking the Blue Economy with the Ecosystem Approach.

66. However, action to "close the tap" of impacts on the marine environment that stem from the maritime economy cannot wait for complete datasets on these impacts to be available. In application of the precautionary principle, a well-calibrated balance between the development of the maritime economy and increased protection and restoration of the Mediterranean environment is needed, through urgent and systemic regulatory action, in order to achieve a truly sustainable Blue Economy that is compatible with achieving GES in the Mediterranean.

*Tourism*

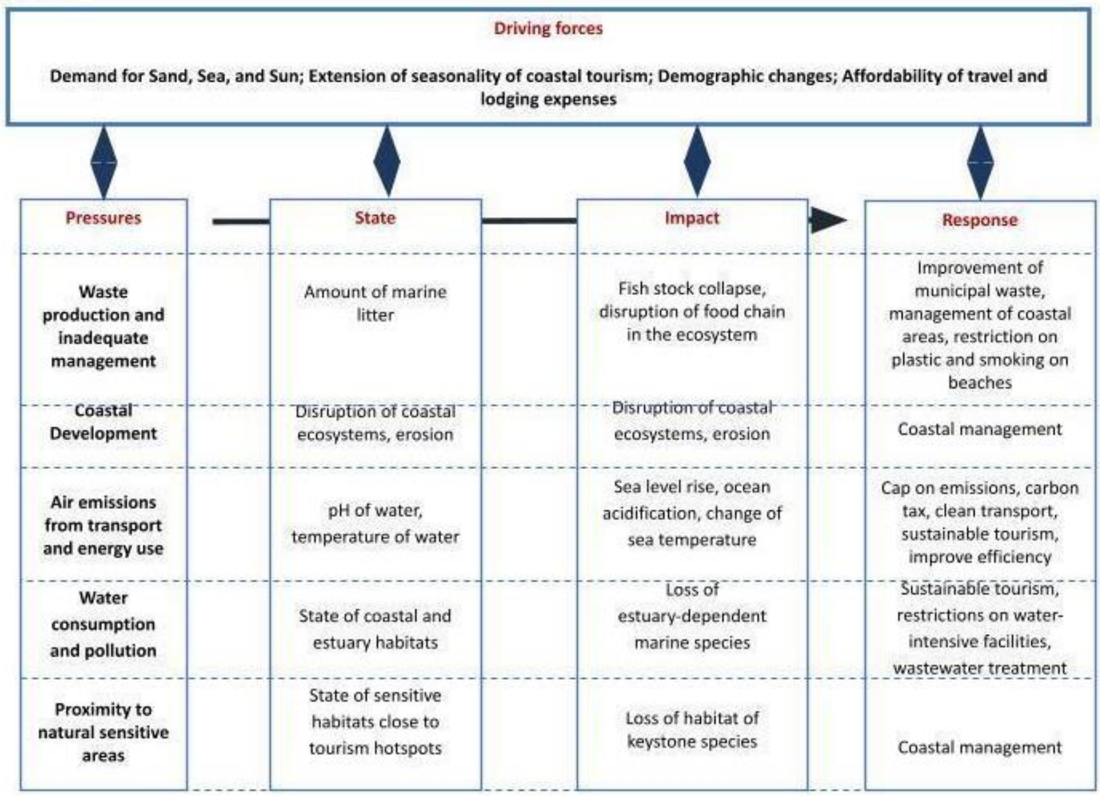



Figure 6: Pressures exerted by the tourism sector on the marine environment. (Source: UNEP/MAP and Plan Bleu, 2020).

67. Exceptional natural resources (including 46,000 km of coastline), cultural heritage, diversity of the region, its gastronomy and climate, coupled with favourable geographic location and good connectivity with the main source markets have all contributed to the Mediterranean becoming the world’s leading tourism destination (UN World Tourism Organisation, UNWTO, 2015; UNEP/ MAP and Plan Bleu, 2020). Mediterranean destinations developed a rich and diverse set of tourism products, services and experiences, completing the traditional sun and sea attractions with health, sports, nature and culture as well as cruise and business tourism.

68. Data on tourism specifically related to the Mediterranean coastal region is generally not available and data contained in this chapter refers to national data (all marine façades included for countries with multiple marine façades).

**Tourism in the Mediterranean: the key facts**

- Over the past 50 years (1970 – 2019), the number of international tourist arrivals (ITAs) increased by a factor of seven: from around 58 million in 1970 (161 in 1995, 246 in 2005) to 408 million in 2019
- During the past decade (2010 – 2019), a cumulative increase of ITAs to the Mediterranean countries was 43.2%
- In 2019, close to one third (27.8%) of the global ITAs were recorded in the Mediterranean
- Tourism was severely affected by COVID-19 pandemic: the number of ITAs decreased by more than two thirds in 2020; a moderate recovery was seen in 2021, with total number of ITAs reaching 45.5% of the 2019 level
- According to pre-COVID-19 projections, the total number of ITAs was to reach 500 million by 2030
- A strong growth in receipts from international tourism was recorded, with the total amount almost quadrupling between 1995 (USD 81 billion) and 2019 (USD 308 billion); the receipts plunged in 2020 (-64.3% compared to 2019 level)
- Economic impact of tourism is strong: contribution of tourism and travel to GDP has been estimated by WTTC at USD 943.4 billion, with 18.4 million direct and indirect jobs across the region in 2019; the COVID-19 crisis halved the GDP from tourism and travel in the Mediterranean, causing a loss of 3.1 million jobs
- Ranking within the top five Mediterranean destinations did not change much over time; Türkiye and Greece were the fastest growing; the cumulative share of the top five destinations in total Mediterranean ITAs has been gradually decreasing due to emergence and development of new destinations across the region

| **1995** | **2005** | **2019** |
|---|---|---|
| (88% of the Med ITAs) | (82% of the Med ITAs) | (79% of the Med ITAs) |
| France (60.0 mill) | France (75.0 mill) | France (90.9 mill) |
| Spain (33.0 mill) | Spain (55.9 mill) | Spain (83.5 mill) |
| Italy (31.1 mill) | Italy (36.5 mill) | Italy (64.5 mill) |
| Greece (10.1 mill) | Türkiye (20.3 mill) | Türkiye (51.2 mill) |
| Türkiye (7.1 mill) | Greece (14.8 mill) | Greece (31.3 mill) |

(Sources: Plan Bleu, 2016; UNWTO, 2022 and 2022b; WTTC, 2022)

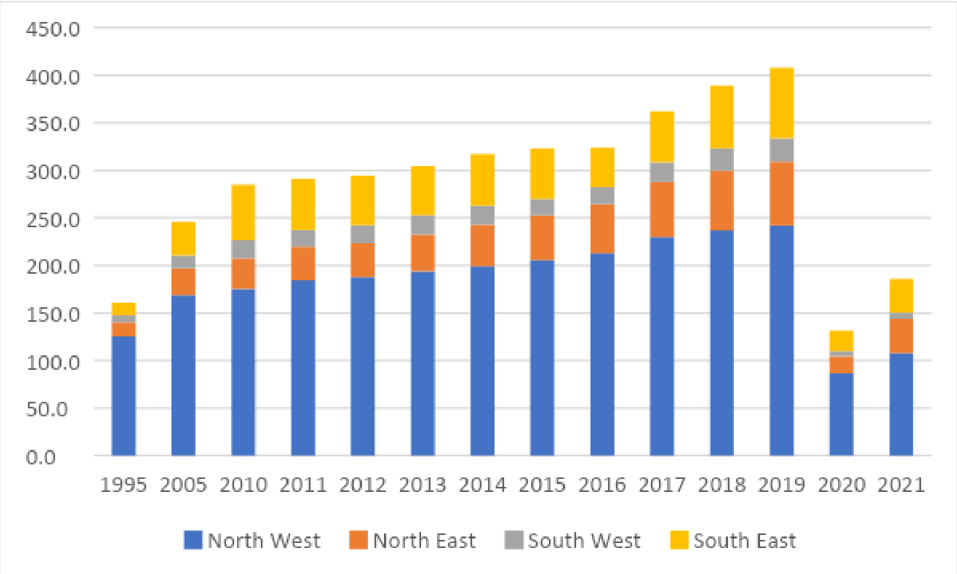



Figure 7: International Tourist Arrivals (ITAs) in the Mediterranean (in millions). (Sources: Based on UNWTO 2022 and 2022b).

69. The overall number of ITAs in Mediterranean countries reached 408 million in 2019. During the past decade (2010 – 2019) alone, an average annual increase of 13.7 million ITAs (4.1% year-on-year) was recorded. While tourism in the established North West Mediterranean destinations (primarily France, Spain and Italy) remained predominant, their relative share in the total numbers of visits decreased by nearly 20 percentage points between 1995 and 2019. The share of fast-growing destinations from the South East and North East (in particular Türkiye, but also Albania, Croatia and Montenegro) in the overall number of tourists in the region has increased considerably, in particular during the past 15 years. The share of ITAs to North East Mediterranean countries, for example, increased from 11.4% in 2005 to 16.4% in 2019. Despite significant potential, the contribution of South West destinations to the overall Mediterranean ITAs remained modest (5 to 6%). In 2019, the Mediterranean earned close to USD 308 billion in international tourism receipts[8], which is approximately at the level of Egypt's GDP for the same year, or 1.5 times higher than the GDP of Greece.

Table 4: International Tourist Arrivals (ITAs) and receipts from tourism per capita.

| **Country code** | **ITAs per capita** | **Receipts from tourism per capita (in USD)** |
|---|---|---|
| AL | 2.07 | 805.8 |
| DZ | 0.06 | 2.3 |
| BA | 0.36 | 363.5 |
| HR | 4.28 | 2,902.6 |
| CY | 3.34 | 2,753.3 |
| EG | 0.13 | 129.5 |
| FR | 1.35 | 944.3 |
| GR | 2.92 | 1,902.7 |
| IL | 0.51 | 839.4 |
| IT | 1.08 | 830.4 |
| LB | 0.28 | 1,254.4 |
| LY | no data | no data |
| MT | 5.55 | 3,769.4 |
| MC | 10.01 | no data |
| ME | 4.02 | 1,929.2 |
| MA | 0.35 | 224.8 |
| SI | 2.25 | 1,532.3 |
| ES | 1.77 | 1,690.9 |
| SY | 0.14 | no data |
| TN | 0.80 | 179.6 |
| TR | 0.61 | 357.2 |
| ***MED*** | ***0.79*** | ***593.3*** |

Colour codes

| | | |
|---|---|---|
| ≥ 10 ITAs p.c | | |
| 5 – 10 | | |
| 2 – 5 | | |
| 0.5 – 2 | | |
| ≤ 0.5 | | |

(Sources: Based on UNWTO 2022 and 2022b; World Bank, 2022).

[8] Spending by international visitors on goods and services in destinations.

70. The main pressures of the tourism sector on the marine environment are marine litter, coastal land take, habitat degradation, air emissions, water consumption and sewage generation, and proximity to natural sensitive areas (UNEP/ MAP and Plan Bleu, 2020). Fluctuations in numbers of tourist arrivals come with a direct impact on the environment due to resource consumption and generation of externalities that are caused at the individual level, and that add on to more general impacts caused by tourism infrastructure.

71. In recent years, the number of tourist arrivals in Mediterranean countries was highly variable due to several reasons: Armed conflicts in the region, security concerns as well as political instability along with deteriorating social and economic conditions, all resulted in tourism downturns and/ or serious disruptions in some of the SEMC in the period since 2010, affecting in particular Syrian Arab Republic (with 8.1 million ITAs in 2010 and only 2.4 million in 2019), Libya, Egypt and Tunisia[9]. Egypt experienced a rapid tourism growth in the past – from 2.9 million arrivals in 1995 to a record of 14 million in 2010. However, following the 2011 instability and related events, ITAs plummeted and remained below 10 million for several years, to start rising again in 2018 and 2019.

72. The COVID-19 pandemic brought the total number of international arrivals down to 131.4 million in 2020 (-67.8% compared to 2019) i.e., well below the 1995 level (of 161 million). Receipts also plummeted from USD 308 billion in 2019 to USD 110 billion in 2020 (- 64.3%), while losses were spread unevenly across the region: Monaco and France recorded the lowest decreases in ITAs (-50% and -54% respectively), while Cyprus was the most affected (-85%), followed by Montenegro (-84%), Bosnia and Herzegovina (-83.3%) and Israel (-82.6%). Signs of recovery were visible already in 2021, with the total number of ITAs reaching 45.5% of the 2019 level, representing an increase of 41.3% compared to 2020, whereas receipts increased by an even larger margin (56.7%). Mediterranean tourism recovered faster than the global average and regional ITAs made up as much as 41.6% of the world tourism in 2021, compared to 27.8% in the pre-pandemic 2019. According to the WTTC data[10], the impact of COVID-19 crisis on employment was less severe than the impact on on tourism GDP: following a loss of 3.1 million jobs across the region in 2020 (a decline of 17.1% compared to 2019), total employment in 2021 was 16.8 million (representing a decline of 8.8% in relation to 2019). Full recovery of global tourism to pre-pandemic levels is projected for 2024 (EIU, 2022).

73. According to available estimates, almost half (47.2%) of all ITAs to Mediterranean countries in 2017 were linked to coastal areas (UNEP/MAP and Plan Bleu, 2020). Shares of coastal tourism varied markedly between different groups of countries, reaching for example 85% in the North East Mediterranean countries while remaining below 40% in North West and South East; the estimated share of coastal tourism in the South West Mediterranean was around 62%. In 2019, coastal areas accounted for a very high share of the total nights spent in tourist accommodation in Malta (100%), Cyprus (97%), Greece (96%), Spain (96%), and Croatia (93%) (EU, 2022). Nights spent in coastal regions of EU countries in 2018 represented 42% of the total; at the same time, coastal regions had the highest tourism intensity[11] with 12.3 nights-spent per inhabitant (Batista e Silva et al., 2020).

74. While tourism had a strong positive economic impact across the region and has emerged as a pillar of many national economies in the Mediterranean, the benefits associated with tourism came at significant environmental and social costs. The negative impacts of tourism have been widely recognised and documented[12], and there is a growing set of recommendations, policies and projects aiming at the development of sustainable tourism in the Mediterranean. When ITAs decreased in recent years, pressures on the environment caused by tourism decreased as well, giving coastal and marine

[9] During 1990's, similar effects of conflicts and instability were seen in some Balkan countries that have recovered meanwhile and became major tourist destinations.
[10] Refer to direct and indirect GDP/ jobs.
[11] Compared to other types of tourism such as mountains and nature, cities, urban mix, and rural.
[12] In e.g., Plan Bleu, 2016; UNEP/ MAP and Plan Bleu, 2020; Plan Bleu, 2022; Fosse et al., 2021.

biodiversity “a break” and the possibility to recover in some places, in conjunction with decreasing pressures from other human activities. For example, some marine species occurrences increased and water quality improved in many places during the COVID-19 pandemic (Coll, 2020). But the dominant Mediterranean mass tourism model has picked up speed again and continues to concentrate in coastal areas. Unless this model is profoundly changed into a sustainable model, the coastal and marine environment is likely to continue to be adversely affected by tourism in the years to come.

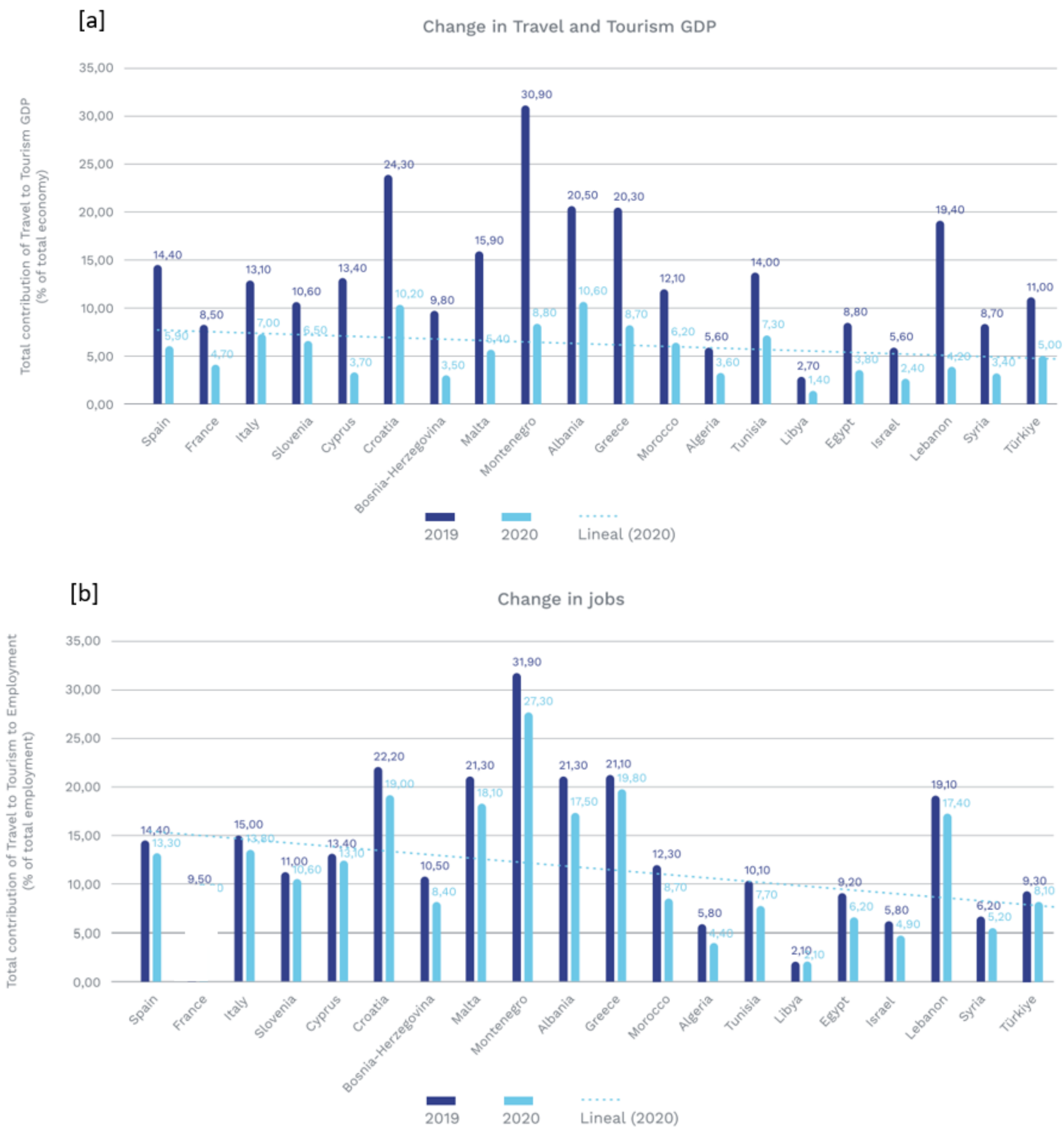



Figure 8: Change in tourism GDP(a) and jobs (b), 2019-2020. (Source: Plan Bleu (2022). State of Play of Tourism in the Mediterranean, Interreg Med Sustainable Tourism Community project).

*Fisheries and Aquaculture*

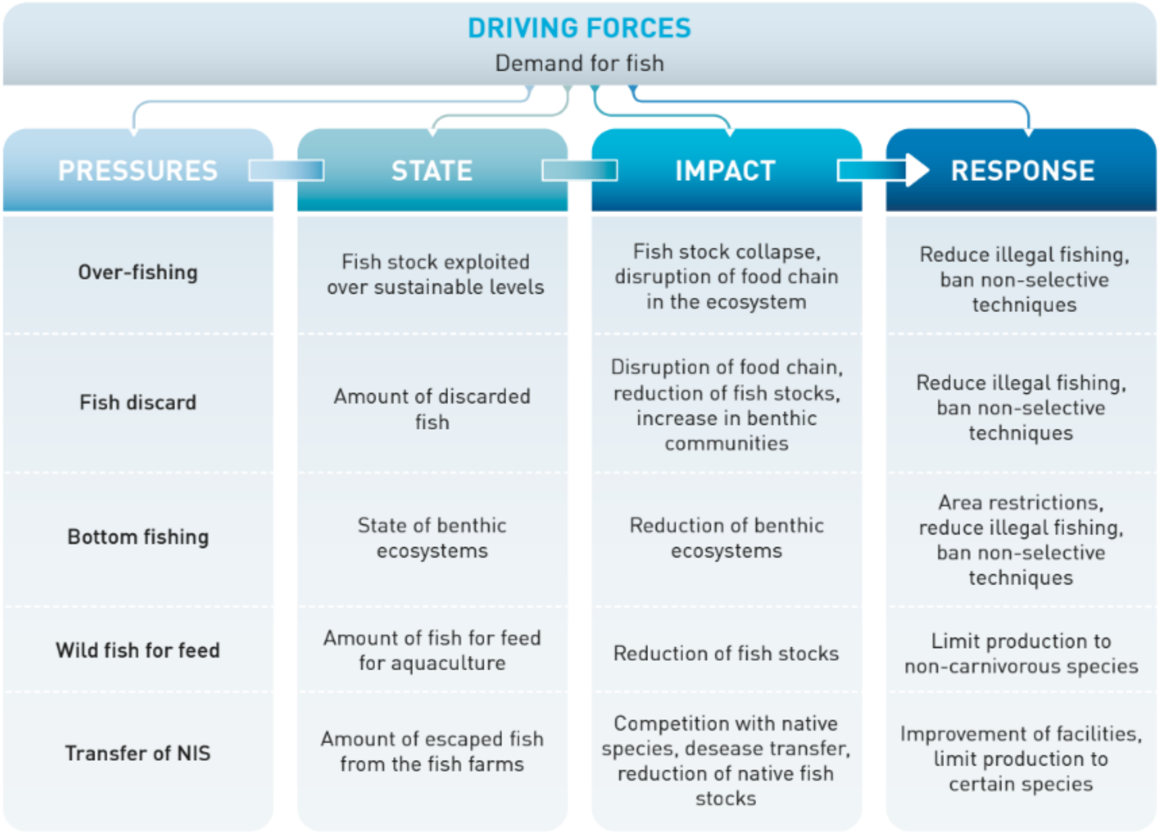


Figure 9: Pressures exerted by fisheries and aquaculture. (Source: UNEP/MAP and Plan Bleu, 2020)

75. A variety of capture fishery and aquaculture techniques are employed across the Mediterranean at different scales, including industrial, semi-industrial and small-scale fisheries, as well as industrial and small-scale farming. Capture fisheries exploit a variety of benthic and pelagic fish stocks, molluscs and crustaceans. Aquaculture production includes extensive aquaculture in pond or lagoon areas and small family farms cultivating mussels, but also more intensive offshore finfish cage farms. Fishery and aquaculture represent a relatively small sector of the Mediterranean blue economy (both in terms of GVA – less than 5%, and job creation – less than 10%)[13], nevertheless with an important socioeconomic and cultural function in terms of food production, revenue, employment and preservation of traditional activities (UNEP/MAP and Plan Bleu, 2020).

[13] Union for the Mediterranean (UfM) 2017 report *Blue economy in the Mediterranean*, https://ufmsecretariat.org/wp-content/uploads/2017/12/UfMS_Blue-Economy_Report.pdf based on earlier Plan Bleu analyses (e.g., 2014 report *Economic and social analysis of the uses of the coastal and marine waters in the Mediterranean*, https://planbleu.org/sites/default/files/publications/esa_ven_en.pdf).

Fisheries[14]

76. According to the latest available data (as reported to the GFCM Secretariat and/ or estimated), a total of 76,280 fishing vessels were operating by 2019 in 20 Mediterranean countries[15], with a total capacity of around 758,000 gross tonnage (GT)[16]. These figures are likely to be underestimating the actual size of the fleet, given the lack of data in some countries, especially regarding small-scale vessels (FAO, 2020).

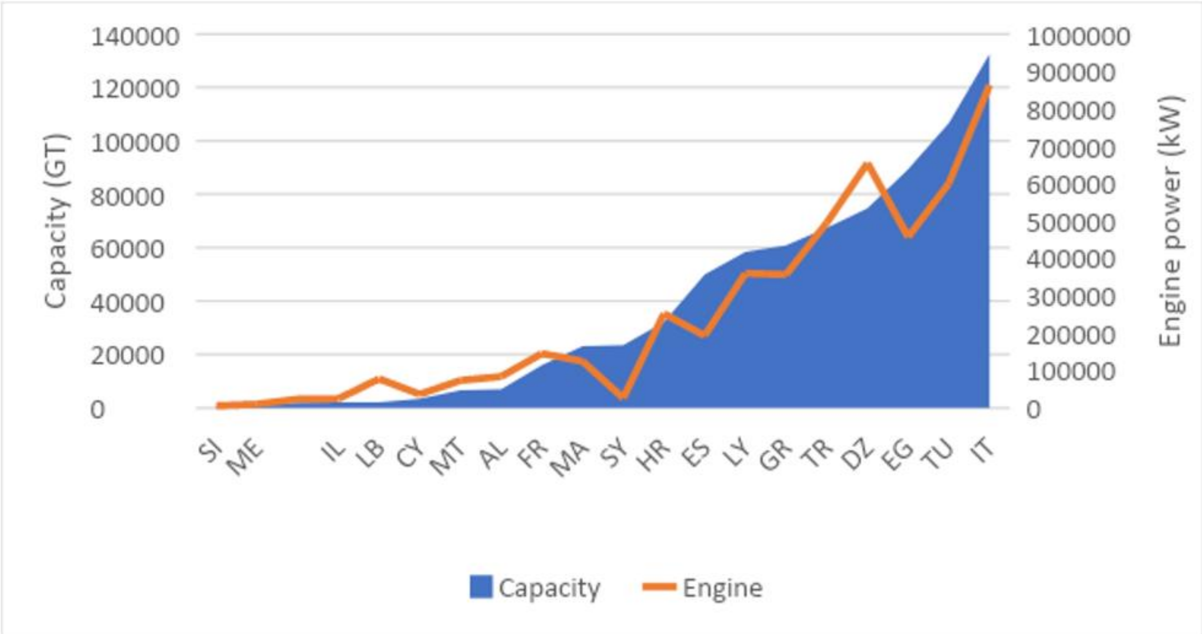



Figure 10: Capacity of the fishing fleet operating in the Mediterranean basin by country, 2019
*(Source: FAO, 2020; own estimate)*

77. In terms of capacity (expressed in gross tonnage (GT)), more than 62% of the fishing fleet is operated by five countries: Italy (17.5%), Tunisia (14.1%), Egypt (11.8%), Algeria (9.8%) and Türkiye (8.9%[17]). Greece's fishing fleet makes 16.8% of the total number of vessels, but only 8% of the total capacity, indicating that small-scale fisheries are prevalent. Besides Greece, small-scale fishing vessels account for 90% or more of the total fleet in Lebanon, Cyprus, Türkiye, Tunisia and Croatia. Four out of five fishing vessels in the Mediterranean are small-scale vessels[18] which are the predominant fleet segment in all Mediterranean fishing sub-regions, in particular in the Eastern and Central Mediterranean.

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[14] For capture fisheries, information on fishing fleet, landings, revenues and jobs is predominately based on the report on the State of Mediterranean and Black Sea Fisheries (FAO, 2020).
[15] Data for Türkiye refers to the number of vessels operating in the Mediterranean, whereas capacity of these vessels was estimated based on an assumption it mirrors the share (39.3%) of the total number of vessels reported for the Mediterranean and Black Seas. Bosnia and Herzegovina and Monaco informed the GFCM Secretariat they had no operating fishing fleet in the last reporting period.
[16] The overall number of vessels reported and/ or estimated (by FAO, 2020) for the Mediterranean and the Black Sea was 87,641 (903,270 GT).
[17] Taking only into account 6,026 vessels that operate in the Mediterranean. Türkiye's total fishing fleet operating in the Mediterranean and Black Seas was reported to include 15,352 vessels (with capacity of 171,785 and engine power of 1,261,241 kW).
[18] Including small-scale vessels 0–12 m with engines using passive gear; polyvalent vessels 6–12 m; and small-scale vessels 0–12 m without engines using passive gear. Polyvalent vessels are all vessels using more than one gear type, with a combination of passive and active types of gear, none of which are used for more than 50 percent of the time at sea during the year.

Another important fleet segment are trawlers and beam trawlers, accounting for 7.9% of the total, predominantly used in the Western Mediterranean and the Adriatic; purse seiners and pelagic trawlers make up 5.5% of the fleet.

Table 5: Mediterranean fishing fleet by country and segment

| **Country code** | **No of vessels** | **Share (%) of operating vessels by fleet segment** | | | | |
|---|---|---|---|---|---|---|
| | | **Small-scale** | **Trawlers, beam trawlers** | **Purse sein., pelagic trawl.** | **Other segments[19]** | **Unallocated** |
| AL | 445 | 67.0 | 27.0 | 5.2 | 0.9 | 0.0 |
| DZ | 5,608 | 61.8 | 9.9 | 28.4 | 0.0 | 0.0 |
| HR | 6,211 | 91.2 | 5.5 | 2.7 | 0.5 | 0.0 |
| CY | 774 | 94.4 | 1.0 | 0.0 | 4.5 | 0.0 |
| EG | 3,945 | 44.6 | 24.0 | 5.3 | 26.1 | 0.0 |
| FR | 1,418* | 88.9 | 6.0 | 1.1 | 3.9 | 0.0 |
| GR | 12,807 | 95.4 | 1.8 | 1.7 | 1.2 | 0.0 |
| IL | 336 | 79.8 | 5.7 | 3.0 | 11.6 | 0.0 |
| IT | 10,909 | 69.7 | 18.6 | 4.1 | 7.6 | 0.0 |
| LB | 2,084 | 95.0 | 0.0 | 4.4 | 0.7 | 0.0 |
| LY | 3,974 | 73.3 | 2.0 | 3.1 | 17.8 | 3.7 |
| MT | 682 | 77.6 | 2.9 | 0.6 | 18.9 | 0.0 |
| ME | 224 | 85.3 | 5.8 | 8.9 | 0.0 | 0.0 |
| MA | 3,496 | 87.0 | 4.3 | 7.0 | 1.7 | 0.0 |
| SI | 72 | 87.5 | 12.5 | 0.0 | 0.0 | 0.0 |
| ES | 2,056 | 51.2 | 28.0 | 10.7 | 10.1 | 0.0 |
| SY | 1,300 | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 |
| TU | 13,300 | 92.7 | 3.6 | 3.4 | 0.3 | 0.0 |
| TR | 6,026 | 93.9 | 3.8 | 1.0 | 1.4 | 0.0 |
| **Med total** | **76,280** | **80.5** | **7.7** | **5.4** | **4.5** | **1.9** |

* 1,340 in 2020 according to national French sources DGAMPA, SSP, Ifremer-SIH, 2020. (Source: FAO, 2020).

78. Contribution of the Mediterranean and Black Sea fisheries to the global marine capture ranged from 2.55% during the 1980s to 1.55% in 2020 (FAO, 2022), taking into account that the Mediterranean Sea represents less than 1% of the world's ocean surface. After an irregular decline in total landings in the Mediterranean that started in the mid-1990s, and led to the lowest volumes in 2015 (760,000 tonnes), production increased again over the following three years to 805,700 tonnes in 2018. The average landings over the 2016-2018 period were 787,830 tonnes (a 3% increase compared to the average for the period 2014-2016).

[19] Includes polyvalent vessels 12–24 m, longliners 12–24 m, dredgers 12–24 m, and longliners > 6 m.

79. From 2016 to 2018, Italy continued to be the main producer (22.7% of the total Mediterranean landings), followed by Algeria (13.1%), Tunisia (12.2%), Spain (10%), Greece (9.3%), Croatia (8.9%), Egypt (6.9%), and Türkiye[20](6.4%). The remaining 12 countries[21] accounted for less than 4% individually; added together, their landings represented 10.6% of the Mediterranean total. Compared to the previous period (2014-2016), total landings increased the most in Türkiye (by 20.4%), while as the most substantial decrease (-10.6%) among major producers was recorded in Morocco; in Slovenia and Israel average landings decreased by 30.5% and 22.2% respectively.

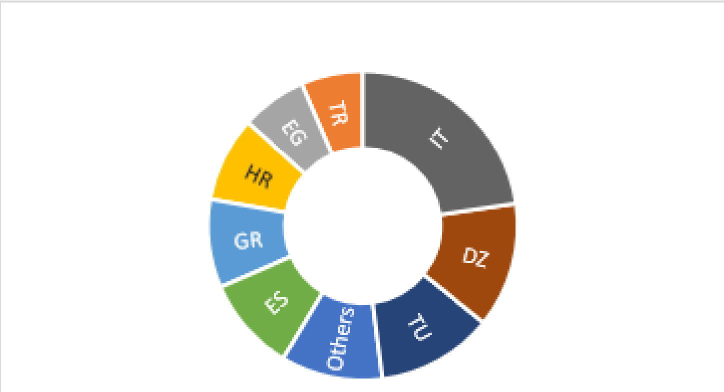


Figure 11: Distribution of landings per country, average 2016-2018. (Source: FAO, 2020).

80. In the period 2016-2018, the main species and their contributions to the total catch were as follows: sardine (23%); European anchovy (14.1%); Sardinellas nei (5.8%); marine fishes nei (4.6%); jack and horse mackerels nei (2.8%); deep-water rose shrimp (2.8%); bogue (2.6%); and European hake (2.5%); other species' individual contributions were below 2%.

81. During the five years 2013-2018, total revenues in the GFCM area (including Black Sea) were between 3.2 and 3.6 billion (in constant 2018 USD). Total revenue/ value at first sale[22] from marine capture fisheries in the Mediterranean is estimated at USD 3.4 billion in 2018. When different fleet segments are considered, the highest revenues are generated by trawlers, followed by small-scale vessels and purse seiners/ pelagic trawlers. As regards the fishing sub-regions, predominant shares of total revenues are generated in the Western and Eastern Mediterranean (FAO, 2020).

[20] Average landings 2016-2018 for the Mediterranean Sea equalled 50,772 tonnes; average total landings (including Black Sea) were 273,977.
[21] Total landings by Bosnia and Herzegovina and Monaco are negligible.
[22] Revenue is estimated as the value at first sale of fish from vessel-based marine capture, prior to any processing or value-addition activities.

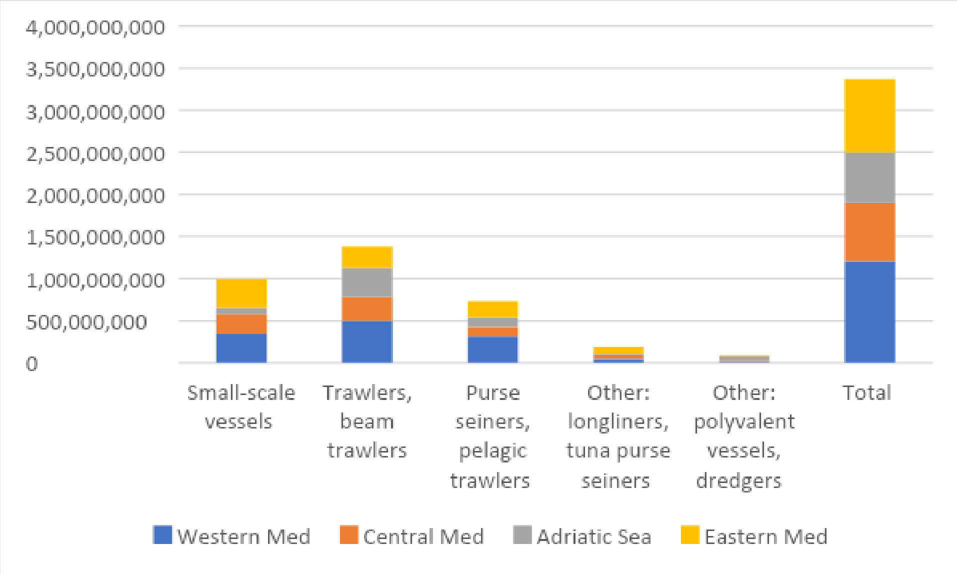


Figure 12: Revenue by fleet segment and sub-region (constant 2018 USD). (Source: FAO, 2020).

82. The wider economic impact of fisheries along the value chain in the region, including direct and indirect and induced effects, is estimated to be 2.6 times the value at first sale (FAO, 2018). In the Mediterranean, revenue from small-scale fisheries makes 29% of the total; however, in some countries (e.g., Cyprus, France, Greece, Lebanon, Morocco, Slovenia), small-scale fisheries account for as much as 50% of the total revenue (FAO, 2020).

83. According to FAO (2020), total employment onboard fishing vessels in the Mediterranean was near 202,000 in 2018. Approximately one third of these jobs are linked to fishing in the Western and Eastern Mediterranean sub-regions; the Central Mediterranean accounts for 24% of the total number of jobs, and the Adriatic Sea sub-region for 9%. Estimates from the previous analyses (for example by the World Bank, FAO and WorldFish) suggest that non-vessel-based jobs employ almost 2.5 times as many people as those onboard vessels. On average, employment onboard fishing vessels represents around 0.1% of total coastal populations (i.e., approximately one fisherman per 1,000 coastal residents), but is six to 11 times higher in Morocco, Croatia and Tunisia. Small-scale fisheries account for 55% of the total employment onboard fishing vessels (but the share can go to as much as 70 – 90% in some countries). Women represent between 1 and 6% of the capture fisheries workforce. In processing, women either represent the majority of workers or are in the same numbers as men. Women are considered to play a vital role in the sale of fish, pesca-tourism and gastronomic activities. Where available, disaggregated data showed women were predominantly found in lower-level jobs with less pay than men (EC, 2019).

84. The Mediterranean fisheries were severely affected by the COVID-19 pandemic (GFCM, 2020; FAO, 2020). A reduction in operating vessels of up to 80% was observed in some countries, with a decrease in production of some 75% during the first months following the outbreak. This may have led (at least temporarily) to reduced pressure on resources and the environment. Total marine captures in the Mediterranean and Black Sea decreased by 14.4% in 2020 compared to 2019, i.e., by 9.2% compared to the average annual production during the 2010s (FAO, 2022) but longer-term COVID-19 impacts on fisheries are yet to be analysed.

85. Overall, fisheries in the Mediterranean remain highly threatened by overfishing, pollution, habitat degradation, invasive species and climate change (UNEP/MAP and Plan Bleu, 2020). Among FAO's 16 Major Fishing Areas in 2019, the Mediterranean and Black Sea had the second highest rate of stocks fished at unsustainable levels (63.4%), behind the Southeast Pacific with 66.7% (FAO, 2022).
Most stocks remain in overexploitation; however, the number of stocks in overexploitation has further decreased, as has the overall exploitation for the whole Mediterranean and Black Sea region. For the stocks for which validated assessments are available, a notable decrease of stocks in overexploitation has been assessed in recent years: from 88% in 2014, to 75% in 2018. This dynamic is reflected in

marked improvements for a number of demersal species in terms of fishing mortality and, in some cases, biomass, too (FAO, 2020).

86. Nevertheless, the GFCM estimates the overall fishing mortality for all resources combined is nearly 2.5 times higher than sustainable reference points. A clear (although not significant) decreasing trend has been seen in the average exploitation ratio (current fishing mortality over target fishing mortality, F/FMSY) since 2012. Based on available information (for 62 stocks covering 20 geographical subareas and 14 species), 36% of Mediterranean stocks are assessed to have low biomass levels, 19% intermediate and less than a half (46%) high biomass level (FAO, 2020).

87. In addition to its negative environmental impact, bycatch from fishing activities – including discards and incidental catch of vulnerable species – has significant implications for the sector, including from economic, regulatory and public perception perspectives. Sea turtles (around 89%) and elasmobranchs (around 8%) continue to represent the highest share of reported incidental catch of vulnerable species; seabirds and marine mammals together account for the remaining 3% (FAO, 2020). Discards represent a window for improvement in the fishing sector as 18% of total catches are discarded (UNEP/MAP and Plan Bleu, 2020, based on the FAO's The State of Mediterranean and Black Sea Fisheries 2018).

88. While playing a particularly important cultural and employment role, small-scale fisheries are generally considered to have less ecological impact than industrial fisheries but can still have significant impacts that need to be addressed (Bolognini et al., 2019).
Aquaculture[23]

89. Total marine aquaculture production (excluding freshwater, including Türkiye's Black Sea production) approached one million (994,623) tonnes in 2020 with average annual growth rates of 6.8% and a cumulative increase of around 90% between 2010 and 2020. The most extensive growth was recorded in Algeria, where production increased by a factor of 15 to 30. In the same period, production increased by several folds in Tunisia, Albania, Türkiye, Egypt and Malta. A decrease was recorded in France and Italy, as well as in Bosnia and Herzegovina and Lebanon. Marine aquaculture output was not negatively affected by the COVID-19 pandemic: production in 2020 increased by 13.2% compared to 2019.

90. The biggest aquaculture producers are Egypt, Türkiye, Greece and Italy. Taking into account the average annual production (2010-2020), Egypt and Türkiye accounted for 27.2 and 23.4% of the total respectively; due to high growth rates in these two countries, their relative shares in the overall production increased by 2020 approaching and/or slightly exceeding one third of the total (35.4% for Egypt and 29.5 for Türkiye). Egypt is a globally significant producer, where total aquaculture output (including freshwater) grew from less than half a million tonnes in the early 2000s, to 1.6 million tonnes in 2019, making more than 80% of the total fish production (capture fisheries and aquaculture) in the country (FAO, 2022).

[23] Information on production (quantity, value) 2010-2020 from the FAO FishStatJ database (FAO, 2022a). Data for Libya and Syrian Arab Republic were not available for the observed period; no production reported for Monaco. Data for Türkiye include Black Sea aquaculture. Sources other than FishStatJ database were used, as referenced in the text. Although freshwater aquaculture may impact the marine environment via discharges to Sea, freshwater aquaculture has not been considered in this analysis.

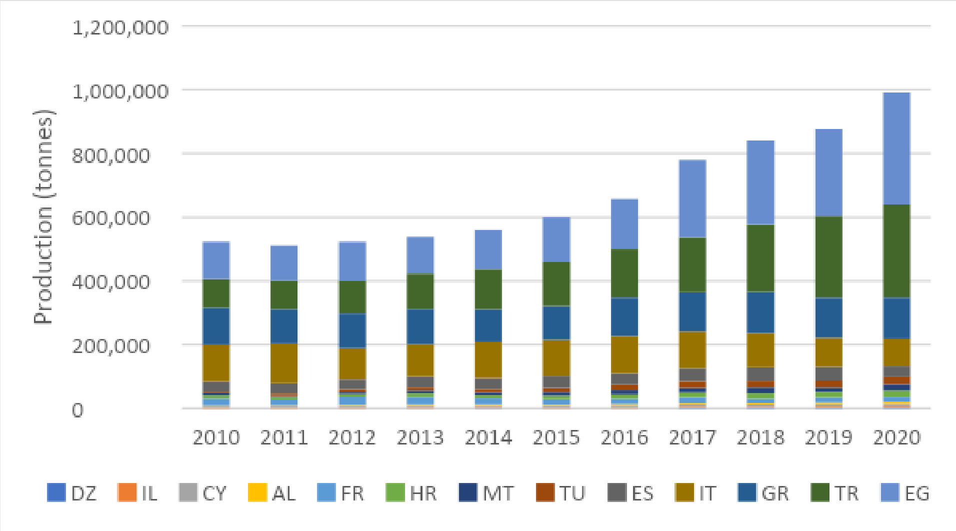



Figure 13: Aquaculture output 2010-2020: contribution of the main producers.Note: countries with production of more than a thousand tonnes in recent years (cumulatively accounting for more than 99% of the total) shown in the graph. (Source: FAO, 2022a, FishStatJ database accessed November 2022).

91. In 2019, production of less than one thousand tonnes was recorded in Slovenia (914), Morocco (465), Montenegro (379), Bosnia and Herzegovina (176) and Lebanon (19).

92. Among the top five producers, stable output trends were recorded in Greece and Spain, while in Italy production dropped by a quarter in 2020 compared to 2010 (mainly due to reduced shellfish production). High growth rates characterise production in Türkiye and Egypt, especially as of 2016.
Value of production increased from USD 2.3 billion in 2010 to USD 4.3 billion in 2020. In 2018, aquaculture production value (USD 3.5 billion) slightly exceeded total revenue from capture fisheries (USD 3.4 billion)[24]. Highest production values in 2020 were recorded in Türkiye, Egypt, Greece, Italy, Spain and Malta (accounting for some 88% of the total).

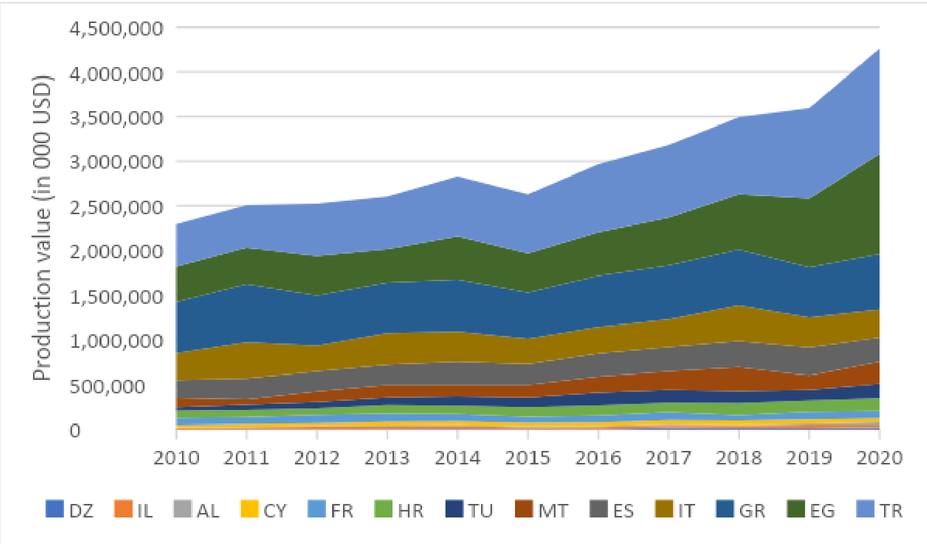



Figure 14: Aquaculture production value, main producers 2010-2020. (Source: FAO, 2022a, FishStatJ database accessed November 2022).

[24] It should be noted that aquaculture production value includes Türkiye's Black Sea production (while capture fisheries revenue refers only to the Mediterranean fishing area).

93. Mediterranean marine aquaculture is dominated by finfish, accounting for 83% of the total production; molluscs account for 16% of the overall output. Gilthead seabream (*Sparus aurata*) and Seabass (*Dicentrarchus labrax*) are the most commonly farmed species, at 464,000 tonnes and USD 2.24 billion in 2019. More than 95% of the world's seabream and seabass production comes from aquaculture, of which 97% is produced by Mediterranean countries. In terms of quantity, other important farmed species are mullets and mussels. With a production of 99,200 tonnes in 2019, Mediterranean mussel (*Mytilus galloprovincialis*) is the fourth most farmed species in the region, with Italy (62% of the region's production) and Greece (24%) as the main producers (Carvalho and Guillen, 2021). Bluefin tuna are also raised in some locations.

94. Data on aquaculture jobs are less available than for capture fisheries. One of the recent estimates suggest that Mediterranean aquaculture offers employment to 313,000 persons, taking into account both direct and indirect jobs (Bolognini et al., 2019). Like fisheries, aquaculture is also a sub-sector dominated by male workers in the EU Member States, with women representing 7% to 26% of the workforce, but with more opportunities being provided for women (EC, 2019). In this sub-sector, there is also an unreported number of "invisible" female workers, particularly in small-scale freshwater aquaculture and shellfish farming.

95. Aquaculture made around half the total fishery output in the Mediterranean in recent years, and is expected to continue growing, in line with global trends. Its environmental effects depend on the size of the farms, the production systems and management methods used, as well as on the marine habitats in which they are located; aquaculture may harm the marine environment, and at the same time depends on a good quality environment to be productive (Bolognini et al., 2019).

96. Growth in aquaculture production in the Mediterranean can be accompanied with high dependency on fish meal from sea catches, large nitrate and phosphorus effluents, as well as genetic modification of natural fish stocks (UNEP/ MAP and Plan Bleu, 2020). Some of the priority issues related to sustainable aquaculture development in the Mediterranean (as identified by Massa et al., 2017) include integration of aquaculture into coastal zone management and sea use planning, improvements in site selection and licensing procedures, enhancement of aquaculture-environment interactions and implementation of environmental monitoring.

*1.2.5.3 Maritime transport*

**DRIVING FORCES**
International trade & tourism

| PRESSURES | STATE | IMPACT | RESPONSE |
|---|---|---|---|
| Water discharge & hull fouling | Number of NIS, location of discharge | Predation and competition on native species | Management of discharge, maintenance of hulls |
| Emissions | Amount of emissions | Sea level rise, ocean acidification, change of sea temperature | Reduction of emissions, RE-powered transport, carbon tax |
| Underwater noise | Distribution of underwater noise | Physical damage, behaviour change, population decrease of mammals | Speed limits, monitoring, technology upgrade |
| Oil spills | Reduction of plankton, fish stocks, marine mammals and birds | Reduction of plankton, fish stocks, marine mammals and birds | New engine of vessels, cleaner fuels, on-board pollution control |
| Collisions | Number of cetaceans killed by ships | Loss of cetaceans stock | Speed limits, monitoring, relocation of routes |
| Anchoring | Anchoring on sensitive marine habitats | Destruction of seabed habitats | Anchoring restricted zones |
| Land take: ports | State of marine environment in ports | Degradation of coastal ecosystems | Green ports |
| Marine litter from fisheries | Marine litter from fisheries | Reduction of fish stock, NIS | Management of litter from fisheries |

Figure 15: Pressures exerted by maritime transport on the marine environment. (Source: UNEP/MAP and Plan Bleu, 2020).

97. The Mediterranean Sea is located at the crossroads of three major maritime crossings: Strait of Gibraltar, opening into the Atlantic Ocean and the Americas; the Suez Canal, a major shipping gateway which connects to Southeast Asia via the Red Sea; and the Dardanelles Strait, leading to the Black Sea and Eastern Europe/Central Asia. With such a strategic location, it is an important transit and trans-shipment area for international shipping, as well as a realm for Mediterranean seaborne traffic (movement between a Mediterranean port and a port outside the Mediterranean) and short sea shipping activities between Mediterranean ports (UNEP/MAP and Plan Bleu, 2020).

98. Despite covering less than 1% of the world's oceans, the Mediterranean Sea accounted for more than a fifth (21-22%) of global shipping activity measured by the annual number of port calls, and around 9% of the annual container port throughput in recent years (Randone et.al, 2019; own calculations based on UNCTAD, 2022a). Approximately 18% of global seaborne crude oil shipments take place within or through the Mediterranean. In some countries (Croatia, Cyprus, Greece, Italy, Malta, Spain), maritime transport (including port activities and shipbuilding and repair) accounted for between 0.4 and 1.3% of the total employment in 2019. The Western Mediterranean and the Aegean-Levantine Sea are the busiest parts of the basin (Randone et al., 2019).

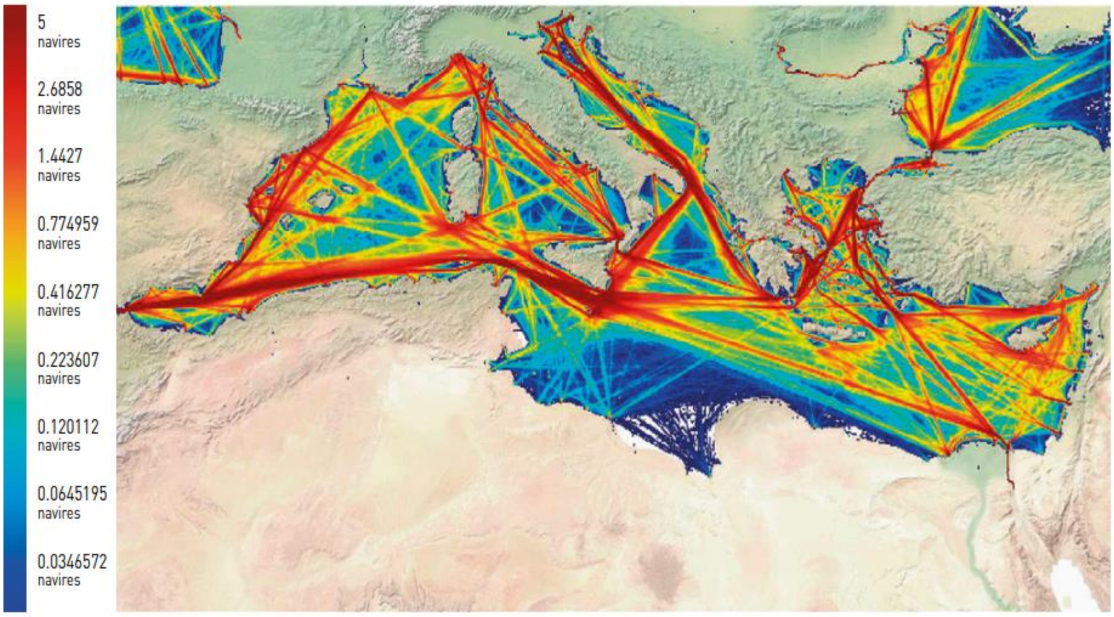



Figure 16: Traffic density in the Mediterranean Sea area. (Source: INERIS, 2019).

99. Over the period 2015 – 2021, the merchant fleet registered in 20 Mediterranean countries[25] encompassed a total of around 9,400 vessels, with a capacity of more than 245 million dead-weight tons in 2021. Total carrying capacity increased by 63.5% (from 152.9 million) in comparison with 2005. Four countries (Malta with 46.5%, Greece with 25.9%, Cyprus with 13.7% and Italy with 4.5%) account for 90% of the total merchant fleet carrying capacity (UNCTAD, 2022a).

100. As regards ownership of the world fleet (by carrying capacity expressed in dead-weight tons) in 2021, five Mediterranean countries were among top 35 world economies: Greece (4,705 vessels in total, 620 under national flag) with 17.6% of the world total; Monaco (478 vessels, none under national flag), accounting for 2.1% of the total; Türkiye (1,548 vessels, 426 under national flag), 1.3%; Italy (651 vessels, 481 under national flag), 0.8%; and Cyprus (311 vessels, 134 under national flag), with 0.6% of the carrying capacity of the world's fleet (UNCTAD, 2021).

101. The Mediterranean has more than 600 commercial ports and terminals (Plan Bleu, 2014). Nine of these are among the 20 largest cargo ports in the European Union: Algeciras and Valencia (Spain), Marseille (France), Genova and Trieste (Italy), Piraeus (Greece), and Aliaga, Izmir and Ceyhan and İskenderun ports (Türkiye). Important ports in the southern Mediterranean with more than 1 million TEU include Port Said and Alexandria (Egypt), Tangier (Morocco), Beirut (Lebanon) and Haifa (Israel) (Randone et al., 2019, and Grifoll et al., 2018).

102. With nearly one million (935,649) port calls in 2021, volume of maritime transport reached 96% of 2019 level in the Mediterranean countries. Italy's ports accounted for one quarter of the total port calls in 2021, Türkiye's for one fifth, followed by Greece (16.4%), Spain (12.7%), Croatia (7.8%), France (6.8%) and Malta (3.2%). Share of passenger ships in total port calls in 2019 exceeded 75% in Croatia, Malta, Italy, Greece and Türkiye; cargo ship calls were predominant (accounting for 75% of the total or more) in Tunisia, Cyprus, Algeria, Slovenia and Israel. COVID-19 impact (measured by the number of port calls) was the lowest in Albania (-3% in 2020 compared to 2019), the highest in Montenegro (reduction of nearly 52%); in the countries with largest annual numbers of port calls, reduction was around 15% (UNCTAD, 2022a).

[25] No data for Bosnia and Herzegovina.

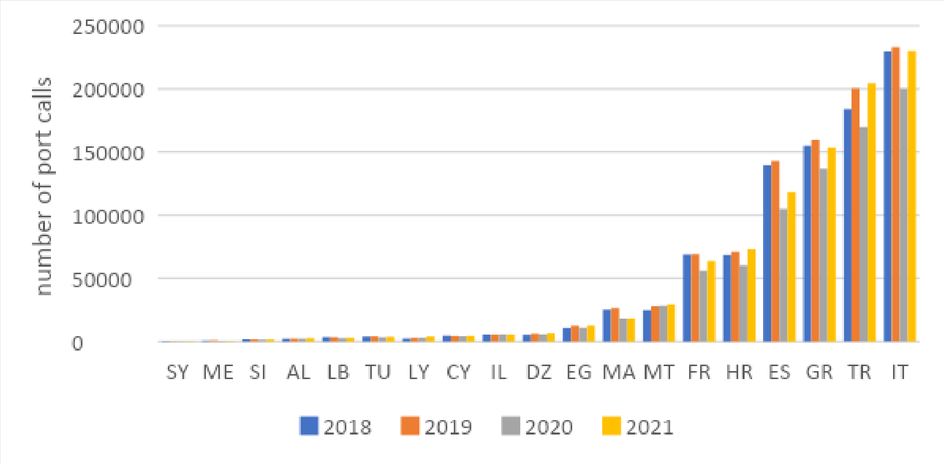



Figure 17: Number of port calls by country, 2018-2021. (Source: UNCTAD 2022a)

103. Shipbuilding activities are present in several Mediterranean countries (Egypt, Greece, Spain, Croatia, Türkiye, France and Italy), and represent a very small share of the global shipbuilding: with a share of 0.6 to 0.9% since 2016, Italy was the lead Mediterranean country. Türkiye is a provider for ship recycling, with 9.2% (or 1.6 million gross tons) of the total reported tonnage sold for ship recycling in 2020 (UNCTAD, 2021).

104. The impact of the COVID-19 pandemic on international maritime trade was not as dramatic as initially expected[26]. Growth had already been weak in 2019 at 0.5%, and in 2020 total maritime trade declined by 3.8%. In 2021, a 3.2% growth was recorded bringing global maritime trade to only slightly below the pre-pandemic level. In line with the global expansion of seaborne trade, shipping in the Mediterranean basin is expected to increase in the coming years, in terms of both number of routes and traffic intensity.

105. The main pressures from maritime transport on the environment include: potential accidental and illicit discharges of oil and hazardous and noxious substances (HNS); marine litter; water discharge and hull fouling; air emissions from ships; underwater noise; collisions with marine mammals; land take through port infrastructure; and anchoring (UNEP/ MAP and Plan Bleu, 2020).

[26] A study (IEMed, 2021) looking at the COVID-19 impacts in, *inter alia* the Western Mediterranean, found out that the number of vessels sharply decreased in the first days of mobility restrictions (starting from March 2020) compared to pre-disturbance baselines (i.e., equivalent periods of 2019), reaching an overall median drop of 51% during the initial national lockdowns (lasting approximately until 22 June 2020). Maximal reductions ranged from 22.2% (tankers) to 93.7% (recreational boats), with a maximal overall drop across all categories of 62.2% during mid-April.

*1.2.5.4 Energy (Oil and Gas and Renewable energy - offshore)*

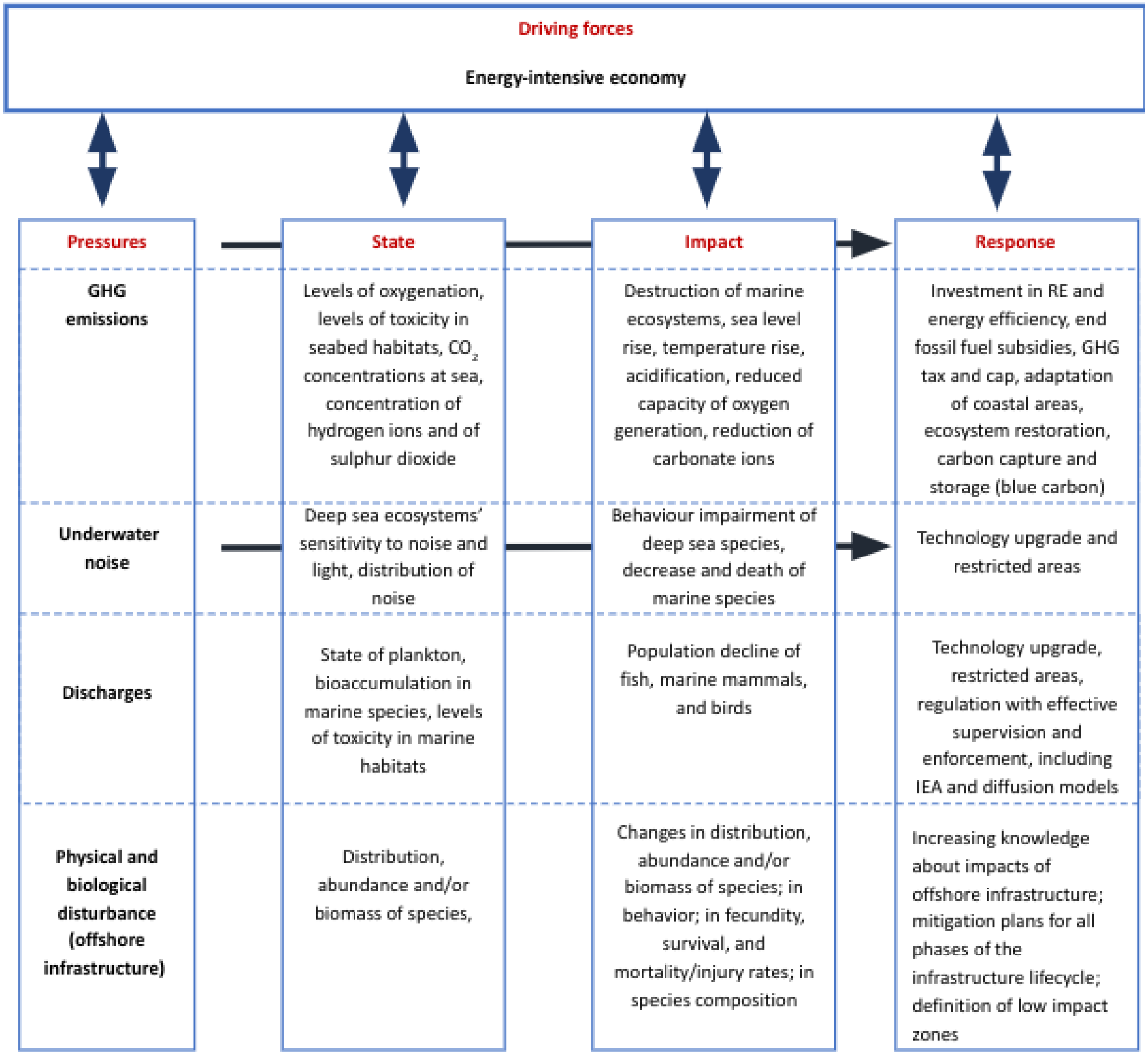



Figure 18: Pressures exerted by energy production and consumption in the Mediterranean. (Source: Based on UNEP/MAP and Plan Bleu, 2020).

106. The Mediterranean region is a net importer of energy: in 2018, total consumption exceeded total production by 39%. If the current trends continue, import dependence is projected to grow over the next decades (OME, 2021).

Primary energy demand

Total primary energy demand [table] in the Mediterranean equalled 1,021 Mtoe[27] in 2018 and 1,030 Mtoe in 2019, with an overall increase of around 45% compared to 1990. In 2020, a decrease of around 9% was recorded due to the effects of the COVID-19 pandemic, bringing primary energy demand down to 938 Mtoe.

Table 6: Primary energy demand in the Mediterranean

| | **1990** | | **2018** | | **2020** | |
|---|---|---|---|---|---|---|
| | Mtoe | Share (%) | Mtoe | Share (%) | Mtoe | Share (%) |
| Coal | 106 | 14.9 | 105 | 10.3 | 95 | 10.1 |
| Oil | 350 | 49.1 | 369 | 36.1 | 322 | 34.3 |
| Gas | 108 | 15.2 | 303 | 29.7 | 284 | 30.3 |
| Nuclear | 97 | 13.6 | 124 | 12.1 | 99 | 10.6 |
| Hydro | 16 | 2.3 | 24 | 2.4 | 24 | 2.6 |
| Renewables | 35.5 | 4.9 | 96.1 | 9.4 | 113.6 | 12.1 |
| **TOTAL** | **712.5** | | **1021.1** | | **937.6** | |

(Source: OME (2021), Mediterranean Energy Perspectives to 2050, edition 2021).

107. Shares of coal and oil in the total primary energy demand had a downward trend over the past three decades, with a particularly pronounced decrease for oil (accounting for about half the energy demand in 1990, going down to around one third in 2020); shares of nuclear sources and hydro energy were relatively stable [table]. Major changes in the primary energy mix were seen for gas (doubling of the share in 2020 compared to 1990) and renewables (increase of 2.4 times between 1990 and 2020). Demand for renewables proved resilient to the effects of COVID-19 crisis, with a recorded increase of around 18% in 2020 (compared to 2018).

108. There are marked differences in the primary energy consumption across the Mediterranean, with the South Mediterranean countries currently accounting for 40% of the region's total, while per capita energy demand in the South is less than half that in the North. Disparities are also pronounced as regards energy transition. Despite recent investments, some eastern and southern rim countries lag behind the Northern Mediterranean in energy mix diversification, energy efficiency improvements and in increasing the share of renewable energies (MedECC, 2020).
Renewables.

109. The most significant uptake of renewables has been recorded in power generation, while the share of renewable sources is still very low in end-use sectors, especially in industry and transport. In 2020, renewable energy technologies made up 43% (686 GW) of the total power generation capacity, deployed predominantly in the North Mediterranean countries. Nevertheless, the development of renewable capacity was very fast in the South and East where it nearly tripled over the period 2005 – 2020 (OME, 2021).

110. Biomass and waste had a dominant share (59.3%) in the structure of renewables in 2020, followed by geothermal (14.6%), wind (14.4%) and solar (11.5%); the share of tide, wave and ocean energy was below 1%. Photovoltaics were the main contributor to solar energy demand in 2020, accounting for 58.6% of the total, followed by solar heating and cooling (25%) and concentrated solar power (16.3%). The fastest growing renewables are wind and solar: demand for wind energy reached 16.36 Mtoe in

[27] Million tons of oil equivalent.

2020 while it was non-existent in 1990; demand for solar energy increased from 0.54 Mtoe in 1990 to 13.11 Mtoe in 2020 (data from OME, 2021).

111. Offshore wind installations, as well as wave, tide-current and thermal gradient energies are in the early stages of development in the Mediterranean. The offshore wind sector is expected to grow in the coming decades, inter alia due to new developments in floating platform constructions making them more suitable to deep waters. In the EU Mediterranean countries, production of electricity by offshore wind farms could reach 12 gigawatts (GW) in 2030 (UNEP/MAP and Plan Bleu, 2020).

112. While supporting energy decarbonization, the expansion of marine energy production may lead to significant environmental impacts, many of which are not yet sufficiently studied: adverse impacts on bird behaviour, abundance and survival, especially if offshore wind farms are located on major migratory routes; impacts on behaviour and abundance of marine mammals including through noise; increased marine traffic to service the infrastructure; impacts on ecosystem structure, functions and processes; but also including potential positive impacts on biodiversity through the artificial reef effect of marine infrastructure. While knowledge gaps persist, marine renewables may hinder the achievement of good environmental status for biodiversity or seafloor integrity (Galparsoro et al., 2022).

Fossil fuels

113. Although shares of fossil fuels in the total primary energy are slowly declining, demand for oil and gas continued to rise in absolute numbers and the reliance on these energy sources is still very high across the Mediterranean. Coal, oil, and gas accounted for three quarters of the region's primary energy demand in 2020.

114. The Mediterranean oil and gas resources (onshore and offshore) are assessed at close to 7% of oil and over 9% of the world's conventional gas resources (OME, 2021).

115. More than two hundred offshore oil and gas platforms were active in the Mediterranean in the second half of 2010s (UNEP/MAP and Plan Bleu, 2020). With recent explorations (in the Levantine Basin,, as well as in the Nile Delta Basin and the Aegean Basin) and new discoveries of large fossil fuel (mainly gas) reserves[28], the number is expected to increase, with potential transformative effects for ecosystems and economies, in particular in the Eastern Mediterranean. In recent years, resurgence of interest in exploration has also been recorded in the Adriatic, in the areas south-west and west of Crete, and in the Ionian Sea (OME, 2021).

116. Between 1990 and 2018, total production of fossil fuels in the Mediterranean increased by 8.3% (from 349 to 378 Mtoe), whereas oil and coal production shrank and gas production more than doubled. Alternative gases were not used to a significant extent in the past. But the development and use of gases such as biomethane from organic sources, bio-LNG and synthetic natural gas, or by blending hydrogen[29] into existing natural gas networks (OME, 2021). Alternative fuels must be carefully produced and managed to avoid serious unintended consequences of their use, including greenhouse gas emissions.

117. When it comes to offshore oil and gas activities, environmental impacts may arise at all phases: exploration, exploitation and decommissioning. These impacts include oil discharges from routine operations, use and discharge of chemicals, atmospheric emissions, noise, light and physical impacts

[28] According to OME, 2021, one of the most important recent (2015) natural gas discoveries was the super-giant Zohr field offshore Egypt with 850 bcm of gas in place, confirming the substantial hydrocarbons potential in the Mediterranean Sea and the region's significance in the global fossil fuels exploration and production industry.

[29] Green hydrogen produced from water using renewable electricity or blue hydrogen produced from natural gas supported with Carbon Capture, Utilisation and Storage (CCUS).

from the placement of pipelines and installations. During the transportation of oil and gas by pipeline or tanker, accidental spills from installations have the potential to cause impacts beyond the area of production. A high dependence of the Mediterranean region on fossil fuels is correlated to environmental risk stemming from the exploration, exploitation, decommissioning and transport of these fossil fuels (UNEP/MAP and Plan Bleu, 2020).

*1.2.5.5 Marine mining*

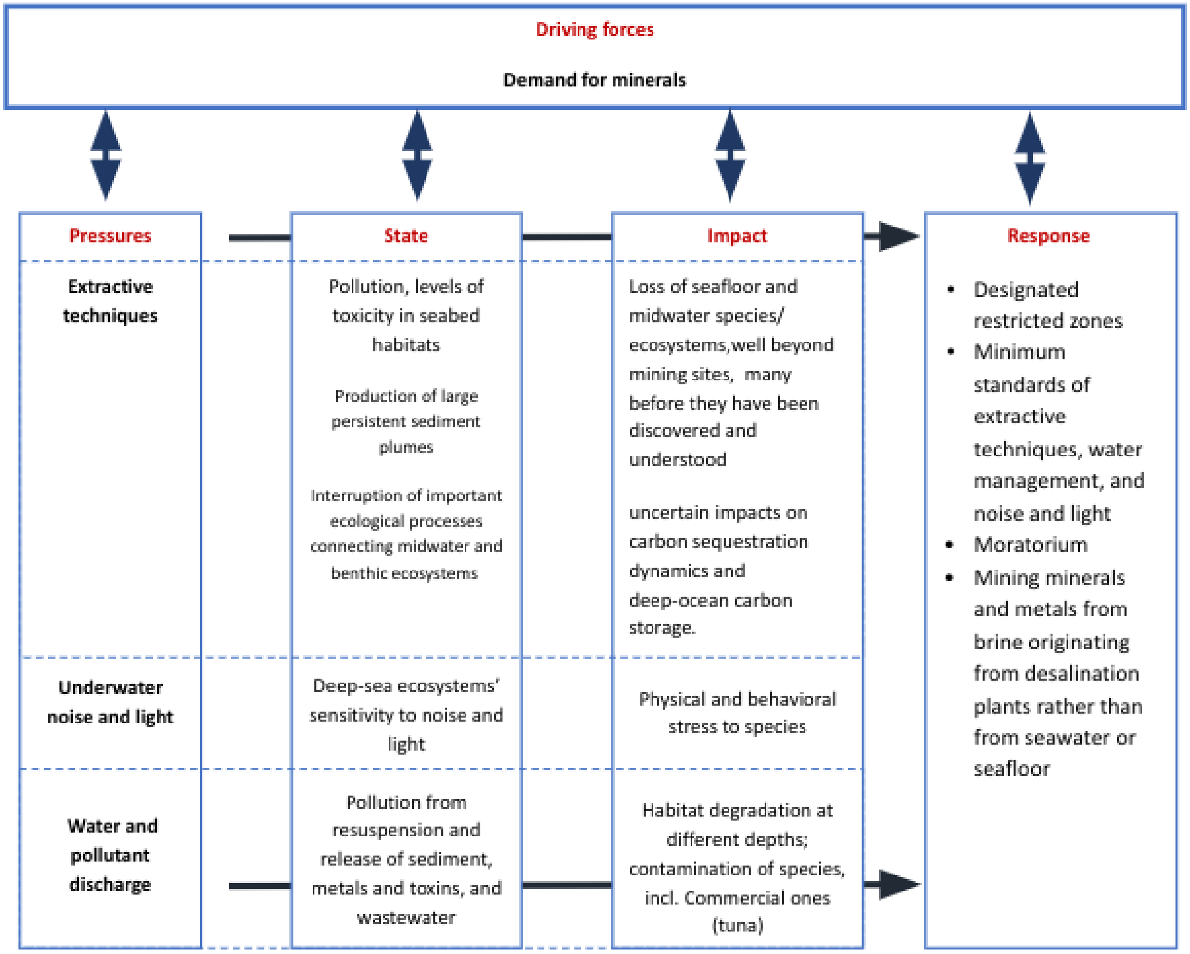



Figure 19: Driving forces (demand for minerals) in the Mediterranean. (Source: Based on UNEP/MAP and Plan Bleu, 2020 and Seabed mining science statement website[30]).

[30] http://www.seabedminingsciencestatement.org, 2023.

118. Marine and seabed mining is defined by OECD as the production, extraction and processing of non-living resources in seabed or sweater (OECD, 2016). For example, this includes extraction of minerals and metals from the seabed (in shallow waters or the deep sea), marine aggregates (limestone, sand and gravel) and minerals dissolved in seawater.
Analyses conducted in the framework of the European Maritime Spatial Planning Platform (Pascual and Jones, 2018) offered the following definitions/ assessments:

- Marine mining refers to exploration, exploitation and extraction of marine minerals, such as iron ore, tin, copper, manganese and cobalt; the sector is characterised as growing;
- Deep-sea mining is done at depths from 800 to 6,000 m, primarily targeting deposits of polymetallic nodules, manganese crust and sulphides, and is in early stages of development – referred to as an emerging sector;
- The exploitation of marine aggregates is a mature sector that refers to exploration, exploitation, extraction and dredging of sand and gravel from the seabed, primarily for the purpose of construction and beach nourishment. Mining of aggregates had an estimated gross value added (GVA) of EUR 625 million and provided 4,800 jobs in Europe (EEA, 2015).

119. At a longer time scale, Rare Earth Elements (REE) that are present in deep-sea mud may also become strategic mining targets as land-based reserves become progressively less accessible (Piante and Ody, 2015) and demand for these resources is soaring especially with the massive electrification of the world economy. Seabed mining is thus likely to become a priority area of the maritime economy with largely unknown environmental impacts.

120. Potential areas for seabed mining have been identified in the Mediterranean Sea, with sulphide deposits identified along the Italian and Greek coastlines (Piante and Ody, 2015). Results of the EC funded project GeoERA-MINDeSEA[31] revealed promising prospects in placer deposits near the coasts in the eastern Mediterranean – Greece and Cyprus, as well as ferromanganese crusts in the Western Mediterranean off the coasts of Spain and Morocco. (Sakellariadou et al., 2022).

121. While the economic potential of deep-sea mining is assessed as significant, the Mediterranean is not considered a priority area for these activities. The UfM Blue Economy report concluded there were no projects that have been granted a mining license[32] in the Mediterranean and no deep-sea activities by 2017, with the exception of the 2007 exploration project in the Tyrrhenian Sea in Italy. The slow development of deep-sea exploitation in the Mediterranean can be partially attributed to low technological development in the region and the lack of a dedicated regulatory system (UfM, 2017). However, exploitation of the Mediterranean seabed may become more economically interesting with increasing global prices for relevant resources.

122. Potential environmental issues linked to deep-sea mining are not well known, which questions the sustainability of such a practice; the main pressures (with potential to cause harmful environmental consequences) are linked to extractive techniques, underwater noise and light, and water and/or chemical discharges (UNEP/ MAP UNEP/MAP and Plan Bleu, 2020).

123. An attempt to identify and understand better potential environmental impacts from deep-sea mining undertaken within the MIDAS project (Managing Impacts of Deep-seA reSource exploitation project, partly funded by the EU, implemented over the period 2013 – 2016) resulted in a set of recommendations and best practices for ensuring relative sustainability of the industry, including

[31] Launched in 2018 to map and to establish the metallogenic context for different seabed mineral deposits with economic potential in the pan-European setting.
[32] Any project or activity being planned in a country's continental shelf can not be conducted without explicit consent of that country and references in this report do not mean that consent has been obtained.

creation of conservation zones where mining activities would be prohibited; these recommendations were taken into account for the regulations of the EU Member States for areas located in their Exclusive Economic Zones, as well as for the regulations of the International Seabed Authority for international waters (located more than 200 miles from a State's baseline) (UfM, 2017).

124. In the EU Communication on Blue Economy (EC, 2021) it is emphasised that marine minerals in the international seabed area cannot be exploited before the effects of deep-sea mining on the marine environment, biodiversity and human activities have been sufficiently researched, the risks understood and before it is demonstrated that the technologies and operational practices do not cause serious harm to the environment (EC, 2021). The recent "Marine Expert Statement Calling for a Pause to Deep-Sea Mining" has been signed by 704 marine science & policy experts from over 44 countries. The scientists "strongly recommend that the transition to the exploitation of mineral resources be paused until sufficient and robust scientific information has been obtained to make informed decisions as to whether deep-sea mining can be authorized without significant damage to the marine environment and, if so, under what conditions"[33].

125. Some statistics about marine mining are available for European countries: Overall, the share of the marine *Non-living resources* sector in the EU blue economy in 2019 was 0.2 % of jobs and 2.5 % of GVA (EU, 2022). The *Other minerals* sub-sector continues to be on the rise, with a GVA of about EUR 160 million of GVA (3 % of the GVA in the sector of *Non-living resources*) and employment of 1,426 in 2019, referring mainly to marine aggregates rather than to mining activities. More than 50 million $m^3$ of marine aggregates, primarily sand and gravel, are extracted from the European marine seabed, mostly for the construction industry, beach nourishment and sea defence construction (EU, 2022). The demand is expected to continue rising as the construction sector expands and coastal communities try to adapt to new pressures posed by climate change.

126. Extraction of marine aggregate material, together with dredging, is recognised as highly damaging to seabed habitats. These activities result in substantive (and often permanent) alterations to hydrodynamic and ecosystem processes. The main pressures linked to extraction/ dredging include seabed disturbance and disruption of habitat, disruption to wildlife, pollution and water contamination, and use conflicts (UNEP Finance Initiative, 2022).

*1.2.5.6 Water abstraction*

Freshwater resources

127. The Mediterranean region has been estimated to hold about 1.2% of the world's renewable water resources and is recognised as one of the most water-challenged regions in the world (IAI, 2021). The pre-existing water scarcity is being aggravated by population growth, urbanization, growing food and energy demands, pollution, and climate change (UNEP/MAP and Plan Bleu, 2020).

128. The ten largest Mediterranean river basins are the Nile (Egypt), Rhone (France), Ebro (Spain), Po (Italia), Moulouya (Morocco), Meric/Evros (Greece, Türkiye), Chelif (Algeria), Büyük Menderes (Türkiye), Axios/Vardar (Greece) and Orontes/Asi (Türkiye). In the last 50 years, a decline in water discharge from rivers (estimated at around 340 $km^3$) has been observed, resulting from multiple stressors such as decreasing precipitation, an increasing number of reservoirs and increasing irrigated areas (UNEP/ MAP and Plan Bleu, 2020).

[33] https://www.seabedminingsciencestatement.org/.

129. Total renewable freshwater resources of the countries belonging to the Mediterranean Basin were reported[34] at between 1,212 $km^3$ $yr^{-1}$ and 1,452 $km^3$ $yr^{-1}$, with Northern Mediterranean countries holding between 72 and 74% of the resources and the SEMCs sharing the remaining 26 to 28% (MedECC, 2020).

130. Analyses conducted towards preparation of the Fifth Assessment Report of the IPCC showed that by 2014, 44 out of 73 catchments[35] in the Mediterranean region were under high to severe water stress, with hotspots in southern Spain, Tunisia, Libya, Syrian Arab Republic, Lebanon, and Israel. Furthermore, it was assessed that except for France and the Balkans, all the catchments in the Mediterranean would be under high to severe water stress by 2050, mainly due to climate change (reduced mean precipitation and groundwater availability, increased frequency and duration of droughts etc.), leaving 34 million people under high water stress and 202 million under severe water stress (IAI, 2021). Water shortages, especially pronounced during the summer, coincide with tourism peaks in coastal areas.

Water withdrawals

131. Total freshwater withdrawals in the Mediterranean countries were at the level of 290 billion $m^3$ in 2019 (FAO Aquastat). The largest consumers were Türkiye and Egypt with 61.5 and 77.5 billion $m^3$ respectively; freshwater withdrawals of around 10 billion $m^3$ or higher were recorded in Algeria, Greece, Morocco, Syrian Arab Republic, France, Spain and Italy. Per capita withdrawals ranged from less than a 150 $m^3$ to close to 1,000 $m^3$ (Table 7).

Table 7: Freshwater withdrawals per capita and by sector, 2019

| | **Total freshwater withdrawal ($10^9$ $m^3$/ year)** | **Total withdrawal per capita ($m^3$ pc/ year)** | **Withdrawals by sector (%)** | | |
|---|---|---|---|---|---|
| | | | **Agriculture** | **Municipal** | **Industrial** |
| **AL** | 1.13 | 392.58 | 61.2 | 21.0 | 17.8 |
| **DZ** | 9.802 | 243 | 63.8 | 34.4 | 1.8 |
| **BA** | 0.3055 | | | | |
| **HR** | 0.67 | 176.74 | 11.0 | 62.6 | 26.4 |
| **CY** | 0.202 | 231.11 | 59.9 | 40.1 | 0.0 |
| **EG** | 77.5 | 772 | 79.2 | 13.9 | 7.0 |
| **FR** | 26.85 | 412.24 | 11.1 | 19.8 | 69.1 |
| **GR** | 10.115 | 965.77 | 80.2 | 16.7 | 3.2 |
| **IL** | 1.16 | 272.09 | 51.4 | 43.1 | 5.5 |
| **IT** | 34.05 | 564.62 | 49.7 | 27.8 | 22.5 |
| **LB** | 1.812 | 268.39 | 38.0 | 13.0 | 48.9 |
| **LY** | 5.72 | 860.21 | 83.2 | 12.0 | 4.8 |
| **MT** | 0.041 | 143.06 | 36.5 | 61.9 | 1.6 |
| **MC** | 0.005 | 128.32 | 0.0 | 100.0 | 0.0 |
| **ME** | 0.16 | 256.22 | 1.1 | 59.9 | 39.0 |
| **MA** | 10.573 | 286 | 87.8 | 10.2 | 2.0 |
| **SI** | 0.944 | 454.11 | 0.3 | 18.0 | 81.7 |
| **ES** | 29.469 | 630.53 | 65.3 | 15.3 | 19.4 |

[34] In the MedECC's First Mediterranean Assessment Report, based on the data of the FAO's Aquastat database and previous research.
[35] Areas where water is collected by the natural landscape.

| | | | | | |
|---|---|---|---|---|---|
| **SY** | 13.964 | 981.86 | 87.5 | 8.8 | 3.7 |
| **TN** | 3.781 | 328.76 | 76.3 | 22.5 | 1.2 |
| **TR** | 61.534 | 742.18 | 87.7 | 10.6 | 1.7 |

(Source: FAO, 2023. AQUASTAT Core Database. Food and Agriculture Organization of the United Nations. Database accessed on 21 February 2023).

132. Irrigated agriculture is the most water-demanding sector accounting for nearly 80% or more of total withdrawals in Egypt, Greece, Libya, Morocco, Syrian Arab Republic, Tunisia and Türkiye.

133. Besides freshwater withdrawals, a total of 6.6 billion $m^3$ of treated wastewater is used across the region, primarily in Egypt, Spain, Israel, France and Greece. Israel is the leader among the SEMCs when it comes to reuse of treated wastewater (with a rate of over 85% of collected wastewater). Among the EU Mediterranean countries, Cyprus and Malta are the most advanced with 90% and 60% of their treated wastewater reused (UNEP/ MAP and Plan Bleu, 2020, based on IPEMED, 2019).

134. The largest producers of freshwater through desalination in 2019 were Israel (645 million $m^3$), Algeria (631 million $m^3$), Spain (405 million $m^3$) and Egypt (200 million $m^3$). Malta is the desalination leader, with more than half of its drinking water supply produced via desalination (UNEP/MAP and Plan Bleu, 2020).

135. The Mediterranean is a water scarce region already under current climate and water use conditions, with high ratios of water abstraction and consumption compared to water availability, where regional groundwater depletion is already an issue. Under the scenario of global warming of 2ºC, projections indicate that the water availability in the Mediterranean could decrease by 10 – 30% locally. In such a context, implementation of irrigation and urban water efficiency measures gains importance. Water reuse is seen as an important measure to reduce abstractions, but the costs of treatment for reuse (as per the new EU standards) may exceed the current willingness to pay for water in agriculture. Desalination could become an increasingly applied option (De Roo et al., 2021).

136. Anthropogenic water abstractions are likely to impact freshwater-seawater dynamics in the Mediterranean basin, in combination with natural and climate-change induced variations of water flow into the sea. Water abstractions include both freshwater abstractions from the catchments that change the characteristics of freshwater reaching the coastal and marine environment, and coastal saltwater abstractions for the purpose of producing drinking water via desalination.

137. Freshwater abstractions in catchments may result in diversions and reductions in freshwater flow, alterations of timing and rates of flow to estuarine and coastal systems, and/or adverse water quality conditions with major changes in nutrient loading. This can affect sediment loads, pH, temperature, salinity, clarity, oceanography and nutrients. The effects of such changes can include mortality, changes in growth and development, and in some cases movement of organisms (Gillanders & Kingsford, 2002).

138. Desalination is the process of removing salts from water. A by-product of this process is toxic brine which can degrade coastal and marine ecosystems unless treated. For every litre of potable water produced, about 1.5 litres of liquid polluted with chlorine and copper are created in most desalination processes. The toxic brine depletes oxygen and impacts organisms along the food chain when pumped back into the sea (UNEP, 2019). Desalination also comes with a high energy demand. Using renewable energy sources for desalination can be an option to mitigate carbon emissions stemming from desalination.

*1.2.5.7 Wastewater and waste disposal*

Waste generation in the Mediterranean

139. According to the latest available data (as presented in table 1), more than 198 million of tonnes of municipal solid waste (MSW) is generated in the Mediterranean countries[36] annually - an average of around 400 kg per capita per year (or 1.1 kg a day), ranging from less than 0.6 kg/day to more than 3.3 kg/day.

Table 8: Municipal waste generation and recycling rates in Mediterranean countries[37]

| Country | Year | MSW (t) | MSW pc (kg/y) | Share of MSW recycled | |
|---|---|---|---|---|---|
| | | | | % | year |
| MA | 2014 | 7,126,000 | 202 | 8 | 2014 |
| SY | 2009 | 4,500,000 | 216 | 2.5 | -- |
| TN | 2014 | 2,686,000 | 219 | 4 | 2014 |
| EG | 2016 | 22,000,000 | 284 | 12 | 2013 |
| DZ | 2016 | 12,378,740 | 305 | 8 | 2016 |
| BA | 2015 | 1,248,718 | 353 | n.a. | -- |
| LB | 2014 | 2,149,000 | 358 | 8 | 2015 |
| AL | 2019 | 1,087,447 | 381 | 18.1 | 2020 |
| LY | 2011 | 2,420,000 | 385 | n.a. | -- |
| TR | 2019 | 35,374,156 | 424 | 11.3* | 2019 |
| HR | 2019 | 1,810,038 | 445 | 29.5 | 2020 |
| ES | 2019 | 22,408,548 | 476 | 36.4 | 2020 |
| IT | 2019 | 30,088,400 | 499 | 51.4 | 2020 |
| SI | 2019 | 1,052,325 | 504 | 59.3 | 2020 |
| GR | 2019 | 5,615,353 | 524 | 21 | 2020 |
| ME | 2018 | 329,780 | 530 | 4.6 | 2020 |
| FR | 2019 | 36,748,820 | 548 | 42.7 | 2020 |
| CY | 2019 | 769,485 | 642 | 16.6 | 2020 |
| MT | 2019 | 348,841 | 694 | 10.5 | 2020 |
| IL | 2021 | 6,150,962 | 656 | 23.5 | 2021 |
| MC | 2012 | 46,000 | 1,217 | 5.4 | -- |
| **Med** | | **198,347,650** | **400** | | |

Note: own calculation based on the data from EEA and UNEP/ MAP, 2021 and on data from the Ministry of Environmental Protection of Israel, 2023. Sources: World Bank What a Waste Global Database[38], EEA and UNEP/MAP, 2021, EEA, 2023, Ministry of Environmental Protection of Israel, 2023

[36] Close to 97 million in the SEMCs and around 101 million in the NMCs. The regional/ sub-regional sums were derived from the data referring to 2019 for most NMCs and Türkiye, while the last available data for the SEMCs mainly refer to the period 2014 – 2016; data for Syrian Arab Republic and Libya were only available for 2009 and 2011 (respectively).
[37] Covering all marine façades of multi-façade countries.
[38] According to the World Bank, information presented in the database is the best available based on a study of current literature and limited conversations with waste agencies and authorities. While it is recognized variations in the definitions and quality of reporting for individual data points might exist, the general trends depicted by the database records are believed to be representative of the global reality.

| Colour | Countries with annual MSW generation (kg/pc) |
|---|---|
| | 200 – 300 |
| | 300 – 400 |
| | 400 – 500 |
| | ≥ 500 |

140. Total quantities of e-wastes generated in the Mediterranean countries are at the level of 8.3 millions of tonnes, while generation of hazardous wastes exceeds 28.5 millions of tonnes annually (World Bank database, accessed January 2023).

141. As regards the MSW composition, organic materials represent the main fraction in most of the SEMCs, accounting for as much as 68% in Tunisia and 70% in Libya (World Bank database, accessed January 2023). Share of plastics ranges from few percent to more than a fifth of the total quantity and is generally higher in the NMCs (Ibid.).

142. MSW generation has been increasing across the Mediterranean and a growing trend is expected to continue in the coming decades. While municipal waste generation in the NMCs is significantly higher compared to the SEMCs, waste management systems are more advanced. Despite notable improvements, collection of MSW is still a significant issue in most SEMCs where only a few countries are succeeding in reaching full waste collection coverage (EEA and UNEP/ MAP, 2021), whereas collection services are, as a rule, underdeveloped in rural areas, suburbs and slums.

143. According to EEA and UNEP/ MAP report (2021), more than a half (54%) of total MSW is, on average, disposed at open dumps in the SEMCs[39], while the share goes to as high as 80% in some countries. Landfilling (different types of landfills) has been reported as the main disposal option in Algeria (accounting for 89% of total MSW), Israel (75%) and Tunisia (70%). On the other hand, the overall landfill rate – waste sent to landfill as a share of generated waste – decreased from 23% to 16% during 2010 and 2020 in the EU as a whole, in line with the objective of reducing reliance on landfilling; total quantity of waste sent to landfill in this period decreased by 27.5% – from 173 million tonnes to 125 million tonnes[40].

144. Reported recycling rates are mainly below 10% in the SEMCs, except for Egypt where the rate is higher (12%) due to a significant impact of informal recycling activities, and Israel (where nearly a quarter of MSW is recycled). Recycling rates are also low in Türkiye (around 11%) as well as in the non-EU NMCs (table 1); with a recycling rate of 18.1% in 2020, Albania made a significant step forward in recent years (figure 2). Over the past 15 years, the EU Mediterranean countries made significant progress with recycling, with Slovenia and Italy doubling the recycling rates and countries like Croatia and Cyprus increasing the rates by as much as eight and four times respectively (figure 2). Nevertheless, recycling rates in most EU Mediterranean countries (the only exceptions being Slovenia and Italy) were well below the EU-27 average, and are particularly low in Malta (10.5%) and Cyprus (16.6%).

[39] Including Jordan.
[40] https://www.eea.europa.eu/ims/diversion-of-waste-from-landfill accessed January 2023.

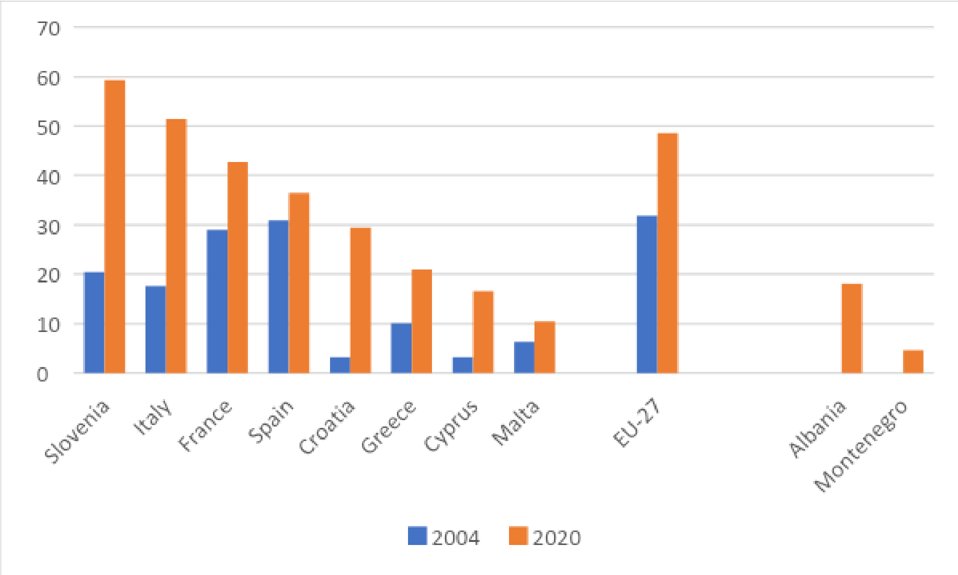



Figure 20: Recycling rates in the Mediterranean EU Member States, Albania and Montenegro (2004 and 2020). (*Source: https://www.eea.europa.eu/ims/waste-recycling-in-europe accessed February 2023).*

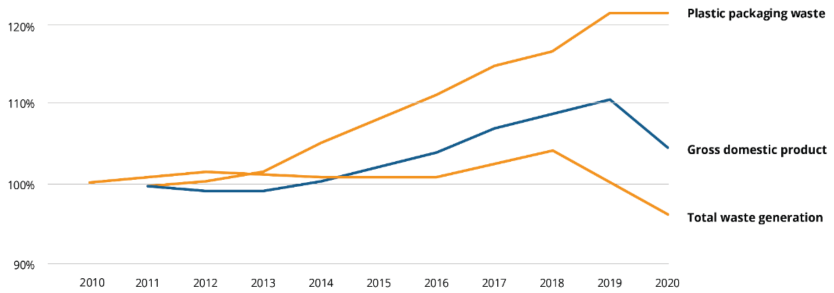
Marine litter

145. While waste management systems are improving across the region, the progress is uneven. Mismanaged waste, in particular plastics, are identified as the key source of marine litter (EEA and UNEP/ MAP, 2021; the EEA web report, 2023) – a growing problem for oceans and seas around the globe, including the Mediterranean Sea. Inadequate wastewater treatment and poor stormwater management in some Mediterranean areas exacerbate the problem (UNEP/MAP and Plan Bleu, 2020). Due to its semi-closed nature, the Mediterranean Sea retains most of its plastic debris; a growing body of evidence suggests that unlike the other major oceans/ seas, there are no specific regions in the Mediterranean in which plastic debris accumulates (Baudena et al. 2022).

146. Coastal population and tourism, associated with take-make-waste economic models, are the main drivers of plastic waste generation and marine litter in the Mediterranean. The evidence suggests that efforts to adequately prevent, collect and process such wastes are far from sufficient to reduce leakages into the sea (EEA and UNEP/MAP, 2021).

147. While the total waste quantities are projected to rise, there is little or no evidence on decoupling between economic growth and waste generation, in particular when plastic packaging waste is taken into account. As shown in figure 3, generation of plastic packaging waste grows much faster than GDP in the EU-27. Case studies presented in Kaza et al., 2021, including Slovenia's experience, show that decoupling of waste generation from economic growth is possible, with a mix of policies targeting actors and behaviours along the entire value chain.

148. Estimates from UNEP/ MAP, 2015, and EEA and UNEP/MAP, 2021 reports suggest the amount of plastic waste littered at sea from the Mediterranean countries ranged from approximately 0.5 kg per coastal inhabitant a year in Albania and Morocco and around 0.7 kg in Lebanon, to between 1 and 2 kg in most other riparian countries and slightly over 2 kg in Israel and Spain.




[Figure]: Total waste and plastic packaging waste generation versus GDP in EU-27. (Source: https://www.eea.europa.eu/data-and-maps/figures/total-waste-and-plastic-packaging accessed February 2023).

149. Estimates from the study prepared for IUCN, taking into account data for the Mediterranean watershed areas, offer different conclusions suggesting the highest leakage of macroplastics comes from the non-EU North Mediterranean countries (app 3 kg per watershed inhabitant in Albania and Bosnia and Herzegovina and as much as 8.7 kg in Montenegro), while contributions from the EU Member States and SEMCs were estimated at below 1 kg per inhabitant per year (Boucher and Bilard, 2020). The same study estimated total plastic leakage (from watershed areas) at between 150,000 (low estimate) and 610,000 tonnes per year. The mid-range estimate was assessed at 229,000 tonnes annually, made up of 94% macroplastics and 6% microplastics. Taking into account absolute amounts, Egypt, Italy and Türkiye were identified as the top three countries contributing to plastic leakage (Boucher and Bilard, 2020). Addressing plastic pollution upstream and limiting plastic production is a priority in mitigating plastic pollution in the marine environment.

Wastewater

150. Total municipal wastewater generation in the riparian countries of the Mediterranean Sea was at the level of 32,872 million $m^3$ ($Mm^3$) per year (table 2). Around three quarters of produced wastewater (24,847 $Mm^3$) were treated (FAO, 2023), with uneven treatment shares across the region.

Table 9: Generation and treatment of municipal wastewater, 2017-2019

| **Country** | **Municipal WW (Mm3/year)** | | **Treated WW share (%)** |
|---|---|---|---|
| | **produced** | **treated** | |
| AL | 54.0* | 20.5 | 38.0 |
| DZ | 1,500.0 | 400.0 | 26.7 |
| BA | 82.3 | 57.0 | 69.2 |
| HR | 360.0 | 300.0 | 83.3 |
| CY | 30.0 | 30.0 | 100.0 |
| EG | 7,078.0 | 4,282.0 | 60.5 |
| FR | 4,000.0 | 3,770.0 | 94.3 |
| GR | 568.0* | 568.0 | 100.0 |
| IL | 500.0 | 450.0 | 90.0 |
| IT | 3,926.0 | 3,902.0 | 99.4 |
| LB | 310.0 | 56.0 | 18.1 |
| LY | 504.0 | 40.0 | 7.9 |
| MT | 26.0 | 24.0 | 92.3 |
| MC | 8.0 | 6.0 | 75.0 |
| ME | 31.0 | 9.5 | 30.6 |
| MA | 700.0 | 166.0 | 23.7 |
| SI | 241.0 | 158.0 | 65.6 |
| ES | 5,870.0 | 5,465.0 | 93.1 |
| SY | 1,370.0 | 550.0 | 40.1 |
| TN | 312.0 | 274.0 | 87.8 |
| TR | 5,280.0 | 4,236.0 | 80.2 |
| **Med** | **32,872.3** | **24,847.0** | **75.6** |

Notes: For Albania, data on produced wastewater was used as reported in EEA and UNEP/ MAP, 2021 (data recorded in the database seems to be an outlier). For Greece, data on produced municipal wastewater was not available in the database; data on collected wastewater is recorded instead. (Source: FAO AQUASTAT Core Database accessed on 17 February 2023).

151. The analysis conducted for the EEA and UNEP/ MAP report (2021) showed that wastewater generation was on the rise across the region (resulting mainly from population growth and fluctuations from tourism), as was the case with wastewater collection and treatment. The largest volumes are generated by the Mediterranean EU countries, where almost all the produced municipal wastewaters (96% on average) are treated. While significant progress with wastewater treatment has been achieved in the non-EU NMCs and most of the SEMCs during the past decade, significant volumes (estimated at around 5 $km^3$/yr) of wastewater are still discharges untreated into the environment, streams, wadis or directly into the sea (EEA and UNEP/ MAP, 2021). The instability in Lebanon, Libya and Syrian Arab Republic have either resulted in the shutting down of wastewater treatment plants or the suspension of constructing new ones (Ibid.)

152. Inadequate levels of treatment are a key challenge in the Mediterranean, with 21% of treated wastewater (25% in southern countries) undergoing only basic treatment, and less than 8% (1% in southern countries) undergoing tertiary treatment (UNEP/MAP and Plan Bleu, 2020, EEA and UNEP/MAP, 2021).

153. The achieved progress with waste and wastewater management is not sufficient to curb the pressures and that further reduction in key pressures, such as waste and marine litter, wastewater and industrial emissions, is required to achieve a clean Mediterranean and the Good Ecological Status of its sea.

*1.2.5.8 Infrastructure: underwater cables and pipelines*

Underwater cables

154. Over the past 15 years, the Mediterranean region has seen a rapid spread of information and communication technologies (ICTs), with, for example, the total number of mobile cellular telephone subscriptions doubling between 2005 and 2021 to exceed 580 million. The share of the population using the internet has increased by several folds in a number of countries, most notably in Albania and Algeria, but also in Lebanon, Tunisia, Syrian Arab Republic, Egypt, Morocco and Türkiye. As of 2021, the share of internet users in the national populations is above 70% in almost all the Mediterranean countries, and above 90% in Cyprus, Israel and Spain. The number of mobile-cellular subscriptions per 100 inhabitants is the lowest in Libya (around 43) and remains below 100 in Albania, Egypt, Lebanon and Syrian Arab Republic.

155. Submarine cables are deployed in an imbalanced way throughout the Mediterranean Sea, promoting connections of the most developed regions of the world. This contributes to maintaining a digital divide for the SEMCs where despite remarkable progress, significant shares of the population remained excluded from the use of ICTs (because of inability to access technologies or lack of skills to use them). The digital transition seemed to be slower and mainly focused on urban areas in Algeria, Egypt, Libya, Tunisia and Syrian Arab Republic (UNEP/ MAP and Plan Bleu, 2020).

Pipelines

156. An overview of the existing and planned oil and gas pipelines (onshore and underwater) for the Mediterranean is not available.

157. One of the older gas conveyors is the 2,475 km long Trans-Mediterranean Pipeline built in 1983 to transport natural gas from Algeria to Italy via Tunisia and Sicily, with a capacity of more than 33.5 billion cubic metres a year (bcm/ yr)[41]. Several new gas pipelines, such as the Trans-Adriatic and EastMed Pipelines are planned to respond to the need for an increased gas supply to Europe and to diversify natural gas import routes by the EU. The recent construction of the TANAP (Trans-Anatolian Pipeline) is planned to establish a connection to the Trans-Adriatic Pipeline to reach Greece and Italy, and provide the EU with access to 16 bcm/ yr of gas extracted by Azerbaijan from the Caspian Sea (UNEP/ MAP and Plan Bleu, 2020).

*1.2.5.9 Coastal development and artificialisation of coastline*

158. Due to a range of amenities (including favourable climate, landscape, cultural, recreational and other benefits) and development and employment opportunities (activities analysed above), Mediterranean coastal areas are among the most sought-after areas. They are frequently an end point for internal migration flows, including rural – urban population movements, and coastal areas are also highly valued as locations for secondary/ holiday homes. Through this high density of human presence and activity, the coastal zone concentrates pressures on the environment.

[41] https://www.hydrocarbons-technology.com/projects/trans-med-pipeline/

159. The total length of the Mediterranean coasts is more than 57,000 km (UNEP-GRID, 2017). Many of the major cities in Mediterranean countries are located on the coast. The share of urban population increased steadily across the region, standing at or above 70% in over half the countries (Algeria, France, Greece, Israel, Italy, Lebanon, Libya, Spain, Malta, Tunisia, Türkiye) in 2021. Egypt is the only Mediterranean country where rural population (around 57% in 2021) still prevails, while the shares of rural and urban population are about the same in Bosnia and Herzegovina (World Bank, 2022).

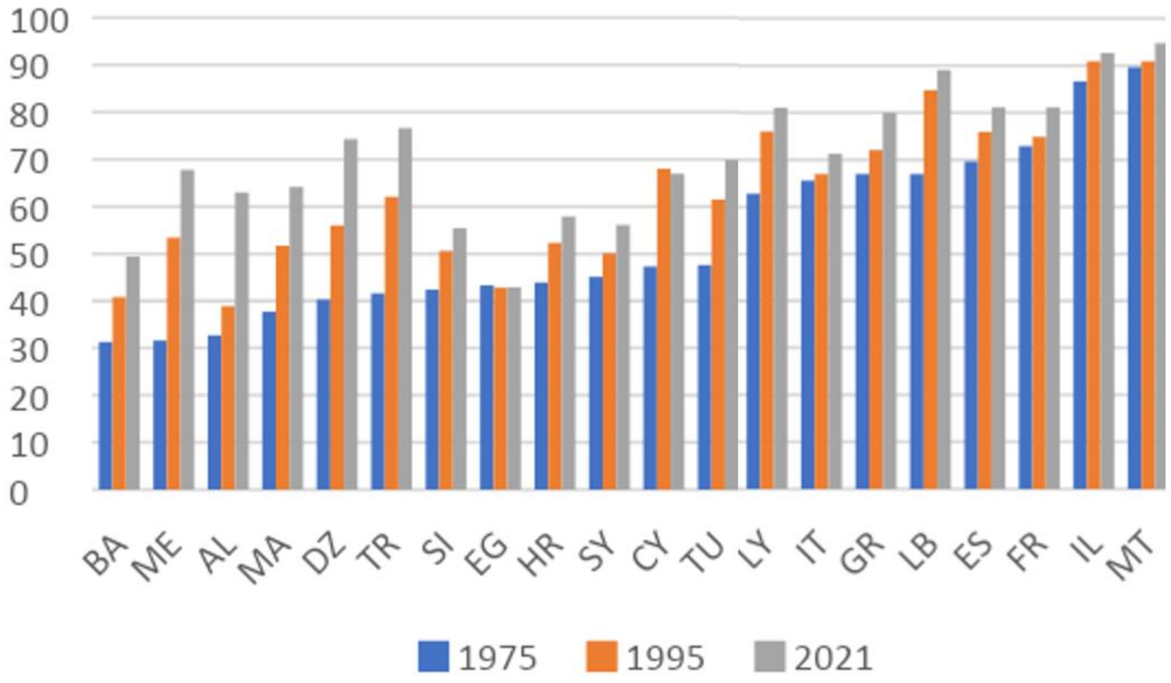



Figure 21: Shares of urban population across the Mediterranean 1975 – 2021
Source: World Development Indicators | DataBank (worldbank.org), accessed November 2022.

160. Approximately one third of the total Mediterranean population (170 – 180 million in 2021) lives in coastal areas. Shares of coastal population range from 5% in Slovenia to 100% in island countries (Cyprus, Malta) and Monaco. Population densities in coastal areas have continued to increase at unsustainable rates over the last decade. Rapid growth of urban and peri-urban areas is recorded all over the Mediterranean.

161. Intensification of coastal uses is at the origin of many impacts that alter the invaluable capital that is the Mediterranean, leading to increased fragmentation of landscapes, disrupting ecological continuity and degrading the environment's capacity to provide ecosystem services to society. It also makes coastal zones highly vulnerable to sea level rise, storm surges, flooding and erosion (UNEP/MAP and Plan Bleu, 2020; Grimes et al., 2022).

162. A detailed analysis of the location and extent of the habitats potentially impacted by hydrographic alterations, the length of coastline subject to physical disturbance due to the influence of human-made structures, and land cover change is given in the 2023 MED QSR chapter on coast and hydrography.

*1.2.5.10 Fertiliser and pesticide use in agriculture*

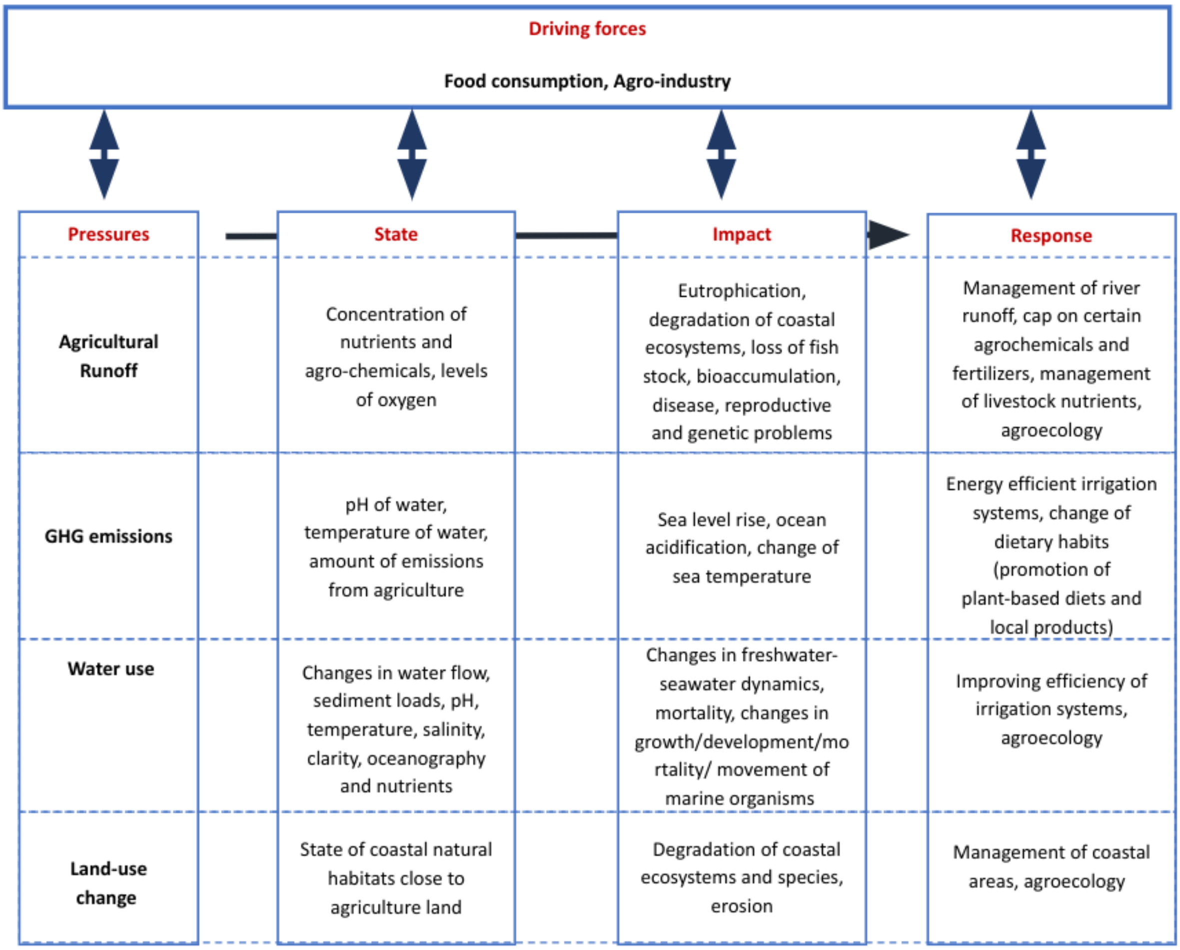


Figure 22: Pressures exerted by agriculture on the marine environment (Source: Based on UNEP/MAP and Plan Bleu, 2020)

163. The main impacts of agriculture on the marine environment are due to the runoff of nutrients and agro-chemicals into the sea. Disaggregation of the impact from different sources of land-based pollution is difficult and there is no quantitative data concerning the effect of agriculture on the environment of the Mediterranean Sea. The runoff of inorganic nitrogen and phosphorus fertilizers leads to eutrophication, which in turn negatively impacts coastal and marine ecosystems. The runoff and infiltration of pesticides into the sea affect the marine environment at a slower pace by bioaccumulation higher up the food chain (UNEP/MAP and Plan Bleu, 2020).

164. In 2020, fertilizer consumption in kg/ha of arable land ranged from 7 kg/ha in Syrian Arab Republic to 473 kg/ha in Egypt, with half of the Mediterranean countries being above and half of the Mediterranean countries being below the world average fertilizer consumption of 146 kg/ha of arable land (World Bank, 2023).

Table 10: Fertilizer consumption in kg/ha of arable land, in Mediterranean countries, 2017-2020

| Country | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|
| AL | 100 | 67 | 94 | 101 |
| BA | 106 | 85 | 87 | 90 |
| CY | 175 | 158 | 188 | 163 |
| DZ | 21 | 21 | 21 | 21 |
| EG | 574 | 522 | 495 | 473 |
| ES | 155 | 158 | 157 | 167 |
| FR | 178 | 172 | 157 | 169 |
| GR | 130 | 135 | 141 | 150 |
| HR | 214 | 221 | 212 | 200 |
| IL | 230 | 241 | 231 | 140 |
| IT | 130 | 130 | 128 | 136 |
| LB | 293 | 275 | 279 | 249 |
| LY | 26 | 16 | 19 | 15 |
| MA | 60 | 63 | 65 | 58 |
| MC | no data | no data | no data | no data |
| ME | 234 | 247 | 252 | 307 |
| ML | 93 | 89 | 96 | 127 |
| SI | 257 | 262 | 255 | 256 |
| SY | 3 | 2 | 7 | 7 |
| TN | 49 | 57 | 57 | 57 |
| TR | 132 | 110 | 126 | 150 |
| World | 141 | 140 | 138 | 146 |

Source: World Bank, 2023

165. The consumption of pesticides in the Mediterranean basin varies largely between countries. In 2020, the average use of pesticides in kilograms per hectare of cropland ranged from 0.3 kg/ha in the Syrian Arab Republic to 14.5 kg/ha in Israel. Almost two thirds of the Mediterranean countries showed pesticide consumption above the world average of 1.8 kg/ha (FAOstat, 2023). Pesticides, especially if used irrationally, can lead to animal and human health problems such as the inability to reproduce normally in certain animal species, or cancer, neurological effects, diabetes, respiratory diseases, foetal diseases, and genetic disorders in humans who have been directly or indirectly exposed to certain pesticides (UNEP/MAP and Plan Bleu, 2020). Managing this type of pollution is particularly difficult because of its diffuse nature and largely unknown combined effects of multiple types of pesticides and their life cycles in the terrestrial and marine environment.

Table 11: Use of pesticides in kg/ha of cultivated land, in Mediterranean countries, 2017-2020 (Source: FAOstat, 2023).

| | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|
| **AL** | 0.9 | 0.6 | 1.1 | 1.1 |
| **BA** | 2.2 | 2.3 | 2.2 | 2.4 |
| **CY** | 9.7 | 9.6 | 10.3 | 9.2 |
| **DZ** | 0.7 | 0.7 | 0.7 | 0.7 |
| **EG** | 2.6 | 2.9 | 2.9 | 2.9 |
| **ES** | 3.6 | 3.3 | 2.6 | 2.6 |
| **FR** | 3.6 | 4.5 | 2.9 | 3.4 |
| **GR** | 2.6 | 3.5 | 3.4 | 3.3 |
| **HR** | 1.8 | 1.9 | 1.7 | 1.7 |
| **IL** | 14.3 | 15.2 | 14.6 | 14.5 |
| **IT** | 6.1 | 5.9 | 5.2 | 6.1 |
| **LB** | 6.6 | 6.7 | 6.7 | 6.7 |
| **LY** | 0.3 | 0.4 | 0.4 | 0.4 |
| **MA** | 1.4 | 1.4 | 1.6 | 1.5 |
| **ME** | 6.2 | 6.2 | 6.1 | 6.2 |
| **SI** | 4.6 | 5.0 | 4.2 | 4.1 |
| **SY** | 0.3 | 0.3 | 0.3 | 0.3 |
| **TN** | 0.5 | 0.7 | 0.7 | 0.7 |
| **TR** | 2.3 | 2.6 | 2.2 | 2.3 |
| **World** | 1.9 | 1.8 | 1.8 | 1.8 |

Table 12: Agricultural use of pesticides in tons (Source: FAOstat, 2023)

| | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|
| **AL** | 6,067 | 6,067 | 6,067 | 6,067 |
| **BA** | 2,517 | 2,545 | 2,514 | 2,723 |
| **CY** | 1,163 | 1,246 | 1,271 | 1,218 |
| **DZ** | 615 | 442 | 730 | 757 |
| **EG** | 9,988 | 11,352 | 11,352 | 11,352 |
| **ES** | 60,896 | 55,223 | 43,337 | 43,337 |
| **FR** | 70,604 | 85,072 | 54,381 | 65,216 |
| **GR** | 8,503 | 11,199 | 11,032 | 10,475 |
| **HR** | 1,570 | 1,677 | 1,558 | 1,644 |
| **IL** | 6,881 | 7,322 | 6,983 | 6,983 |
| **IT** | 56,641 | 54,153 | 48,567 | 56,556 |
| **LB** | 1,816 | 1,816 | 1,816 | 1,816 |
| **LY** | 649 | 788 | 788 | 788 |
| **MA** | 13,697 | 13,697 | 13,697 | 13,697 |
| **ME** | 91 | 91 | 91 | 91 |
| **MT** | 98 | 89 | 102 | 102 |
| **SI** | 1,087 | 1,172 | 972 | 949 |
| **SY** | 1,422 | 1,422 | 1,422 | 1,422 |
| **TN** | 2,670 | 3,211 | 3,511 | 3,511 |
| **TR** | 54,098 | 60,020 | 51,297 | 53,672 |

### 1.2.6 A need to anticipate emerging and fast-growing new activities

166. Faced with the lack of space along coastlines and the pressure of emerging maritime activities, the permanent occupation and exploitation of the sea is developing from the coast to offshore: creation of artificial islands, ports, and wind farms, telecommunications and energy cables as well as pipelines; exploration and exploitation of until now untouched marine resources, represent a new field of experimentation, development, impact and potential conflict. The increasing presence of infrastructure at Sea, and particularly infrastructure of strategic importance for energy and data/communications supply, also comes with a need for countries to protect this infrastructure in a generally tense geopolitical and security context faced in the Mediterranean. Therefore, some of the activities at Sea are likely to trigger the emergence of other potentially polluting activities at Sea, including surveillance activities and potentially military interventions. New activities at Sea seldomly limit their presence and impact to the Sea because they need to be connected to the shore in order to allow use of their products on land (energy, minerals, landing terminals and hinterland infrastructure onshore, …). All of these activities modify - at least temporarily - the marine and/or coastal environment. Making these activities compatible with GES, already in the planning phase, is therefore essential for the achievement of GES in the Mediterranean.

### 1.2.7 Knowledge gaps

167. This chapter provides an analysis of the main socio-economic components that influence the Mediterranean coastal and marine environment. Analysis is based on available data from a number of different sources, such as UN system data, data from international organisations, and relevant scientific articles. The absence of a comprehensive monitoring system of socio-economic characteristics and the sustainability of economic activities makes it difficult to establish clear links between the quality status of the Mediterranean Sea (analysed in the following chapters) and the social and economic pillars of sustainable development (analysed in this chapter). In particular, while a certain level of information on demographic, economic and employment has been collected, literature review did not adequately inform the level of environmental and social sustainability of human activities that impact the coastal and marine environment. A knowledge gap remains in measuring to what extent human activities are compatible or in line with the objective of achieving GES and clear sustainability indicators of human activities are generally lacking.

### 1.3 Regional cooperation

1.3.1 Cooperation frameworks in relation to environmental protection

*The UNEP/MAP-Barcelona Convention System*

168. The Barcelona Convention, adopted in 1976, was the first legally binding instrument for the environmental protection of the Mediterranean Sea. Its provisions and thematic protocols provided the legal basis for the progressive development of a wide framework for regional cooperation to which the Mediterranean countries and the European Union adhered.

169. In addition to its legal texts, the Barcelona Convention system has other consultation and cooperation frameworks adopted by the Contracting Parties to assist them and coordinate their efforts in implementing the Convention and its Protocols.

170. The Mediterranean Commission on Sustainable Development (MCSD): The MCSD is an advisory body to the Contracting Parties aimed at assisting them in their efforts to integrate environmental issues in their socioeconomic programmes and to promote sustainable development policies in the Mediterranean region and countries. Serving as a forum for experience sharing and peer learning, the MCSD is unique in its composition since it includes not only government representatives but also local authorities, socio-economic actors, non-governmental organizations, intergovernmental organizations, the scientific community and parliamentarians. All the Commission members participate in its deliberations on an equal footing.

171. The Contracting Parties also adopted a series of legislations, national and regional strategies and action plans aimed at guiding their efforts in addressing issue of relevance for the objectives of the Convention and its Protocols. These regional strategies and action plans offer various opportunities for cooperation, exchange of experience and mutual assistance among the Contracting Parties and for partnership with other Inter-Governmental organizations as well as with a wide range of civil society and non-governmental organisations.

172. Promoting partnership and cooperation with relevant regional and global institutions and actors is among the key guiding principles followed by the Mediterranean Action Plan (MAP) Coordinating Unit and the Regional Activity Centres. Over the years, they have sought to foster existing partnerships and to enter into new ones in line with the priorities set by the Contracting Parties to the Barcelona Convention and its Protocols. In this context, the UNEP/MAP Coordinating Unit has a long-standing cooperation with a number of key regional and international organizations, and with many of them put in place Memoranda of Understanding and/or follows other cooperation modalities:

- ✓ Agreement on the Conservation of Cetaceans of the Black Sea and contiguous Atlantic Area (ACCOBAMS)
- ✓ Baltic Marine Environment Protection Commission (HELCOM)
- ✓ Basel, Rotterdam, and Stockholm (BRS) Conventions
- ✓ Food and Agriculture Organization of the United Nations (FAO)
- ✓ General Fisheries Commission for the Mediterranean (GFCM)
- ✓ Global Environment Facility (GEF)
- ✓ International Atomic Energy Agency (IAEA)
- ✓ International Maritime Organization (IMO)
- ✓ International Union for Conservation of Nature (IUCN)
- ✓ London Convention and Protocol
- ✓ London Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter
- ✓ OSPAR Commission
- ✓ Permanent Secretariat of the Commission on the Protection of the Black Sea Against Pollution (BSC PS)
- ✓ UNEP Regional Seas programme

- ✓ Union for the Mediterranean (UfM)
- ✓ United National Development Programme (UNDP)
- ✓ United Nations Educational Scientific and Cultural Organization (UNESCO)
- ✓ World Bank

173. During the period between the 2017 and 2023 Med QSRs a clear improvement is recorded in the coordination between regional organizations operating in the Mediterranean in relation to the preservation of the marine environment and the sustainable use of its biodiversity and living resources. Within this framework, memoranda of collaboration have been established between organizations with a view to promoting consultation and harmonization of activities to avoid duplication and to increase the complementarity of their intervention. In addition, projects involving several regional organizations have been implemented thanks to financial support provided by intergovernmental donors and private foundations. Such projects concerned various important issues for the marine environment of the Mediterranean such as marine litter, marine underwater noise, incidental catches of vulnerable species, habitat preservation and endangered species.

## 2. Mediterranean Quality Status Assessments

### 2.1 Pollution and Marine Litter

*[Section 2.1 "Pollution and Marine Litter" will contain the approved text of Working Documents WG.550/10 and WG.550/12 respectively, that will result after the review and endorsement of the Integrated CORMON Meeting (27-28 June 2023).]*

### 2.2 Biodiversity and Fisheries

*[Sub-sections on Fisheries (developed by GFCM) and Cetaceans will contain the approved text of Working Documents WG.550/4 and WG.550/9 respectively, that will result after the review and endorsement of the Integrated CORMON Meeting (27-28 June 2023).]*

#### 2.2.1 EO1 Biodiversity

*Common Indicators 1 (Habitat distributional range) & 2 (Condition of the habitat's typical species and communities)*

**Assessment methodology for CI-1 (Habitat Distribution)**

The GES definition for CI-1 is 'the habitat is present in all its distributional range'. All specific habitat types currently addressed by EO1 are considered to exhibit a distributional range across the Mediterranean which is in line with prevailing physiographic, geographic and climatic conditions. Despite the finer resolution of EO1 habitats compared with the broad habitat types under EO6, these EO1 habitat types are generally distributed throughout the Mediterranean (north to south, east to west), making it difficult to detect changes in distributional range will vary at the Mediterranean Sea scale. There is a slight possibility for the depth range of infralittoral/circalittoral habitats, such as maerl, to vary due to changes in water clarity (e.g., by changing the depth of the infralittoral zone).

In addition to distributional range, the guidance fact sheet for CI-1 indicates there is a need to also consider loss of habitat extent. This aspect is relevant for all habitat types and is often a particular concern for habitats which are sensitive to specific pressures, such as physical loss and disturbance, and hence there inclusion as threatened habitats under EO1. Use of certain bottom fishing gears and anchoring of large vessels leads to habitat loss and damage of Posidonia oceanica meadows, other types of seagrass beds and maerl beds. Poor water quality in coastal areas, from input of contaminants and nutrient enrichment, also leads to loss in habitat extent.

174. The Mediterranean continental shelf possesses rich and important habitats. However, The anthropogenic pressure exerted on the marine and coastal habitats of the Mediterranean region led during the past decades to a substantive decrease in the extent and conditions of most of the key habitats of the region. Pollution, fisheries, urbanisation and invasive alien species (increasing temperature and UV, and acidification) are the most frequently cited pressures in the Red List of European Habitats (Gubbay et. al., 2016) affecting the distribution range and the conditions of habitats. Climate change is also affecting some mediolittoral and infralittoral habitats, especially by altering the thermal structure of the water column, with extensive mass mortalities (Rivette et al., 2014). The proliferation of coastal and marine infrastructures, such as breakwaters, ports, seawalls and offshore installations call for special concern, all being associated with loss of natural habitats and alteration of hydrographic conditions (Perkol-Finkel et al., 2012). New strategies aimed at elevating the ecological and biological value of coastal infrastructures are urgent.

175. According to available data, habitat destruction is one of the most pervasive threats to the diversity, structure, and functioning of Mediterranean marine coastal ecosystems and to the goods and services they provide.

176. The Alboran Sea, the Gulf of Lyons, the Sicily Channel and Tunisian Plateau, the Adriatic Sea, off the coasts of Egypt and Israel, along the coasts of Turkey are highly impacted. Low cumulative human impacts were found in offshore areas, and in several small coastal areas of some countries. These areas represent important opportunities for conservation aimed at preventing future degradation.

Key messages (Habitats):

177. The seabed and its benthic habitats are a key component of the Mediterranean's marine ecosystem. It holds a high diversity of marine communities and species and provides a range of essential ecosystem services including provision of seafood, natural coastal protection and carbon sequestration.

178. The seabed is subject to a wide range of anthropogenic pressures, arising from land-based activities which lead to pollution (contaminants, nutrient enrichment, litter) and sea-based activities that cause physical damage and loss of habitat (bottom fishing, mineral extraction, coastal and offshore infrastructure), introduce non-indigenous species, and disrupt the natural carbon cycle.

179. The seabed is under severe pressure in the coastal zone where extensive stretches of coast have lost their natural marine habitat through the building of coastal infrastructure and sea defences. Offshore, down to depths of 1000m, the most wide-spread and extensive damage to seabed habitats comes from bottom fishing using trawls and dredges. Below this depth, these fishing practices are banned, thereby providing protection to sensitive deep-sea habitats throughout the Mediterranean. However, there is increasing evidence of litter from land-based sources accumulating at these depths.

180. Particularly threatened habitats, including coralligenous habitats, maerl/rhodolith habitats and Posidonia oceanica seagrass meadows, and, are now subject to IMAP monitoring programmes under Ecological Objective (EO) 1 (biodiversity). Consideration of the wider sea-floor under EO6 (sea-floor integrity) is less well developed.

181. Given the current level of development of assessment techniques for EO1 and EO6, it is only possible to present a preliminary approach to seabed habitat assessments for the 2023 Med QSR. This is done at a broad scale and with a focus on assessing the extent of pressures, as a proxy for impacts on habitats.

182. A pilot assessment for the Adriatic Sea shows all coastal and offshore habitats are subject to multiple pressures, but habitats in the south which are below 1000m depth are less affected. The most widespread pressure is physical disturbance by bottom fishing which, using data at a 10km-by-10km grid resolution, affects 90% of this subregion.

Good environmental status (GES) assessment for CI-1 (Habitat Distribution)

183. Distribution maps for the three EO1 habitats for which data are being reported under the IMAP monitoring programme are shown with IMAP data reported up to December 2022 (from Israel, Italy, Malta, Spain and Slovenia), as well as data and models from other sources:

a. Coralligenous habitat (Figure 23, Figure 24);
b. Maerl and rhodoliths habitat (Figure 25, Figure 26);
c. Posidonia oceanica meadows (Figure 27, Figure 28).

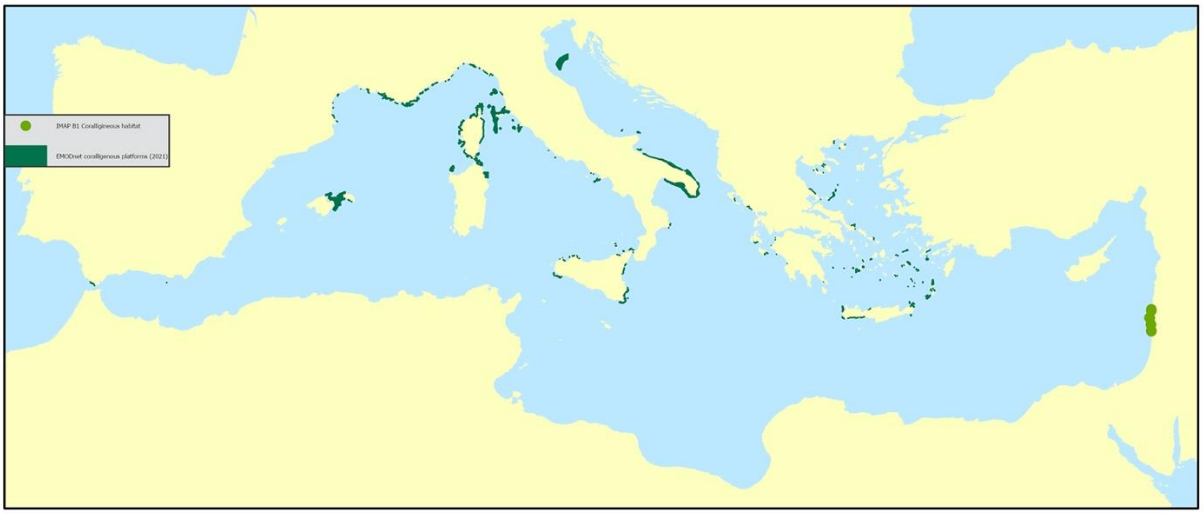



Figure 23: Distribution of Coralligenous habitat in the Mediterranean Sea, based on data reported under IMAP (up to December 2022) (data points enlarged to enhance visibility) and from EMODnet (2021).

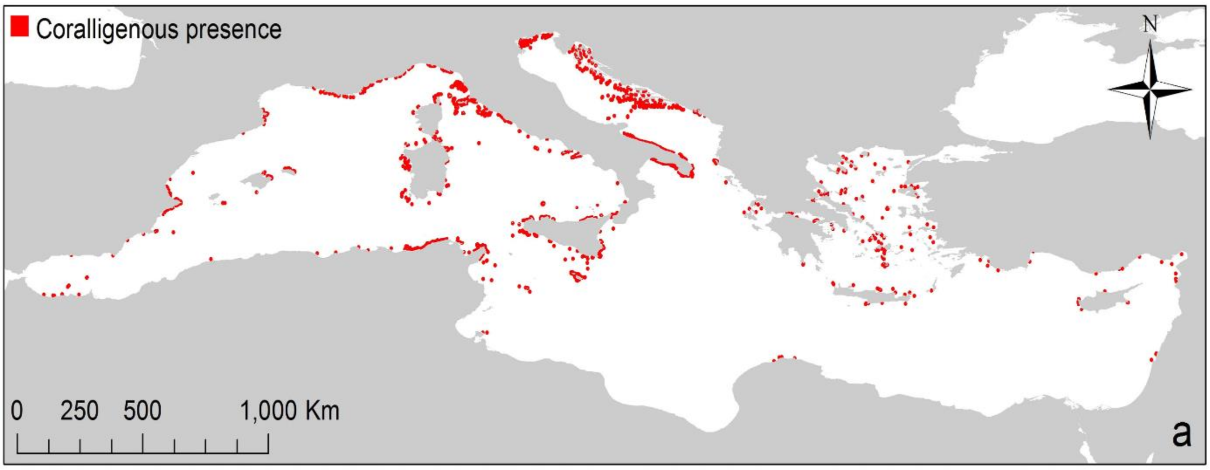



Figure 24: Modelled distribution of Coralligenous habitat in the Mediterranean Sea (red areas) (from Corine et al., 2014).


Figure 25: Distribution of maerl and rhodoliths habitat in the Mediterranean Sea, based on data reported under IMAP (up to December 2022) (data points enlarged to enhance visibility).

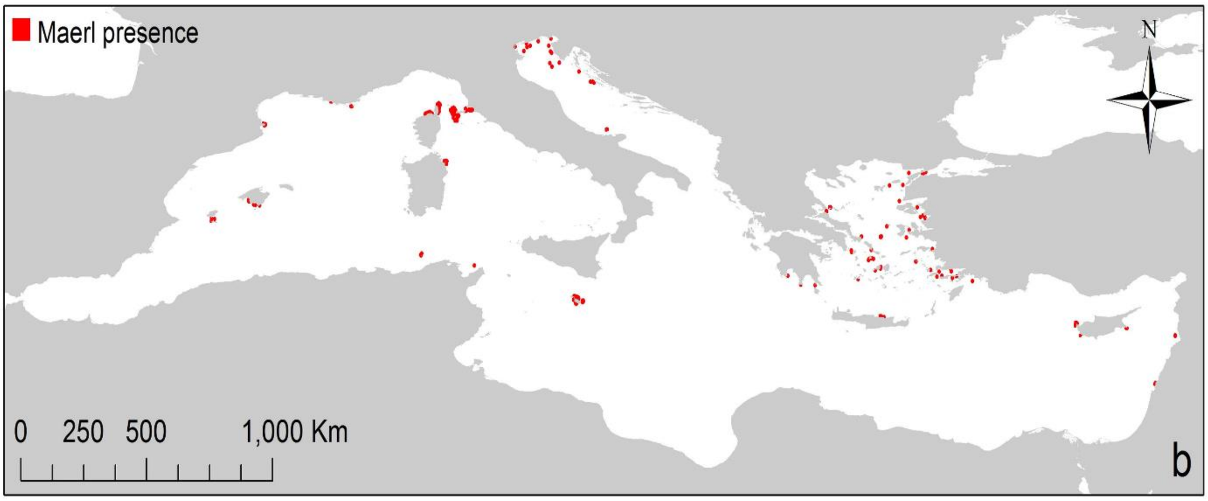



Figure 26: Modelled distribution of maerl habitat in the Mediterranean Sea (red areas) (from Corine et al., 2014).

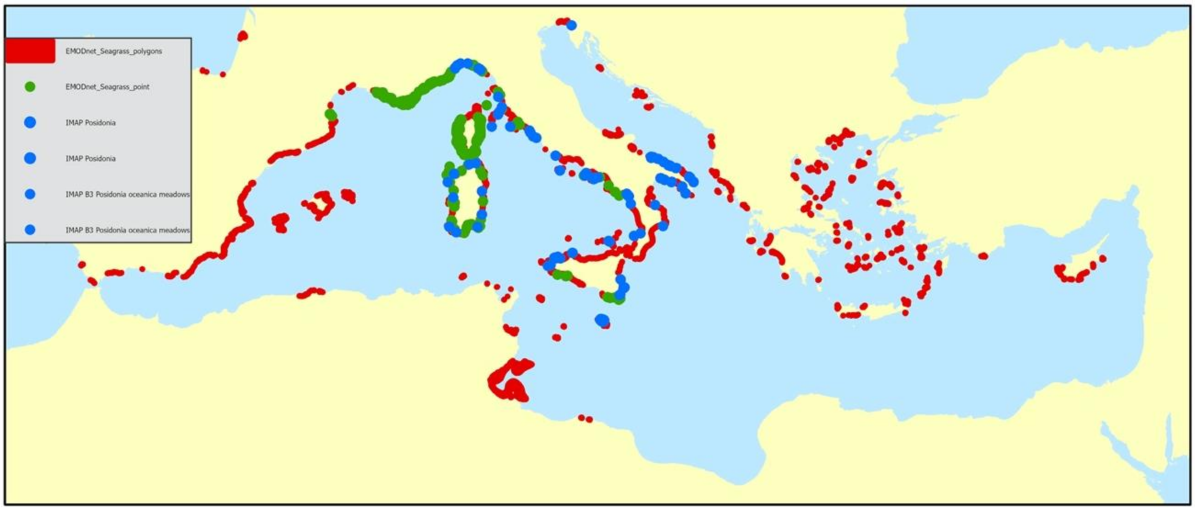



Figure 27: Distribution of Posidonia oceanica meadows, based on data reported under IMAP (up to December 2022) and from EMODnet (2021) (data points enlarged to enhance visibility).

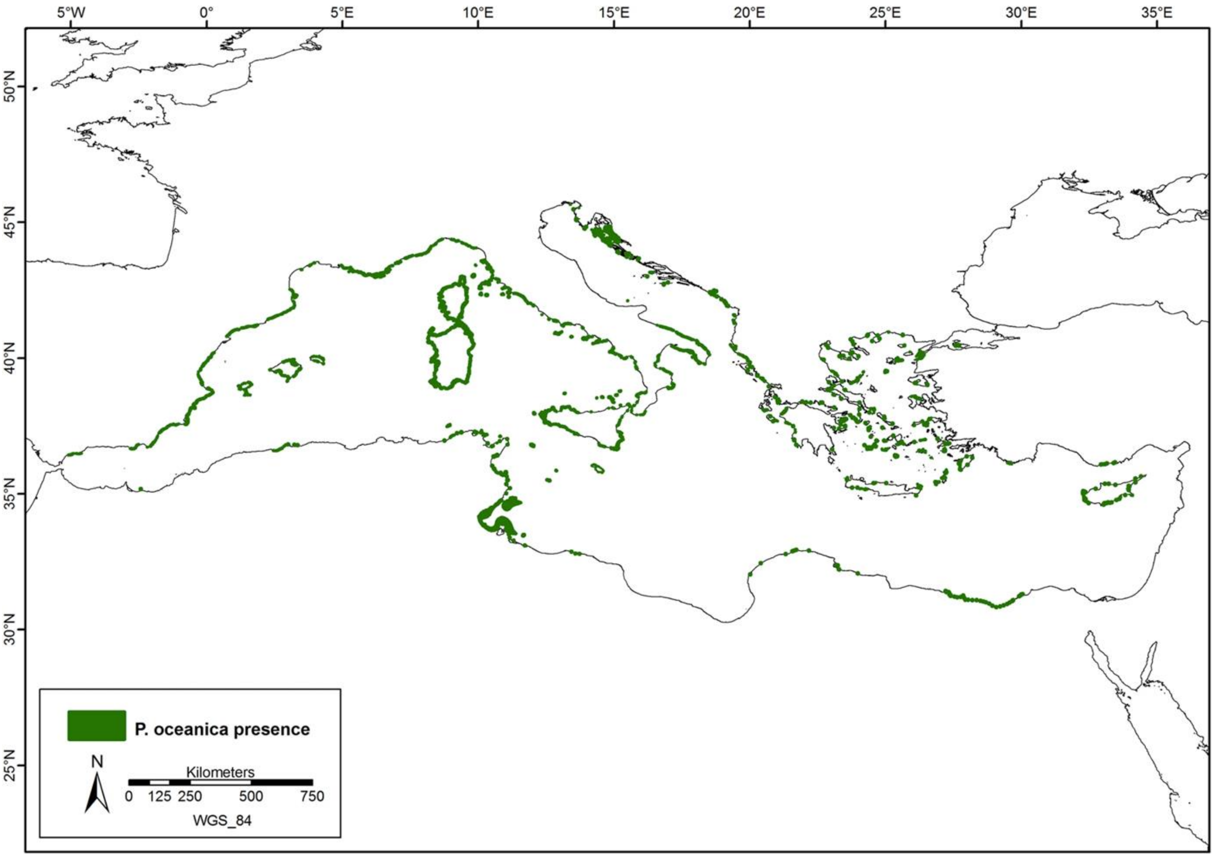



Figure 28: Distribution of Posidonia oceanica meadows in the Mediterranean Sea (green areas) (from Telesca et al., 2015).

Good environmental status (GES) assessment for CI-2 (Habitat Condition)

184. Monitoring methods have been established for three EO1 habitats and Contracting Parties have initiated data flows into the IMAP Info System (section 2.1.2.1). The agreed monitoring methods cover a wide range of possible techniques, yielding a variety of data types. The method of assessment of these data, and threshold values, are yet to be agreed under the IMAP. At present, it is therefore not feasible to assess CI-2 for EO1 habitat types. There is, however, a rich scientific literature that describes the state of these habitats and provides evidence of poor state in multiple locations across the region.

Key findings for Common Indicator CI-1 (Habitat Distribution)

185. The distributional range of broad and fine habitat types is considered to generally be in line with prevailing physiographic, geographic and climatic conditions.

186. All habitats may be subject to habitat loss; this is more pronounced in the coastal zone, due to the greater intensity of coastal infrastructures and sea defences; habitat loss is of particular concern for specific habitats under EO1. However, persistent use of bottom-contacting fishing gears can also lead to habitat loss, which may affect extensive areas on the continental shelf and slope.

187. Assessment of CI-1 requires the setting of an 'extent threshold' and improvement in the availability of data on habitat extent and loss. A key basis for this is the provision by Contracting Parties of improved habitat maps (both broad- and fine-scale), making these available for compilation at Mediterranean-region scale (broad habitat maps via EMODnet, other habitat types via the IMAP Info System).

Key findings for Common Indicator CI-2 (Habitat Condition)

188. Habitat condition in the Mediterranean Sea region is affected by multiple pressures. There is a greater range of pressures in the narrow coastal zone, whilst the offshore and bathyal zones, down to 1000m depth, are most affected by physical disturbance pressures.

189. Due to narrow nature of the continental shelf across much of the Mediterranean (excepting in the Adriatic Sea and the Strait of Sicily), the bathyal zone, below 1000m depth, and abyssal zone account for a very high proportion of the Mediterranean Sea. In these zones, bottom fishing is banned leading to much lower levels of physical disturbance, although the seabed may be subject to effects of contaminants accumulating in deep-sea sediments and to the accumulation of litter, such as in canyons.

190. Bottom fishing accounts for the vast majority of the physical disturbance, covering up to 90% or more of the seabed (at 10km-by-10km grid cell resolution) in coastal and offshore areas. In some areas this may represent an overestimate of the extent of physical disturbance, due to the grid-cell resolution and use of presence/absence data.

191. Under the IMAP, Contracting Parties have started to submit data on the condition of three specified habitats for EO1; data across the entire region are needed to enable an assessment of habitat condition for these habitat types. In addition, methods of interpreting these data (through specific indicators) and a setting of threshold values are needed to enable assessment against the GES definition in future QSRs.

192. For broad habitat types, improvements in the availability and resolution of pressure data, and in relating these data to the state (condition) of the habitats are needed. This would lead to a more robust assessment than has been presented here in the pilot study.

193. Data on pressures and habitat state are generally more available in northern parts of the Mediterranean, which may incorrectly imply that these areas are in a worse state than southern areas. An effort should therefore be made to ensure an even level of data are available across the region.

Measures and Actions Required to achieve GES (CIs 1 & 2, habitats)

194. Despite many decades of scientific study on particular habitats in specific locations, systematic assessment of seabed habitats, both broad-scale and fine-scale, for the Mediterranean Sea as a whole is generally at an early stage of development. However, the knowledge base and assessment methodologies are under rapid development and offer good prospects for future QSRs.

195. Improvement in the availability of data is needed for:

a. Habitat maps – these provide the fundamental basis for habitat assessments and need to be further improved in quality and accuracy. The EUSeaMap full coverage map of broad habitat types relies on the quality of the underlying input data, especially on seabed substrates, and needs to be improved across much of the region. Countries should be encouraged to contribute mapping data to help improve the region-wide seabed mapping;
b. Activities and pressures – the mapping of pressures, using activities as a basis, provides a good means to assess the wider seabed of the region. These data are generally more easily (and cheaply) collected than direct observational data of the seabed, offering a more cost-effective means to undertake assessments. Further, such data are important for management of pressures (i.e., reducing pressures in areas to help achieved GES) and for marine spatial planning; further data collection is needed, particularly in the south and east, to provide an even coverage across the Mediterranean. The current region-wide datasets of activities and pressures (from the EEA/ETC-ICM) are at a 10km-by-10km grid resolution – for use in relation to seabed assessments, the data need to be prepared at a finer resolution;
c. Monitoring data on the state of the seabed – the traditional collection of direct observations of the seabed (e.g., through video and sampling) remains an important aspect of data

collection programmes, providing a means to validate pressure data to assess seabed habitat condition. Monitoring programmes are costly and need to be focused on the needs of assessment and measures to ensure good value. To facilitate pan-regional assessments, the monitoring data need to be compatible between countries, following specified data standards; further data collection is needed, particularly in the south and east, to provide an even coverage across the Mediterranean;

d. Pressure-state interactions – there is continued need for study of pressure-state interactions, both at research level and through state assessments, to improve confidence in use of pressure data (such as a proxy for broad-scale state assessments);

e. Climate change – the effects of climate change on the seabed and its communities need to be better understood; of particular importance is assessment of the carbon storage capacity of marine habitats and the contribution this makes to mitigation of climate change effects; the importance of shallow vegetated habitats, such as Posidonia oceanica meadows, for blue carbon is often highlighted, but the carbon sequestration capacity of the much more extensive soft sediment habitats of the shelf zone and its disruption by physical disturbance pressures is ultimately a more important knowledge gap;

f. Assessment methods – further work is needed to develop specific indicators (or test existing indicators available in other regions) for use with the monitoring data, and to bring the assessment methods to a fully operational level. Based on these methods, Contracting Parties need to agree threshold values to provide a clear means to assess the extent to which GES has been achieved;

g. Assessment results – the availability of seabed assessment results, including visualisation of the extent of GES in each part of the region, provides an important output that demonstrates the work of the IMAP and Contracting Parties, stimulates improvements and helps direct actions towards achieving GES.

*Common Indicators 3, 4 and 5 (Bird species)*

**Assessment methodology for CI3-CI5 of EO1 regarding seabirds**

For the current assessment, the reporting and processing is not yet carried out through the IMAP Info System. Thus, for CI3-CI5 of EO1 regarding seabirds, the assessment for the 2023 MED QSR is mainly based on national monitoring datasets, submitted to SPA/RAC by the CPs' focal points. Datasets for at least some of the Common Indicators and some of the 11 indicator species have been received from a list of CPs. Datasets provided by the CPs' focal points were complemented with data from additional sources where available. The following additional data sources were utilised:

- Wetland International - International Winter Census (IWC) data: Datasets of IWC midwinter counts collected during the current assessment cycle were requested from Wetland International for all CPs.
- Birdlife International - Seabird Tracking Database: Datasets of tracked individuals of indicator species in the region were requested from BirdLife International repository.
- Experts on indicator species in the region: Additional information was received from experts of specific indicator
- Published reports on the topic containing relevant information and data concerning the current assessment cycle for specific countries, subregions, or the entire region.

Where available, GES assessments were adopted from national assessments carried out by the CPs. Otherwise, where data quality permitted, evidence-based GES assessments are carried out using quantitative monitoring data collected by each CP during the current assessment cycle. Only if/where it is believed that data collected by the CPs are not sufficient (based on data quality, methodologies used and/or representativeness), quantitative monitoring data collected by other entities were added for the GES assessment. Data is integrated for the GES assessment, creating the basis of the 2023 MED QSR.

For each CI, indicator species, and CP (and stage were relevant, e.g., breeding versus non-breeding), GES is assessed separately, using the methodologies outlined in the document "*Monitoring and Assessment Scales, Assessment Criteria, Thresholds and Baseline Values for the IMAP Common Indicators 3, 4 and 5 related to sea birds*" (UNEP/MED WG.521/Inf.7). GES is presented in a simplified traffic-light system approach (see Tables 13-17). Data from complete assessments or from sub-samples that are deemed representative are evaluated against baselines (in most cases: modern baselines collected in previous assessment cycles) using threshold values.

196. Seabirds as a group occur in all seas and oceans worldwide. In the Mediterranean, similar to other taxonomic groups, the endemism rate for seabirds is high with various endemic or near-endemic taxa at a species or subspecies level. In addition to their ecological importance, the role of seabirds as potential indicators of marine conditions is widely acknowledged.

197. Nevertheless, despite the importance of seabirds, the most important current challenge is to ensure the survival and improve the status of the many seabird species which are already globally threatened with extinction and to maintain the remainder in favourable conservation status. Indeed, seabirds are among the most threatened bird groups globally. They are all endangered by a number of threats, including contamination by oil pollutants, direct and indirect depletion of food resources, non-sustainable forms of tourism, disturbance, direct persecution including illegal hunting and the use of poison, mortality from bycatch, wind farms, loss of habitats, degradation of habitat, introduction of and predation by alien species as well as climate change.

Key Messages (Bird species)

198. Within the Ecological Objective EO1 seabirds *sensu lato* form a crucial component of the region's marine biodiversity and ecosystem with many of the relevant taxa being endemic or near endemic in the Mediterranean. Mostly situated on top of marine food webs, these highly mobile organisms come to land to breed, thus contributing to nutrient exchange between marine and coastal areas, by linking sea and land.

199. Facing multiple pressures at land and at sea, seabirds from different functional ecological groups in the region act as indicators and serve as sentinels for the health of the Mediterranean Ecosystem.

200. The integrated Good Environmental Status (GES) of EO1 of three Common Indicators related to seabirds (CI3-CI5) reveals that for many populations of various species GES is reached, when taking a modern baseline approach. However, the data quality currently prevents a truly quantitative integrated GES assessment across the entire region. Furthermore, specifically some of the endemic taxa which are of conservation concern, currently appear to fail to reach GES targets, at least in some of the CIs.

201. Closing data gaps, harmonising data collection and monitoring programs and further implementing conservation actions within the Marine Protected Areas (MPA) network that are providing promising results, are important steps for successfully assessing GES and reaching set targets across the region in the near future.

Good environmental status (GES) / alternative assessment (CIs 3, 4 and 5 for Bird species)

202. Based on the monitoring data received at the country level for focal species, GES assessment was carried out for a total of 11 species from six functional groups, for three CIs and four subregions. The detailed results of species, CI and subregion-based analysis are given in the following subsections and a summary of these results are provided in Tables (13-17).

The eleven species considered for the assessment are:

- ✓ Osprey *Pandion haliaetus*
- ✓ Kentish Plover *Charadrius alexandrines*
- ✓ Mediterranean Shag *Gulosus aristotelis desmarestii*
- ✓ Audouin's Gull *Ichthyaetus audouinii*
- ✓ Slender-billed Gull *Chroicocephalus genei*
- ✓ Lesser-crested Tern
- ✓ Thalasseus bengalensis emigrates
- ✓ Sandwich Tern *Thalasseus sandvicensis*
- ✓ Mediterranean Storm-petrel
  *Hydrobates pelagicus melitensis*
- ✓ Scopoli's Shearwater *Calonectris Diomedea*
- ✓ Yelkouan Shearwater *Puffinus yelkouan*
- ✓ Balearic Shearwater *Puffinus mauretanicus*

Table 13: :GES Assessment for CI3. OSPR: Osprey, KEPL: Kentish Plover, MESH: Mediterranean Shag, AUGU: Audouin's Gull, SBGU: Slender-billed Gull, LCTE: Lesser Crested Tern, SATE: Sandwich Tern, MESP: Mediterranean Storm-petrel, SCSH: Scopoli's Shearwater, YESH: Yelkouan Shearwater, BASH: Balearic Shearwater. B: Breeding, OB: Offshore Breeding. LC: Least Concern, VU: Vulnerable, EN: Endangered, CR: Critically Endangered, E: Endemic or near endemic

*GES reached (≥90%)* *GES partially reached (≥50%)* *GES partially reached (<50%)* *GES not reached (≤10%)* *Data deficiency*

| Common Indicator 3: Species Distributional Range – Breeding Sites and Offshore Breeding Distribution | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | OSPR | KEPL | MESH | AUGU | | SBGU | LCTE | SATE | MESP | | SCSH | | YESH | | BASH | |
| | | EN | LC | LC,E | VU,E | | LC | LC,E | LC | LC,E | | LC,E | | VU,E | | CR,E | |
| | | **B** | **B** | **B** | **B** | **OB** | **B** | **B** | **B** | **B** | **OB** | **B** | **OB** | **B** | **OB** | **B** | **OB** |
| Adriatic | Albania | | | | | | | | | | | | | | | | |
| | Croatia | | | | | | | | | | | | | | | | |
| | Italy | | | | | | | | | | | | | | | | |
| | Montenegro | | | | | | | | | | | | | | | | |
| | Slovenia | | | | | | | | | | | | | | | | |
| Aegean and Levantine Sea | Cyprus | | | | | | | | | | | | | | | | |
| | Egypt | | | | | | | | | | | | | | | | |
| | Greece | | | | | | | | | | | | | | | | |
| | Israel | | | | | | | | | | | | | | | | |
| | Lebanon | | | | | | | | | | | | | | | | |
| | Syria | | | | | | | | | | | | | | | | |
| | Türkiye | | | | | | | | | | | | | | | | |
| Central and Ionian Sea | Albania | | | | | | | | | | | | | | | | |
| | Greece | | | | | | | | | | | | | | | | |
| | Italy | | | | | | | | | | | | | | | | |
| | Libya | | | | | | | | | | | | | | | | |
| | Malta | | | | | | | | | | | | | | | | |
| | Tunisia | | | | | | | | | | | | | | | | |
| Western Mediterranean | Algeria | | | | | | | | | | | | | | | | |
| | France | | | | | | | | | | | | | | | | |
| | Italy | | | | | | | | | | | | | | | | |
| | Spain | | | | | | | | | | | | | | | | |
| | Tunisia | | | | | | | | | | | | | | | | |
| | Morocco | | | | | | | | | | | | | | | | |

Table 14: :GES Assessment for CI4. OSPR: Osprey, KEPL: Kentish Plover, MESH: Mediterranean Shag, AUGU: Audouin's Gull, SBGU: Slender-billed Gull, LCTE: Lesser Crested Tern, SATE: Sandwich Tern, MESP: Mediterranean Storm-petrel, SCSH: Scopoli's Shearwater, YESH: Yelkouan Shearwater, BASH: Balearic Shearwater. B: Breeding, OB: Offshore Breeding. LC: Least Concern, VU: Vulnerable, CR: Critically Endangered, E: Endemic or near endemic

*GES reached (≥90%)* *GES partially reached (≥50%)* *GES partially reached (<50%)* *GES not reached (≤10%)* *Data deficiency*

| Common Indicator 4: Species Abundance – Breeding Sites and Offshore Breeding Distribution | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | OSPR | KEPL | MESH | AUGU | | SBGU | LCTE | SATE | MESP | | SCSH | | YESH | | BASH | |
| | | EN | LC | LC,E | VU,E | | LC | LC,E | LC | LC,E | | LC,E | | VU,E | | CR,E | |
| | | **B** | **B** | **B** | **B** | **OB** | **B** | **B** | **B** | **B** | **OB** | **B** | **OB** | **B** | **OB** | **B** | **OB** |
| Adriatic | Albania | | | | | | | | | | | | | | | | |
| | Croatia | | | | | | | | | | | | | | | | |
| | Italy | | | | | | | | | | | | | | | | |
| | Montenegro | | | | | | | | | | | | | | | | |
| | Slovenia | | | | | | | | | | | | | | | | |
| Aegean and Levantine Sea | Cyprus | | | | | | | | | | | | | | | | |
| | Egypt | | | | | | | | | | | | | | | | |
| | Greece | | | | | | | | | | | | | | | | |
| | Israel | | | | | | | | | | | | | | | | |
| | Lebanon | | | | | | | | | | | | | | | | |
| | Syria | | | | | | | | | | | | | | | | |
| | Türkiye | | | | | | | | | | | | | | | | |
| Central and Ionian Sea | Albania | | | | | | | | | | | | | | | | |
| | Greece | | | | | | | | | | | | | | | | |
| | Italy | | | | | | | | | | | | | | | | |
| | Libya | | | | | | | | | | | | | | | | |
| | Malta | | | | | | | | | | | | | | | | |
| | Tunisia | | | | | | | | | | | | | | | | |
| Western Mediterranean | Algeria | | | | | | | | | | | | | | | | |
| | France | | | | | | | | | | | | | | | | |
| | Italy | | | | | | | | | | | | | | | | |
| | Spain | | | | | | | | | | | | | | | | |
| | Tunisia | | | | | | | | | | | | | | | | |
| | Morocco | | | | | | | | | | | | | | | | |

Table 15: GES Assessment for CI5. OSPR: Osprey, KEPL: Kentish Plover, MESH: Mediterranean Shag, AUGU: Audouin's Gull, SBGU: Slender-billed Gull, LCTE: Lesser Crested Tern, SATE: Sandwich Tern, MESP: Mediterranean Storm-petrel, SCSH: Scopoli's Shearwater, YESH: Yelkouan Shearwater, BASH: Balearic Shearwater. RS: Reproductive Success, SU: Survival Rate. LC: Least Concern, VU: Vulnerable, CR: Critically Endangered, E: Endemic or near endemic

*GES reached (≥90%)* (green) *GES partially reached (≥50%)* (yellow) *GES partially reached (<50%)* (orange) *GES not reached (≤10%)* (red) *Data deficiency* (grey)

**Common Indicator 5: Demography– Breeding Stage**

| | | OSPR | | KEPL | | MESH | | AUGU | | SBGU | | LCTE | | SATE | | MESP | | SCSH | | YESH | | BASH | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | EN | | LC | | LC,E | | VU,E | | LC | | LC,E | | LC | | LC,E | | LC,E | | VU,E | | CR,E | |
| | | RS | SU | RS | SU | RS | SU | RS | SU | RS | SU | RS | SU | RS | SU | RS | SU | RS | SU | RS | SU | RS | SU |
| Adriatic | Albania | | | grey | grey | grey | grey | | | | | | | | | | | | | | | | |
| | Croatia | | | | | | | red | grey | | | | | | | | | green | grey | yellow | | | |
| | Italy | | | grey | grey | grey | grey | orange | grey | grey | grey | | | yellow | grey | | | grey | grey | grey | grey | | |
| | Montenegro | | | | | | | | | | | | | | | | | | | | | | |
| | Slovenia | | | grey | grey | grey | grey | | | | | | | | | | | | | | | | |
| Aegean and Levantine Sea | Cyprus | | | | | grey | grey | | | | | | | | | | | | | | | | |
| | Egypt | | | grey | grey | | | | | grey | grey | | | | | | | | | | | | |
| | Greece | | | grey | grey | grey | grey | grey | grey | grey | grey | | | | | grey | grey | grey | grey | grey | grey | | |
| | Israel | | | grey | grey | | | | | | | | | | | | | | | | | | |
| | Lebanon | | | grey | grey | | | | | | | | | | | | | | | | | | |
| | Syria | | | grey | grey | | | | | | | | | | | | | | | | | | |
| | Türkiye | | | grey | grey | grey | grey | grey | grey | grey | grey | | | grey | grey | grey | grey | grey | grey | grey | grey | | |
| Central and Ionian Sea | Albania | | | grey | grey | grey | grey | | | | | | | | | grey | grey | grey | grey | grey | grey | | |
| | Greece | | | grey | grey | grey | grey | grey | grey | | | | | grey | grey | grey | grey | yellow | grey | grey | grey | | |
| | Italy | | | grey | grey | | | red | grey | | | | | | | grey | grey | yellow | grey | grey | grey | | |
| | Libya | | | grey | grey | grey | grey | | | | | grey | grey | | | | | | | | | | |
| | Malta | | | | | | | | | | | | | | | grey | green | yellow | grey | yellow | red | | |
| | Tunisia | | | grey | grey | | | | | grey | grey | | | | | | | grey | grey | grey | grey | | |
| Western Mediterranean | Algeria | grey | grey | grey | grey | grey | grey | grey | grey | grey | grey | | | grey | grey | grey | grey | grey | grey | grey | grey | | |
| | France | yellow | yellow | grey | grey | grey | grey | green | green | green | green | | | green | green | grey | grey | grey | grey | grey | grey | | |
| | Italy | grey | grey | grey | grey | grey | grey | red | grey | grey | grey | | | | | grey | grey | yellow | yellow | red | grey | | |
| | Spain | grey | grey | grey | grey | grey | grey | red | grey | grey | grey | | | grey | grey | grey | grey | yellow | yellow | | | red | grey |
| | Tunisia | | | grey | grey | | | | | grey | grey | | | | | | | grey | grey | grey | grey | | |
| | Morocco | grey | grey | grey | grey | | | grey | grey | | | | | | | | | grey | grey | | | | |

Table 16: GES Assessment for CI3 non-breeding state. OSPR: Osprey, KEPL: Kentish Plover, MESH: Mediterranean Shag, AUGU: Audouin's Gull, SBGU: Slender-billed Gull, LCTE: Lesser Crested Tern, SATE: Sandwich Tern, MESP: Mediterranean Storm-petrel, SCSH: Scopoli's Shearwater, YESH: Yelkouan Shearwater, BASH: Balearic Shearwater. LC: Least Concern, VU: Vulnerable, CR: Critically Endangered, E: Endemic or near endemic

| | |
|---|---|
| *GES reached (≥90%)* | *Data deficiency* |

| **Common Indicator 3: Distributional Range – Non-breeding Stage** | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | OSPR | KEPL | MESH | AUGU | SBGU | LCTE | SATE | MESP | SCSH | YESH | BASH |
| | | LC/EN | LC | LC,E | VU,E | LC | LC,E | LC | LC,E | LC,E | VU,E | CR,E |
| Adriatic | Albania | | | | | | | | | | | |
| | Croatia | | | | | | | | | | | |
| | Italy | | | | | | | | | | | |
| | Montenegro | | | | | | | | | | | |
| | Slovenia | | | | | | | | | | | |
| Aegean and Levantine Sea | Cyprus | | | | | | | | | | | |
| | Egypt | | | | | | | | | | | |
| | Greece | | | | | | | | | | | |
| | Israel | | | | | | | | | | | |
| | Lebanon | | | | | | | | | | | |
| | Syria | | | | | | | | | | | |
| | Türkiye | | | | | | | | | | | |
| Central and Ionian Sea | Albania | | | | | | | | | | | |
| | Greece | | | | | | | | | | | |
| | Italy | | | | | | | | | | | |
| | Libya | | | | | | | | | | | |
| | Malta | | | | | | | | | | | |
| | Tunisia | | | | | | | | | | | |
| Western Mediterranean | Algeria | | | | | | | | | | | |
| | France | | | | | | | | | | | |
| | Italy | | | | | | | | | | | |
| | Spain | | | | | | | | | | | |
| | Tunisia | | | | | | | | | | | |
| | Morocco | | | | | | | | | | | |

Table 17: GES Assessment for CI4, non-breeding stage. OSPR: Osprey, KEPL: Kentish Plover, MESH: Mediterranean Shag, AUGU: Audouin's Gull, SBGU: Slender-billed Gull, LCTE: Lesser Crested Tern, SATE: Sandwich Tern, MESP: Mediterranean Storm-petrel, SCSH: Scopoli's Shearwater, YESH: Yelkouan Shearwater, BASH: Balearic Shearwater. LC: Least Concern, VU: Vulnerable, CR: Critically Endangered, E: Endemic or near endemic

*GES reached (≥90%)* *GES partially reached (≥50%)* *GES partially reached <50%)* *GES not reached ≤10%)* *Data deficiency*

| **Common Indicator 4: Abundance – Non-breeding Stage** | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | OSPR | KEPL | MESH | AUGU | SBGU | LCTE | SATE | MESP | SCSH | YESH | BASH |
| | | LC/EN | LC | LC,E | VU,E | LC | LC,E | LC | LC,E | LC,E | VU,E | CR,E |
| Adriatic | Albania | | | | | | | | | | | |
| | Croatia | | | | | | | | | | | |
| | Italy | | | | | | | | | | | |
| | Montenegro | | | | | | | | | | | |
| | Slovenia | | | | | | | | | | | |
| Aegean and Levantine Sea | Cyprus | | | | | | | | | | | |
| | Egypt | | | | | | | | | | | |
| | Greece | | | | | | | | | | | |
| | Israel | | | | | | | | | | | |
| | Lebanon | | | | | | | | | | | |
| | Syria | | | | | | | | | | | |
| | Türkiye | | | | | | | | | | | |
| Central and Ionian Sea | Albania | | | | | | | | | | | |
| | Greece | | | | | | | | | | | |
| | Italy | | | | | | | | | | | |
| | Libya | | | | | | | | | | | |
| | Malta | | | | | | | | | | | |
| | Tunisia | | | | | | | | | | | |
| Western Mediterranean | Algeria | | | | | | | | | | | |
| | France | | | | | | | | | | | |
| | Italy | | | | | | | | | | | |
| | Spain | | | | | | | | | | | |
| | Tunisia | | | | | | | | | | | |
| | Morocco | | | | | | | | | | | |

**<u>Osprey *Pandion haliaetus*</u>**

203. With a close to global distribution range, the Osprey is currently listed as Least Concern by the IUCN with an overall increasing population trend (Birdlife International 2023). However, a regional assessment of breeding raptors across the Mediterranean lists the species as Endangered (Westrip et al. 2022). The status of the Mediterranean Breeding population is used as a reference for the current assessment.

204. The main pressures on the species are believed to be disturbance and loss of nesting habitats due to development and direct persecution (illegal killing). Pollutants and electrocution in powerlines are additional pressures.

*Common Indicator 3: Species Distribution Range*

205. The breeding distribution in the region is restricted to the Western Mediterranean subregion, where the species currently breeds in the CPs Algeria, France (Corsica), Italy, Morocco and Spain (Balearic Islands).

206. The distribution range of the breeding population is assessed as stable (well within the 10% threshold). However, for the species to recover from the current status in the region, an increase in range would be required. Therefore GES is currently not reached. There is no indication for a range shift since the last assessment cycle.

*Common Indicator 4: Population abundance of selected species*

207. The relative abundance of breeding pairs is assessed (relative abundance = annual abundance / baseline abundance) following a modern baseline approach (>6yrs). The threshold value of relative abundance was set as >0.7. In the current assessment cycle, the relative abundance was 1.17-1.18. This means that GES for the species in the Western Mediterranean regarding breeding population abundance would be reached taking this modern baseline approach.

208. However, the species status in the region is currently Endangered (Westrip 2022). Furthermore, it is acknowledged that according to Monti et al. (2018) the current population in the Mediterranean represents just about one third of the number of individuals as compared to the first half of the 20th century. Finally, there appears to be limited information regarding the historic population sizes of the species in the other subregions, where the species is currently not reported nesting. Overall, it is concluded that GES for the species in the region regarding the population size is not reached.

*Common Indicator 5: Population Demographic Characteristics*

209. Adult survival and reproductive success rates of the breeding population in the Western Mediterranean Subregion are utilised to assess GES of CI 5. In France, the annual survival rate has been identified to be at 0.52. The annual reproductive success rate is given as 0.62 for Italy and as 0.72 for France with a baseline of 1.17 given for the latter one (1987-1988). Both adult survival and reproductive success rate appear relatively low. Demographic parameters for Ospreys were not available from other CPs, which will ideally be collected during future assessment cycles to identify if CI 5 reaches GES in the Western Mediterranean.

**<u>Kentish Plover *Charadrius alexandrinus*</u>**

210. CPs holding breeding populations in the Mediterranean are Albania, Algeria, Croatia, Cyprus, Egypt, France, Greece, Israel, Italy, Lebanon, Libya, Morocco, Slovenia, Spain, Tunisia and Türkiye. Due to its large distribution range, the species is globally listed as Least Concern by the IUCN (Birdlife International 2023). However, the population trend is believed to be decreasing both globally and in the region.

211. Main pressures acting on the species in the region are the loss and degradation of coastal habitats, estuaries and wetlands due to intensive developments, disturbance from recreational and economic activities during breeding and problematic species such as feral dogs, crows, foxes and large gulls.

Common Indicator 3: Species Distributional Range

212. The species distributional range during the current assessment cycle is available for the CPs Albania and Croatia (subregion Adriatic). It is assessed against a modern baseline as being stable (Albania) to increasing (Croatia).

213.

*Common Indicator 4: Population abundance*

214. Data on breeding pairs have been provided by Albania, Croatia and Spain. The relative breeding bird abundance is assessed as 1.0 for Albania (361-645bps) and as 0.9-1.0 for Croatia (27-32bps), taking a modern baseline approach. These values indicate that GES is reached locally. The relative breeding population abundance for the Spanish part of the Western Mediterranean is assessed as 0.26, therefore not reaching GES locally. For a successful GES assessment of the species regarding CI 4 in the entire region, CPs would need to provide baseline and current values on the number of breeding pairs.

215. Kentish Plovers are reported to winter regularly in all subregions as revealed by IWC midwinter count data. IWC count data during the current assessment cycle amount to approximately 11.000 individuals wintering annually in the region. To confirm that GES regarding the wintering population is reached, CPs would need to provide baseline values for the Kentish plover wintering populations.

*Common Indicator 5: Population Demographic Characteristics*

216. No CP provided data on reproductive success and annual survival rates of Kentish Plovers in the region, thus GES regarding CI 5 could not be assessed.

**Mediterranean Shag *Gulosus aristotelis desmarestii***

217. The Mediterranean Shag is a subspecies of the European Shag. It is endemic to the Mediterranean and Black Sea. CPs with breeding populations include Albania, Algeria, Croatia, Cyprus, Egypt, France, Greece, Italy, Libya, Morocco, Spain, Tunisia, and Türkiye. The European Shag is listed as Least Concern by the IUCN (Birdlife International 2023), but with decreasing population numbers.

*Common Indicator 3: Species Distributional Range*

218. Numbers regarding the current distributional range as well as modern baseline values have been provided by the CPs Albania, Croatia, Italy and Greece . The current distributional range has been assessed as stable for Albania, Croatia and Greece (Adriatic, Central and Ionian Sea and Aegean and Levantine Sea) and as increasing for Italy (both, for the Adriatic and Western Mediterranean subregions). Therefore, regarding distributional range of the species GES is reached for the Adriatic subregion.

*Common Indicator 4: Population abundance*

219. The assessment and monitoring of this indicator is mainly aiming at the breeding population of the species in the region. Data on the number of breeding pairs against a modern baseline have been provided by Albania and Croatia (Adriatic subregion) and by Cyprus (Aegean-Levantine Sea), all with stable population abundance (relative population abundance ~ 1.0). The at-sea population abundance of the species in Cyprus is assessed as stable.

220. Data from the Western Mediterranean subregion have been provided by France and Spain, both showing a decline in population abundance as compared to the baseline. The relative population abundance of the French population was assessed at 0.8, still above the defined threshold value. However, the relative population abundance of the Spanish population was assessed at 0.31, well below the threshold value (>0.7). Therefore, it appears likely that the GES in the entire Western Mediterranean subregion is currently not reached.

*Common Indicator 5: Population Demographic Characteristics*

221. No CP provided data on reproductive success and annual survival rates of Mediterranean Shags in the region. Greece provided baseline levels for hatching and fledgling success. Overall GES regarding CI 5 could not be assessed.

**<u>Audouin's Gull *Ichthyaetus audouinii*</u>**

222. Part of the functional ecological group Offshore surface-feeders, the Audouin's Gull is near endemic in the region, with approximately 90% of the 33000-46000 mature individuals breeding in the Mediterranean. CPs with breeding populations include Spain, France, Morocco, Algeria, Tunisia, Italy, Croatia, Greece, Cyprus and Türkiye. Due to recent population decline the species is currently listed as Vulnerable by the IUCN (Birdlife International 2023).

223. It is a widely marine gull species, foraging mainly on fish including fisheries discards. Audouin's Gulls nest in colonies on rocky cliffs, offshore islands and islets, saltmarshes, and sandy peninsulas. Females lay three to four eggs per season.

*Common Indicator 3: Species Distributional Range*

224. Assessments of breeding distributional range against a modern baseline were provided by the CPs Albania, Croatia and Italy where the relative area of occupancy was assessed as stable (1.0, Albania, Croatia) or increasing (1.2, Italy). Baseline data for the species distributional range have been provided by Greece.

225. To assess GES of CI 3 of the species for all subregions, other CPs with breeding populations would need to provide current and baseline data of distributional range across the region.

*Common Indicator 4: Population abundance of selected species*

226. The assessment of CI 4 is based on the breeding and non-breeding population of the species. Current numbers of breeding pairs and baseline levels have been provided by the CPs Croatia, France, Italy and Spain. The breeding population abundance has been assessed as increasing in parts of the relatively small Adriatic population (relative breeding abundance 1.9 – 13). It has also been assessed as increasing for parts of the population of the Central and Ionian Sea (relative breeding abundance: 2.8). In the Western Mediterranean, the breeding population abundance in colonies of birds from Spain, which account for approximately 80% of the global population, has been decreasing (overall relative breeding abundance: 0.54). The smaller populations in the Western Mediterranean subregion in Italy and France have been assessed as stable for Italy (0.9) and increasing for France (1.5). While GES of this CI is assumed to be reached for Audouin's Gulls of the Adriatic and Central and Ionian Sea, no data was available for the Aegean and Levantine Sea. However, baseline data from the Aegean and

Levantine Sea have been provided by Greece, where the species has declined during the previous assessment cycle. It is expected that GES is not reached in the Greek part of this subregion. On the basis of data from Spain, it is expected that GES in the Western Mediterranean is currently not reached but data from breeding colonies along the southern coasts of this region were not available.

*Common Indicator 5: Population Demographic Characteristics*

227. Annual survival rates have been assessed in France, (~1.0, Western Mediterranean). Annual reproductive success rates are reported to be very low in Croatia (0.02, Adriatic Sea) and vary strongly between subregions in Italy (0.83 for the Adriatic, 0.31 for the Central and Ionian Sea, 0.27 for the Western Mediterranean). For France, reproductive success is reported to be 0.99. In the Spanish part of the Western Mediterranean, reproductive success is currently reported to be low (0.35), however it has improved as compared to the previous assessment cycle (0.27). Baseline data for hatching and fledgling success have been provided for the Greek part of the Aegean and Levantine Sea subregion. Overall, the data quality appears too patchy for a GES assessment of CI 5 for Audouin's Gulls in the region, but the data presented here indicates that GES for this vulnerable marine gull species is likely not reached.

**Slender-billed Gull *Chroicocephalus genei***

228. The Slender-billed Gull is not strictly a marine species. It forages mainly on fish, crustaceans and insects. The nest in colonies, situated in estuaries, marshes, river valleys and on beaches contains three to four eggs. The species is a partial migrant and can be found in the Mediterranean year-round. Outside the breeding period it can be observed across the region in coastal areas.

229. The global population of this species, which is estimated at 310,000-380,000 individuals (Wetlands International, 2021), is listed as Least Concern, but the population in the European part of the region is known to be decreasing (<25% in three generations (Birdlife International 2023). CPs in the region with breeding populations are France, Greece, Italy, Spain, Tunisia, and Türkiye.

*Common Indicator 3: Species Distributional Range*

230. Breeding distribution baseline data are provided for Italy and can be utilised for future assessment cycles. The species has been confirmed to be absent as a breeding species from Albania during the current assessment cycle. Slender-billed Gulls have been reported wintering commonly in all subregions. To assess whether GES is reached regarding the winter distributional range of the species, CPs would need to provide data on current and baseline winter distribution.

231. Overall, the lack of data especially on breeding distributional range for the current assessment cycle but also for baseline values is preventing a GES assessment of CI 3 for the species.

*Common Indicator 4: Population abundance of selected species*

232. Data on breeding population abundance are available for Spain and France. For the Spanish population the relative breeding population in 2017 is assessed at 0.29-0.31 using a modern baseline approach. The relative population abundance in the French part of the Western Mediterranean is assessed slightly higher at 0.39. If these data are indicative for the subregion in general and for the entire region, GES regarding CI 4 is not reached. However, CPs would need to provide data on breeding population numbers of the current and previous assessment cycle to allow for a region wide GES assessment.

233. Data from IWC mid-winter counts reveal that an average number of close to 33.000 individuals 'winter across the region, approximately two thirds of them in Tunisia.

*Common Indicator 5: Population Demographic Characteristics*

234. Data on population demographic characteristics of Slender-billed Gulls in the region are available for the Western Mediterranean region from France. There, the annual survival rate is assessed at 0.97 (2016-2021) while the average reproductive success rate is 0.98 (2015-2021). This would mean that GES is tentatively reached there for CI 5. However, demographic parameters would need to be collected across the region to allow modelling population growth rates for the Mediterranean breeding population of the Slender-billed Gull.

**Lesser-crested Tern *Thalasseus bengalensis emigrates***

235. The global population of the species, listed as Least Concern by IUCN, is estimated at 225.000 birds. However, the subspecies emigratus, which is endemic to the region numbered some 4000 birds in 1993, or a maximum of less than 2300 pairs in 2009 (Hamza et al., 2011). With Libya (Central Mediterranean Region) being currently the only country with breeding colonies in the region, the Mediterranean population is extremely vulnerable due to small population size and restricted distribution range in very few colonies.

*Common Indicator 3: Species Distributional Range*

236. No data are available regarding the breeding distribution of Lesser-crested Terns during the current assessment cycle. Therefore, GES of the species regarding CI3 cannot be assessed. However, there is no indication of an increase in the breeding distribution range of species. Due to the very restricted range, it is likely that GES in the region is currently not reached.

*Common Indicator 4: Population abundance*

237. There is no data available on breeding population abundance of Lesser-crested Terns during the current assessment cycle. Single-digit figures of the species have been reported during the current assessment cycle along the southern Mediterranean coast, namely from Libya (Central Mediterranean), Algeria and Morocco (Western Mediterranean Region) encountered during IWC midwinter counts. A robust GES assessment based on these few winter records seems currently not possible.

*Common Indicator 5: Population Demographic Characteristics*

238. For the current assessment cycle, no data on population demographic characteristics such as annual survival rates and reproductive success were available to identify the population growth rate. This means that GES of CI 5 for the Lesser-crested Tern population in the region currently cannot be assessed.

**Sandwich Tern *Thalasseus sandvicensis***

239. These birds breed in relatively dense colonies, exclusively in coastal areas with available feeding grounds close by. The population inhabiting the Mediterranean and Black Sea Region is estimated at 20270 – 65670 breeding pairs. The global conservation status is Least Concern and assessed as stable, the population trend in the region is fluctuating.

*Common Indicator 3: Species Distributional Range*

240. CPs with breeding populations in the region are France, Greece, Italy, Spain and Türkiye, and the species is reported breeding in all subregions.

241. Data on changes in the breeding distribution range for the current assessment cycle as compared to a modern baseline (2010-2016) is available for the Adriatic subregion (Italy). The data reveal a relative breeding distributional range of 0.64. This reduction in distributional range indicates that GES of CI 3 for the Adriatic breeding population of the Sandwich Tern is not reached.

242. The species has been reported wintering in all subregions with data from IWC mid-winter counts provided by the majority of CPs. Relative wintering distributional range is assessed as stable (1.0) for parts of the Adriatic Sea (Albania and Croatia, modern baseline). It can be assumed that GES regarding the wintering range of the species is reached for the entire Adriatic and potentially for the whole region, however CPs would need to provide data on current and baseline range assessments (e.g., occupied versus assessed grid cells) to confirm this.

*Common Indicator 4: Population abundance of selected species*

243. The relative breeding bird abundance has been provided for the Western Mediterranean (France: 0.32; Spain: 0.91). GES of CI 4 for the Sandwich Terns breeding in this subregion is close to the lower threshold level of 0.7 but not reached (0.68).

244. Breeding pair numbers for the current assessment cycle have been provided for the Adriatic population (Italy), but baseline values would need to be provided to assess GES.

*Common Indicator 5: Population Demographic Characteristics*

245. Data on demographic parameters is only available from France for the Western Mediterranean subregion for both, annual survival rate (0.97) and reproductive success (0.99), which means that GES regarding CI 5 in part of the subregion is reached.

246. Data on average annual reproductive success during the current assessment cycle has been provided for the Adriatic Sea subregion (0.46; Italy). The value appears low for GES on CI 5 to be reached in the subregion.

**Mediterranean Storm-petrel *Hydrobates pelagicus melitensis***

247. The Mediterranean Storm-petrel breeds in colonies among boulders and in sea caves on rocky islands and islets. The females lay a single egg. The birds are highly mobile, but also highly philopatric. At least part of the population leaves the Mediterranean into the Atlantic during the non-breeding season. The population of the Mediterranean subspecies of the European Storm-petrel which is endemic to the region is estimated at around 13000-17000 breeding pairs (Birdlife International 2021). Most known breeding colonies are distributed in the central and western Mediterranean with a large proportion of the population restricted to a few archipelagos and with Malta holding 50% and Italy holding 30% of the population.

*Common Indicator 3: Species Distributional Range*

248. Breeding distributional ranges assessed against modern baselines are available from parts of the Central Mediterranean and Ionian Sea for Albania: 0.33, Italy: 1.0, and Malta: 2.33. However, it has to be noted that the apparent increase in distribution range in Malta is mainly attributed to an increase in knowledge. Data on relative distributional range are also available from part of the Western Mediterranean subregion, namely Italy: 1.0. As Italy and Malta combined hold approximately 80% of the entire population in the region, GES regarding the species' breeding distribution is reached at least for the Central Mediterranean and Ionian Sea subregion and when taking a modern baseline approach.

249. Additionally, relative breeding distributional range data are available from Greece for the Aegean and Levantine Sea subregions: 1.0. Furthermore, a small colony has been discovered recently in the Southern Adriatic Sea subdivision, leading to a range increase for the CP.

250. At-sea distribution is exemplarily presented as 50%UD core foraging areas and 95%UD home ranges from GPS- and GLS-tracked individuals from some colonies in Italy, Malta and Spain.

*Common Indicator 4: Population abundance*

251. For the current assessment cycle, population abundance data are available for parts of the subregions Western Mediterranean (France, Italy, Spain), Central Mediterranean and Ionian Sea (Albania, Italy, Malta), Aegean and Levantine Sea as well as the Adriatic Sea subregion (Greece).

252. For the Western Mediterranean subregion, France reports a current population of 130 bp, leading to a relative population abundance of 9.29 as compared to a modern baseline. Italy reports a current population abundance of 1459-1776 breeding pairs for the Western Mediterranean without providing a baseline, while Spain provides a current population abundance of 528 breeding pairs against a modern baseline of 3347 breeding pairs. However, for many Spanish nesting sites of the species no data are provided for the current assessment period. Therefore, no relative breeding population abundance is calculated for Spain.

253. For the Central Mediterranean and Ionian Sea, Albania provides a relative breeding population abundance of 1.0 (0-50 breeding pairs in both current and modern baseline assessment). Italy provides a current breeding population of seven pairs (without a baseline). Malta provides an average relative breeding population abundance 1.27 (breeding population estimate from 2019 CMR and modelling: 8197-8397 pairs). Due to the apparent slight population increase of the largest Mediterranean Storm-petrel colony in Malta, GES is assessed as being reached for CI 4 at least in the Central Mediterranean and Ionian Sea subregion.

254. Data from Greece indicate a population increase for the Aegean and Levantine Sea subregion as well as for the Southern Adriatic subdivision. However, this apparent population increase is mainly attributed to an improve in knowledge. In order to confirm whether GES regarding CI 4 for this small and elusive seabird species is also reached for the entire region, CPs would need to provide current breeding pair numbers against baseline values across the range.

*Common Indicator 5: Population Demographic Characteristics*

255. For the current assessment cycle, no data of reproductive success were provided. The adult annual survival rate is available for Malta's largest Storm-petrel colony, modelled from CMR data. It is assessed at 0.87 for the period 2013 – 2021. As the colony has experienced a slight population growth over the last two assessment cycles (see CI 4) it can be assumed that GES for CI 5 is reached locally.

**Scopoli's Shearwater *Calonectris Diomedea***

256. The Scopoli's Shearwaters are nocturnal in the colonies, highly mobile, but also highly philopatric. During foraging trips, they can cover large areas. Almost the entire population spends the non-breeding period (November-March) outside the region, mainly in the Atlantic, which means that some pressures may act on the species outside the region.

257. The species is near-endemic in the region, distributed over a wide range across the Mediterranean, with strong-holds in the Western and Central Mediterranean subregions. CPs with confirmed breeding populations are Algeria, Croatia, France, Greece, Italy, Malta, Spain, and Tunisia. Furthermore, breeding is suspected in Türkiye.

258. The breeding population of this regional near-endemic species is estimated at 285,000-446,000 mature individuals (Birdlife International 2023). The species' single largest colony on Zembra Island, Tunisia, has been relatively recently reassessed at 141,000 to 223,000 breeding pairs (Defos du Rau et al 2015). Its conservation status is currently Least Concern with a long-term negative population trend and a reduction in range at least in the European part of the distribution area.

*Common Indicator 3: Species Distributional Range*

259. In the Adriatic Sea subregion, Albania reports for the species a reduction from 5 grid cells (50km x 50km) down to 0, while Croatia and Italy in the same subregion report a relative breeding distribution range of 1.0. (13 occupied grid cells overall, 10km x 10 km). For the Central Mediterranean and Ionian Sea subregion data provided by Greece (one colony) and Italy reveal a relative breeding distribution range assessment of 1.0. In Malta, relative breeding distribution is assessed at 1.19, with improved knowledge of colony sites causing the apparent increase. In the Western Mediterranean subregion, Italian data reveal a relative breeding distribution range of 0.97, within threshold level (10%). The GES for CI 3 is not assessed for any of these subregions due to insufficient data.

260. The at-sea distribution is exemplarily presented as 50%UD core foraging areas and 95%UD home ranges from GPS-tracked individuals from three colonies in Italy (Central and Ionian Sea, Western Mediterranean), one colony in France and three colonies from Spain (Western Mediterranean).

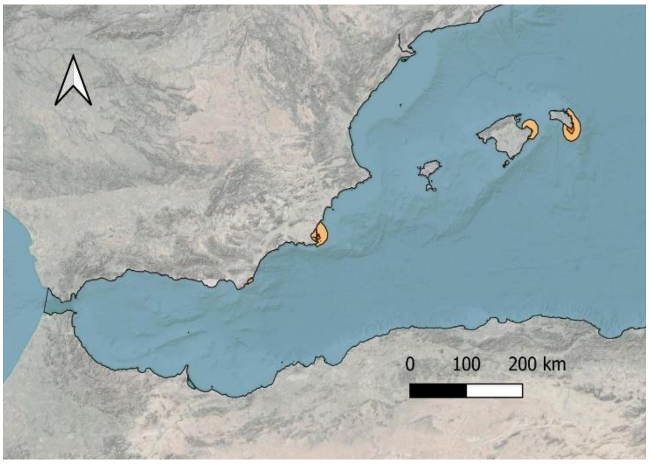
261. Overall, the lack of comparable current assessment and baseline data on breeding and at-sea distribution range, prevent from assessing GES of the species regarding CI 3 across the region.

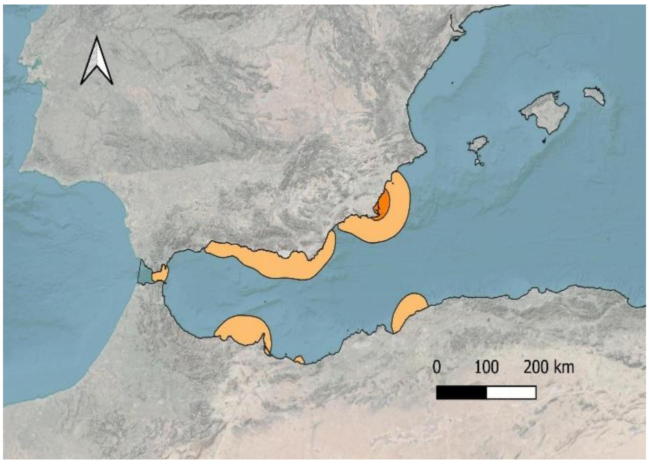
*Common Indicator 4: Population abundance*

262. The majority of the population leaves the Mediterranean region to spend the winter period (November to February) in the Atlantic, off the Western African coast. Therefore, population assessments during the non-breeding period appear not representative and thus not meaningful for a GES assessment.

263. Relatively robust baseline breeding population estimates are available for the majority of Scopoli's Shearwater colonies in the region, with a modern baseline estimate of 140,184 – 215,626 breeding pairs, more than 80% of them on Zembra (Tunisia, Western Mediterranean). Only for some colonies (approximately 17%-22%) of the breeding population there are current population abundance assessments available. For the single largest colony holding the majority of the species' population, no breeding population estimates have been provided for the current assessment cycle. Available data on relative breeding population abundance draw a heterogenous and non-conclusive picture for CI 4 of the species within subregions and across the region; Adriatic Sea: 0.79-98 (Croatia) to 1.35-1.47 (Italy), Central Mediterranean and Ionian Sea: 1.0 (Greece), 1.13-1.23 (Italy) and 0.56-0.78 (Malta), and Western Mediterranean: 0.92 (France), 0.98-2.53 (Italy) and 1.01 (Spain).

264. Overall, the current data quality and availability does not allow for a conclusive GES assessment of CI 4 in the region.

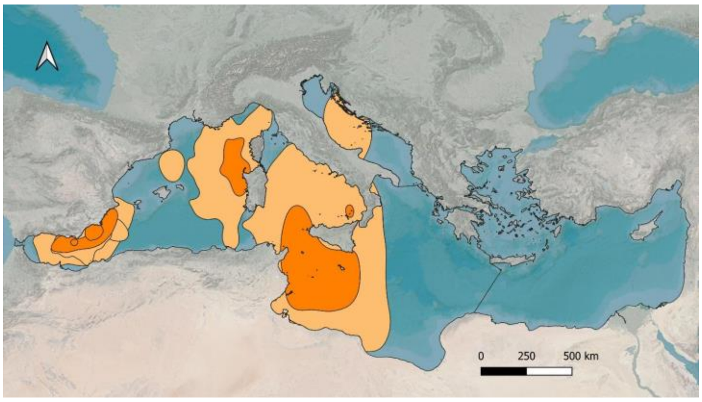


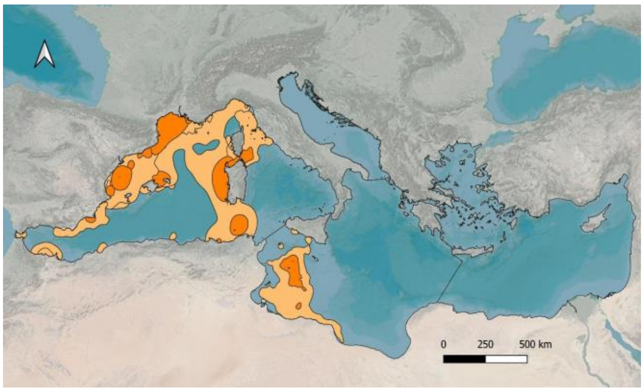




**A** **B**

Examples of at-sea distribution ranges of in the Western Mediterranean subregion during the breeding season. Home ranges (95% UD, light orange) and core foraging areas (50% UD, dark orange) of GPS tracked adults of:

A- *Gulosus aristotelis desmarestii* B- *Ichthyaetus audouinii (Spanish colony)*



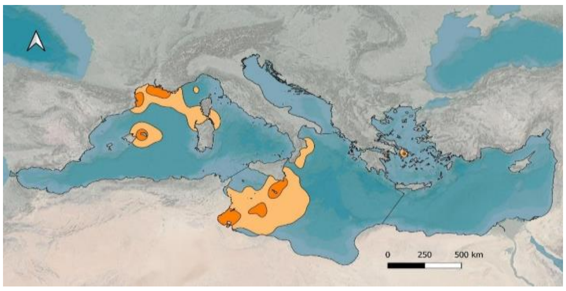




**A** **B**

Examples of at-sea distribution ranges in the region. Home ranges (95% UD, light orange) and core foraging areas (50% UD, dark orange) of gps and gls tracked adults of:

A - *Hydrobates pelagicus melitensis* (from colonies in Italy, Malta and Spain)

B- *Calonectris diomedea* (from one colony in France, three colonies in Italy, and three colonies in Italy, and three colonies in Spain)




Example of at-sea distribution ranges of *Puffinus yelkouan* during the breeding season. Home ranges (95% UD, light orange) and core foraging areas (50% UD, dark orange) of gps tracked adults from colonies in Greece, Italy, and Malta.

Figure 29: Examples of distribution of bird species

*Common Indicator 5: Population Demographic Characteristics*

265. Annual survival rates from the current assessment cycle are available for two colonies in the Western Mediterranean (Italy: 0.88 and Spain: 0.83). Reproductive success rates are available for colonies in the following subregions: Adriatic Sea: Croatia: 0.73-0.79; Central and Ionian Sea: Greece: 0.65, Italy: 0.59 and Malta: 0.70-0.72; Western Mediterranean: Italy; 0.69 and Spain: 0.74.

266. No information has been provided regarding demographic parameters of Scopoli's Shearwater colonies in the Aegean and Levantine Sea subregion, nor for the single largest colony in the region (Zembra, Western Mediterranean). Overall, the data quality and availability currently do not allow for an assessment of CI 5 in the region.

**Yelkouan Shearwater *Puffinus yelkouan***

267. This region-endemic species is an obligate marine species and strictly nocturnal in the colonies. Females lay one egg per season. Birds can be found in the Mediterranean year-round, but part of the population moves eastwards and spends the non-breeding period (July-November) in the Black Sea, which implies that some pressures on the species may be active outside the region.

268. The population is estimated at 15,337-30,519 pairs, roughly equating to 46,000-92,000 individuals (Derhé, 2012). Strongholds of the population are found in the central and eastern Mediterranean. In the Western Mediterranean subregion (Balearic Islands) it is replaced by the sibling taxon *P. mauretanicus*, with which it may form a stable hybrid population on Menorca. Countries with confirmed current breeding populations are Albania, Algeria, Croatia, France, Greece Italy, Malta, Algeria, and Tunisia. In the past breeding was also confirmed for the Bulgarian Black Sea area and Yelkouan Shearwaters are suspected to breed in Türkiye.

269. The conservation status of the species has been assessed as Vulnerable with a decreasing population trend, the latter being to some extent mitigated by improved knowledge of this elusive breeder, including the discovery of new colonies in recent years leading to an apparent population increase.

*Common Indicator 3: Species Distributional Range*

270. Relative breeding distributional range data are available for parts of the Adriatic subregion, namely Albania, Croatia and Italy. Overall, the relative breeding distributional range was assessed at 0.64, indicating a range contraction in the subregion.

271. For parts of the Central Mediterranean and Ionian Sea subregion (Albania, Italy, Malta) the relative breeding distributional range was assessed at 1.39. However, the apparent increase in breeding distributional range can be mainly attributed to the discovery of formerly unknown colonies in Malta due to increased monitoring effort, rather than to a true range expansion. A similar picture is given for the Aegean and Levantine Sea subregion (Greece), where the discovery of colonies in the recent past leads to a relative breeding distributional range of 1.1.

272. For parts of the Western Mediterranean region (Italy) the relative breeding distributional range was assessed at 0.89, indicating a slight range contraction in this subregion, just outside the 10% threshold bracket.

273. Overall, it can be assumed that due to range contractions specifically in the Adriatic and less pronounced in the Western Mediterranean, GES for the vulnerable Yelkouan Shearwater concerning CI3 is currently not reached.

274. The at-sea distribution of Yelkouan Shearwaters in the region is exemplarily presented as 50%UD core foraging areas and 95%UD home ranges from GPS- and GLS-tracked individuals from a colony each in the Western Mediterranean (Italy), Central and Ionian Sea (Malta) and Aegean and Levantine Sea (Greece).

*Common Indicator 4: Population abundance*

275. Systematic bi-montly passage counts at a bottleneck (Bosporus), where a major part of the population is known to migrate through, show the cyclic and consistent nature of passages. This method can be used as a supporting monitoring tool for the species and can reveal relative abundance data here and at other bottlenecks.

276. Relative breeding abundance data are available from parts of the population spread over most subregions. In the Adriatic Sea, the relative breeding population abundance is assessed at 1.83 to 2.0 for Croatia, while it is assessed at 2.87 to 3.9 for Italy. In the Central and Ionian Sea subregion, relative breeding abundance is assessed at 1.0 for Albania, 0.59 to 1.2 for Italy and 1.08 to 1.33 for Malta. In the Western Mediterranean subregion, the relative breeding abundance is assessed at 0.11 for France and Italy 1.06 to 1.35. For the Aegean and Levantine subregion, the relative breeding population abundance is assessed at 1.96 to 2.01 (Greece).

277. The wide ranges between lower and upper values for Yelkouan Shearwater populations in some of the CPs reflect the difficulty to assess CI 4 in this elusive species. The very high relative values of 1,83-3.9 for some CPs, indicating a strong increase of the population, can be mainly explained by an apparent population increase due to improved knowledge, while values between 1 and 1.5 could indicate true population recovery compared to baseline levels due to implemented conservation actions.

278. Overall, the gaps and heterogeneity in available data for this vulnerable species currently don’t give a clear picture of the situation and prevent a truly quantitative assessment of GES regarding CI 4.

*Common Indicator 5: Population Demographic Characteristics*

279. For the current assessment cycle, modelled annual survival rates from CMR data in the colonies are available for one CP in the Central Mediterranean (Malta). With just above 0.7 they appear relatively low (baseline assessed at 0.74).

280. Annual reproductive success rates are available for part of the Adriatic Sea subregion (Croatia, 0.63-0.65), the Central Mediterranean and Ionian Sea subregion (Malta, 0.43-0.70) and the Western Mediterranean subregion (Italy, 0.44). Baseline levels of reproductive success rate are available for one large colony in the Aegean and Levantine subregion (Greece), evaluated during the previous assessment cycle. With values between 0.18 – 0.38 they appear very low.

281. Although data quality does not allow for a quantitative GES assessment of CI 5 for the species across the region, it is not likely that a population growth rate of >1 is reached, which would be necessary for a species recovery and thus for reaching GES.

**Balearic Shearwater *Puffinus mauretanicus***

282. The Balearic Shearwater is the sibling taxon to the Yelkouan Shearwater, closely related and very similar and thus sharing the same functional ecological group *Offshore surface or pelagic feeder*.

283. In fact, latest research on the genomics of the genus *Puffinus* suggests that the two taxa show low genetic differentiation, not above the level of subspecies (Obiol et al. 2023), with potential consequences for management and conservation decisions.

284. The species is obligate marine and its nest are found in burrows, caves or crevices and females lay one egg per season. They are highly mobile, covering large areas during foraging trips. The birds are nocturnal in the colonies and show philopatry and high site fidelity. After the breeding period, most birds move westwards to spend the non-breeding period (August to December) in the East Atlantic. This means that some pressures on the species are active outside the region.

285. Population estimates for the Balearic Shearwaters are 19,000 - 25,000 mature individuals (Birdlife International 2023), 2,000-2,400 breeding pairs (Oro et al., 2004) or 7,200 breeding pairs (Genovart et al., 2016). The entire known breeding population is restricted to the Balearic Islands, Spain. The species is listed as Critically Endangered with a rapidly declining population trend.

*Common Indicator 3: Species Distributional Range*

286. No data have been provided in the current assessment cycle by the CP regarding the species' breeding distributional range and the at-sea distribution and the non-breeding distribution.

*Common Indicator 4: Population abundance of selected species*

287. As a baseline, the average number for the period 1990 to 2016 is provided as 2369 breeding pairs. For the year 2018 in the current assessment cycle, the breeding population is assessed at 351 breeding pairs. However, it appears that only a few colonies were monitored in both assessment cycles, and they do not overlap to an extent where comparison is meaningful. Due to the unfavourable conservation status of the species GES is currently not reached regarding CI 4 .

*Common Indicator 5: Population Demographic Characteristics*

288. No data on the adult annual survival rates are available of the species for the current assessment cycle. The reproductive success rate for the current assessment cycle was at 0.7 in 2017 and had been assessed at an average of 0.63 in the period 1986-2016.

289. For the closely related Yelkouan Shearwater, Oppel et al. (2011) stated that annual survival rates of adults would need to be >0.9 to consider the population to be sustainable. The reproductive success would need to be >0.75 to allow for a recovery or positive growth of the population (Louzao et al., 2006). Therefore, it is highly likely that GES for CI 5 for this critically endangered species is currently not reached.

<u>Key findings per Common Indicator (CIs 3, 4 and 5 for Bird species)</u>

290. For CI3, the species' distributional range, the results of the assessment indicate overall compliance with GES targets for seabirds in the Mediterranean. This can be partially explained by taking a modern baseline approach and by apparent range expansion due to increased monitoring and assessment effort for some species. However, it must be noted that the range assessment mainly focused on the breeding distributional range as larger data gaps remain for a more complete assessment of the at-sea- and non-breeding distribution of many indicator species across the region.

291. For CI4, the current patchiness and heterogeneity of data and the larger gaps in datasets prevent a comprehensive, truly quantitative GES assessment of population abundance of seabirds across the region. However, the available datasets point towards a heterogenous picture, with some species in some countries (or subregions) reaching GES target compliance while others do not. Lack of information on pristine, historical and in some cases even modern conditions impede the abundance assessment for the current cycle. Overall, it appears that assessment results particularly for populations of the species of conservation concern in the region might currently not be compliant with GES targets.

292. For CI5, the data availability across the indicator species and across the region appears currently insufficient for assessing compliance of this CI with GES targets quantitatively. Demographic parameters such as annual survival rates remain relatively poorly monitored overall. Examples of populations, for which CI5 seems sufficiently monitored suggest that it might be the CI for which GES overall is not reached, especially when assessing species of conservation concern.

293. The assessment of Mediterranean seabird populations has come a long way since the initial MED QSR (2017). While the 2017 report qualitatively described the status of seabirds in the region without providing GES assessments, there has been significant improvements towards at least a semiquantitative assessment for all CIs, at least for some indicator species and for some populations in the region.

294. Increased international collaborations, including integrated and representative approaches, knowledge transfer and concerted, comparable efforts are now necessary in order to reduce existing knowledge gaps and allow for a truly quantitative assessment of GES of seabird related indicators in the entire region.

Measures and actions required to achieve GES (CIs 3, 4 and 5 for Bird species)

295. For the current assessment cycle, the results of the GES assessment regarding seabirds present an improvement in data availability and in applied methodologies when compared to the previous assessment cycle. It is possible to draw some preliminary conclusions using available quantitative monitoring data and assessment methodologies. For some indicator species and CIs sufficient data was available at a national scale, allowing for an assessment that reflects the impact of reduced pressures on local populations. Therefore, it highlights the importance of regular monitoring efforts to inform on the success of implemented conservation actions. However, for the current assessment cycle, the data that was made available remains patchy, heterogenous, and limited for a robust GES assessment of all indicator species for the three CIs across subregions. It is believed that the IMAP Infosystem will facilitate data reporting and improve efficiency and comparability for monitoring and GES assessments of future cycles.

296. Currently, the lack of representative, comparable subsamples distributed equally across the subregions remains one of the major challenges for an integrated assessment of the status of marine avifauna in the region. To achieve a robust GES assessment, monitoring data between two cycles should be made fully comparable. This requires monitoring a certain number of same or representative populations as prolonged time series at the finest spatial scale practical.

297. In order to improve the representativeness of monitoring samples, coordinated monitoring within subdivisions or subregions would further improve overall GES assessments. Mid-winter count data made available by IWC for this assessment cycle as well as transboundary counts of Mediterranean Shag roosts in the Adriatic are good examples highlighting useful outcomes of coordinated and synchronised monitoring efforts.

298. Enabling coordinated efforts and achieving standardised monitoring at the local level also requires regular transfer of know-how and calibration of monitoring methods within subdivisions, subregions or across the region. Finally, harmonisation between different assessment programmes such as MSFD can be further improved for a more efficient assessment of GES in the Mediterranean.

299. Quantifying GES for seabird populations in the Mediterranean remains challenging. Seabirds are highly mobile organisms and therefore a robust analysis of their state requires transboundary monitoring. Ensuring communication and information exchange between different assessment programmes and sea conventions within the region and for migratory species which leave the Mediterranean also other seas can help overcome this challenge.

300. The majority of seabird species in the Mediterranean form metapopulations with discrete local breeding colonies. Without better understanding the demographic connectivity between these colonies, deciding on a meaningful spatial scale at which GES should be assessed remains to some extent arbitrary. Therefore, closing such knowledge gaps will be pivotal for the finetuning of monitoring programmes and for successful GES assessments in the future.

301. Currently, a strong bias remains in the amount of monitoring data available for the different aspects in the life cycle of the majority of Mediterranean seabirds. This bias means that there is insufficient knowledge regarding the non-breeding season and the periods the birds spend out at sea, often far away from the breeding grounds. To reduce this bias, it is recommended that future assessment cycles increase the effort of monitoring the birds away from the colonies, by means of increased colour ringing and ring-reading, tracking programmes and counts at bottlenecks.

*Common Indicators 3, 4 and 5 (Monk Seal)*

**Assessment methodology for CI3-CI5 of EO1 regarding Monk Seal**

1. For the 2023 MED QSR Mediterranean Monk seal assessment to be successful, the main experts working with this endangered species were contacted by SPA/RAC and were kindly asked to provide relevant data on Mediterranean monk seal, covering the three above-listed Common Indicators.
2. To facilitate the data collation process, a questionnaire was produced, as an Excel file (See document provided together with this report with all responses), including four different spreadsheets covering different aspects, namely data supplier information, species distributional range, population abundance, and demographic characteristics.
3. Participants in this survey were requested to also provide any available reports on the three CIs of Mediterranean monk seal and point out any links to additional data, data depositories and contacts of data-holders that might be beneficial to further enhance the assessment. In addition, participants that may consider that they do not have sufficient quantitative data regarding the three CIs, were encouraged to provide or point at any additional information that might allow at least for a qualitative assessment of the Good Environmental Status.
4. The 2023 MED QSR assessment for the Mediterranean monk seal does not only rely on the participation of these experts, in order to count with the most updated and detailed information, but also on the scientific literature available for the species. The above-mentioned questionnaire was shared with 29 experts from 16 countries.

302. Mediterranean monk seals (*Monachus monachus*) were once widely and continuously distributed in the Mediterranean and Black Seas, and in North Atlantic waters from Morocco to Mauritania, including the Cape Verde and the Canary Islands, Madeira, and the Azores (Johnson et al. 2006). Today fewer than 700 individuals are thought to survive in isolated subpopulations in the eastern Mediterranean, the archipelago of Madeira and the Cabo Blanco area in the north-eastern Atlantic Ocean (Karamanlidis et al. 2015). The largest aggregations of Mediterranean monk seals are found near Cabo Blanco (González and Fernandez de Larrinoa 2012, Martínez-Jauregui et al. 2012). Principal sites in the Mediterranean are located in the Ionian and Aegean seas, including the National Marine Park of Alonissos (Trivourea et al. 2011) and the Gyaros Marine Protected Area (Dendrinos et al. 2008), both in Greece. An increasing presence of monk seals has been also reported in the Levantine Sea (Beton et al., 2021; Kurt and Gücü 2021; Roditi-Elasar et al., 2021; SPA/RAC-UNEP/MAP, 2020). Moreover, within the Mediterranean Basin, there are recent indications that seals might be frequenting areas within their historical range where they had been extirpated in previous decades (Bundone et al., 2019).

303. Historical evidence suggests that Mediterranean monk seals commonly used to haul out on open beaches (Johnson and Lavigne 1999, González 2015). Still, in more recent times -- probably as an

adaptation to increased human disturbance -- they generally seek refuge in remote marine caves. These natural rocky shelters share common morphological characteristics, including one or more entrances above or below water level, an entrance corridor, an internal pool, and a beach that provides a dry haul out area (Dendrinos et al. 2007). While at sea, Mediterranean monk seals have been reported sleeping, either at the surface floating (vertically or horizontally) with eyes closed or resting underwater on the seafloor or over seagrass beds with eyes and nostrils shut (Karamanlidis et al. 2017, Mpougas et al. 2019). On all occasions, seals proved to be easily wakened when approached by humans.

304. The monk seal populations at Cabo Blanco in the Atlantic, and at Gyaros Island in the eastern Mediterranean, are the only large extant aggregations of the species that still preserve the structure of a colony, while remaining subpopulations in the eastern Mediterranean are usually small, fragmented groups of <20 individuals (Karamanlidis et al. 2015).

Key messages (Monk Seal)

305. The present assessment provides insight into both the strengths and limitations of the current status of the Mediterranean monk seal across the Mediterranean basin.

- In the areas where monk seal breeding had been reported (see “Group A” countries in GES section below), the species continues to breed.
- In all areas where no monk seal breeding takes place, but repeated sightings of monk seals were reported (see “Group B” countries in GES section below), the species continues to be present, and the most recent data shared by experts, through the survey conducted to produce this assessment, indicate a moderate expansion of the specie’s range.
- Consequently, if habitat suitable for the species is available (and protected), they offer good potential for new breeding episodes.
- All research and conservation groups (data providers) have agreed in reporting problems related to disturbance and habitat loss, which seem to pose a widespread threat throughout the species' range.
- The reported wider distribution of the species across the basin in recent times has led to an increase in the number of “players” in the Mediterranean monk seal conservation “game”. These research and conservation groups, some of them with a need for capacity building and training initiatives, consider necessary to increase monitoring efforts. In this regard, a significant number of organizations carrying out monitoring activities on Mediterranean monk seals, were not able to respond to the set of questions focussed on demographic parameters, included in the questionnaire (see Methodology section). This lack of response suggests that in many areas an optimal level of (regular) monitoring effort was not achieved in order to obtain these parameters.
- Following up on the above, for instance, groups working in Israel and the Adriatic Sea were not able to respond to these demographic parameters, possibly as a consequence of both a low level of monitoring effort and a very low monk seal presence.
- By improving our capacity to establish the basic demographic parameters for this endangered species, we would be also advancing in our capacity to produce more fine-tuned total population estimates. Recent new approaches to infer population numbers from pup multiplier ratios may largely benefit from it, since there is still a significant knowledge gap on pup survival rates.
- Breeding caves and foraging areas need to be identified and protected. Conservation management action should not be limited to monitor resting and haul-out areas.
- There is a lot of data collected, although not always in a homogeneous format or by applying commonly agreed methodologies and procedures. Therefore, this wealth of data it is often not comparable between different sites and research groups. This important issue could be overcome through the establishment of commonly agreed monitoring protocols and a data sharing platform. New initiatives led by the Monk Seal Alliance seem to provide good *momentum* to address this recurrent request by Mediterranean monk seal researchers and conservation bodies.

Good environmental status (GES) assessment (CIs 3, 4 and 5 for Monk Seal)

306. The main problem encountered in envisaging a region-wide Strategy derives from the quite diverse conservation status of monk seals in the different portion of the Mediterranean and by consequence the quite different priorities and responsibilities saddled onto the various monk seal Range States.

307. When developing an updated *regional strategy for the conservation of monk seal in the Mediterranean* (Decision IG.24/7) this challenge was tackled by assigning Mediterranean countries to three groups. Consequently, the following criteria has been also followed for this assessment taking under consideration the information provided by regional experts.

- “Group A” countries, where monk seal breeding has been reported after year 2010.
- “Group B” countries, where no monk seal breeding is reported, but with repeated sightings of monk seals (>3) were reported since 2010.
- “Group C” countries, where no monk seal breeding is reported, and where very rare or no sightings of monk seals (≤3) were reported since 2010.

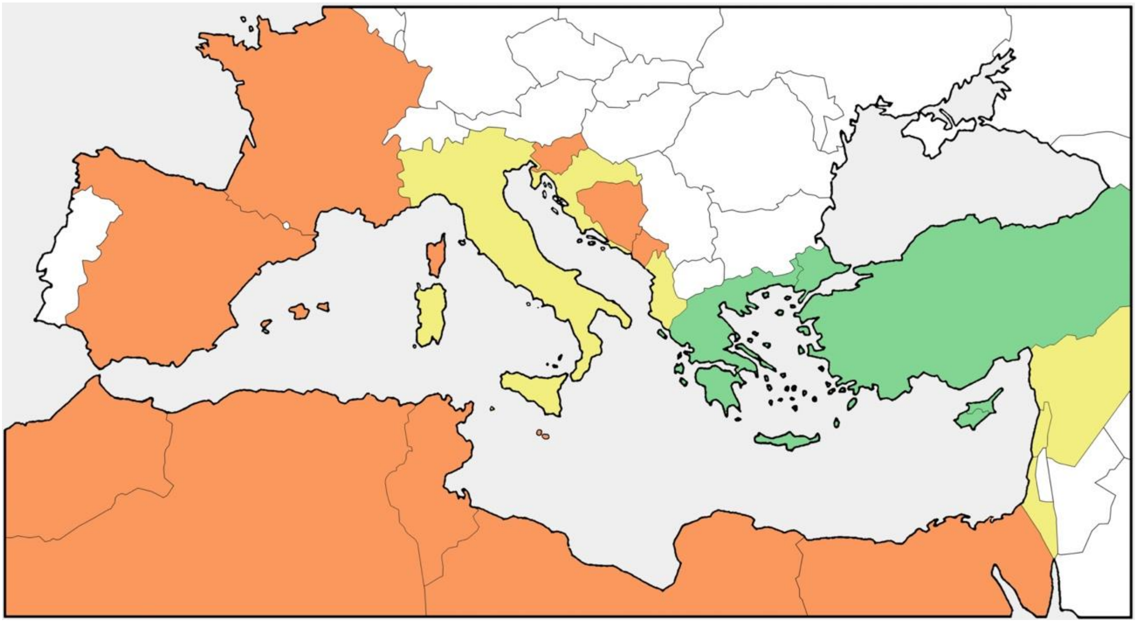


Figure 30: Monk seal conservation status by country, adopted from updated regional strategy for the conservation of monk seal in the Mediterranean (2019). Green: “Group A” countries; yellow: “Group B” countries; tan: “Group C” countries.
Note: Syria has been moved to Group B based on feedback produced by regional experts.

308. Based on this Countries’ classification and on the pressure analysis, the following table applying a traffic light system was produced to facilitate the GES assessment for the related CIs.

- Green = GES achieved.
- Orange = GES Unsure
- Red = GES not achieved

**GES assessment for CI3 (Distribution) for Monk Seal**

Table 18: GES assessment for CI3 (Distribution)

| SUB REGIONS | SUB DIVISIONS | COUNTRY |
|---|---|---|
| WESTERN MEDITERRANEAN SEA | NWMS | Spain |
| | | France |
| | | Italy |
| | ALBS | Spain |
| | | Morocco |
| | | Algeria |
| | TYRS | France |
| | | Italy |
| ADRIATIC SEA | NADR | Italy |
| | | Slovenia |
| | MADR | Italy |
| | | Croatia |
| | SADR | Italy |
| | | Montenegro |
| | | Albania |
| CENTRAL AND IONIAN SEA | CEN | Malta |
| | | Tunisia |
| | | Lybia |
| | IONS | Albania |
| | | Greece |
| | | Italy |
| AEGEAN AND LEVANTINE SEAS | AEGS | Greece |
| | | Turkey |
| | LEVS | Greece |
| | | Turkey |
| | | Syria |
| | | Lebanon |
| | | Cyprus |
| | | Israel |
| | | Egypt |

**GES assessment for CI4 (Population abundance) for Monk Seal**

Table 19: GES assessment for CI4 (Population abundance)

| SUB REGIONS | SUB DIVISIONS | COUNTRY |
|---|---|---|
| WESTERN MEDITERRANEAN SEA | NWMS | Spain |
| | | France |
| | | Italy |
| | ALBS | Spain |
| | | Morocco |
| | | Algeria |
| | TYRS | France |
| | | Italy |
| ADRIATIC SEA | NADR | Italy |
| | | Slovenia |
| | MADR | Italy |
| | | Croatia |
| | SADR | Italy |
| | | Montenegro |
| | | Albania |
| CENTRAL AND IONIAN SEA | CEN | Malta |
| | | Tunisia |
| | | Lybia |
| | IONS | Albania |
| | | Greece |
| | | Italy |
| AEGEAN AND LEVANTINE SEAS | AEGS | Greece |
| | | Turkey |
| | LEVS | Greece |
| | | Turkey |
| | | Syria |
| | | Lebanon |
| | | Cyprus |
| | | Israel |
| | | Egypt |

**GES assessment for CI5 (Population demographic characteristics) for Monk Seal**

309. Various types of data need to be gathered to enable accurate description of Mediterranean monk seal population demographics. Key demographic data and survivorship are logistically difficult to determine, requiring access to the seals in remote locations and long-term uninterrupted monitoring to build individual historical series. Consequently, these data have not been systematically gathered and reported across the region, which led the authors of the present report to propose it GES unsure for "Group A" countries.

Table 20: GES assessment for CI5 (Population demographic characteristics)

| SUB REGIONS | SUB-DIVISIONS | COUNTRY |
|---|---|---|
| WESTERN MEDITERRANEAN SEA | NWMS | Spain |
| | | France |
| | | Italy |
| | ALBS | Spain |
| | | Morocco |
| | | Algeria |
| | TYRS | France |
| | | Italy |
| ADRIATIC SEA | NADR | Italy |
| | | Slovenia |
| | MADR | Italy |
| | | Croatia |
| | SADR | Italy |
| | | Montenegro |
| | | Albania |
| CENTRAL AND IONIAN SEA | CEN | Malta |
| | | Tunisia |
| | | Lybia |
| | IONS | Albania |
| | | Greece |
| | | Italy |
| AEGEAN AND LEVANTINE SEAS | AEGS | Greece |
| | | Turkey |
| | LEVS | Greece |
| | | Turkey |
| | | Syria |
| | | Lebanon |
| | | Cyprus |
| | | Israel |
| | | Egypt |

Key findings per Common Indicator (CIs 3, 4 and 5 for Monk Seal)

310. Med QSR 2017 identified key knowledge gaps needed to be further addressed towards achieving GES.

CI3-distributional range and 2023 data gaps

311. The Med QSR 2017 targeted marine mammals in general, therefore not focusing specifically on the Mediterranean monk seal. However, most of the key findings and knowledge gaps could be fully attributed to this species. In this sense, the most important knowledge gaps stemmed from the disparity in the global distribution of research effort, with more effort having been made and being made in northern Mediterranean countries, while in some southern Mediterranean countries information on occurrence and distribution came primarily from anecdotal data and very localised research projects. The resulting knowledge gap compromised the identification of protection measures aimed at the conservation of the species on local and regional scales. Accordingly, more sampling and monitoring effort was identified as a basic requirement in the least monitored areas. Since then, a new initiative, the Monk Seal Alliance (MSA), consisting of a consortium of like-minded foundations optimising resources to trigger collaborative conservation and rehabilitation of the Mediterranean monk seal, has committed significant funds to support new research initiatives. Among them, for instance, the Med-Monk seal Project: Enhancing knowledge and awareness on monk seal in the Mediterranean, located in, Algeria, Egypt, Italy, Lebanon, Libya, Morocco, Syria, Tunisia and led by Specially Protected Areas Regional Activity Centre (SPA/RAC), aims at filling the gap of knowledge on the occurrence in these countries categorized as low density countries in relation to the presence of the monk seal and where no breeding episodes have been reported. In this regard, new initiatives, and current monitoring efforts should be yielding valuable information in the early future.

CI4-Abundance and 2023 data gaps

312. In reference to this CI, the MedQSR2017 focused mainly on knowledge gaps of cetacean species, highlighting the need to provide abundance and density estimates through synoptic levels and to implement the conservation priorities listed by the European directives and the Ecosystem Approach. For the Mediterranean monk seal there are no density or abundance estimates, and although there is restrictive and specific legislation for the conservation of the species, both in European directives and in regional and national strategies, implementation of these laws is not yet widespread. In this sense, one of the knowledge gaps cited in the MedQSR2017, the lack of baseline critical information is therefore detrimental to conservation and especially in the assessment of trends. Currently it seems that the species is expanding its range with new monitoring initiatives being developed in countries such as Italy, Croatia, Albania, Montenegro and Israel. However, the lack of a baseline estimate makes difficult to validate this (likely) expansion.

CI5-Demographic characteristics and 2023 data gaps

313. The need for a systematic monitoring programme over time to establish time series is necessary to determine the basic demographic parameters of the species
.

314. Counts of pups seem to have been established as a valid measure of the annual production of the species, on the one hand, and, on the other, by means of different pup multiplier ratios to determine the gross number of adults. However, although pups could be efficiently monitored (and sexed) before their first moult, after this event the monitoring of youngsters results very difficult. This being the case, as indicated in MedQSR 2017, continuous monitoring programmes by means of photo-identification and repeated at regular intervals should be established, since it is the most accurate, and non-invasive way to establish the life story of individual monk seals.

<u>Measures and actions required to achieve GES (CIs 3, 4 and 5 for Monk Seal)</u>

315. As presented in sections 4 and 5, for CI3-distribution, GES has not been achieved for all Group B countries, while it has been achieved by Group A countries except for Cyprus. Therefore, actions dedicated to facilitating the widespread distribution of the species in all Group B countries and Cyprus should be a priority. Such actions should include not only the set-up of a good monitoring network but also the protection of key habitats for the species and the reduction of any potential threats (e.g.., intentional killings, tourism disturbance).

316. When looking at Mediterranean monk seal population abundance (CI4), the lack of a baseline estimates makes difficult to validate the (likely) expansion of the species reported in recent years. Based on the reported information by regional experts, it seems that most (rough) population estimates come mainly from the minimum photo-identified individuals. However, a new approach by MOm (Greece) using pup-multipliers method may be taken as a new way forward for reliable abundance estimates. A common strategy for producing population estimates should be agreed on to be able to compare information among researchers.

317. It must be pointed out that monk seal photo-identification is a widespread practice across the region; therefore, the creation and implementation of a data-sharing platform would offer great potential to establish reliably information on movements and home range establishment. Such initiative is currently in the portfolio of actions to be supported by the Monk Seal Alliance.

318. Data reported by regional experts manifests the difficulty to study the population demographic characteristics (CI5). Since key demographic data and survivorship are logistically difficult to determine, new actions should focus on providing opportunities for long-term uninterrupted monitoring to allow building individual historical series, key to assess basic demographic trends. New technologies, combined with the long-term regular use of more traditional methods (e.g., individual tags and photo-identification) may shed light on these aspects.

319. As presented in the newly drafted Mediterranean monk seal DPSIR framework, the following measures and actions should be taken in order to achieve GES for the species.

Research Actions aimed at responding the following questions:

- Distribution
- Abundance
- Pup production
- Movements
- Foraging areas

Conservation Measures:

- Protect critical pupping habitat
- Regulate human activities
- Improvement of surveillance
- Habitat restoration

Management and Law Enforcement measures:

- Regulation of Fishing activities
- Public education and awareness
- Management of tourism
- Reduce anthropogenic mortality

Common Indicators 3, 4 and 5 (Marine Turtles)

320. The marine reptile theme in the IMAP framework comprises two species of marine turtle that complete their life cycles within the Mediterranean. These are the more widely distributed and abundant loggerhead turtle (*Caretta caretta*) and the less common and more spatially restricted green turtle (*Chelonia mydas*). Both species have established endemic Regional Management Units (RMUs) within the Mediterranean (Wallace et al. 2010; Figure 1). However, especially in the western Mediterranean, juvenile loggerhead turtles of Atlantic origin are also common. This complicates the understanding of the efficacy of conservation measures in that subregion as it is not clear if the impacted turtles are part of Mediterranean or Atlantic RMUs.

321. A third species of marine turtle, the leatherback (*Dermochelys coriacea*) is also regularly present in the Mediterranean, with individuals originating from the Atlantic, but their numbers in the Mediterranean are low and source populations are large, suggesting that negative impacts on individuals in the region will not adversely affect conservation status of their Atlantic RMU(s).

322. Good environmental status assessment for marine turtles in the Mediterranean therefore focuses on the two indigenous Mediterranean RMUs of the loggerhead and the green turtle. However, conservation actions to improve the environmental status of these turtles under the biodiversity Ecological Objective (EO1) of the IMAP process of the Barcelona Convention, will also lead to positive impacts on the non-indigenous turtles present in the region.

Key messages (Marine Turtles)

323. Combining the findings of the three most relevant CIs with literature on research and conservation actions taking place in the Mediterranean, the marine turtle theme can be considered as meeting GES.

324. Distribution of turtles across the Mediterranean (CI3) is increasing in loggerhead nesting outside their traditional range. Similarly, green turtle distribution at sea is deemed to be expanding.

325. Nesting levels, a basic proxy for population abundance (CI4) are stable or increasing at all major nesting sites where recent data have been reported and nesting is occurring where there was previously none.

326. At the breeding areas, available data suggest that hatchling sex ratios (CI5) are in favourable condition. This is the one demographic characteristic that is likely to be impacted by climate change, but it is also one that can be adequately monitored and if required mitigated against.

327. There are fundamental gaps in monitoring and data reporting for turtles in marine habitats. Monitoring methods and data reporting require standardisation across all CPs. Further research is required for better understanding of turtle populations and improving their conservation status.

Good environmental status (GES) assessment (CIs 3, 4 and 5 for Marine Turtles)

**Assessment methodology for CI3, CI4 and CI5 of EO1 regarding Marine Turtles**

Data supporting GES assessment of the marine turtle theme in this MED QSR were obtained from multiple sources. The Info System by INFO/RAC did not contain any marine turtle national monitoring data as the system is not ready to ingest such information. Therefore, data were acquired from internet searches that identified primary peer-reviewed scientific literature, reports (grey literature) and in some cases generalist web pages presenting unpublished data records. These were supplemented with additional unpublished reports shared by SPA/RAC and information found on the Mediterranean Biodiversity Platform (http://data.medchm.net/en/home). Lastly the author approached members of his personal network of Mediterranean marine turtle researchers to obtain information and validation of web-derived specific data points.

The gathered data were entered into spreadsheets relating to each relevant CI. Turtle abundance and distribution at sea (CI3, CI4) were kept as separate sheets as they were distinct sets of data sources whereas abundance and distribution of nesting activity were combined into a single sheet as data sources generally contained information covering both CIs. Population demographic characteristics (CI5) were divided into five sheets, grouped around specific diagnostic topics.

These data were then investigated to determine if they were sufficient to quantify GES status at region, sub-region, subdivision, and national level (Figure 2, Table 2), as set out in the ratified instructional document (UNEP/MED WG.514/Inf.12, 2021).

Integral to the process of determining GES for the different CIs is the requirement to compare current status with either established baseline levels or with threshold values and the outcome of previous GES assessments. For GES to be achieved under CI3 marine turtles need to be present across all their previously established range. As stated in (UNEP/MED WG.514/Inf.12, 2021) presence was assumed unless proven otherwise and available documents and recent distribution maps were examined to identify any such areas where turtles were shown to no longer be present. Similarly for GES to be established under CI4, turtle abundance needs to be at previously established levels across the region. Again, an extensive review of literature was carried out and findings compared with the previous Med QSR. Lastly, the GES assessment for CI5 was attempted through examining available literature for data points mainly focusing on the targets that can be affected/improved by conservation measures, e.g., hatchling emergence success.

Where complete datasets were lacking, the author used their expertise to infer likely GES status and to inform discussion on priority topics in terms of data collection and reporting needs for progress to be made for the subsequent MED QSR in 2029.

328. Each CI considered in this assessment can be attributed to a colour in a 'traffic-light' system, where green equals GES is met, Amber equals uncertain if GES is met, red equals GES is knowingly not met or there are no data on which to make an expert assessment. Ideally this process would be undertaken using prescribed standardised data supplied by all Contracting Parties, which would facilitate the most robust and defensible verdicts, but in lieu of such data being available, information from a variety of sources is compiled to provide a best approximation via expert opinion.

329. Quantity and quality of data available to carry out this GES assessment varied greatly among countries and was completely lacking for some countries with minor marine areas within the Mediterranean (Table 3). Results of the assessment for each of the contributing CIs is presented in turn below.

Table 21: Factors considered in defining GES for marine turtles based on UNEP/MED WG.514/Inf.12 (2021

| | **CI3 (**Species distributional range**)** The species continues to occur in all its natural range in the Mediterranean, including nesting, mating, feeding and wintering and developmental … sites | | **CI4 (**Population abundance**)** The population size allows to achieve and maintain a favorable conservation status considering all life stages of the population | | **CI5 (**Population demographic characteristic**)** Low mortality induced by incidental catch. Favorable sex ratio and no decline in hatching rates. | |
|---|---|---|---|---|---|---|
| | At sea | Nesting | At sea | Nesting | At sea | Nesting |
| Spatial scale | Region<br>Sub-region<br><br>National | Region<br>Sub-region<br>Sub-division<br>National | Region<br>Sub-region<br><br>National | Region<br>Sub-region<br>Sub-division<br>National | Region<br>Sub-region<br><br>National | Region<br>Sub-region<br>Sub-division<br>National |
| National Monitoring requirement | Six-yearly assessments. Nearshore and offshore habitats | Six yearly estimates of nationwide nesting locations. | Annual assessments.<br>Up to 4 nearshore hotspots systematically checked. Ancillary data collected (strandings / fisheries) | Annual assessments based on nesting level category* Six yearly estimates of nationwide nesting levels. | Six-yearly assessment review.<br>Bycatch and mortality rates nearshore and offshore. | Annual assessments.<br>Hatchling Emergence Success,<br>Hatching Sex Ratio |
| Key target 1 | No areas identified as no longer utilised by turtles | Nesting distribution is at least stable: No areas identified as no longer used compared to previous assessment. OR balance between newly exploited and abandoned nesting areas | Turtle presence remains at same level or increasing at index sites. | Nesting levels remain at same level or increasing at index sites. | Assessed mortality rates remain low in nearshore index habitats | Values for Hatchling Emergence Success to exceed the following levels nationally (per species):<br>loggerhead: 65%<br>green: 75% |
| Key target 2 | | | Ancillary data do not indicate a decline in turtle abundance nationally. | Interpretation of six-yearly data to determine that abundance estimates remain stable or increasing in view of potential changing distribution. | Interpretation of mortality rates from ancillary data to determine national annual survival estimates which should not worsen. | Hatchling Sex Ratio not to exceed 95% ♀ nationally. |

*Categories are based on levels of nesting. Category 1 = established, common and dense nesting (•••; 75% nesting or 7 sites), Category 2 = established limited and sparse nesting (••; 50% nesting or 4 sites), Category 3 = new emerging low-level nesting (•; continue existing schemes), and Category 4 = Absent or sporadic nesting (#; continue existing schemes). For country classifications see Table 22 Table *22*: Data availability and GES status for CI3, CI4 and CI5 relating to marine turtles..

Table 22: Data availability and GES status for CI3, CI4 and CI5 relating to marine turtles.
Marine turtle species: Cc - *Caretta caretta*, Cm - *Chelonia mydas*
Nesting abundance: # - exceptional occurrences, • - new emerging / low level, •• - established limited/sparse, ••• - established common/dense.
Monitoring reporting fulfilment: M - Missing, P - Partial, C - Complete. *GES met: Y - Yes, N - No, U – Unknown.

| | | **Albania** | | **Algeria** | | **Bosnia and Herzegovina** | | **Croatia** | | **Cyprus** | | **Egypt** | | **France** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Cc** | **Cm** | **Cc** | **Cm** | **Cc** | **Cm** | **Cc** | **Cm** | **Cc** | **Cm** | **Cc** | **Cm** | **Cc** | **Cm** |
| CI3 | At Sea Presence | Y | Y | Y | | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| | Nesting Presence | # | | # | | Y | Y | Y | Y | Y | Y | Y | Y | # | |
| CI4 | At Sea Abundance | — | ↑ | — | | — | — | — | — | — | — | — | — | — | ↑ |
| | Nesting Abundance | # | | # | | ••• | ••• | •• | •• | ••• | ••• | •• | •• | # | |
| | Nesting Trend | | | | | ↑ | ↑ | — | — | ↑ | ↑ | — | — | | |
| CI5 | Hatchling Emergence Success* | | | | | P-U | P-U | P-U | P-U | P-U | P-U | P-U | P-U | | |
| | Sex Ratio Hatchlings* | | | | | C-Y | C-Y | C-Y | M-U | C-Y | C-Y | C-Y | M-U | | |
| | Clutch Size | | | | | C | C | C | C | C | C | C | C | | |
| | Clutch Frequency | | | | | C | C | M | M | C | C | M | M | | |
| | Internesting Interval | | | | | C | C | M | M | C | C | M | M | | |
| | Remigration Interval | | | | | C | C | M | M | C | C | M | M | | |
| | (operational) Sex Ratio Adults | | | | | N | C | M | M | N | C | M | M | | |
| | Oceanic: Pop structure / sex ratio | M | M | M | | N | N | M | M | N | N | M | M | M | |
| | Neritic: Pop structure / sex ratio | P | P | P | | C | C | P | P | C | C | P | P | P | |
| | Oceanic: threats / survivorship* | M-U | M-U | M-U | | M-U | M-U | M-U | M-U | M-U | M-U | M-U | M-U | M-U | |
| | Neritic: threats / survivorship* | P-U | P-U | P-U | | C-U | C-U | P-U | P-U | C-U | C-U | P-U | P-U | M-U | |
| | Oceanic: Health index | M | M | M | | M | M | M | M | M | M | M | M | M | |
| | Neritic: Health index | M | M | M | | M | M | M | M | M | M | M | M | M | |
| | Growth rates | M | M | M | | C | C | M | M | C | C | M | M | M | |
| | Longevity | | | | | C | C | | | C | C | | | | |
| | Age / size at Sexual Maturity | | | | | M | M | | | M | M | | | | |

*Table 22. (Continued)*

| | | Greece | | Israel | | Italy | | Lebanon | | Libya | | Malta | | Monaco | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ***Cc*** | ***Cm*** | ***Cc*** | ***Cm*** | ***Cc*** | ***Cm*** | ***Cc*** | ***Cm*** | ***Cc*** | ***Cm*** | ***Cc*** | ***Cm*** | ***Cc*** | ***Cm*** |
| **CI3** | At Sea Presence | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | | Y | |
| | Nesting Presence | Y | # | Y | Y | Y | | Y | Y | Y | # | Y | | | |
| **CI4** | At Sea Abundance | — | — | — | — | — | — | — | — | — | — | — | | — | |
| | Nesting Abundance | ••• | # | ••• | •• | •• | | •• | •• | ••• | # | • | | | |
| | Nesting Trend | ↑ | | ↑ | ↑ | ↑ | | — | — | — | | ↑ | | | |
| **CI5** | Hatchling Emergence Success* | P-U | | P-U | P-U | P-U | | P-U | P-U | P-U | | M-U | | | |
| | Sex Ratio Hatchlings* | P-U | | P-U | P-U | P-U | | M-U | M-U | P-U | | M-U | | | |
| | Clutch Size | C | | C | C | C | | M | M | C | | M | | | |
| | Clutch Frequency | C | | M | M | M | | M | M | M | | M | | | |
| | Internesting Interval | C | | M | M | M | | M | M | M | | M | | | |
| | Remigration Interval | C | | M | M | M | | M | M | M | | M | | | |
| | (operational) Sex Ratio Adults | C | | M | M | M | | M | M | M | | M | | | |
| | Oceanic: Pop structure / sex ratio | M | | M | M | C | | M | M | M | | P | | M | |
| | Neritic: Pop structure / sex ratio | P | P | M | M | C | | M | M | M | | P | | M | |
| | Oceanic: threats / survivorship* | M-U | M-U | M-U | M-U | P-U | | M-U | M-U | M-U | | P-U | | M-U | |
| | Neritic: threats / survivorship* | P-U | P-U | P-U | P-U | P-U | | M-U | M-U | P-U | | P-U | | M-U | |
| | Oceanic: Health index | M | | M | M | P | | M | M | M | | M | | M | |
| | Neritic: Health index | M | M | M | M | P | | M | M | M | | M | | M | |
| | Growth rates | P | | M | C* | C | | M | M | M | | M | | M | |
| | Longevity | C | | M | M | P | | | | | | | | | |
| | Age / size at Sexual Maturity | M | | M | C* | C | | | | | | | | | |

*Table 22. (Continued)*

| | | Montenegro | | Morocco | | Slovenia | | Spain | | Syria | | Tunisia | | Türkiye | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ***Cc*** | ***Cm*** | ***Cc*** | ***Cm*** | ***Cc*** | ***Cm*** | ***Cc*** | ***Cm*** | ***Cc*** | ***Cm*** | ***Cc*** | ***Cm*** | ***Cc*** | ***Cm*** |
| **CI3** | At Sea Presence | Y | Y | Y | | Y | Y | Y | | Y | Y | Y | Y | Y | Y |
| | Nesting Presence | | | | | | | Y | | Y | Y | Y | # | Y | Y |
| **CI4** | At Sea Abundance | — | ↑ | — | | — | | — | | — | — | — | — | — | — |
| | Nesting Abundance | | | | | | | • | | •• | ••• | •• | # | ••• | ••• |
| | Nesting Trend | | | | | | | ↑ | | — | — | — | | ↑ | ↑ |
| **CI5** | Hatchling Emergence Success* | | | | | | | C-N | | M-U | P-U | P-U | | P-U | C-Y |
| | Sex Ratio Hatchlings* | | | | | | | P-U | | M-U | M-U | P-U | | C-Y | C-Y |
| | Clutch Size | | | | | | | C | | M | C | C | | C | C |
| | Clutch Frequency | | | | | | | M | | M | M | M | | M | M |
| | Internesting Interval | | | | | | | M | | M | M | M | | M | M |
| | Remigration Interval | | | | | | | M | | M | M | M | | M | M |
| | (operational) Sex Ratio Adults | | | | | | | M | | M | M | M | | M | M |
| | Oceanic: Pop structure / sex ratio | M | M | M | | | | P | | M | M | M | M | M | M |
| | Neritic: Pop structure / sex ratio | P | M | M | | P | | P | | M | P | P | P | P | P |
| | Oceanic: threats / survivorship* | M-U | M-U | P-U | | | | P-U | | M-U | M-U | M-U | M-U | M-U | M-U |
| | Neritic: threats / survivorship* | P-U | M-U | P-U | | P-U | | P-U | | P-U | P-U | P-U | P-U | P-U | P-U |
| | Oceanic: Health index | M | M | M | | | | P | | M | M | M | M | M | M |
| | Neritic: Health index | M | M | M | | M | | M | | M | M | M | M | M | M |
| | Growth rates | M | M | M | | M | | M | | M | M | M | M | M | M |
| | Longevity | | | | | | | | | | M | M | | M | M |
| | Age / size at Sexual Maturity | | | | | | | | | | M | M | | M | M |

Common Indicator 3 (Distribution)

330. Marine turtle distribution meets GES from national to regional level (Tables 3 & 4). As per guidance (UNEP/MED WG.514/Inf.12, 2021), this can be assumed unless there is direct evidence to the contrary provided by national monitoring schemes. Loggerhead turtles remain present or assumed present in all marine locations, as indicated by recent distribution maps produced (Camiñas et al 2020, DiMatteo et al 2022; Figure 3) and are increasing their distribution in terms of nesting (Hochscheid et al. 2022; Figure 4). Green turtle distribution is assessed to be stable or increasing. The most recent spatial designation for this species in the Mediterranean, compiled by the IUCN Marine Turtle Specialist Group (Figure 3; Wallace et al 2023), is expanded westwards compared with the original extent (Wallace et al 2010), with a recent publication contributing new presence records of green turtles in the Adriatic Sea (Jančič et al 2022). In terms of nesting, sporadic green turtle nesting events have started occurring in Greece (Margaritoulis et al 2023), Tunisia (Ben Ismail et al 2022), and Libya (Saied 2023), which are far west of the traditional nesting region (Casale et al 2018; Figure 4), suggesting that green turtles may be starting a breeding range expansion in the same way as loggerheads.

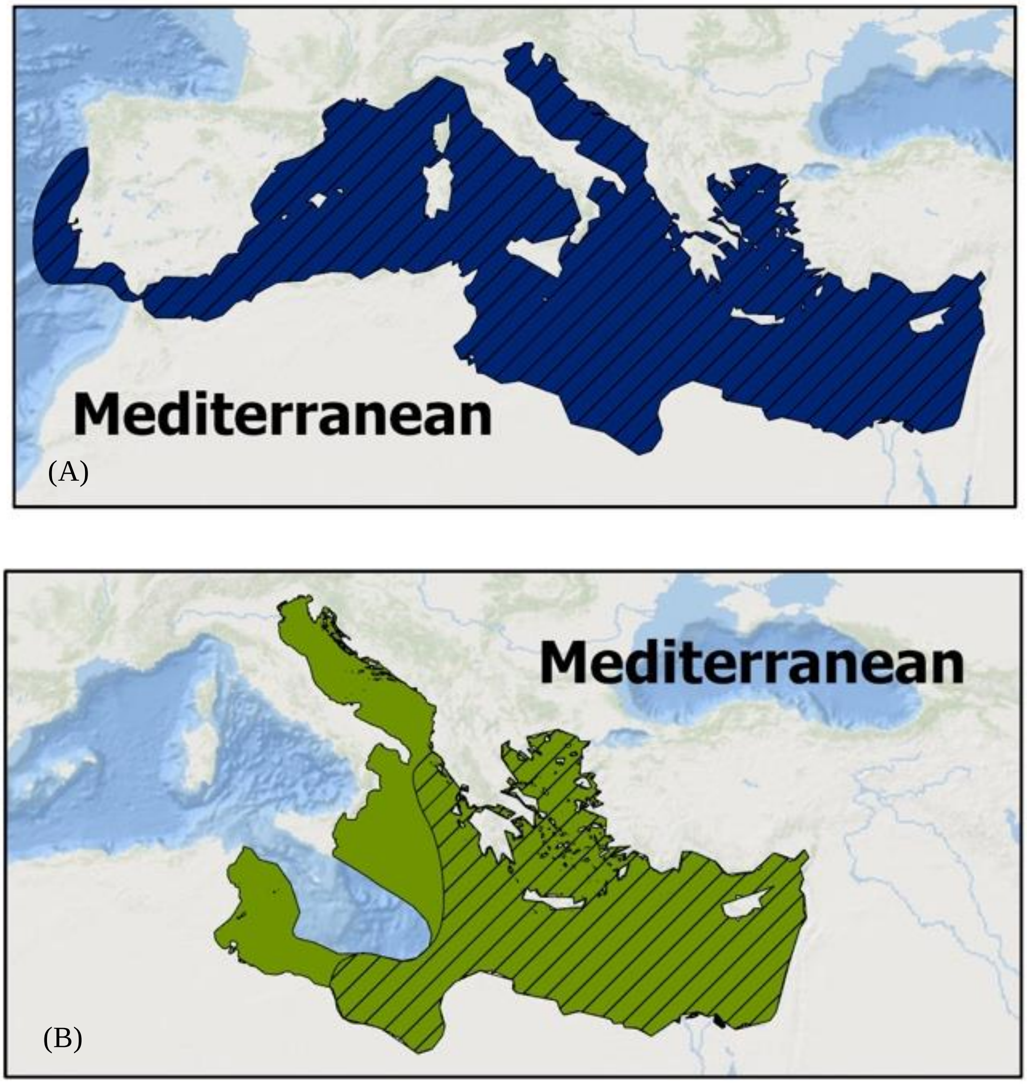



Figure 31: Turtle distribution across the Mediterranean as indicated by the revised regional management unit extents for Mediterranean loggerhead (A) and green (B) turtles (taken from Wallace et al 2023).

Table 23: GES status for marine turtle in relation to Common Indicator 3: Distribution.
Green = GES met. Orange = Unsure if GES met. Red = GES not met.

| Region | Sub-region | Sub-division | Relevant Contracting Parties |
|---|---|---|---|
| Mediterranean | Western Mediterranean | NWMS | Spain - France |
| | | ALBS | Spain - Morocco |
| | | TYRS | France - Italy - Tunisia |
| | | SWMS | Algeria |
| | Adriatic Sea | ADRS | Italy - Slovenia - Croatia - Bosnia & Herzegovina - Montenegro - Albania |
| | Central and Ionian Seas | CENT | Libya - Tunisia |
| | | IONS | Italy - Greece - Malta |
| | Aegean and Levantine Seas | AEGS | Greece - Türkiye |
| | | LEVS | Türkiye - Cyprus - Syria - Lebanon - Israel - Egypt |

**Common Indicator 4 (Abundance)**

331. Based on an incomplete non-systematic dataset, marine turtle abundance is interpreted to meet GES from regional to sub-regional level (Tables 3 & 5). Despite the lack of systematic monitoring data for offshore marine habitats, a region-wide turtle abundance at sea has recently been modelled and published (DiMatteo et al. 2022, Figure 5) which can form a baseline for understanding the difficult-to-determine offshore abundance levels. Nearshore data have not been gathered or published in a systematic manner, as proposed (UNEP/MED WG.514/Inf.12, 2021), but there have been no indications of decreased abundance at any monitored site. For green turtles there are indications that numbers are increasing in the Adriatic Sea (Jančič et al. 2022), which has led to the subregion being included in the RMU extent (see CI3 above and Figure 3). Nesting across the region (Figure 4) is reported as generally stable or increasing at well-established nesting areas that have received long-term monitoring efforts (Casale et al. 2018), which suggests growing populations. For loggerhead turtles nesting has started to occur more frequently in areas and countries where nesting was not previously reported (Hochscheid et al. 2022), supporting a positive trend and consolidating the positive GES status for this CI.

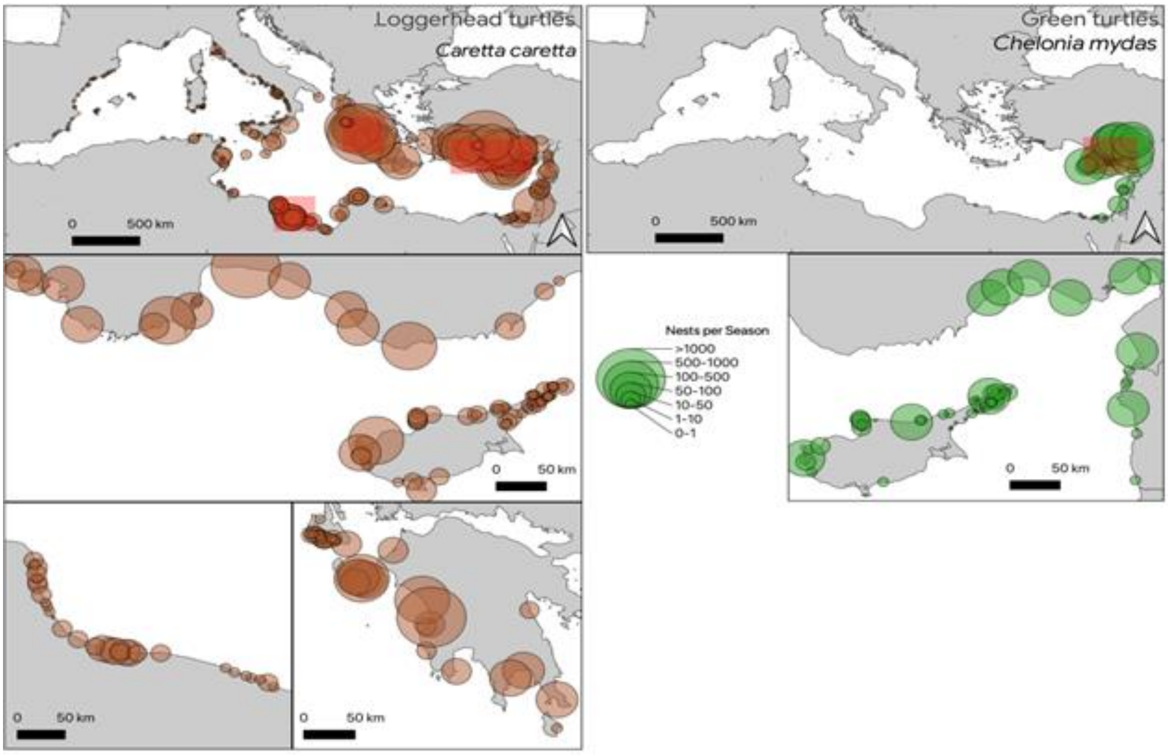



Figure 32: Beach-scale marine turtle nesting levels across the Mediterranean Sea. Green turtle nesting is confined to the eastern Mediterranean, mainly the extreme north-eastern area, and there are no large nesting aggregations for loggerheads in the western Mediterranean, though nesting levels are currently increasing. Marine turtle nesting in Israel and Malta are depicted in generic locations as beach-scale data are not available.

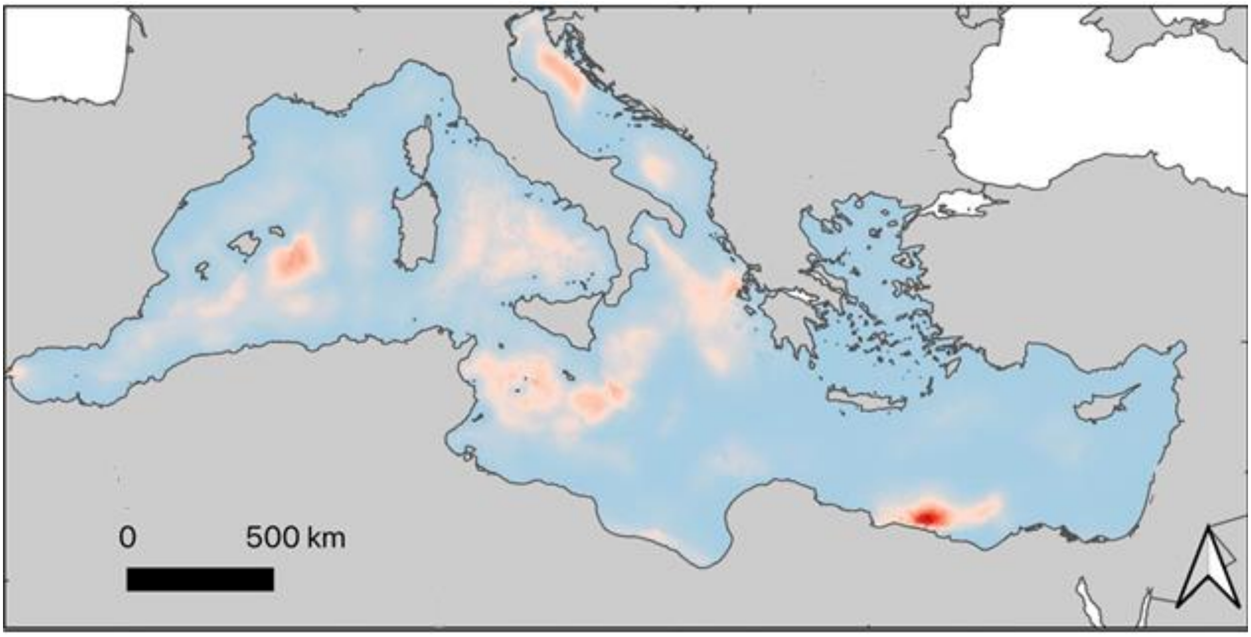



Figure 33: Turtle density across the Mediterranean. Modelled distribution and abundance of hard-shelled turtles (mainly loggerheads) after DiMatteo et al. (2022). The hotspot off the Egyptian coast is generated from extrapolation and requires verification.

Table 24: GES status for marine turtle in relation to Common Indicator 4: Abundance
Green = GES met. Orange = Unsure if GES met. Red = GES not met.

| Region | Subregion | Sub-division | Contracting parties |
|---|---|---|---|
| Mediterranean | Western Mediterranean | NWMS | Spain - France |
| | | ALBS | Spain - Morocco |
| | | TYRS | France - Italy - Tunisia |
| | | SWMS | Algeria |
| | Adriatic Sea | ADRS | Italy - Slovenia - Croatia - Bosnia & Herzegovina - Montenegro - Albania |
| | Central and Ionian Seas | CENT | Libya - Tunisia |
| | | IONS | Italy - Greece - Malta |
| | Aegean and Levantine Seas | AEGS | Greece - Türkiye |
| | | LEVS | Türkiye - Cyprus - Syria - Lebanon - Israel - Egypt |

**Common Indicator 5 (Demography)**

332. In this Common indicator, many types of data need to be gathered to enable accurate modelling of turtle populations, but only a few can be directly influenced by conservation actions. The rest depend on environmental conditions which can be incorporated in models that predict population trends based on differing scenarios. This CI has received least attention from Contracting Parties, in terms of reporting, though publications containing some data exist. Consequently, GES status for this CI remains undetermined for marine turtles across the board from national to regional level (Tables 3 & 6). Focusing on demographic parameters at nesting sites that can be influenced by conservation measures, such as Hatchling Emergence Success and the incubation durations of nests, the data required for this CI, are derived from the basic nesting beach monitoring that takes place at numerous nesting areas across the region, and hence it is believe the data are being gathered but are simply not being compiled and reported by the CPs in a standardised and systematic way. Key demographic data for turtles at sea, such as survivorship and health indices are logistically difficult to determine requiring access to turtles in remote locations and large sample sizes to validate any statistical inferences, and consequently these data have not been systematically gathered and reported across the region.

Table 25: GES status for marine turtle in relation to Common Indicator 5: Demography
Green = GES met. Orange = Unsure if GES met. Red = GES not met.

| Region | Subregion | Sub-division | Contracting Parties |
|---|---|---|---|
| Mediterranean | Western Mediterranean | NWMS | Spain - France |
| | | ALBS | Spain - Morocco |
| | | TYRS | France - Italy - Tunisia |
| | | SWMS | Algeria |
| | Adriatic Sea | ADRS | Italy - Slovenia - Croatia - Bosnia & Herzegovina - Montenegro - Albania |
| | Central and Ionian Seas | CENT | Libya - Tunisia |
| | | IONS | Italy - Greece - Malta |
| | Aegean and Levantine Seas | AEGS | Greece - Türkiye |
| | | LEVS | Türkiye - Cyprus - Syria - Lebanon - Israel - Egypt |

Key findings per Common Indicator (CIs 3, 4 and 5 for Marine Turtles)

CI 3:
Key results
333. The most significant development relating to distribution of turtles across the Mediterranean is the increase in loggerhead nesting outside of the traditional range, with nests being made in the western Mediterranean and Malta and to the north in the Ionian and Adriatic Seas (Fig. 4). This may be considered a positive evolution resulting from moderate global warming, but the negative impacts resulting from continued heating and related sea level rise are yet to be revealed. Similarly, green turtle distribution at sea is deemed to be expanding as indicated in the revised RMU distribution, which may mean this species has new safe locations to exploit but could also mean turtles are lured away from established beneficial foraging areas into less productive ones. The overall at-sea distribution of turtles should remain to be considered the entire Mediterranean region for loggerhead turtles and the area covered by the updated RMU boundary for green turtles, unless evidence to the contrary is gathered by a Contracting Party.

Comparison
334. This 2023 review is again based on variable data from a wide range of sources and not from reports on monitoring activities carried out be CPs. Again, nesting data are more prevalent, and this time highlight the expansion of nesting to new areas. Detailed information on marine habitat use remains patchy but turtle presence can be assumed unless proven to the contrary.

Gaps
335. As indicated, at-sea monitoring data are lacking which is largely a result of lack of consistent standardised monitoring turtles in marine habitats. Data on nesting populations are more common but are irregularly reported and lacking from certain established nesting areas.

CI 4:
Key results
336. With the recent publication of the marine habitat abundance map (Fig. 5) there is now a region-level assessment for marine turtles that can be used as a framework for estimating abundance. Nesting levels are stable or increasing at all major nesting sites where recent data have been reported and nesting is occurring where there was previously none.

<u>Comparison</u>
337. Progress has been made towards better understanding of turtle population abundances since the previous report, through modelling at-sea populations using extensive transect datasets and from intensive beach-based fieldwork at nesting sites. However, the need for counts of males at breeding areas has only partially been met with very few studies, and monitoring programs at foraging, wintering and development grounds are still lacking.

<u>Gaps</u>
338. There is still a lack of standardised monitoring across many nesting areas to determine population abundances present per Contracting Party and where there are programmes, reporting of required data is lacking. The situation is worse for in-water studies on turtle abundance as they are almost entirely lacking and those that are undertaken are not reported.

CI 5:
<u>Key results</u>
339. At the breeding areas, available data suggest that hatchling sex ratios are in favourable condition with sufficient males produced to sustain the populations. Lack of information on hatchling emergence success means annual recruitment cannot be determined, but given the generally increasing nesting populations, it suggests that over the long-term, sufficient hatchlings are being recruiting and surviving through to adulthood. Data on survival rates, threats at sea and other factors are very patchy, precluding any firm analysis, but again, given the general increase in breeding levels across the region there is expectation that populations are in suitable condition to be maintained and potentially increase further. However, direct evidence to support positive outlook are urgently required.

<u>Comparison</u>
340. As was found with the 2017 assessment, present knowledge on sea turtle demography remains patchy, with certain information more widely available than others, and certain locations generating a disproportionate amount of relevant information. This situation needs to be improved to more robustly support the positive outlook for turtle populations suggested here, and to build population models that can predict which conservation actions should be prioritised to maintain and improve population status.

<u>Gaps</u>
341. Fundamental monitoring and reporting gaps on the factors that can be influenced to improve the conservation status of sea turtles remain for all Contracting Parties as there are no standardised national monitoring and reporting regimes in place. Data on other topics relating to turtle nesting biology and fecundity lack consistent reporting and estimates of health, survivorship and population structure at sea are similarly lacking due to fundamental absence in relevant monitoring programs.

<u>Measures and actions required to achieve GES (CIs 3, 4 and 5 for Marine Turtles)</u>

342. Despite this appraisal suggesting overall that GES is met for the marine turtle theme, many data that may support or refute this assessment are lacking and those data that are available have been retrieved from a wide range of sources, from primary scientific literature to unpublished reports and web articles. Consequently, the assessment has necessarily included inferences from expert opinion on various topics where a comprehensive synthesis of data is impossible due to lack of data or impractical due to patchy unstandardised datasets.

343. Research (Table 8) and conservation (Table 9) priorities set out by Casale et al. (2018) remain relevant for better understanding of turtle populations and improving their conservation status and strongly concur with the requirements elaborated for the marine turtle assessment under IMAP (UNEP/MED WG.514/Inf.12, 2021). The competent authority in each CP needs to

understand the data reporting requirements and which entity is undertaking specific monitoring actions. Through doing this they can identify gaps in data acquisition resulting from lack of fieldwork in necessary sites, gaps in reporting at sites where monitoring is carried out and identify entities that could be tasked with additional field monitoring at currently unmonitored sites. In terms of progressing towards adequate reporting, the simplest first step to take is to ensure data from all existing monitoring programmes are collected and reported in a standardised manner. The next most simple change is that in locations where monitoring programs exist, but collection of certain data is lacking, the programs should be adapted to acquire this sought-after information and analyse and report it as required.

344. Challenges within each nation include knowledge of what work is being carried out where and by whom and do these actions then cover the full requirements of IMAP? Some countries have different entities working in different regions or on different fields (e.g., at-sea work or nesting beach studies etc.) but a national overview is lacking. It is therefore beneficial that each CP has in place some oversight or coordination mechanism to ensure all required monitoring activities are carried out. The coordinator could be a governmental body, scientific institution, or non-governmental organisation, with the important remit that they know what work is being carried out and have the competency to collect and synthesise the information adequately for each six-yearly Mediterranean Quality Status Report.

345. This IMAP reporting framework, a requirement of all riparian Mediterranean states does not exist in isolation but coincides with other international reporting requirements such as those for the EU Habitats Directive and its Marine Strategy Framework Directive (MSFD). There is much overlap and synergy between these programs, which means data collected if collected in adequately rigorous manner can be used multiple times and not only for the IMAP. Of note is the recently published article highlighting progress towards a common approach for assessing marine turtle population status at European level within the MSFD, which should be considered when designing and coordinating marine turtle monitoring strategies. The resulting economy of scale lessens the burden on competent authorities as suitable coordinated actions obviate the need to repeat work and simplifies the analysis process.

### 2.2.2 EO2 Non-Indigenous Species

*Common Indicators 6*

**Methodology for data analysis in relation to CI 6**

Following the recommendations in the document on Monitoring and Assessment Scales, Assessment Criteria and Thresholds Values for the IMAP Common Indicator 6 Related to Non-Indigenous Species (UNEP/MED WG.500/7, 2021), analysis of the temporal trends of new NIS occurrences was conducted at the subregional level. Thresholds and quantitative targets for GES have not been determined yet for CI6, but rather GES is based on directional trends, i.e., the reduction or minimization of the introduction and spread of NIS linked to human activities (see BOX 1). Consequently, trends in occurrence were analysed in two different ways. The first method involves breakpoint analysis in order to identify structural changes in the dataset, representing dates (i.e., years) when the mean introduction rate displays significant changes (increases or decreases). Breakpoint analysis was performed on the 1970-2011 time-series, i.e., excluding the 2012-2017 assessment period, with which comparisons are made. Once time periods with stable mean values were detected, 95% Confidence Intervals around the means were calculated as a measure of uncertainty. Subsequently, the mean NIS introduction rate of the 2012-2017 assessment period with its 95%CI was calculated and compared with the respective values of the breakpoint generated segments, providing a qualitative assessment (for details of the approach see Galanidi & Zenetos, 2022; Östman et al., 2020; Zeileis et al., 2003).

**Species selection for spatial distribution maps**

A small number of NIS with high impacts on a variety of habitats were selected for spatial distribution mapping. Starting from the CIMPAL evaluation of the 60 species in Katsanevakis et al. (2016), a shortlist of species was created on the basis of three criteria; habitats they invade, magnitude of impacts and introduction pathway. More specifically, the 13 habitat types examined by Katsanevakis et al. (2016) were merged into six broader habitat types, namely: estuaries & lagoons, Posidonia oceanica and other seagrass and seaweed meadows, coralligenous habitats, soft sediments (0-200 m depth), rocky substrates (0-200 m depth) and pelagic habitats (0-200 m). Subsequently, NIS species with massive impacts on each of these habitats were marked and a subset was selected for mapping. Since many of these species have impacts on more than one habitat types, all broad habitat types were well represented in the final group of 10 species (Table 1). Finally, primary and secondary pathways of introduction were examined for each species to ensure that all the major pathways are also sufficiently represented.

List of species selected for spatial distribution mapping. EC-Aqua = Escape from large aquaria (accidental), EC-Mar = Escape from mariculture, REL = Release (intentional), TC = Transport-Contaminant, UNA = Unaided, TS = Transport-Stowaway, TS-Shipping indicates both/either ballast water and/or hull fouling as vectors.

| Habitats | Species | Pathway | |
|---|---|---|---|
| lagoons/seagrass/soft/rocky | *Lagocephalus sceleratus* | Corridor | Unaided |
| seagrass/soft/rocky/coral | *Pterois miles* | Corridor | Unaided |
| Seagrass/soft/rocky/pelagic | *Plotosus lineatus* | Corridor | UNA |
| lagoons/pelagic | *Mnemiopsis leidyi* | TS-Ballast | Unaided |
| lagoons/soft | *Callinectes sapidus* | TS-Ballast | TS, UNA |
| Soft | *Anadara transversa* | TS-Fouling | TC |
| seagrass/rocky/coral | *Acrothamnion preissii* | EC / TS-Angling | TS-Shipping |
| Rocky | *Codium fragile subsp. fragile* | TC | TS-ball |
| lagoons/seagrass | *Caulerpa taxifolia var. distichophylla* | EC-Aqua | TS-angling, TS-hull, UNA |
| lagoons/rocky | *Rugulopteryx okamurae* | TC | |

346. Biological invasions are globally identified as one of the main drivers of biodiversity loss, with impacts ranging from loss of genetic diversity to native population losses, species displacements, habitat modifications and even whole ecosystem shifts (IPBES, 2019). Consequently, the role of non-indigenous species (NIS) as a pressure that threatens ecosystems is addressed in the framework of numerous policies and strategies worldwide. In the Mediterranean Sea and in the context of the Barcelona Convention, the Protocol concerning specially protected areas and biological diversity in the Mediterranean (SPA/BD Protocol) invites the Contracting Parties to take "all appropriate measures to regulate the intentional or non-intentional introduction of non-indigenous into the wild and prohibit those that may have harmful impacts on the ecosystems, habitats or species" (UNEP/MAP, 2017a).

347. In the Mediterranean Sea, one of the most invaded ecosystems in the world (Costello et al., 2021), it is currently estimated that the number of NIS is in the range of 1000 with no sign of decline in their introduction rate. Recent work has demonstrated that, besides the unabated rate of new introductions, the rate of alien species spread and establishment is also increasing, with upwards of 70% of the introduced species being considered established (Zenetos & Galanidi, 2020; Zenetos et al., 2022a; b), causing the degradation of distinctive Mediterranean communities and habitats (Katsanevakis et al., 2014). In the western Mediterranean, negative impacts are caused primarily by invasive macrophytes, whereas in the Levantine and the Aegean Sea by fishes, and in the Adriatic Sea by introduced molluscs (Tsirintanis et al., 2022). Competition for resources, habitat creation/modification through ecosystem engineering, and predation are the primary mechanisms of negative effects of Mediterranean NIS. Pathway analysis has revealed that shipping, through ballast water and hull fouling, corridors, recreational boating and aquaculture transfers are primarily responsible for NIS introductions and spread in the region, while the ornamental trade and live food trade, among other activities, also contribute to NIS pressure (Katsanevakis et al., 2013, Tsiamis et al., 2018).

Key Messages (Non-Indeginous Species)

348. Ecological Objective 2 (EO2) "Non-indigenous species introduced by human activities are at levels that do not adversely alter the ecosystem" with a single Common Indicator (CI6) assesses "Trends in abundance, temporal occurrence, and spatial distribution of non-indigenous species, particularly invasive, non-indigenous species, notably in risk areas (in relation to the main vectors and pathways of spreading of such species)".

349. Our results indicate that for the past 15-20 years new NIS introduction rates have been relatively stable in the West Mediterranean and the Adriatic, close to levelling off in the East Mediterranean but increasing in the Central Mediterranean. At the same time, there has been a notable increase in research effort and reporting, spurred by both policy requirements but also scientific interest coupled with citizen science initiatives, particularly in the southern Mediterranean.

350. Consequently, clear interpretation of these trends is hampered by the lack of long-term standardised monitoring data, as it is not possible to disentangle the confounding effects of differential recording efforts spatially and temporally from real changes in pathway pressure or vector management.

351. Nevertheless, a number of invasive, high-impact NIS have displayed an increased geographic expansion in the last decade or so, which can be deduced even behind the "noise" of increased detection and reporting. NIS species of warm affinities with long-range pelagic dispersal appear to have been favoured by climate change and increased seawater temperatures to penetrate the cooler regions of the Mediterranean, secondary anthropogenic dispersal however still plays an important role in the spread of the more sedentary species.

<u>Good environmental status (GES) / alternative assessment (CI 6)</u>

*Descriptive characteristics of the entire baseline (1791-2020)*

352. At the pan-Mediterranean level, a total of 1008 validated, non-indigenous species have been found throughout the basin until the end of 2020, of which 143 are Macrophytes, 223 Mollusca, 188 Arthropoda, 172 Fishes, 29 Ascidiacea, 83 Annelida, 32 Bryozoa, 42 Cnidaria, 47 Foraminifera and 49 taxa belong to other taxonomic groups. Among the 1008 validated marine NIS, 742 are currently considered established, which makes the overall establishment rate in the Mediterranean Sea almost 74%. This value varies in the different subregions, with the lowest establishment rate in ADRIA (62%) and the highest in EMED (73%). When it comes to actual numbers, as expected, the eastern Mediterranean has the highest number of NIS with 788 species, followed by WMED (N=338), CMED (N=304) and ADRIA (N=211).

353. During the validation process of the national baselines, 66 species emerged as data deficient: 59 characterised by divergence of opinion as to their alien or cryptogenic status and 7 as suspected questionable records. The highest number of species is observed in Israel and Türkiye, followed by Italy, Greece, Lebanon and Egypt, with values generally decreasing towards the Adriatic and western Mediterranean countries.

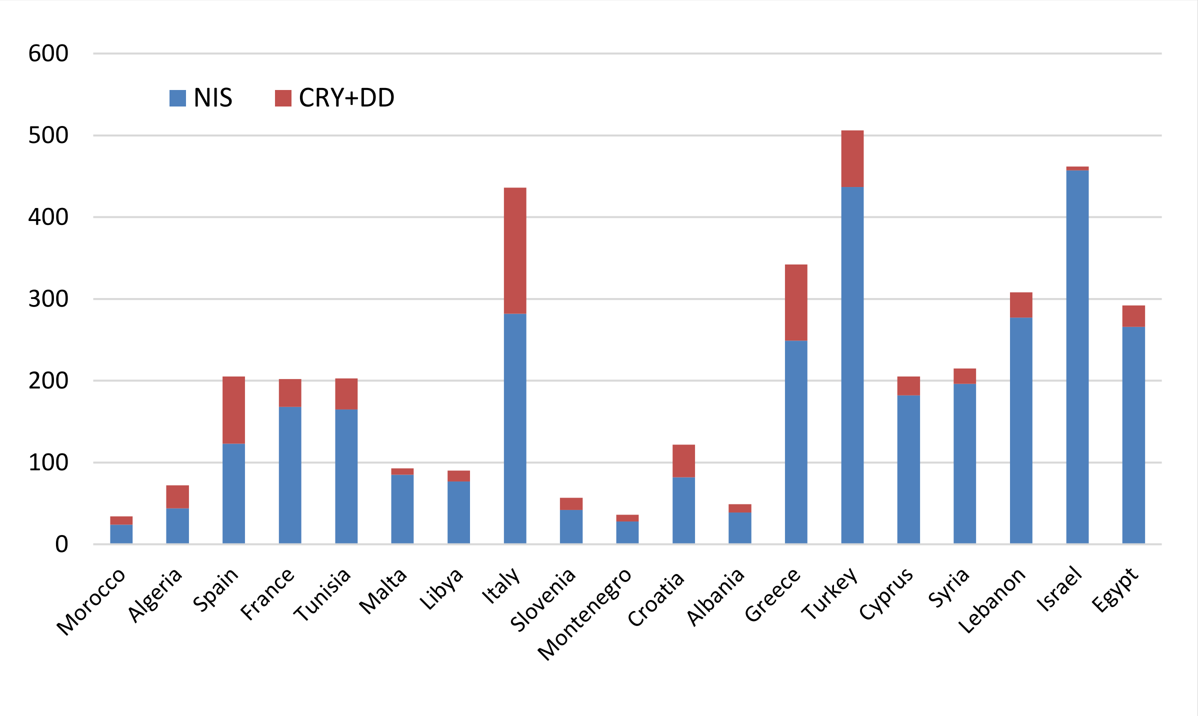



Figure 34: Number of NIS, cryptogenic (CRY) and data deficient (DD) species, detected in each Mediterranean country by December 2020.

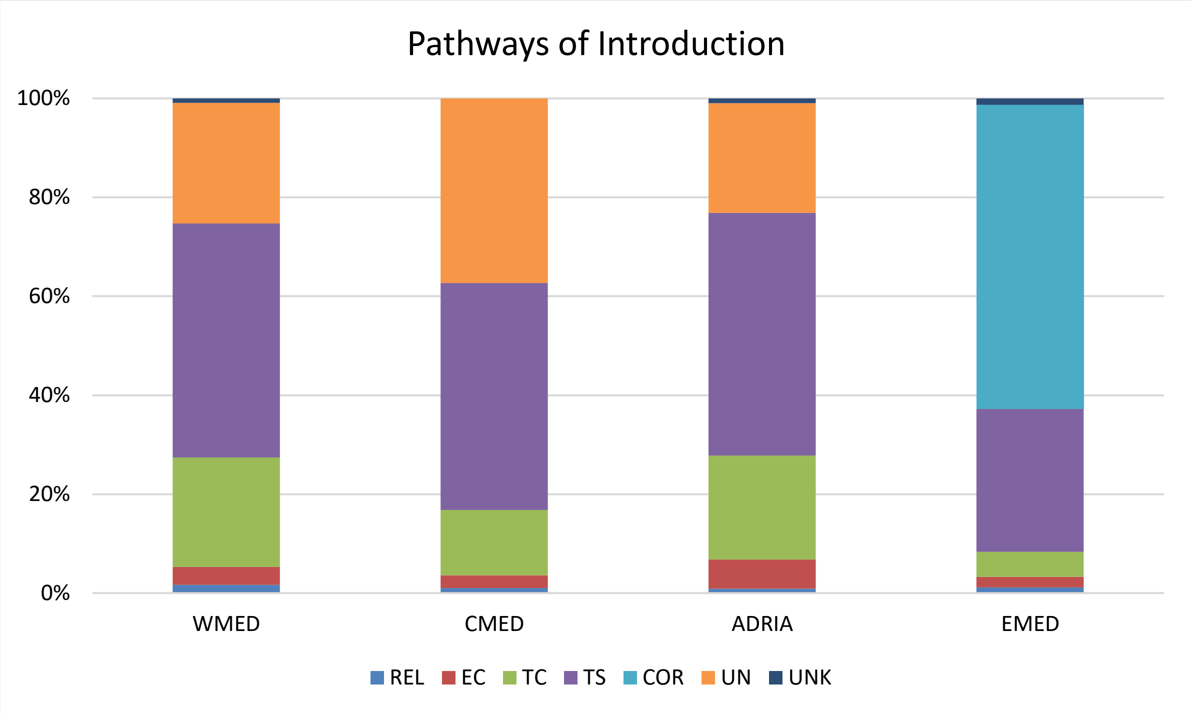



Figure 35: Primary pathways of introduction of marine NIS per Mediterranean subregion. REL = Release in nature, EC = Escape from Confinement, TC = Transport-Contaminant on animals, TS = Transport- Stowaway (including Ship/boat ballast water, Hull fouling and Other means of transport), COR = Corridor, UN = Unaided, UNK = Unknown.

354. Roughly half the non-indigenous species present in the Mediterranean have Corridor as their primary pathway of introduction, (Figure 2). This number reaches 61% in the Eastern Mediterranean, but this pathway is not applicable moving westwards and northwards to the other subregions, where Lessepsian species migrate to a large extent by natural dispersal (pathway Unaided). CMED has the largest proportion of Unaided species, as it accepts naturally dispersing NIS propagules from all other subregions. Noteworthy also is the higher percentage of Contaminant species in ADRIA (21%) and the WMED (22%), which are inadvertently transported with aquaculture activities, while escapees have their largest representation in ADRIA, with 6 % of the species assumed to have escaped from mariculture or from non-domestic aquaria. Intentional releases from domestic aquaria represent only 1-2% of all introductions, with the highest number of species appearing in the western and eastern Mediterranean. The two main shipping vectors together (i.e., Ballast water and Hull fouling) constitute the primary pathway for almost one third of the NIS entering the Mediterranean but as high as 49% of the NIS present in ADRIA.

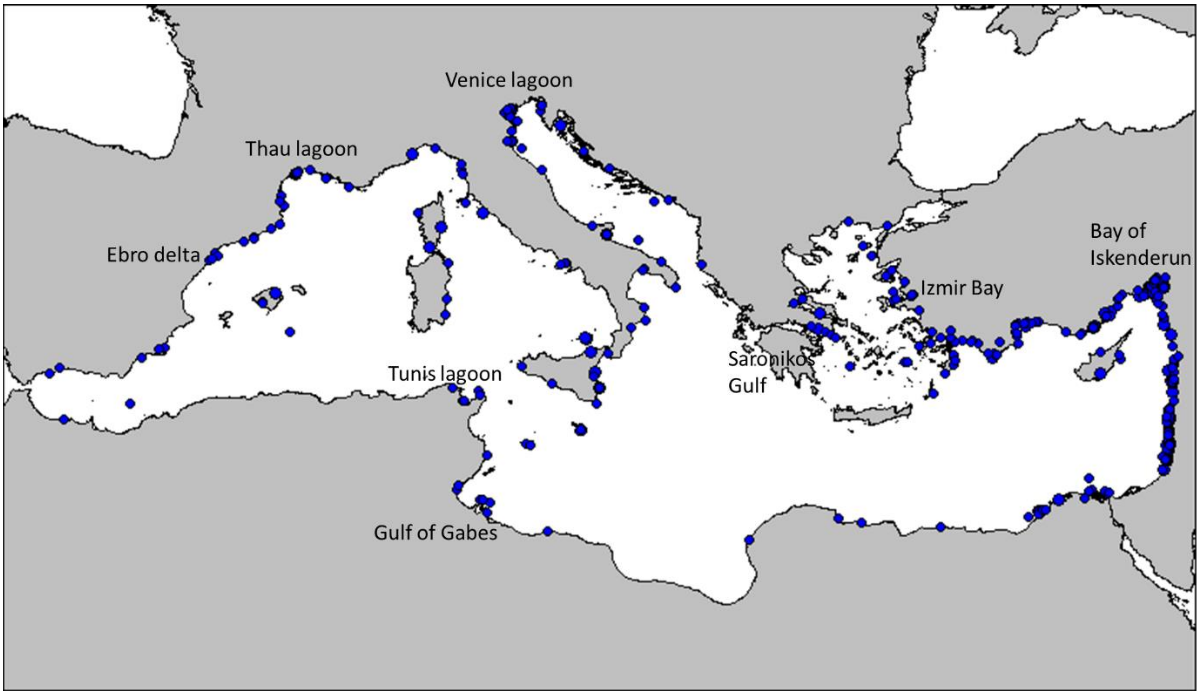



Figure 36: First new NIS records in the Mediterranean, observed between 1988-2017.

355. Figure 3 illustrates the gateways of new NIS records in the Mediterranean since 1988. The above pattern corresponds clearly to the pathways of introduction a) Indo-Pacific species invade [either unaided (Lessepsian NIS) or via shipping] and become visible firstly in the Levantine basin (Egypt, Israel, Lebanon, Syria, south Türkiye); b) accidental introductions with oysters appear in Thau lagoon (France), Venice lagoons (Italy), Ebro delta (Spain), Tunis lagoon (north Tunisia); c) vessel transferred species from the Atlantic are reported mostly from port areas e.g., Bay of Iskenderun, Izmir Bay, Türkiye; Saronikos Gulf (Greece) Gulf of Gabes (Tunis). Research effort and contribution of citizen science has revealed new species across the Mediterranean and has been particularly significant in reporting new records in previously unexplored areas such as Libya.

*Temporal trends in occurrence*

356. Breakpoint analysis, carried out on the 1970-2011 subset with 2012-2017 as the assessment period, demonstrated that there are indeed different points in time when the NIS introduction rate significantly increased in each Mediterranean subregion, spanning from the mid-1990's to the mid-2000's (Figure 4). During the almost 50 years of the analysed time period NIS introduction rates have more than doubled in EMED, CMED and ADRIA and almost doubled in WMED (Table 4). After the identified breakdates, introduction rates have remained stable in the western Mediterranean and the Adriatic but have markedly increased in the Central Mediterranean (Table 4). In the eastern Mediterranean new NIS records appear slightly elevated for the 2012-2017 period but the value still overlaps with the confidence intervals of the previous time segment (1997-2011).

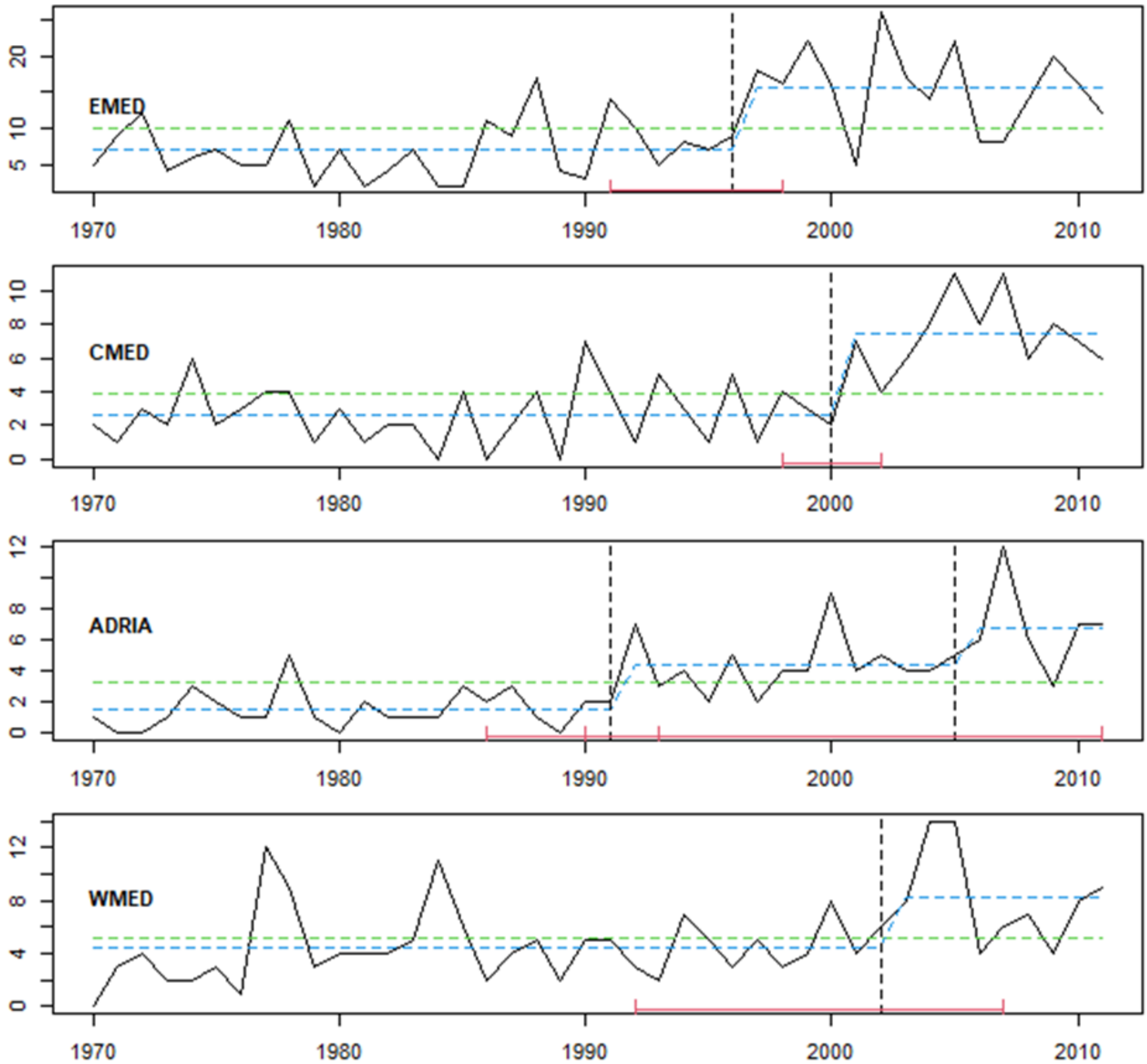



Figure 37: Number of new NIS introductions per year (y-axis) in different Mediterranean subregions for the period 1970-2011 (continuous black line) with breakpoints and fitted mean values superimposed: vertical dashed line indicates breakpoint or year of significant change in the mean values of new NIS, with 95% confidence intervals around the breakdate (CIs) in red brackets; dashed green line shows the null model of no temporal change in new NIS numbers; and dashed blue line represents fitted mean values before and after the identified breakpoint.

Table 26: Results of the breakpoint structural analysis for each Mediterranean subregion for the period 1970-2011, with 2012-2017 considered as the assessment period. Segment yearly means are the fitted mean values of the yearly number of new NIS before and after the breaks, with 95% Confidence Intervals of the fitted means (95% CI) in parentheses. EMED = eastern Mediterranean (i.e., Aegean and Levantine), CMED = central Mediterranean (i.e., Central and Ionian Sea), ADRIA = Adriatic, WMED = western Mediterranean

| | **Breakdate** | **Segment yearly means (95% CI)** | | | **2012-2017 mean (95% CI)** |
|---|---|---|---|---|---|
| | | Segment 1 | Segment 2 | Segment 3 | |
| **EMED** | 1996 | 6.9 (5.4, 8.5) | 15.6 (12.4, 18.8) | na | 17.7 (11.1, 24.2) |
| **CMED** | 2000 | 2.7 (2, 3.3) | 7.5 (6, 8.9) | na | 12.5 (6.7, 18.3) |
| **ADRIA** | 1991/2005 | 1.5 (1, 2) | 4.4 (3.4, 5.5) | 6.8 (3.8, 9.9) | 6.7 (4.9, 8.4) |
| **WMED** | 2002 | 4.4 (3.5, 5.4) | 8.2 (5.4, 11.1) | na | 8 (6.1, 9.9) |

357. Linear regression was applied to the five 6-year reporting periods that span and capture the significant changes in NIS introduction rates in the 4 Mediterranean subregions (1988-1993, 1994-1999, 2000-2005, 2006-2011, 2012-2017). The introduction rates (i.e., 6-year regression slopes) produced by this analysis are rather similar to the previous approach and reveal the same broad patterns in each subregion (Figure 5), the only difference being that comparisons between introduction rates of the last assessment period (2012-2017) and the rest of the timeline are not as straightforward to interpret with regards to GES targets due to short term fluctuations. Nevertheless, it is still evident that a significant increase in new NIS records occurred in the period between the mid-1990’s and the mid-2000’s in all Mediterranean subregions, with relatively stable rates from then onwards and no sign of decrease until 2017. On the contrary, there has been a significant increase in NIS introduction rates in the CMED after 2011 and a slight increase, albeit not statistically significant in the EMED.

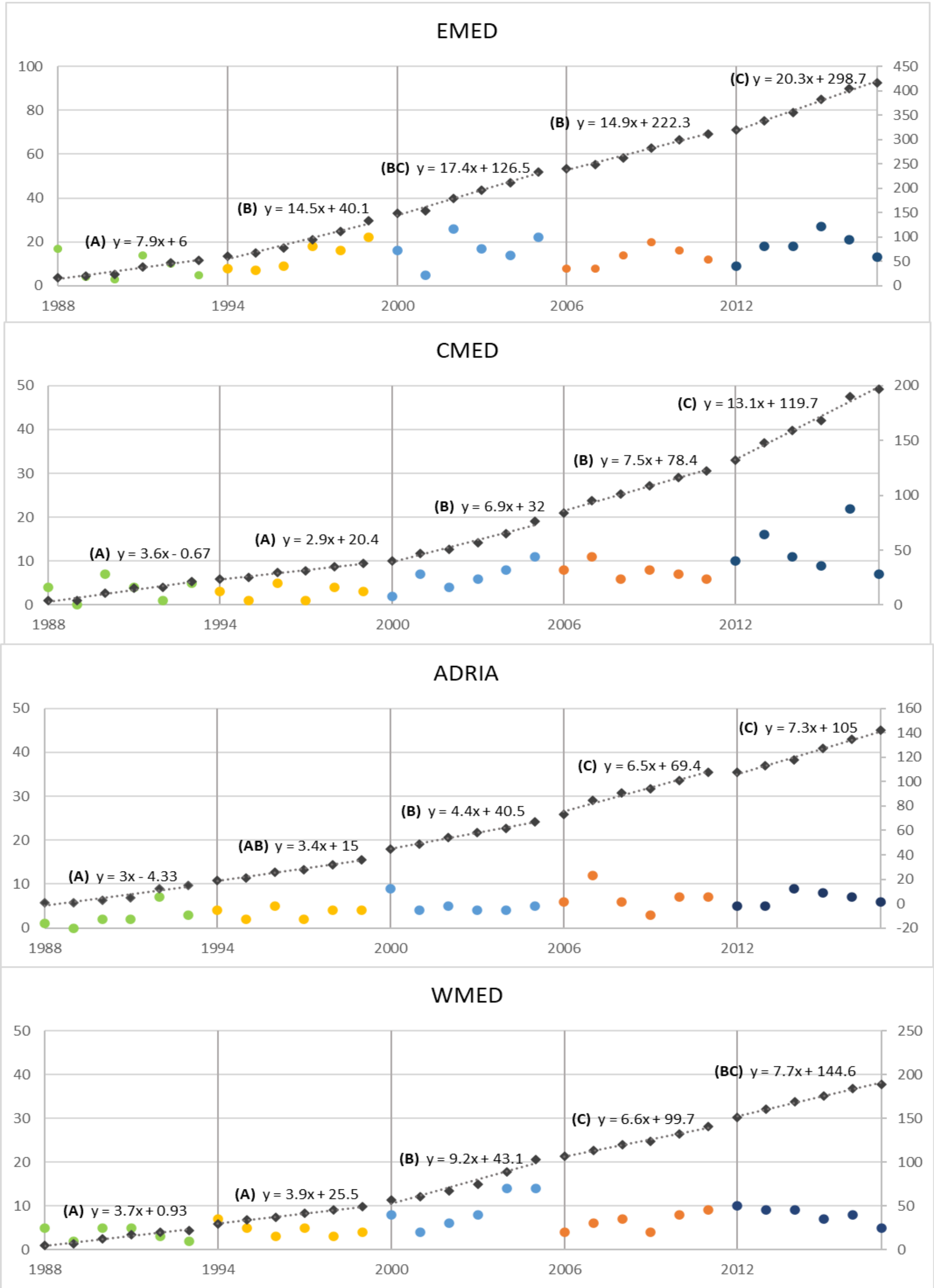



Figure 38: Annual new NIS records (coloured symbols) for each Mediterranean subregion and the trends in cumulative NIS records (dark grey symbols and fitted lines) for the five assessment periods between 1988 and 2017. The equations from the linear regression models are displayed above the fitted curves; letters in parentheses indicate statistically different regression slopes (yearly introduction rates) i.e., slopes that belong to different letter groups are different at the 0.05 level of significance.

*Trends in spatial distribution*

Total xenodiversity

358. An informative way to summarise the changes in the distribution of NIS at the total xenodiversity level is by employing Venn diagrams to visualise the overlap between NIS species in each subregion and how this has changed over time (Figure 6). The eastern Mediterranean contains the highest number of unique species, even though the percentage has declined from 69% to 50% since 1970. An overall decline in the proportion of unique species is also evident in the Western Mediterranean and the Adriatic but an increase is observed in the Central Mediterranean. Meanwhile, the total number of species shared among all subregions has risen from 6 in 1970 to 84 in 2020 (2.2% to 8.3% respectively), signalling the increasing homogenisation of NIS species in the basin.

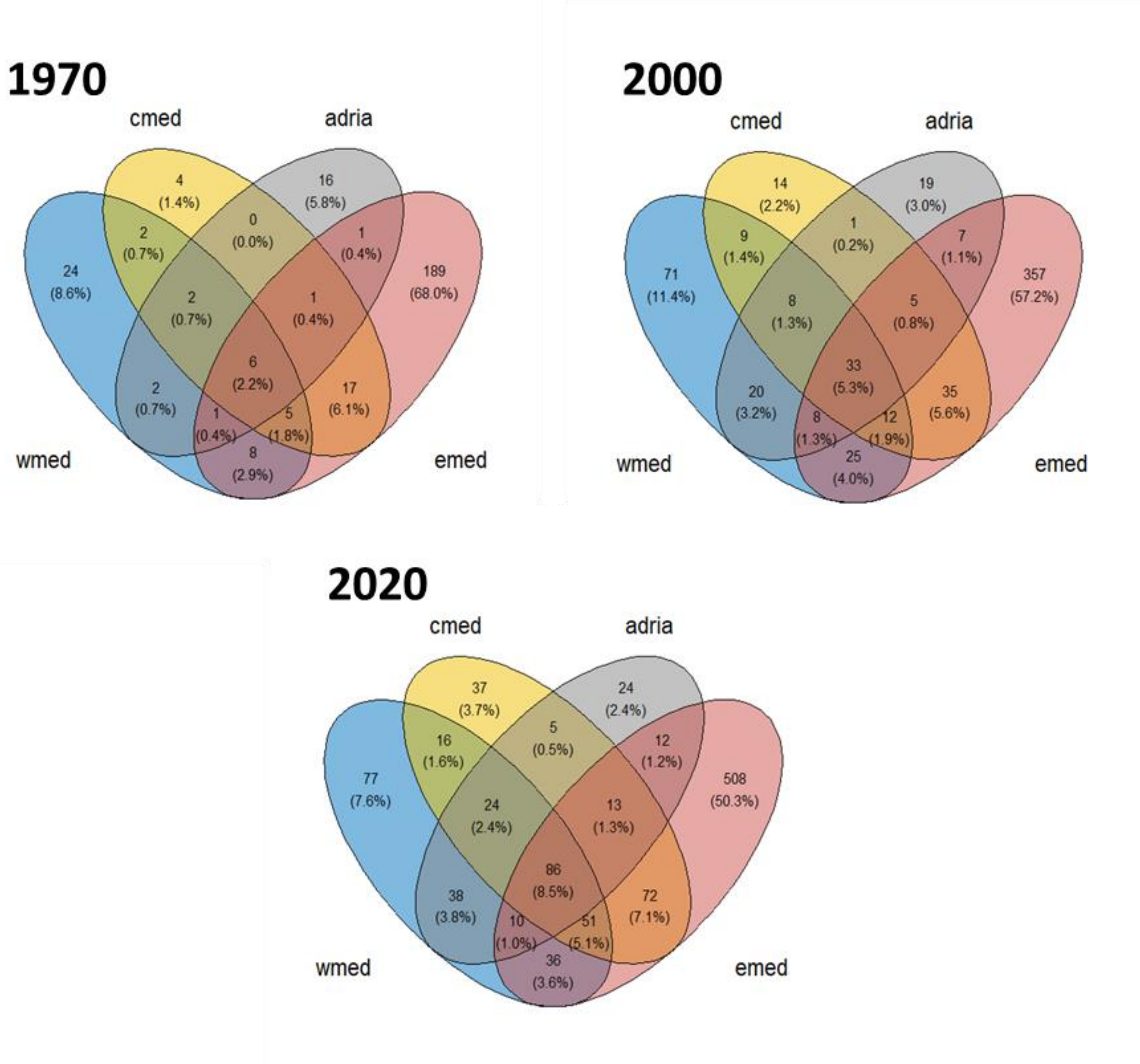



Figure 39: Cumulative number of species that are unique to or shared between the 4 Mediterranean subregions in 1970, 2000 and 2020

Individual species

359. Distribution maps of selected species are displayed to give a general overview of their spread patterns over time. The associated frequency histograms (number of observations in each time bin) certainly highlight an increase in recording effort over the last 10-15 years but at the same time serve as an indication of the rate and intensity of dispersal. Lessepsian fish species (Figures 7-9), first appearing in the Mediterranean after 1990, are characterised by a typical progression from the southern Levantine

northwards but then these patterns vary, depending on life cycle characteristics and environmental tolerances. ***Lagocephalus sceleratus***, with adult active migration as well as pelagic larval dispersal, proliferated rapidly throughout the Levantine and the southern Central Mediterranean but also penetrated the Central Aegean during the warm summer of 2007 and reached the northern Aegean already in the 2006-2011 period. In 2012-2017 it expanded its distribution and has been slowly advancing in the Adriatic and the southern Western Mediterranean. ***Pterois miles*** was first recorded in Israel in 1991 (Golani & Sonin, 1992) but, with the exception of a single record in Greece in 2008, only started its invasion process after 2012. Until 2017 it had rapidly expanded throughout the Levantine and the southern Aegean, with sporadic records in the Central Mediterranean (Ionian coast of Greece, Sicily and Tunisia). In the last few years, being in the radar of Citizen Science initiatives as an emblematic and highly impactful invasive species (Galanidi et al., 2018), *P. miles* is characterised by a dramatic explosion of observations but more importantly it has penetrated into the Adriatic and is spreading north, an indication that its lower thermal tolerance limit is a critical factor for future spread (Dimitriadis et al., 2020). ***Plotosus lineatus***, a venomous, swarming catfish, is a typical example of the boom-and-bust dynamics often characterising invasive species. After the first report in 2001 (Golani, 2002), it underwent a population explosion and rapidly expanded along the Israeli coast already by 2008-2011 (Edelist et al., 2012). [Note: the distribution records in the current map reflect geo-referenced data availability]. While the species remains widespread in the eastern Levant, its spread northwards has advanced at a slower pace, presumably due to the demersal nature and short duration of its larval phase (Galanidi et al., 2019). *Plotosus lineatus* is the first fully marine species to be included in the list of species of Union concern of Council Regulation 1143/2014 on IAS (EU, 2014).

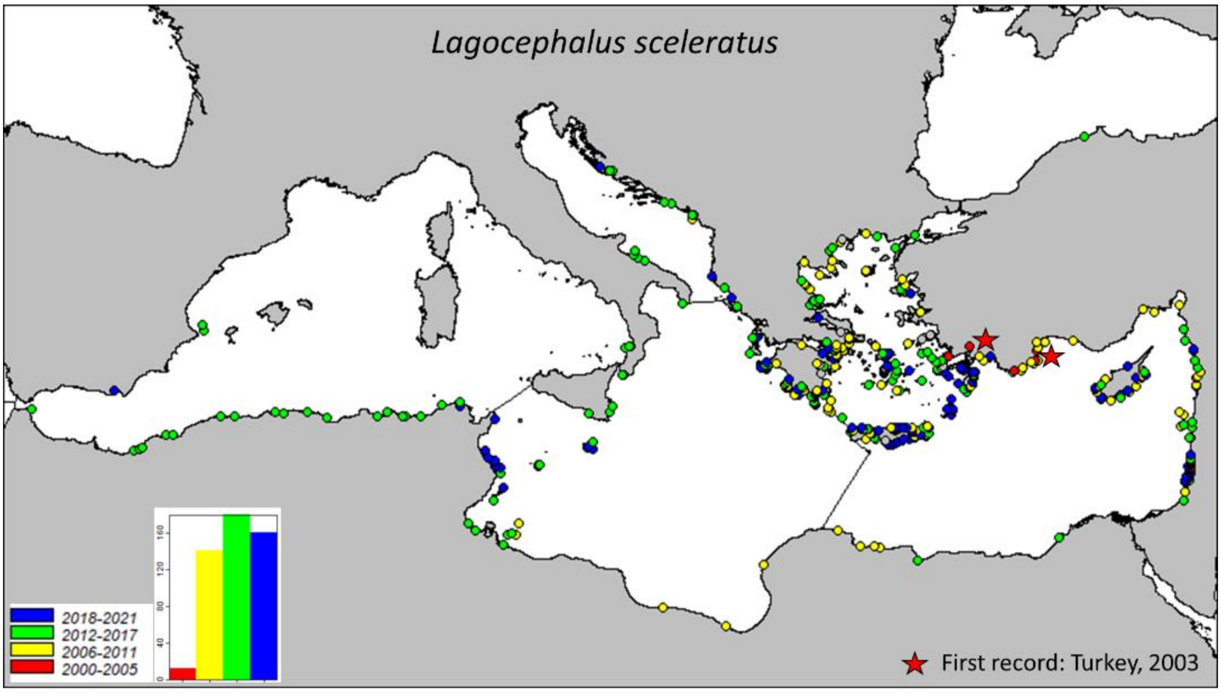



Figure 40: Distribution of Lagocephalus sceleratus in the Mediterranean Sea. First record(s) annotated with an asterisk, different colour symbols correspond to different 6-year reporting periods, corresponding frequency histograms depict number of records in each time bin.

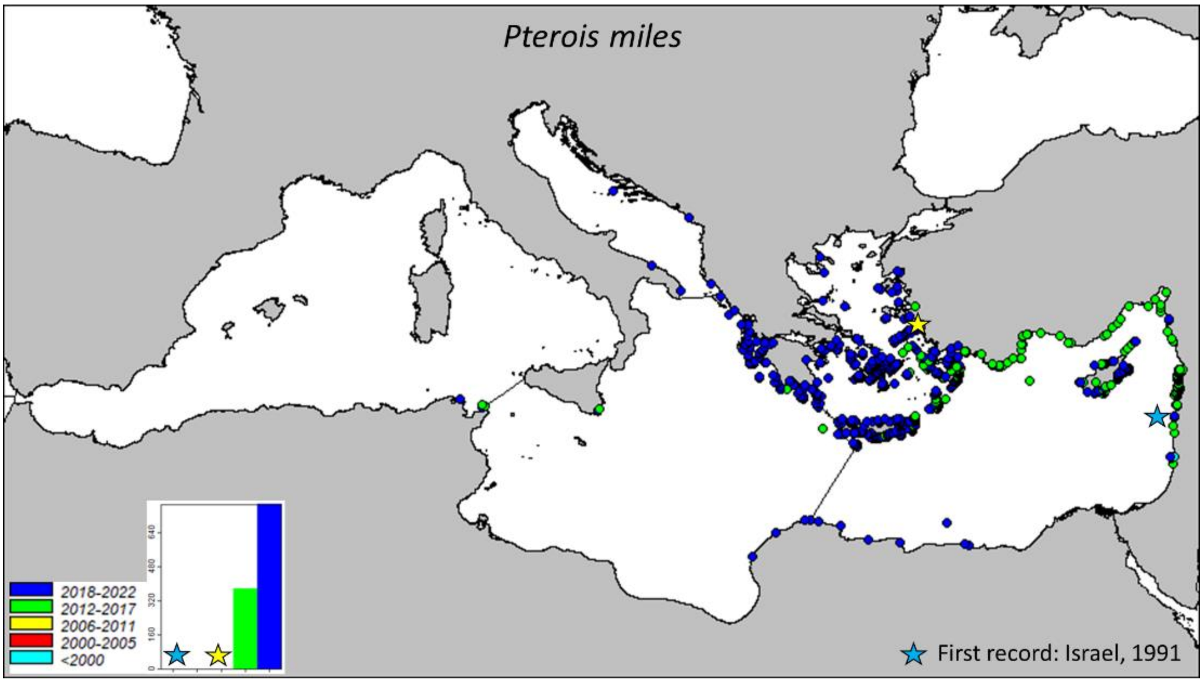



Figure 41: Distribution of Pterois miles in the Mediterranean Sea. Details as in Figure 7.

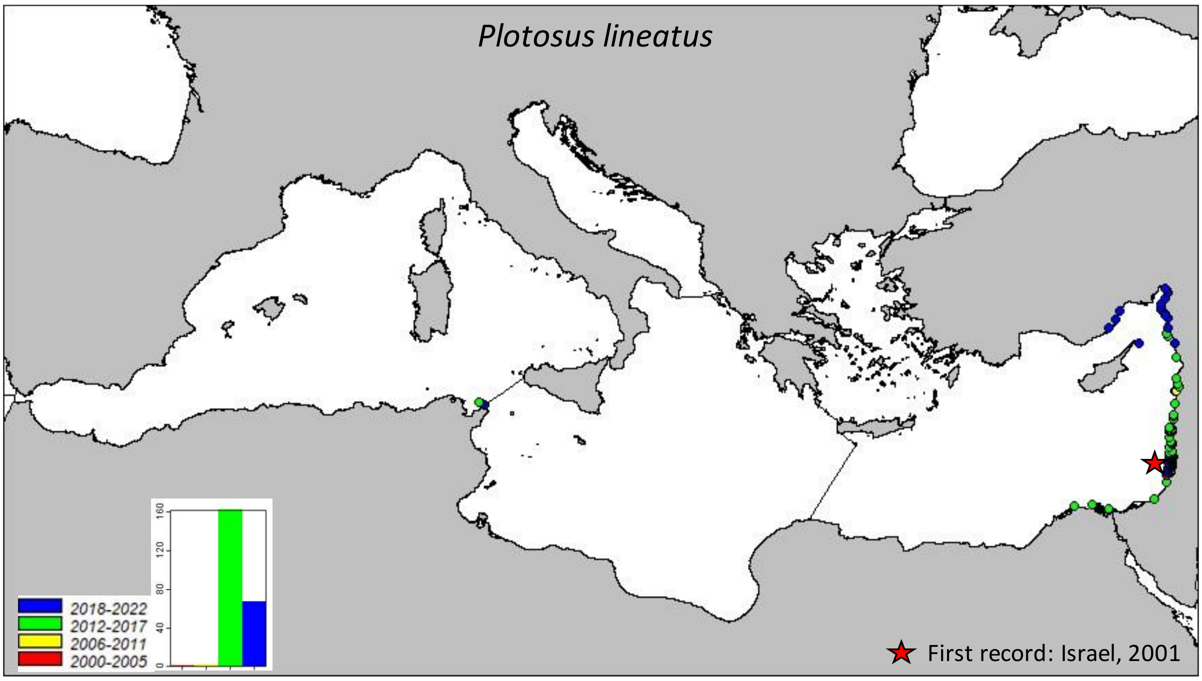



Figure 42: Distribution of Plotosus lineatus in the Mediterranean Sea. Details as in Figure 7.

360. The distribution pattern of ***Mnemiopsis leydyi*** in the current map (Figure 10) is largely a result of the spatial and temporal distribution of recording effort, following distinct bloom events (e.g., more than 60% of all mapped observations stem from two data series, one from large scale surveys in the Northern Aegean between 2004-2010 – Siapatis pers.comm. to ELNAIS - and the other from sampling in the Northern Adriatic in 2016 – Malej et al., 2017). The species is clearly present throughout the basin, having arrived in the early 1990's as a range expansion of a Black Sea population or with ballast water following its introduction into the Black Sea (Shiganova et al., 2001, Bolte et al., 2013) and subsequently spread in all subregions, aided by ballast water transport or unaided with water currents. Despite a considerable lag time from first introduction to population growth in the Mediterranean (Bolte et al., 2013), *M. leydyi* is undoubtedly established in most subregions.

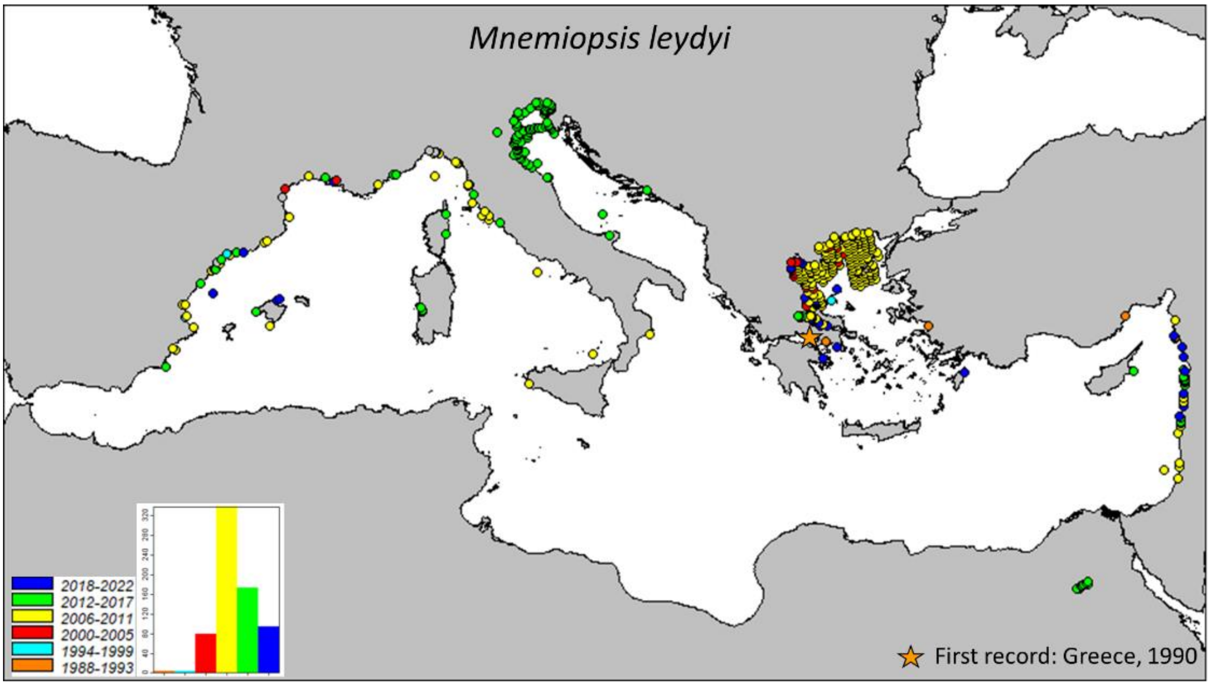



Figure 43: Distribution of Mnemiopsis leydyi in the Mediterranean Sea. Details as in Figure *7*.

361. ***Callinectes sapidus*** is believed to have been introduced multiple times in the Mediterranean through a variety of pathways, among which ballast water transfer and accidental escape or intentional release through live food trade and mariculture are the most likely (Nehring, 2011). Even though sporadically recorded for decades, the species exhibited a massive proliferation in the last decade (Figure 11), including in the western Mediterranean, with increasing and invasive populations, and it is gaining commercial importance throughout the basin (Kevrekidis & Antoniadou, 2018; López and Rodon, 2018). Aside from natural dispersal, anthropogenic secondary introductions are suspected in many cases (Zenetos et al., 2020).

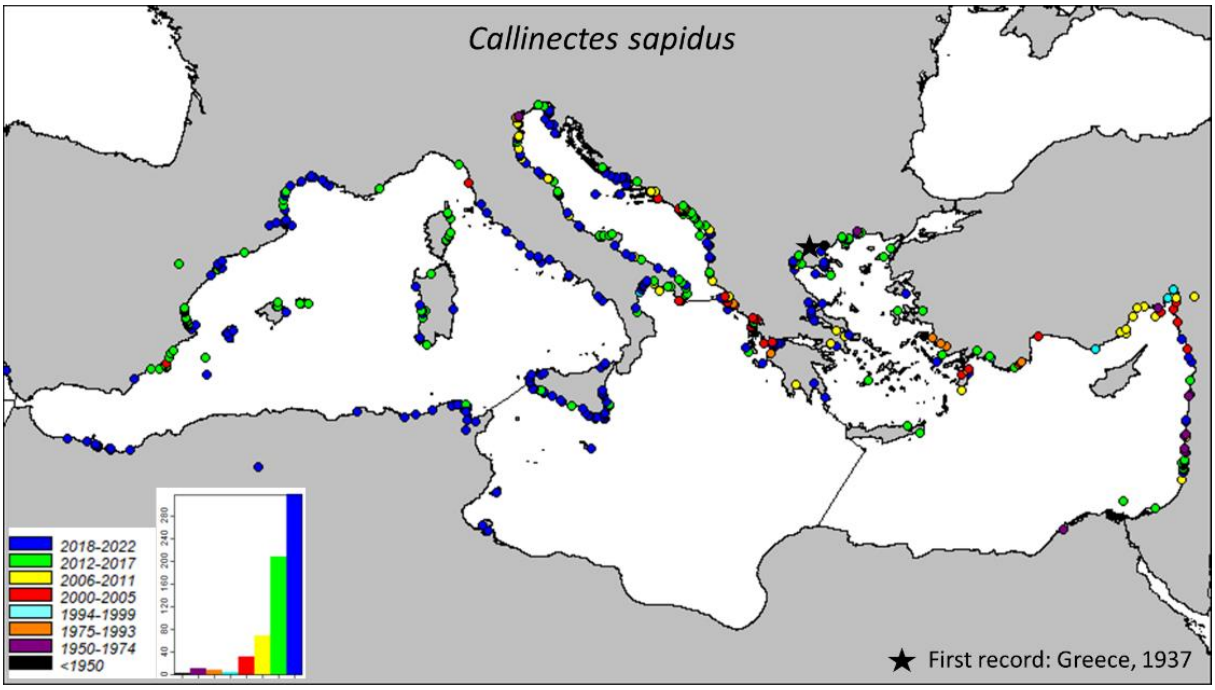



Figure 44: Distribution of Callinectes sapidus in the Mediterranean Sea. Details as in Figure 7.

362. ***Anadara transversa*** is a marine bivalve native to the Northwest Atlantic, that has been introduced to the Aegean and Adriatic Seas (Figure 12). Its first records from the Aegean Sea [Izmir Bay (Demir, 1977) and Bay of Thessaloniki (Zenetos, 1994)], were attributed to introduction in ships hulls. Very few records were reported until 2000 and then it was simultaneously found along a 200-km coastline from Venice to Ancona in the northern Adriatic Sea, its presence attributed to accidental introduction with oyster transfers. However, study of subfossil assemblages enabled Albano et al (2018) to disentangle the distinct stages of invasion of *A. transversa*. They concluded that the species was introduced in the 1970s but failed to reach reproductive size until the late 1990s because of metal contamination, resulting in an establishment and detection lag of 25 years. Very scarce records of the species exist after 2017 although the species is established in the Northern Adriatic. In fact, abundances reaching 42 ind. $m^{-2}$ $day^{-1}$ were documented in artificial collectors used for settlement analyses deployed at commercial mussel parks (Marčeta et al. 2022).

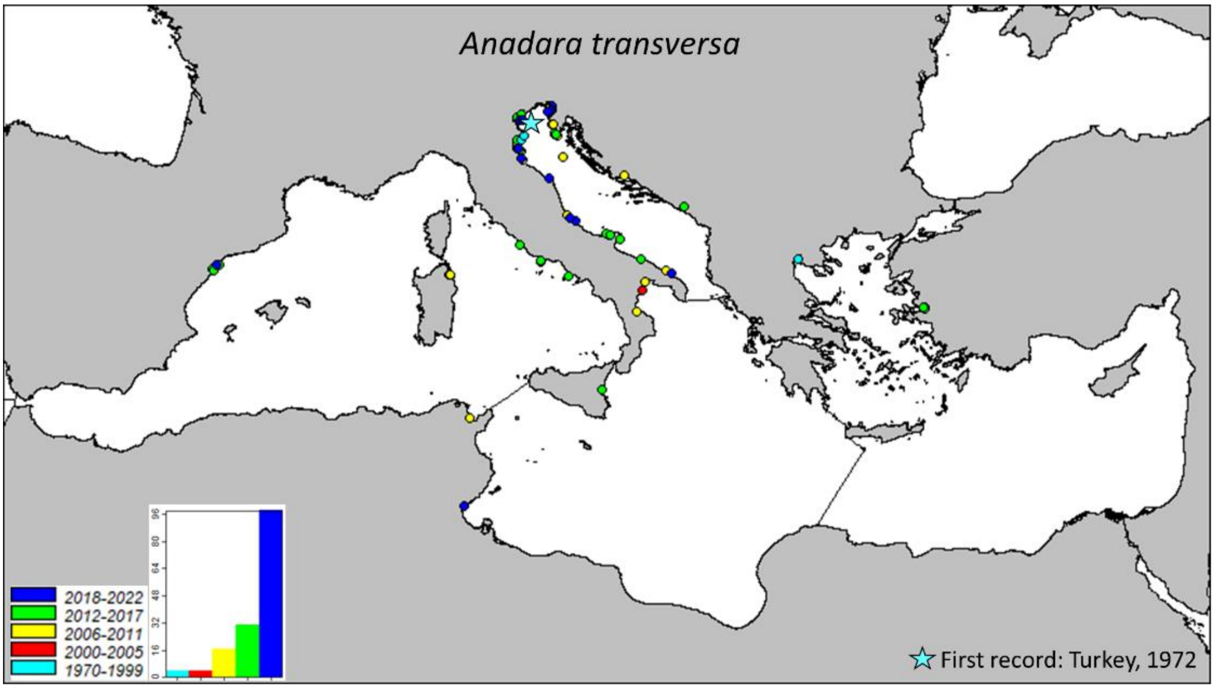



Figure 45: Distribution of Anadara transversa in the Mediterranean Sea. Details as in Figure 7.

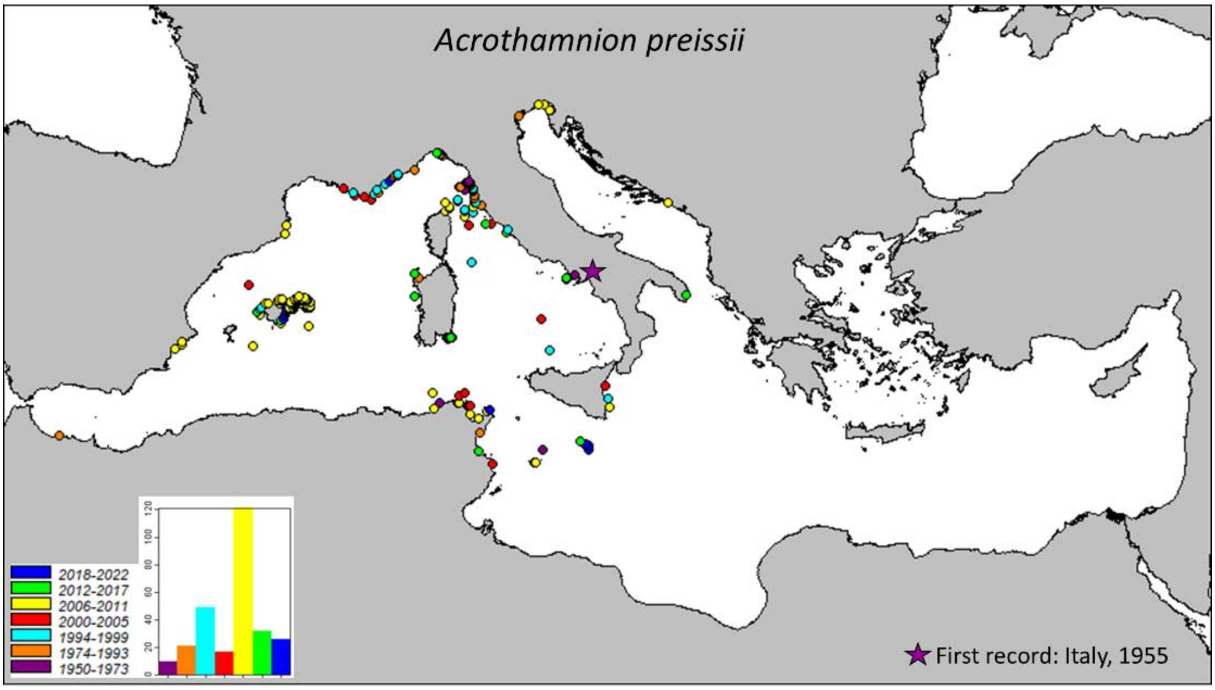



Figure 46: Distribution of Acrothamnion preissii in the Mediterranean Sea. Details as in Figure 7.

363. ***Acrothamnion preissii*** is a tropical rhodophyte of Indo-Pacific origin that was first reported in the Mediterranean Sea in 1955 from Naples, Italy, introduced presumably with vessels (Figure 13). It has become invasive in many localities, particularly in the western part of the basin (Verlaque et al. 2015). Its expansion in the Ligurian Sea in the 1994-1999 period may be linked to climate change in the 1980-90s (Bianchi et al., 2019). *Acrothamnion preissi* is classified among the ten worst invasive species in the Mediterranean, based on their negative impact score (accounting only for impacts on biodiversity) (Tsirintanis et al. 2022).

364. The green alga ***Codium fragile*** **subsp.** ***fragile*** is a global invader that originates from NW Pacific that was first detected in front of the Banyuls marine station (France). A first wave of expansion took place in the period 1971-87 mostly in the northwestern Mediterranean and the Adriatic Sea (Figure 14). After that, a peak in number of occurrence records was observed between 2006-2011 presumably due to scientific effort as well as to citizen science. Along the Spanish coastline in particular, this peak is related to some extent to long-term monitoring data availability. The species is easy to identify as it forms dense sponge-like fronds of low height that become a major structural element of the invaded habitat and dominate the macroalgal community and thus it is not a surprise that many of the latest records (2018-22) have come from citizen scientists reporting to inaturalist. Its introduction has been attributed to vessels but accidental introduction with oysters is also suspected. It appears to be absent from the south-east coasts of the Mediterrranean, while in the Levantine Sea it was detected after 2000.

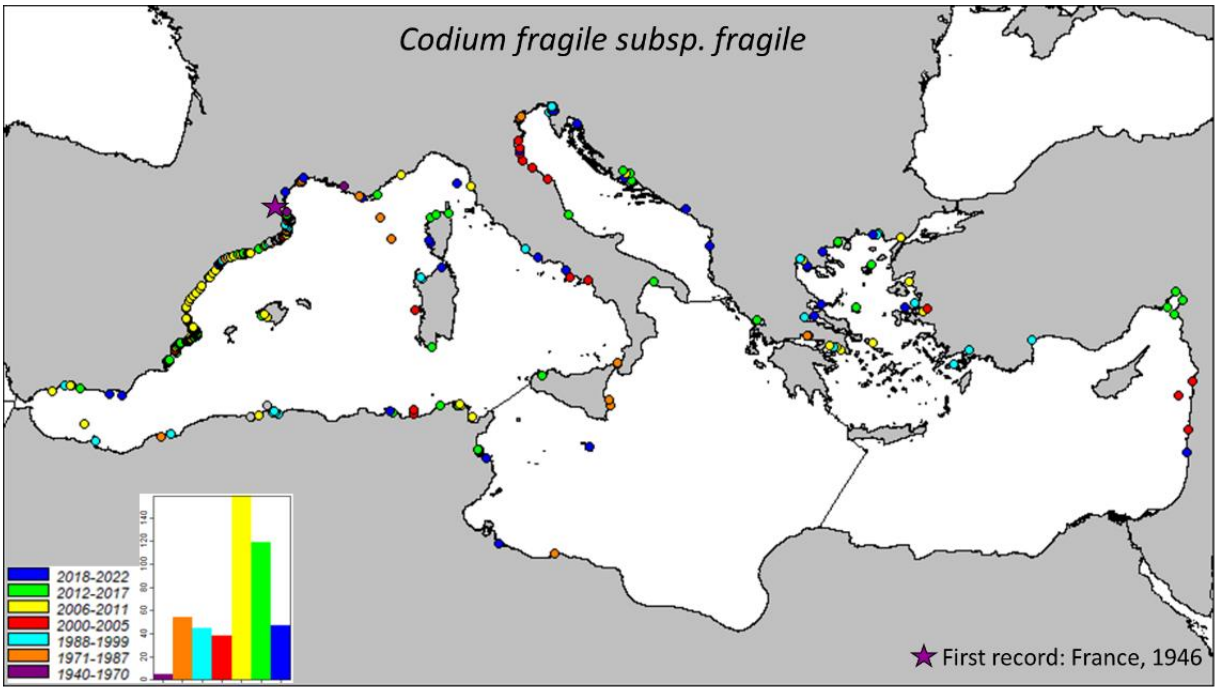



Figure 47: Distribution of Codium fragile subsp. fragile in the Mediterranean Sea. Details as in Figure 7.

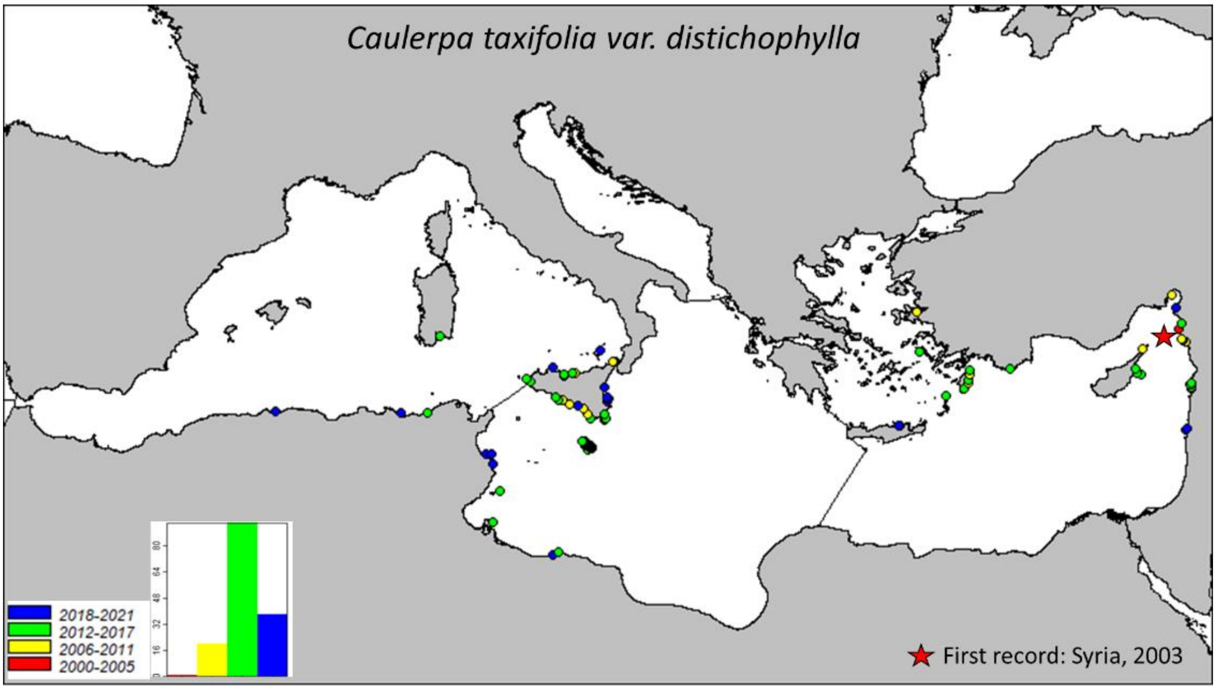



Figure 48: Distribution of C. taxifolia var. distichophylla in the Mediterranean Sea. Details as in Figure 7.

365. The temporal distribution ***Caulerpa taxifolia var. distichophylla*** does not follow any obvious pattern but is rather a typical example of research effort combined with taxonomic expertise. Initially reported as *C. mexicana* from Syria in 2003 (Bitar et al. 2017) and as *C. taxifolia* from Iskenderun in 2006 (Cevik et al., 2007), identification of this slender *Caulerpa taxifolia* strain was proposed by Jongma et al. (2012). Subsequently in the period 2012-17 many records of the species have been published and this continued as the scientific effort increased in the Western and eastern Mediterranean populations of *C. taxifolia var. distichophylla* are probably the result of introduction events from southwestern Australia. Although the vector of primary introductions remains unknown (aquarium trade or shipping), maritime traffic appears to be the most likely vector of secondary dispersal. *Caulerpa taxifolia var. distichophylla* is closely related to *C. taxifolia,* hence interbreeding with the other *C. taxifolia* strains in the Mediterranean Sea might be expected to occur.

366. With only one record since its first finding in 2002, presumably resulting from shellfish transfers, the brown alga ***Rugulopteryx okamurae*** was considered as locally established in France (Verlaque et al (2015). Following a record in Ceuta in 2015, a massive expansion was observed within the strait of Gibraltar and the Alboran Sea coasts of Spain in 2017 and the species became invasive in record time (García-Gómez et al. 2020). The lifecycle of this species, its ecological characteristics such as its euthermia and allelopathy as well and high competitiveness over other native and invasive species may be highly responsible of its invasive behaviour (García-Gómez et al., 2018). In the period 2020-21, *R. okamurae* extended its distribution in Morocco, France and Spain, reaching Madeira (Bernal-Ibáñez et al., 2022). In France, despite occurring for 20 years in the Thau lagoon, *R. okamurae* has not displayed an invasive behaviour in the area. Conversely, in Marseille, with the winter sea surface temperature usually above 13 °C, this alga persists throughout the winter, and therefore, rapidly spreading when conditions are favourable (Ruitton et al. 2021). The new Commission Implementing Regulation (EU) 2022/1203 of 12 July 2022 amending Implementing Regulation (EU) 2016/1141 to update the list of invasive alien species of Union concern now includes *Rugulopteryx okamurae*.

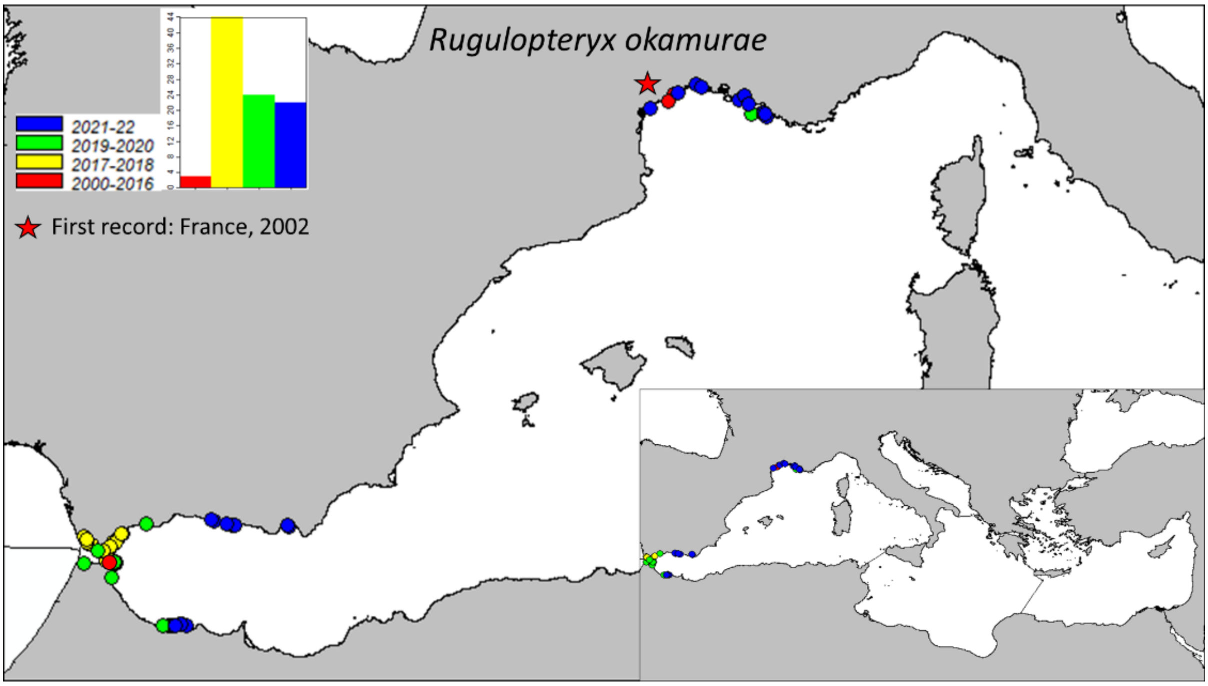



Figure 49: Distribution of Rugulopteryx okamurae in the Mediterranean Sea. Details as in Figure 7.

<u>Key findings for Common Indicator 6 (CI6): Non-Indigenous Species</u>

367. To the extent that Good Environmental Status in relation to CI6 is defined as "Introduction and spread of NIS linked to human activities are minimised, in particular for potential IAS" it is concluded that GES has not been achieved in any of the Mediterranean subregions. The results of trends analyses indicate that for the past 15-20 years new NIS introduction rates have been relatively stable in the West Mediterranean and the Adriatic, close to levelling off in the East Mediterranean but increasing in the Central Mediterranean. In none of the subregions has a reduction in new NIS introductions been observed based on data up to 2020. The appearance of some new NIS in each subregion is the result of range expansion from different subregions where they were initially introduced, as evidenced by the increasing proportion of NIS shared among all Mediterranean subregions. Nevertheless, and in contrast with the other subregions, the proportion of unique new NIS is steadily rising in the Central Mediterranean, thus the increasing new NIS introduction rates there cannot be solely attributed to natural dispersal from the other subregions. Furthermore, a number of invasive, high-impact NIS have displayed an increased geographic expansion in the last decade or so, which can be deduced even behind the "noise" of increased detection and reporting. NIS species of warm affinities with long-range pelagic dispersal appear to have been favoured by climate change and increased seawater temperatures to penetrate the cooler regions of the Mediterranean, secondary anthropogenic dispersal however still plays an important role in the spread of the more sedentary species.

368. Clear interpretation of these trends is hampered by the lack of long-term standardised monitoring data, as it is not possible to disentangle the confounding effects of differential recording efforts spatially and temporally from real changes in pathway pressure or vector management. An additional challenge, also pertinent to the DPSIR analysis for NIS, is that spatially explicit, quantitative pathway pressure data are not uniformly available throughout the Mediterranean, such that any attempted correlations would be skewed or incomplete. This was already identified in UNEP/MED WG.502/Inf.11 (2021) and emerges as a priority in order to strengthen further GES assessments of CI6.

369. Trends in abundance were not assessed as they require long time series of standardised monitoring data from the same locations, the collection and collation of which at the regional level is not sufficiently co-ordinated. Furthermore, an agreed methodology has not been developed for a formal quantification of changes in spatial distribution, which cannot be properly assessed without true presence-absence data.

370. With regards to NIS impacts, even though assessment and mapping have been conducted at the regional level (Katsanevakis et al., 2014; 2016), there is plenty of scope for refinement and improvement as most reported impacts are still based on weak evidence (Tsirintanis et al., 2022). Thus, conducting manipulative and field experiments to examine impacts on species, habitats and ecosystems remains a priority for NIS research. Moreover, considering that species distributions have changed since the first Mediterranean-wide CIMPAL, but also new information has emerged regarding impact strength, NIS impacts need to be re-evaluated.

Measures and actions required to achieve GES for Common Indicator 6 (CI6): Non-Indigenous Species

371. With regards to suitable data availability, the majority of the CPs have developed, and many are already implementing IMAP-compliant monitoring programmes. Furthermore, the IMAP Data and Information System is operational and has already started receiving NIS data, such that standardised time series are anticipated to be available for the next assessment cycle. This should make possible the formal quantification of abundance and spatial distribution changes and increase our confidence in the assessment of trends in temporal occurrence. If CPs have not already initiated the process, IMAP can assist in co-ordinating the development of priority NIS lists for monitoring of abundance through risk analysis and risk assessment. Early detection and early warning systems can be informed by regularly updating the spatial distribution information entered into MAMIAS and the IMAP Info System.

372. Threshold values for trends in temporal occurrence have not been set yet but methodologies and approaches are under discussion through regional co-operation. Quantifying/modelling pathway pressure can assist in specifying quantitative targets (percentage reduction) by introduction pathway. Importantly, all these methodological steps need to be adapted for GES assessment at the national level. The effect of reporting lags on new NIS data and trends analysis in this assessment was circumvented by not using the data of the last 3 years (2018-2020), however it would be beneficial to adopt a commonly agreed methodology to deal with this issue in order to avoid loss of information.

373. Next important steps for GES assessment of NIS include the elaboration of the remaining aspects of CI6 that relate to impacts, by further developing assessment criteria and quantitative targets for the most vulnerable/important species and habitats at risk. This is work that ideally should be co-ordinated with the implementation of EO1 Common Indicators CI1 and CI2 and EO6 on sea floor integrity.

## 2.3 Coast and Hydrography

### 2.3.1 EO7 Alteration of hydrographical conditions

**Methodology:**

- The EO7 Common Indicator 15 reflects the location and extent of the habitats potentially impacted by hydrographic alterations due to new developments (QSR 2017, 2018), i.e., upcoming constructions. It concerns area/habitat and the proportion of the total area/habitat where alterations of hydrographical conditions are expected to occur. The GES is achieved when negative impacts due to a new structure are minimal with no influence on the larger scale coastal and marine system.
- In relation to the 2017 Med QSR countries still have difficulties to provide monitoring data according to the Guidance Factsheet, although the methodology has been simplified. The information received by majority of the countries is of a descriptive nature, rather homogeneous, regardless of the same annotated questionnaire developed in the frame of the EcAp MED III and IMAP MPA projects. However, some scientific partners provided very relevant information of the hydrographic parameters based on satellite data and mainly related to climate change impacts. It seems that all these parameters that are increasing their values due to climate change have significant impacts on all other EOs and should be taken into account for an integrated assessment.
- No monitoring data were reported so GES assessment could not be made according to the Guidance Factsheet (UNEP/MAP, 2019). Therefore, for this assessment other sources of information were used to provide a general overview of the hydrography in the Mediterranean, such as national reports prepared in the context of the EcAp MED III project, IMAP MPA project and by some other countries, and those provided by the scientific partners (i.e., Mercator Ocean) in particular on hydrographic parameters that are changing due to climate change.

*Common Indicator 15: Location and extent of the habitats impacted directly by hydrographic alterations*

374. Large-scale coastal and off-shore developments have the potential to alter the hydrographical regime of currents, waves and sediments in marine environment (UNEP/MAP/PAP, 2015). To address this, UNEP/MAP has included the Ecological Objective 7 “Alteration of hydrographical conditions”, as part of the IMAP of the Mediterranean Sea and Coast (UNEP/MAP, 2016a). EO7’s Common Indicator 15 “Location and extent of habitats impacted directly by hydrographic alterations” considers marine habitats which may be affected or disturbed by changes in hydrographic conditions due to new developments. The main target of this indicator is to ensure that all possible mitigation measures are taken into account when planning the construction of new structures, in order to minimize the impact on coastal and marine ecosystem and its services, integrity, and cultural/historic assets. Good environmental status (GES) regarding EO7 Hydrography is achieved when negative impacts due to new structures are minimal with no influence on the larger scale coastal and marine systems.

Key Messages (CI15)

375. All countries had difficulties with the monitoring of this indicator according to the Guidance factsheet and could not provide monitoring data therefore, the Good Environmental Status has not been assessed.

376. A baseline assessment has been made using data from the national reports prepared in the frame of EcAp MED III and IMAP MPA projects, including some other countries that used the same report format, and from the data provided by scientific partners, Mercator Ocean in particular.

377. Climate change seems to have far bigger impacts on the habitats and marine ecosystems in general than the impacts of hydrographic alterations caused by new structures.

378. Due to the difficulties that countries have with reporting on this indicator further simplification of the Guiding Factsheet is needed so to allow countries to report on the physical loss of habitats, i.e., the structures' footprint.

Key assessment findings per theme / indicator

379. GES has not been assessed for EO7 CI 15 because countries had difficulties to monitor this indicator according to the Guidance Factsheet and therefore, monitoring data was not provided.

380. There are insufficient surveys and monitoring data provided by the countries according to the Guidance Factsheet. This is mainly related to the complex and demanding methodology, as well as institutional and scientific capacities. Assessments that estimate the extent of hydrographic alterations (knowing conditions before and after construction) and its intersection with marine habitats were not provided. Also, related studies such as EIA and SEA reports are either publicly inaccessible or conducted by various different methods. The use of numerical models in EIA to assess hydrographic alterations is costly and time-consuming and requires technical expertise and knowledge as well as statistically significant sets of hydrographic parameters;

381. The link to EO1 is essential for this indicator. Maps of benthic habitats in the zone of interest (broad habitat types and/or particularly sensitive habitats) are required. Therefore, identifying the priority benthic habitats for consideration in EO7, together with assessment of impacts, including cumulative impacts is a cross-cutting issue of priority for EO1 and EO7. Efforts need to be given to detect the cause-consequence relationship between hydrographic alterations due to new structures and habitat deterioration (i.e., scientific gaps and uncertainties exist);

382. Spatial resolution and temporal scope (historic data) of openly available spatial data on hydrographic alterations (i.e., CMEMS products) are not sufficient. Due to the scale of the locations where structures are constructed or planned are rather local (micro-location).

383. Although there are certain systematic databases of spatial data (e.g., EMODnet, CMEMS), the availability and spatial resolution of certain spatial data varies significantly at the level of countries (for example, Malta and Slovenia have bathymetric data measured by LIDAR technology, while some countries do not have these at all).

Measures and actions to achieve GES in relation to CI15

384. Establishment of the national IMAP, monitoring programme that will systematically collect statistically significant data of the hydrographic parameters is required – first, to allow modelling of hydrographic alterations of the planned structures at the very local scale in the EIA/SEA and second, to provide subsequent monitoring data once the structures have been built. A close cooperation has to be established with the authorities that are responsible for planning of such structures including those responsible for EIA. In parallel, mapping of habitats in a surrounding area that could possibly be impacted by such hydrographic alterations should be prepared (link to EO 1).

385. Creation of a digital spatial database of all data from EIA/SEA including spatial coverage and location of the intervention, existing and planned structures and marine habitats. The Copernicus Marine services, the EMODnet service and the spatial planning information system of individual countries (via WMS or WFS layers) (Baučić et al., 2022b) should be used, thus providing all necessary data for the CI 15 assessments and monitoring;

386. As the rational possibility, a revision of the existing indicator Factsheet should be considered that will simplify the method to allow countries to report on the physical loss of habitats, i.e., the structure's footprint only.

387. Considerations should also be given to the possibility of proposing a set of climate change related indicators in the frame of IMAP. This could include monitoring of hydrographic parameters (e.g., salinity, temperature, waves and currents) that are changing rapidly due to climate change. The use of hydrographic parameters reported within EO 5 on eutrophication should be taken into account with the use of remote sensing and other available sources for climate change in order to determine the hydrographic alterations in the Mediterranean region. Such alterations may have much stronger impacts on marine habitats and ecosystems than those monitored by the CI 15 itself.

### 2.3.2 EO8 Coastal ecosystems and landscapes

**Methodology:**

- The assessment of this indicator in the 2017 Med QSR was rather subjective as no monitoring data was available at the time. The current assessment is based on the data provided by the majority of the countries and gives a good insight into the baseline status. It will be with the second set of monitoring data when changes could be assessed with regard to GES that is country-specific. A Guiding document has been prepared that includes a list of criteria which may be used by the countries when defining their GES (PAP/RAXC, 2021). It was successfully tested in Morocco (PAP/RAC, 2022).
- The relationship with other EOs is important with relation to land sea interactions and communication between the terrestrial and marine habitats. Within the Ecological Objective 8 (EO8) there is no possibility for integration between the two indicators, i.e., land cover and the coastline, because there is no firm correlation.
- For CI 16 data is aggregated from the national reports (seventeen out of twenty Mediterranean countries reported).
- The assessment of CI 16 is done for 31 283 km out of 54,992 km of total Mediterranean coastline (or 57 %) as provided by the national reports referring to various years for baseline data (2018 - 2022). Nonetheless, the aggregated baseline data shows that 15 % of the assessed coast is artificial or 8% of the total Mediterranean coastline.
- Two sets of monitoring data were elaborated only for three countries for periods of 6 and 10 years, to observe the change. Change of artificial coast fluctuates around zero (+0.4, - 1.1 and 0,1 %) when expressed as a proportion of reference coastline length. In absolute value there is an increase of artificial coastline of 50 km in these three countries.

388. EO8 is focusing on the terrestrial part of the coastal areas where human activities are continuously altering coastal ecosystems and landscapes. The objective of EO 8 is to ensure that the natural dynamics of coastal areas are maintained and coastal ecosystems and landscapes are preserved. The monitoring under EO 8 addresses coastal artificialisation: construction of buildings and infrastructure along the coastline (such as defence structures, ports and marinas, etc.) and land cover change in accordance with the Guidance factsheet (UNEP/MAP, 2019). Two CIs are established for monitoring coastal artificialisation:

a. Common indicator 16 (CI 16): Length of coastline subject to physical disturbance due to the influence of human-made structures; and
b. Candidate common indicator 25 (CCI 25): Land cover change.

*Common Indicator 16: Length of coastline subject to physical disturbance due to the influence of human-made structures*

389. Mediterranean coastal areas are threatened by development that modifies the coastline through the construction of buildings and infrastructure that are needed to sustain residential, tourism,

commercial, transport and other activities. This development can cause irreversible damage to landscapes; habitats and biodiversity; and shoreline configuration. This Ecological Objective 8 (EO8): Coastal Ecosystems and Landscapes, does not have a precedent in other regional ecosystem approach initiatives, such as HELCOM or OSPAR, neither in the Marine Strategy Framework Directive (MSFD).

390. The UN Environment/MAP emphasizes the integrated nature of the coastal zone, particularly through consideration of marine and terrestrial parts as its constituent elements required by the Integrated Coastal Zone Management (ICZM) Protocol. The aim of monitoring the EO8 common indicator 16 "Length of coastline subject to physical disturbance due to the influence of human-made structures" is twofold: to quantify the rate and the spatial distribution of the Mediterranean coastline artificialisation; and to provide a better understanding of the impact of those structures to the shoreline dynamics.

391. GES for Common Indicator 16 can be achieved by minimizing physical disturbance to coastal areas close to the shoreline induced by human activities. Definition of targets, measures and interpretation of results regarding this common indicator is left to the countries, due to strong socio-economic, historic and cultural dimensions in addition to specific geomorphological and geographical conditions.

Key messages for CI-16

392. Monitoring data was provided for 57% of the total Mediterranean coastline (31 283 km), out of which 26 658 km (85.2%) of coast is natural and 4 625 km (14.8%) is artificial. This provides a good overview of the baseline situation (Figure 50).

393. The majority of human-made structures belong to ports and marinas.

394. Changes in the percentage or total length of coastline subject to physical disturbance due to the influence of human-made structures could only be assessed for three countries.

395. GES could not be assessed because only the first set of monitoring data was provided (except for the three countries that provided two sets of data).

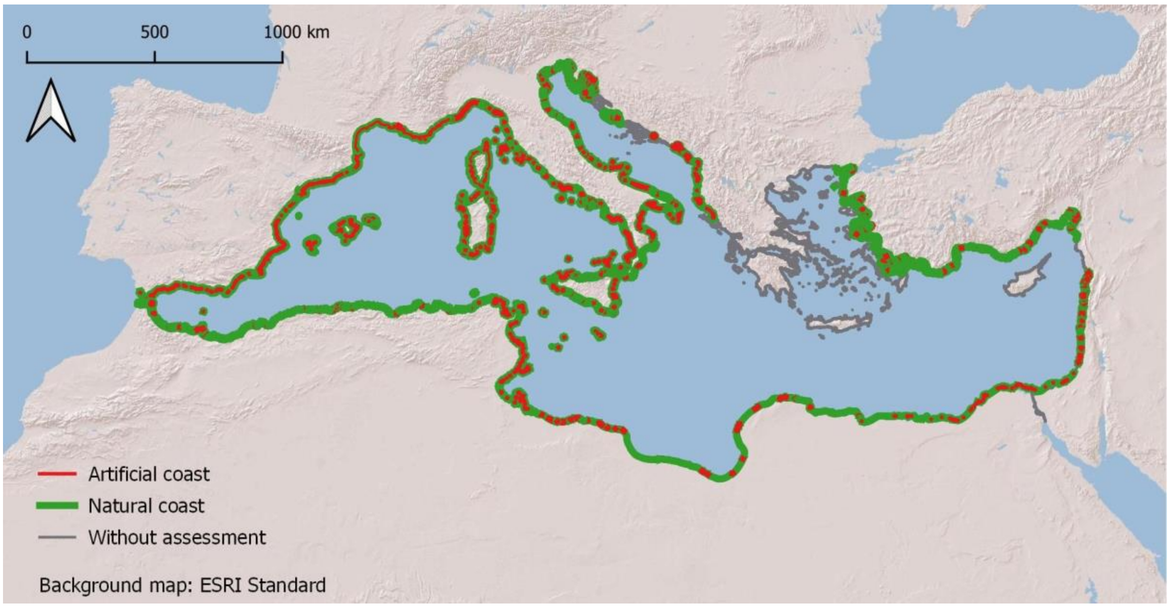



Figure 50: Overview map of the baseline situation for CI 16.

Key assessment findings for CI-16

396. Aggregation of national assessments for CI 16 parameters for the Mediterranean reported here provides the first set of monitoring data. CI 16 assessments are provided for 57% of the Mediterranean coastline or 31 283 km out of which 14.8% or 4,625 km revealed as artificial coast. The proportion (percentage) of artificial coast vary a lot among countries: from 4% to 75% which clearly demonstrates the necessity for country specific GES definitions in terms of percentages or thresholds. Looking at the length of artificial structures, their length is 8 109 km of which 49% have maritime use as ports and marinas (as structures are mapped with all details, they have much longer length then artificial coast itself. See Figure 2.5 above). Looking at the trend, even for only three countries, there is a slight increase of artificial coast in percentage terms. Still, in a monitoring period of 6 or 10 years, it amounted to a total of 50 km.

397. It should be emphasised that there are well-known difficulties in unambiguously defining the coastline and its length. A coastline is a geographical feature that can change significantly over time, and its length significantly depends on the level of detail with which the coastline is depicted. Additionally, the national assessments were made for different reference years and with different mapping techniques, caused by different national data sets and geographic specifics, but also by different interpretation of instructions given in the Guidance factsheet (UNEP/MAP, 2019) and related Data Dictionaries and Data Standard (UNEP/MAP, 2019a). Thus, countries' data cannot be completely compared. However, applying the same criteria as provided at the regional level to ensure synchronization of national efforts to set GES and threshold, and therefore, to prevent biased treatment of countries within regional assessment will allow a more objective assessment of trends once the second monitoring datasets are provided for the next QSR. The GES in the Guidance Factsheet is defined in a descriptive manner as minimised physical disturbance (negative impacts) to coastal areas induced by human activities. Future sets of monitoring data will allow more objective assessments of coastline status: whether it has been further artificialised or it has stayed within GES. This need for a systematic monitoring in Mediterranean regarding the physical disturbance of coastline due to the influence of human-made structures was also a major conclusion in the 2017 QSR.

Measures and actions to achieve GES for CI-16

398. First, technical issues that have to be considered in future monitoring and assessments of CI 16 are as follows:

a. Monitoring of the coastline (second and following assessments) should use the same level of details and spatial resolution as the initial assessment (baseline data). Otherwise, monitoring results could be compromised by the fact that coastline length increases by using larger scales, more so on more indented coasts.
b. The calculation of the length of the coastline varies also due to deformations caused by the choice of the cartographic projection (i.e., calculated in plane by using one of the cartographic projection or by using the ellipsoid). It is recommended to use the ellipsoid lengths calculated on WGS84 as required by the Guidance Factsheet and related Data Dictionaries and Data standards.
c. Methods of mapping coastline vary between the national reports which results in semantic differences of assessed CI 16, in particular with regard to mapping of the length of artificial structures. This should be taken into account while interpreting aggregate data for the Mediterranean. Classification of artificial structures should be unambiguous, regardless of the monitoring period, country or the method used (visual inspection of aerial images or field survey). A manual that will elaborate on various situations should be prepared so that interpretation is unambiguous, i.e., harmonised.

399. Second, measures and actions to achieve GES include the following:

a. The country-specific GES should be defined based on the first set of monitoring data in order to allow assessment of changes for the next QSR. Country specificities could significantly affect the assessment, i.e., interpretation of calculated CI 16. Therefore, issues such as the following need to be taken into account. For example, a country with a significant length of coastline on uninhabited islands, islets and rocks and with a small proportion of artificial coast can be interpreted as a very good condition, while in fact there is a lot of construction on the mainland part of the coast. Another issue is the total length of the coastline per country. If a country has a short coastline than it is expected that the proportion of the artificial coastline will be larger to provide facilities for all human coastal and maritime activities. When defining GES thresholds, these should be considered; i.e., different thresholds could be defined for different parts of coastline. For the definition of country specific GES, the list of assessment criteria and the Guiding document prepared by PAP/RAC can be utilised (PAP/RAC, 2021), including the results of testing the Guiding document in Morocco (PAP/RAC, 2022).

400. Also, measures and actions to achieve GES should be specified and may, in general, include the following three types:

a. Particular management actions needed in order to move towards GES.
b. Measures aimed at obtaining new knowledge for assessing and achieving GES (e.g., scientific research, application of innovative solutions at pilot locations).
c. Measures with the aim of disseminating knowledge to all stakeholders and involving them in defining measures and actions for achieving GES.

401. Particular management actions regarding coastline artificialisation could include:

a. Analysis of existing artificial coastlines and their categorization into those that are necessary, those that can be reduced and those that can be returned to nature (e.g., abandoned jetties, etc.).
b. When planning new artificial structures on the coastline, first analyse whether human needs can be achieved through better management of existing artificial structures and their functional transformations.
c. Along existing artificial coastlines: improve monitoring of environmental impacts and implement measures to reduce negative impacts (such as pollution, habitat fragmentation, noise, light pollution, water cycle).
d. For new artificial coastlines, examine the use of nature-based solutions and ensure financial or other benefits for their implementation.
e. Encouraging the use of coastline in a way that consumes spatial/natural resources as little as possible: e.g., restricting land-take for the second homes.
f. Protect, restore, conserve and enhance threatened and degraded coastal habitats.

402. Results of above measures and actions could be measured by km of reversed coastline (from artificial to natural), km of recovered coastal habitats, % of nature-based solutions used in e.g., coastal protection, number of innovative projects tested (e.g., beach nourishments without impacts on coastal habitats), number of people involved in GES awareness, number of people actively working on the measures, etc.

*Candidate CI25 Land cover change*

**Methodology:**

The assessment of the CCI 25 Land cover change was prepared for the Adriatic sub-region. It serves as an example on how the assessment of this indicator could be prepared for the entire Mediterranean coastal region once data is available for the next QSR and once the CCI 25 is designated as a mandatory IMAP Common indicator.

CCI 25 monitoring entails an inventory of the land cover change in the coastal zone (10 km belt from the coastline, following the practice of the European Environment Agency). The coastal zone is further divided into reporting units by coastal strips (<300 m, 300 m-1 km, 1-10 km from the coastline), Low Elevation Coastal Zone (LECZ) and coastal administrative units. CCI 25 units for the first monitoring (i.e., establishing the baseline) are the following:

- $km^2$ of built-up area in coastal zone;
- % of built-up area in coastal zone;
- % of other land cover classes in coastal zone;
- % of built-up area within coastal strips of different width compared to wider coastal units;
- % of other land cover classes within coastal strips of different width compared to wider coastal units;
- $km^2$ of protected areas within coastal strips of different width;
- $km^2$ of LECZ in coastal zone;
- $km^2$ of built-up area within LECZ in coastal zone;
- % of built-up area within LECZ in coastal zone;
- % of other land cover classes within LECZ in coastal zone;
- $km^2$ of protected areas within LECZ in coastal zone.

For the second monitoring (i.e., assessment of change) the following units are relevant:

- % of increase of built-up area, or land take;
- % of change of other land cover classes;
- % of change of protected areas;
- % of increase of built-up area, or land take within LECZ;
- % of change of other land cover classes within LECZ;
- % of change of protected areas within LECZ

The Candidate CI 25 has been assessed for the Adriatic sub-region of the Mediterranean based on open-source data from the Copernicus Land Monitoring – Coastal zones service, OpenStreetMap, World Database on Protected Areas, and Forest and Buildings removed Copernicus DEM (FABDEM) global elevation map for 2012 and 2018. All data retrieved per countries from the open-sources are available here (Password: IMAP#2023). Coastal urbanisation or land take is almost an irreversible process. Therefore, the CCI 25 indicator provides, among other indications, an inventory of the urbanisation pressures on coastal ecosystems but also reveals changes between land cover classes. With an additional assessment of these processes within the Low Elevation Coastal Zone (LECZ) (Figure 52), i.e., the zone below the elevation of 5 m above sea level, important findings related to adaptation to climate change are provided. The calculation of data and analysis has been prepared by PAP/RAC by using the above-mentioned sources, therefore countries have not provided their own assessments. The draft report (Baučić M. et al 2022 b) was discussed with the Adriatic countries at the meeting in Tunis on 10 November 2022. Upgraded with the LECZ it represents the main input to this QSR.

For the purpose of integration of CIs within EO8 the question of correlation between the CI 16 on coastline and CCI 25 on coastal land cover has been studied, particularly between the land used by human activities and related artificial coastline. Typical situations that can be observed along the Adriatic coast vary from situations with strong correlation (in front of settlement there is the artificial coast) to situations of no correlation (natural beaches in front of a settlement). It can be concluded that there is no firm correlation between land cover and the type of the coastline.

33. Due to the candidate status of this indicator, it was not included in the 2017 Med QSR. Since then, the indicator has been tested through the implementation of several projects such as the EcAp MED II and III, the GEF MedProgramme and alike. With the active support of the CORMON meetings the Guiding Factsheet was improved and upgraded. So, it is now for the first time that this indicator is presented; however, it still at the sub-regional scale (Adriatic Sea) where data was available from the open sources and therefore, required no major contribution from the countries.

34. Good environmental status for CCI 25 is specified in the Guidance Factsheet (UNEP/MAP, 2019) as "Linear coastal development minimised, with perpendicular development being in balance with integrity and diversity of coastal ecosystems and landscapes. Mixed land-use structure achieved in predominantly human-made coastal landscapes".

Key messages for CCI25 (Land cover change)

35. The assessment of CCI 25 in the Adriatic sub-region (coastal zone of 10 km width) shows the following:

36. In 2018 the built-up areas occupy 8.77% (2 500 $km^2$) of the Adriatic coastal zone. The largest land cover change from 2012 is the increase of the built-up area by 27 $km^2$ representing a land take trend of 1% in six years (Figure 51).

37. In the 2012-2018 period the land cover changed from forest and semi-natural land (24 $km^2$), water bodies (3 $km^2$) and agricultural land (2 $km^2$) to built-up (27 $km^2$) and wetlands (2 $km^2$).

38. In 2018 the narrowest coastal strip of 300 m has the highest share of built-up area (18%), more than twice as much as in the coastal zone of 10 km width. The increase in the narrowest coastal strip between 2012-2018 is 4.4 $km^2$ while in the 300 m-1km coastal strip the increase is 3.5$km^2$, mainly at the expense of the decrease of forests and semi-natural land, as well as water bodies and wetlands.

39. There are no countries with a decrease of the built-up areas in the reporting period.

40. Protected areas covered 20% in 2012, reaching 37% in 2018.

41. The low elevation coastal zone (up to 5 m above sea level) occupies 17% (4 955 $km^2$) of the coastal zone (10 km width), of which the built-up areas is 10% (484 $km^2$).

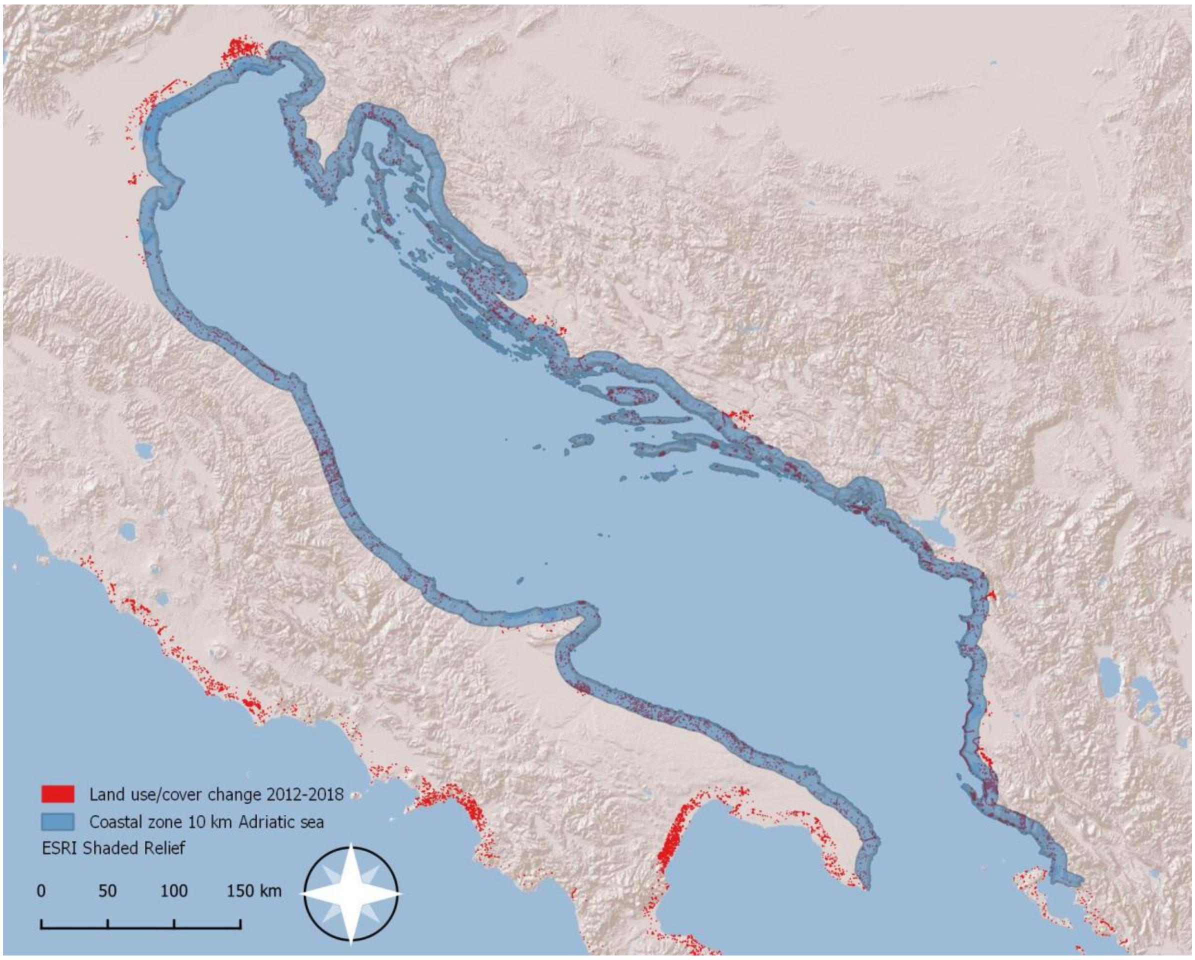


Figure 51: Adriatic sub-region Land cover change 2012 to 2018 for coastal zone (0 – 10 km)

Figure 52: LECZ of the Adriatic sub-region

Key assessment findings for CCI-25

35. The results of the CCI 25 assessment for the Adriatic sub-region show the increasing trend of coastal urbanisation, i.e., increase of built-up areas (27km$^2$ out of 29 km$^2$ land cover change was land-take mostly from natural areas). On the other hand, the areas under protection have also increased showing good practice of preserving and improving GES. However, there is a slight increase of built-up areas in the protected areas. CCI 25 indicator parameters clearly identify the linear coastal development, especially pronounced in Croatia. The assessment could help countries in establishing the right measures and actions to achieve GES.

36. The reporting unit of LECZ shows that large areas of coastal zones are located in the low-lying terrain and that the built-up areas continue to increase there as well. This sheds new light on the problem of coastal artificialization, which will lead to a decrease of resilience to climate change. A detailed analysis at the level of municipalities and cities could help address the problem and set new requirements for urban planning, e.g., no land-take in LECZ.

37. A plethora of GIS data was prepared for the elaboration of this assessment report and is available to be used for other statistics and analyses, and for further GES assessment and setting up measures and actions.

38. The methodology applied in this study confirms that the CCI 25 assessment can be made with open-source data such as OpenStreetMap, World Database on Protected Areas and Forest and Buildings removed Copernicus DEM (FABDEM) global elevation map. All these datasets are available for the whole Mediterranean. The key data for CCI 25 is land cover data, here the Copernicus Land Monitoring – Coastal zones service was used. Currently, it is not available for the entire Mediterranean. However, the best available data for the future could be the ESA World Cover Project providing global land cover maps at 10m spatial resolution, in particular if national most updated and accurate datasets are not available. As new global land cover maps are emerging monthly, having better and better spatial, thematic and temporal resolution land cover monitoring is becoming feasible for the whole Mediterranean at relatively low cost.

<u>Measures and actions to achieve GES for CCI-25</u>

36. Varying geographic, socio-economic, cultural and environmental contexts of coastal zones require the application of specific measures and actions in order to achieve GES. First, in order to define GES in a more objective way a technical manual should be prepared that will allow better understanding of concepts of integrity and diversity of coastal ecosystems and landscapes and their importance for ecosystem approach. This will also allow better assessment of land cover changes in the next QSR period, in particular for the areas with significant changes.

37. Second, more objective GES should be prepared either at the sub-regional level or at country level that will allow more objective assessments for the future QSR.

38. The main targets under EO8 could include the following:

a. Avoid further construction within the setback zone and the flooding prone low-lying coastal zone;
b. Give priority to low-lying coastal zone when preparing adaptation plans to climate change;
c. Maintain diverse and harmonised coastal land cover structure, and reverse dominance of urban land cover;
d. Keep and increase landscape diversity.

39. These general recommendations should be further elaborated and adapted to particular regions. In general, measures and action could be of the following types:

a. Particular management actions needed in order to move towards GES;
b. Measures aimed at obtaining new knowledge about assessing and achieving GES (e.g., scientific research, application of innovative solutions at pilot locations);
c. Measures with the aim of disseminating knowledge to all stakeholders and involving them in the actions for achieving GES.

40. Particular management actions regarding land cover change could include:

a. Analysis of existing built-up areas and their categorization into those that are necessary, those that can be reduced and those that can be returned to nature (e.g., abandoned industrial zones, etc.).
b. When planning new built-up areas, first analyse whether human needs can be achieved through better management of existing built-up areas and their functional transformations.
c. In existing built-up areas: improve monitoring of environmental impacts and implement measures to reduce negative impacts (such pollution, habitat fragmentation, noise, light pollution, water cycle).
d. For new construction areas, examine the use of nature-based solutions and ensure financial or other benefits for their implementation.
e. Encouraging the use of space in a way that consumes spatial/natural resources as little as possible: e.g., restricting land-take for second homes.
f. Protect, restore, conserve and enhance threatened coastal ecosystems and habitats (e.g., dunes, wetlands and coastal forests and woods, in particular).

### 3. Main Actions and Measures Supported the work of UNEP/MAP for the Protection of the Mediterranean Sea and Coast since 2017 Med QSR

403. Since the adoption of MedQSR of 2017, a series of actions and measures were undertaken that supported the efforts made within the framework of UNEP/MAP-Barcelona Convention. The main measures adopted by the Contracting Parties to the Barcelona Convention since 2017 are:

- The **UNEP/MAP Medium-Term Strategy 2022-2027** (MTS) adopted in 2021 as a key strategic framework for the development and implementation of the Programmes of Work of UNEP/MAP. It aims at achieving transformational change and substantial progress in the implementation of the Barcelona Convention and its Protocols, also providing a regional contribution to relevant Global processes[42].
- **Designation of the Mediterranean Sea Emission Control Area for Sulphur Oxides and Particulate Matter**: The Contracting Parties to the Barcelona Convention successively adopted two consensual decisions at their 21st meeting (Naples, Italy, 2-5 December 2019) and 22nd meeting (Antalya, Türkiye, 7-10 December 2021) concerning the designation of the Mediterranean Sea Emission Control Area for Sulphur Oxides and Particulate Matter (Med SOX ECA), pursuant to Annex VI to the International Convention for the Prevention of Pollution from Ships (MARPOL).
- **The Regional Plan on Urban Wastewater Treatment.** It applies to the collection, treatment, reuse and discharge of urban wastewaters and the pre-treatment and discharge of industrial wastewater entering collecting systems from certain industrial sectors. Its objective is to protect the coastal and marine environment and human health from the adverse effects of the wastewater direct and or indirect discharges, in particular regarding adverse effects on the oxygen content of the coastal and marine environment and eutrophication phenomena as well as promote resource water and energy efficiency.
- **Regional Plan on Sewage Sludge Management**. It applies to the treatment, disposal and use of sewage sludge from Urban Wastewater Treatment Plants. Its objective is to ensure effective reuse of beneficial substances and exploitation of energy potential of sewage sludge, while preventing harmful effects on human health and the environment.
- **The Updated Regional Plan on Marine Litter Management in the Mediterranean.** The updated version of the Regional Plan further expands the provision of the version adopted in 2013, to include a number of additional elements, i.e., new definitions, expanded scope of measures in 4 principal areas (economic instruments, circular economy of plastics, land-based and sea-based sources of marine litter), and amendments targets for plastic waste and microplastics.
- The under development **Regional Plans on (a) Agriculture, (b) Aquaculture, and (c) Storm Water, Management in the Mediterranean,** which are expected to be approved by COP23 in December 2023.
- **The Common Regional Framework for Integrated Coastal Zone Management**. It provided the Methodological Guidance for Reaching Good Environmental Status (GES) through ICZM. Its objective is to support the implementation of the EcAp in a coordinated and integrated

[42] In particular the 2030 Agenda for Sustainable Development and its Sustainable Development Goals (SDGs), the UN Decade on Ecosystem Restoration, the UN Decade of Ocean Science for Sustainable Development and the UNEP's Medium-Term Strategy 2022-2025, approved at UNEA-5 in February 2021.

manner so to take all EOs and their GES into account through the implementation of the ICZM Protocol and other Protocols and related key documents.

- The **Post-2020 SAPBIO**[43] and the **Post-2020 Regional MCPAs and EOCMs Strategy**[44], both adopted in 2021 as action-oriented policies for the preservation of the marine and Coastal Biodiversity that contribute to achieve the respective targets of the Sustainable Development Goals and the CBD Post-2020 Global Biodiversity Framework, through the optic of the Mediterranean context.
- The **Mediterranean Strategy for the Prevention of, Preparedness, and Response to Marine Pollution from Ships** (2022-2031). Adopted in 2021 to enhance the implementation of the Protocol concerning Cooperation in Preventing Pollution from Ships and, in Cases of Emergency, Combating Pollution of the Mediterranean Sea. It sets seven Common Strategic Objectives addressing key ships related environmental issues (pollution, climate change, air emission, marine litter (plastic and), Nin-Indigenous Species, designation of special areas, emerging issues related to pollution from ships in the Mediterranean). Its implementation is supported by an Action Plan made of 190 specific actions expected to be implemented in the next ten years.
- The **Strategic Action Programme to address pollution from land-based activities** (SAP-MED) adopted in 1997 as a long-term policy (2000-2025) focused on combatting pollution from land-based sources and activities and their impact on marine and coastal environment. Its objective is to improve the quality of the marine environment of the Mediterranean through facilitating the implementation by the Contracting Parties of the LBS Protocol and promoting shared-management of the land-based pollution. The SAP-MED was designed to assist Parties in taking actions individually or jointly within their respective policies, priorities and resources, which will lead to the prevention, reduction, control and/or elimination of the degradation of the marine environment, as well as to its recovery from the impacts of land-based activities.
- The **Ballast Water Management Strategy for the Mediterranean Sea** (2022-2027) adopted in 2021 updates a first strategy in 2012. The overall objectives of this Strategy are to: (i) establish a framework for a regional harmonised approach in the Mediterranean on ships' ballast water control and management which is consistent with the requirements and standards of the Ballast Water Management Convention; (ii) initiate some preliminary activities related to the management of ships' biofouling in the Mediterranean region; and (iii) contribute to the achievement of GES with respect to NIS as defined in IMAP.
- The **Regional Action Plan on Sustainable Consumption and Production in the Mediterranean** adopted in 2016 as a substantive contribution by the Mediterranean Region to the implementation of the 2030 Agenda for Sustainable Development. It defines common objectives and identifies actions guiding the implementation of the sustainable consumption and production at the national level, addressing, as appropriate, key human activities which have a particular impact on the marine and coastal environment and related transversal and cross-cutting issues.

[43] The Strategic Action Programme for the Conservation of Biodiversity and Sustainable Management of Natural Resources in the Mediterranean Region (Post-2020 SAPBIO). It was adopted in 2021

[44] The Post-2020 Regional Strategy for marine and coastal protected areas and other effective area-based conservation measures in the Mediterranean

404. The UNEP/MAP efforts for the preservation of the Mediterranean Sea and Coast are a contribution from the region to achieve global objectives in relation to the marine environment. In addition to providing a regional contribution to achieve the relevant Sustainable Develop Goals, the action of UNEP/MAP is harmonised with the following global processes since 2017:

- UN Decade on Ecosystem restoration (2021-2030).
- UN Decade of Ocean Science for Sustainable Development (2021-2030).
- UNEP Regional Seas Strategic Directions 2022-2025.
- The Ecosystem Approach: Towards a practical application across Regional Seas Conventions and Action Plans.
- UNEP Marine and Coastal Strategy 2020-2030.
- Post-2020 global biodiversity framework (CBD).
- United Nations Environment Assembly: UNEA-3 (December 2017), UNEA-4 (March 2019), UNEA-5 (February 2021).
- The relevant Decisions of UNFCCC COP 27 ( Sharm el-Sheikh from 6 to 20 November 2022).
- The Intergovernmental Negotiating Committee (INC) mandated to develop legally binding global treaty to control plastic pollution.

405. In addition to the measures undertaken within the framework of the UNEP/MAP, the conservation of the Mediterranean Sea and Coast benefited from measures adopted as part of European Union policies of relevance for the Mediterranean marine and coastal environment. These included in particular:

- The EU Sustainable blue economy, new approach.
- The EU Biodiversity strategy for 2030.
- The EU Nature restoration Law proposal.
- The EU Circular economy action plan.
- The EU MSP Directive and implementation.
- The EU Green Deal for the Climate neutrality.
- The EU Marine Strategy Framework Directive.
- The EU Plastics Strategy.
- The EU Single-use Plastic Directive.
- The EU Green Deal Policy Framework.
- The EU Waste Framework Directive.
- The EU Revised Port Reception Facilities Directive.

## 4. Way forward

## 5. References

(*The bibliographic sources cited in all chapters of the document will be listed here*)

## Annex I

## Striving Achievements since 2017 under UNEP/MAP Barcelona Convention System to Support Achieving GES in the Mediterranean

*[This section (Annex I) will include a compilation of tangible actions and interventions offered and coordinated by UNEP/MAP Barcelona Convention System since the 2017 MED QSR]*