Mediterranean Action Plan Coordinating Unit
Barcelona Convention Secretariat

UN environment

Quality Status Report 2017

1st ENI SEIS II South Support Mechanism Regional workshop on indicators

17-18 May 2017, Copenhagen, Denmark

Stavros Antoniadis
SEIS Project expert
UN Environment/Mediterranean Action Plan
Barcelona Convention Secretariat

Mandate of the QSR2017

UNEP(DEPI)/MED IG.22/28

Decision IG.22/7: Integrated Monitoring and Assessment Programme of the Mediterranean Sea and Coast and Related Assessment Criteria

"The 2017 Status Quality Report will be based on the common indicators, and common indicator assessment fact sheets established for them, following a model to be developed by the Secretariat in cooperation with the Contracting Parties through CORMONs by the end of 2016, and will consider the data from the most recent national monitoring and relevant scientific projects and pilots undertaken relevant to the IMAP."

UNEP(DEPI)/MED WG.427/3

The UNEP/MAP Programme of Work Output 1.4.1 "Periodic assessments based on DPSIR approach and published addressing inter alia status quality of marine and coastal environment

The specific activity for 2016-2017 is to "Prepare and publish Quality Status Report (QSR) based on MAP EcAp-based EO and related common indicators"

This project is funded by the European Union

EO 5 Eutrophication

Common Indicator 13: Concentration of key nutrients in water column (EO5);
Common Indicator 14: Chlorophyll-a concentration in water column (EO5)

EO 9 Pollution

Common Indicator 17: Concentration of key harmful contaminants measured in the relevant matrix (EO9, related to biota, sediment, seawater)
Common Indicator 18: Level of pollution effects of key contaminants where a cause and effect relationship has been established (EO9)
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 (EO9);
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 (EO9);
Common Indicator 21: Percentage of intestinal enterococci concentration measurements within established standards (EO9)

EO 10 Marine litter

Common Indicator 22: Trends in the amount of litter washed ashore and/or deposited on coastlines (EO10);
Common Indicator 23: Trends in the amount of litter in the water column including microplastics and on the seafloor (EO10);
Candidate Indicator 24: Trends in the amount of litter ingested by or entangling marine organisms focusing on selected mammals, marine birds, and marine turtles (EO10)

EO 11 Energy including underwater noise

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

EO 1 Biodiversity

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

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

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

EO 6 Sea-floor integrity

EO7 Hydrography

Common Indicator 15: Location and extent of the habitats impacted directly by hydrographic alterations (EO7) to also feed the assessment of EO1 on habitat extent

EO 8 Coastal ecosystems and landscapes

Common Indicator 16: Length of coastline subject to physical disturbance due to the influence of man-made structures (EO8);
Candidate Indicator 25: Land use change (EO8)

IMAP: From data to assessments (future)

Indicator Guidance factsheets (2016)

Revision of National Monitoring Programmes

Revised templates for data and meta-data (2016-2017)

IMAP Data Reporting System (2016-2017)

Data Assessments to feed into future QSRs

Not possible for the QSR2017

This project is funded by the European Union

UN environment
United Nations Environment Programme

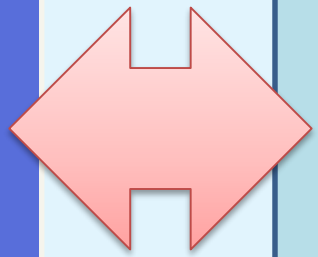
Mediterranean Action Plan
Barcelona Convention

European Environment Agency

QSR2017 based on available information

QSR2017 is too soon to be based on new data as a result of revised national monitoring programs following IMAP adoption in 2016.

Will be based on available data, information, projects, initiatives and partners.



In parallel, all elements required for future QSR's to be fully based on indicator reporting to the INFO-MAP system will be developed for adoption at COP 20 (Dec, 2017).

Piloting assessment templates

This project is funded by the European Union

QSR2017 structure

1. Introduction
2. Environmental Characteristics
3. Socioeconomic characteristics of the Mediterranean
4. **Core theme 1: Land and Sea-based Pollution**
   - 4.1 Eutrophication (EO 5)…….... 2 Indicators
   - 4.2 Pollution (EO 9)……. 5 Indicators
   - 4.3 Marine Litter (EO 10)…… 3 indicators
   - *4.4 Underwater energy; noise (EO 11)…….. 2 indicator*
5. **Core theme 2: Biodiversity and Ecosystems**
   - 5.1 Biodiversity and ecosystems (EO 1)…….. 5 Indicators
   - 5.2 Non-indigenous species (EO2)…… 1 indicator
   - 5.3 Harvest of commercially exploited fish and shellfish (EO3)…… 6 indicators
   - *5.4 Marine Food webs (EO4)…….... tbd*
   - *5.5 Sea floor integrity (EO6)…… tbd*
6. **Core theme 3: Land and Sea Interaction and Processes**
   - 6.1 Hydrography (EO7)…… 1 indicator
   - 6.2 Coastal ecosystems and landscapes (EO8)……..... 2 indicators
7. Ecosystem assessment outlook
8. Conclusions and recommendations

This project is funded by the European Union

UN environment
United Nations Environment Programme

Mediterranean Action Plan
Barcelona Convention

European Environment Agency

QSR2017 structure

For each indicator, the following information will be included:

1 Work undertaken to define indicators, key pressures and drivers
2 Policy Context and Targets
3 Results of the assessment
4 Conclusions and identification of gaps.

Case studies (from CP or partners)

Pilot of Assessment template

- Online interactive report (with links to assessment reports where available, case studies plus other information
- Summary for Policy Makers Publication

This project is funded by the European Union

UN environment
United Nations Environment Programme

Mediterranean Action Plan
Barcelona Convention

European Environment Agency

Final Comments

- ✓ First Quality Status Report to be developed based on IMAP indicators. Ambitious task, especially as IMAP indicator reporting not in place
- ✓ CORMONs and the expert online working groups to provide the technical review and support with additional information, (October – February)
- ✓ Component Focal Points to review and comment on revision (May 2017)
- ✓ EcAp Coordination Group and MAP Focal Points to provide overall coordination and vision, and final review (September)
- ✓ Online QSR to be launched at COP20 (December 2017)

This project is funded by the European Union

Regional assessment processes

Activity	2017	2018	2019	2020	2021	2022	2023
UNEP/MAP Mediterranean Quality Status Report (QSR)							
MSFD Art. 8 National Assessment (MS)							
Second regional indicator-based H2020 assessment (EEA-UNEP/MAP)							
Mediterranean State of the Marine and Coastal Environment and Development (UNEP/MAP-Plan Bleu)							
EEA Marine Messages II							
SoER2020 (EEA)							
Mediterranean future trends (UNEP/MAP-Plan Bleu)							

This project is funded by the European Union

UN environment
United Nations Environment Programme

Mediterranean Action Plan
Barcelona Convention

European Environment Agency

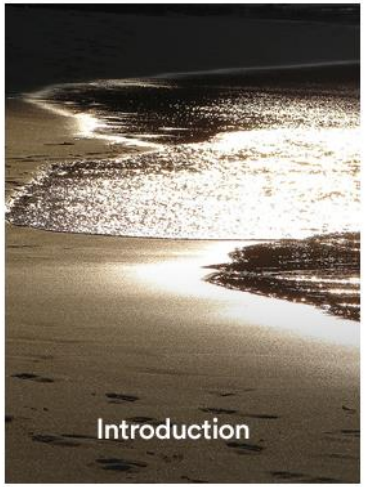
Demo of the QSR on-line

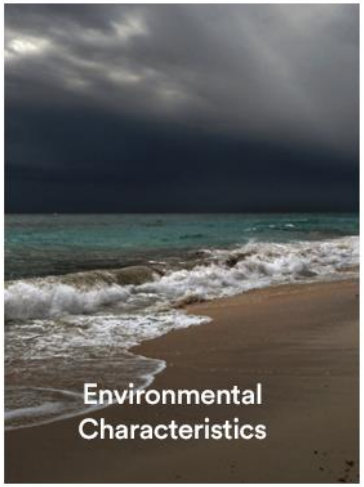
UN environment
United Nations Environment Programme

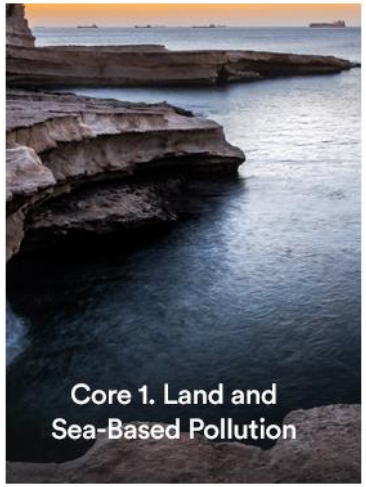
QSR 2017

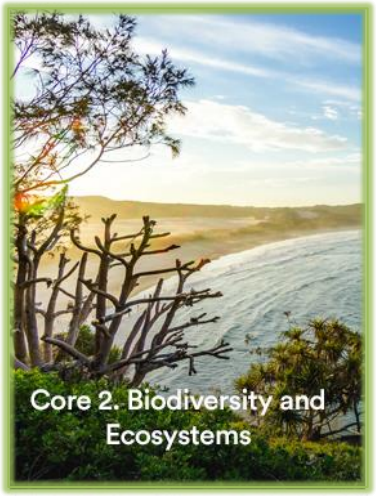
ONLINE REPORT (ZOD)

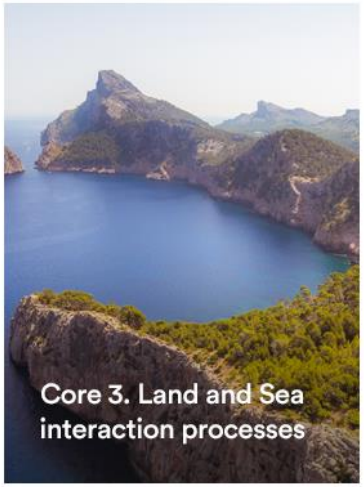
Mediterranean Action Plan
Barcelona Convention

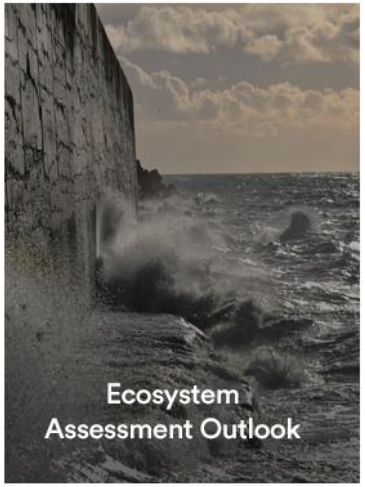


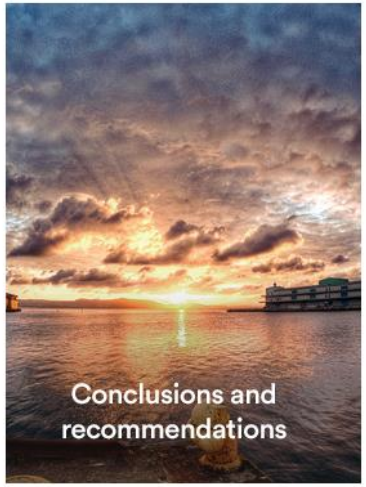












Core 2. Biodiversity and Ecosystems

Biodiversity and ecosystems (EO 1)

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)

Non-indigenous species (EO 2)

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 in the water column and seabed, as appropriate)

Commercially exploited fish and shellfish (EO 3)

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);

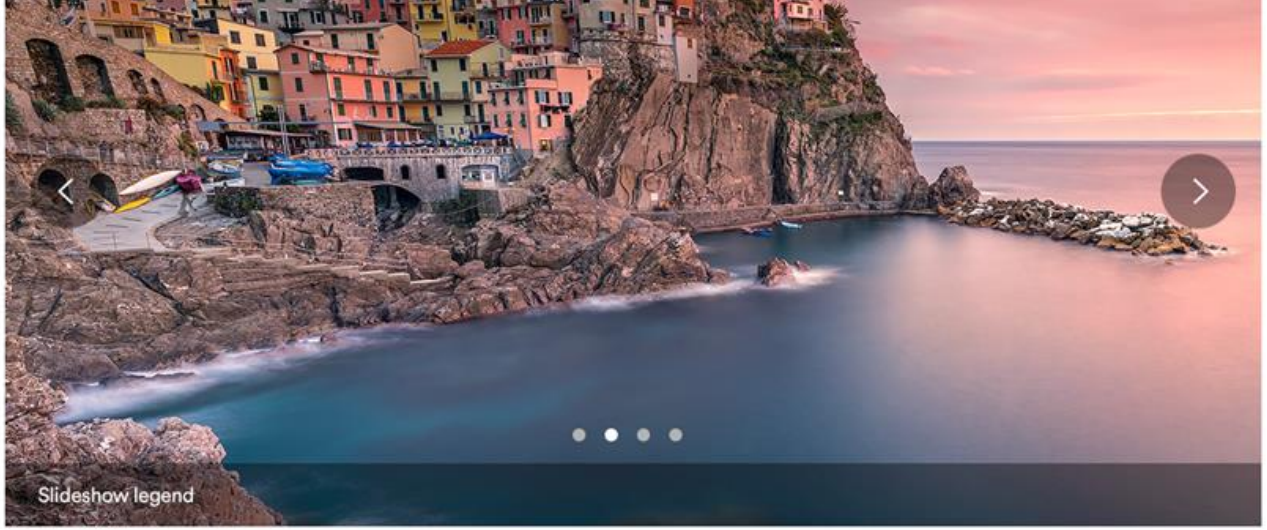
Common Indicator 11: Catch per unit of effort (CPUE) or Landing per unit of effort (LPUE) as a proxy (EO3)

Common Indicator 12: Bycatch of vulnerable and non-target species (EO1 and EO3)

Common indicator 6: Trends in abundance, temporal occurrence, and spatial distribution of non-indigenous species

Work undertaken to define indicators, key pressures and drivers

The February 2014 Integrated Correspondence Group on GES and Targets (Integrated CorGest) of the EcAp process of the Barcelona Convention selected the Common Indicator 6 “Trends in the abundance, temporal occurrence and spatial distribution of non-indigenous species, particularly invasive nonindigenous species, notably in risk areas in relation to the main vectors and pathways of spreading of such species” from the integrated list of indicators adopted in the 18th Conference of the Parties (COP 18), as a basis of a common monitoring program for the Mediterranean in relation to non-indigenous species.



The Integrated Monitoring and Assessment Programme (IMAP), adopted at the 19th Conference of the Parties to the Barcelona Convention (COP 19) in Athens, included definitions of ecological objectives, operational objectives and related indicators for the implementation of the EcAp, as well as guidelines for monitoring to address Common Indicator 6. Four main pathways, i.e. the Suez Canal, shipping, aquaculture, and aquarium trade, were identified as the main drivers of species introduction in the Mediterranean.

Policy context and targets

The CBD's Aichi Biodiversity Target 9 is that "by 2020, invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment". This is also reflected in Target 5 of the EU Biodiversity Strategy (EU 2011). The new EU Regulation 1143/2014 on the management of invasive alien species seeks to address

biodiversity and ecosystem services, as well as to minimize and mitigate the human health or economic impacts that these species can have. The Regulation foresees three types of interventions: prevention, early detection and rapid eradication, and management.

The Marine Strategy Framework Directive (MSFD) specifically recognizes the introduction of marine alien species as a major threat to European biodiversity and ecosystem health, requiring EU Member States to include alien species in the definition of GES and to set environmental targets to reach it. Hence, one of the 11 qualitative descriptors of GES defined in the MSFD is that "non-indigenous species introduced by human activities are at levels that do not adversely alter the ecosystem" (Descriptor 2). Among the indicators adopted to assess this descriptor are "trends in abundance, temporal occurrence and spatial distribution in the wild 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". Ecological Objective 2 and the Common Indicator 6 are in agreement with the MSFD objectives and targets.

Two basin-wide inventories of the marine alien species of the Mediterranean have been published the last years, by Zenetos et al. (2010, 2012) and Galil (2012). Furthermore, many national lists of marine alien species have been published, most of them the last decade, including Croatia, Cyprus, Greece, Israel, Italy, Libya, Malta, Slovenia, and Turkey. All known alien species introductions have been compiled in the Marine Mediterranean Invasive Alien Species online database (MAMIAS; www.mamias.org), developed by RAC/SPA in collaboration with the Hellenic Centre for Marine Research (HCMR). According to MAMIAS, 1057 non-indigenous species have been reported in the Mediterranean

Sea (excluding vagrant species and species that have expanded their range without human assistance through the Straits of Gibraltar), of which 618 are considered as established. Of those established species, 106 have been flagged as invasive. Among the four Mediterranean sub-regions, the highest number of established alien species has been reported in the eastern Mediterranean, whereas the lowest number in the Adriatic Sea (Table 1).

n terms of alien species richness, the dominant group is Mollusca, followed by Crustacea, Polychaeta, Macrophyta, and Fish (Fig. 1). The taxonomic identity of alien species differs among the four sub-basins, with macrophytes being the dominant group in the western and central Mediterranean and in the Adriatic Sea (Table 1).

	Eastern Mediterranean	**Central Mediterranean**	**Adriatic**	**Western Mediterranean**
number of established alien species	468	183	135	215
most important pathway of introduction	Suez Canal	shipping	shipping	shipping
2nd most important pathway	shipping	Suez Canal	aquaculture	aquaculture
richest taxons in alien biota	Mollusca, Crustacea	Macrophyta, Polychaeta	Macrophyta, Mollusca	Macrophyta, Crustacea
trend in the rate of new introductions (based on the last 3 decades)	increasing	decreasing	decreasing	decreasing

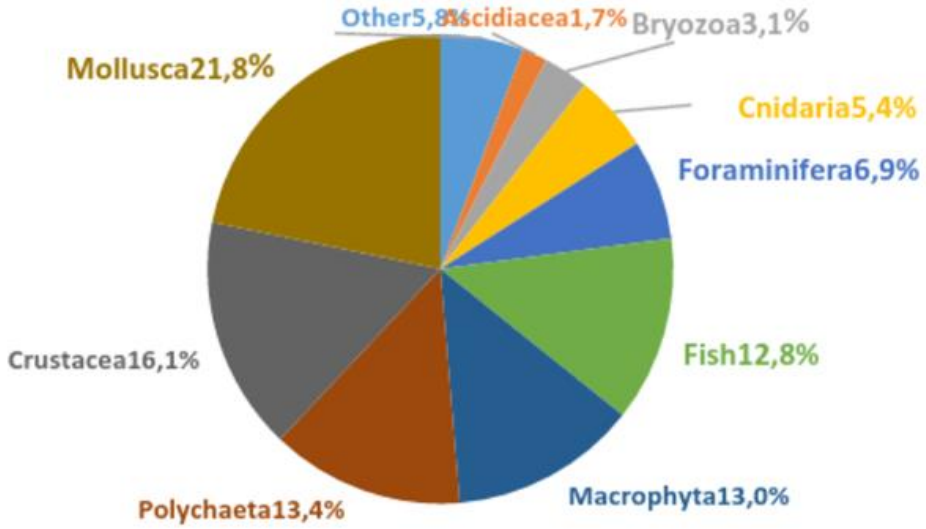


Table 1: *Summarized information for each Mediterranean sub-region about the status of alien invasions. Sources: MAMIAS, Zenetos et al. (2012)*

Alien species in the Mediterranean Sea are linked to four main pathways of introduction: the Suez Canal, shipping (ballast waters and hull fouling), aquaculture, and aquarium trade. Overall in the Mediterranean, the Suez Canal is the most important pathway, contrary to the situation in Europe, where shipping is the most important (Fig. 2). Nevertheless, the importance of pathways varies among the four Mediterranean sub-regions, with shipping being the most important pathway in the western and central Mediterranean and the Adriatic (Table 1). An assessment of the 'gateways' (i.e. countries of initial introduction) to alien invasions in the European Seas (Nunes et al. 2014) revealed marked geographic patterns depending on the pathway of introduction. The Suez Canal was the predominant pathway of first introductions in Egypt,

Lebanon, Israel, Syria and the Palestine Authority (all in the eastern Mediterranean), representing more than 70% of each country's first introduction events. For the other Mediterranean countries, shipping was the predominant pathway of initial introduction.

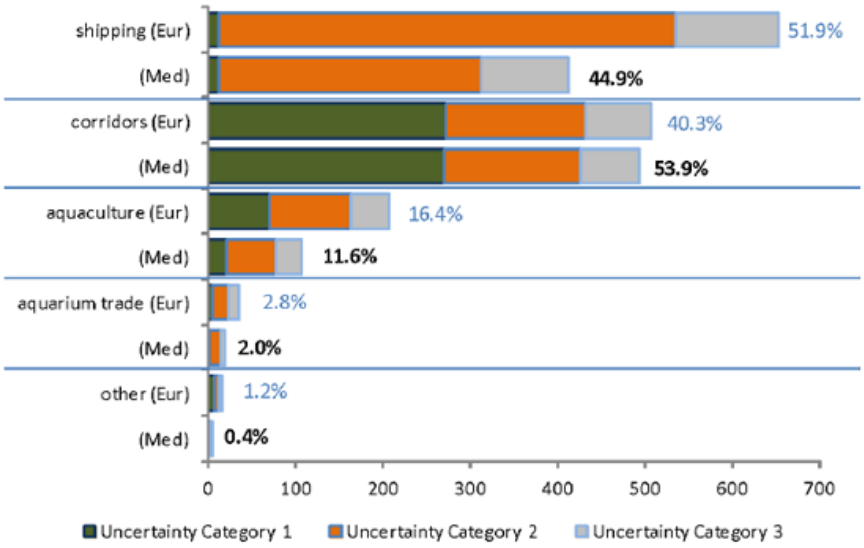


***Figure 2**: Number of marine alien species known or likely to have been introduced by each of the main pathways, in Europe (Eur) and the Mediterranean (Med). Percentages add to more than 100% as some species are linked to more than one pathway (blue percentages refer to the European total, while black percentages to the Mediterranean total). Uncertainty categories: (1) there is direct evidence of a pathway/vector; (2) a most likely pathway/vector can be inferred; (3) one or more possible pathways/vectors can be inferred; (4) unknown (not shown in the graph). Modified from Katsanevakis et al. (2013), Zenetos et al. (2012).*
New introductions of alien species in the Mediterranean Sea have an increasing trend in the rate of new introductions by 30.7 species per decade, and the current (as of the 2000s) rate of new introductions exceeds 200 new species per decade (Fig. 3).

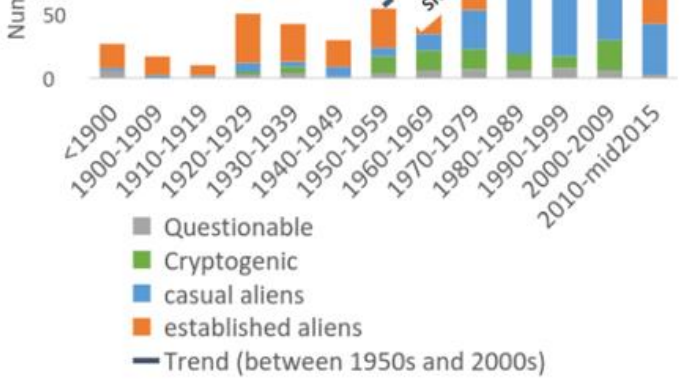


Figure 3: Trend in new introductions of alien marine species per decade in the Mediterranean Sea. Source: MAMIAS decade, and the current (as of the 2000s) rate of new introductions exceeds 200 new species per decade (Fig. 3).

However, this increasing trend in the rate of new introductions mainly reflects new introductions in the eastern Mediterranean, while in the other sub-regions the rate of new introductions is decreasing (Fig. 4).

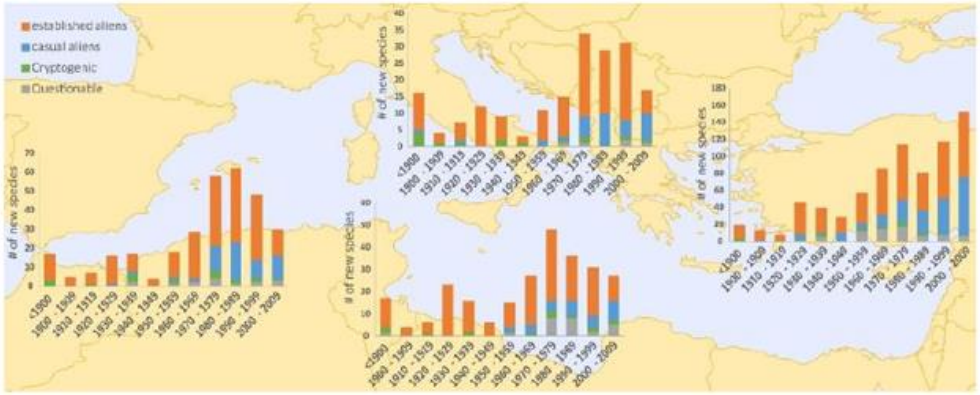


Figure 4: Trend in new introductions of alien marine species per decade in the Mediterranean sub-regions (eastern, central, western Mediterranean, and Adriatic Sea). Source: MAMIAS

However, this increasing trend in the rate of new introductions mainly reflects new introductions in the eastern Mediterranean, while in the other

sub-regions the rate of new introductions is decreasing (Fig. 4).

The cumulative impact of alien species on the Mediterranean marine habitats was recently assessed and mapped, using the CIMPAL index, a conservative additive model, based on the distributions of alien species and habitats, as well as the reported magnitude of ecological impacts and the strength of such evidence (Katsanevakis et al. 2016). The CIMPAL index showed strong spatial heterogeneity, and impact was largely restricted to coastal areas (Fig. 5).

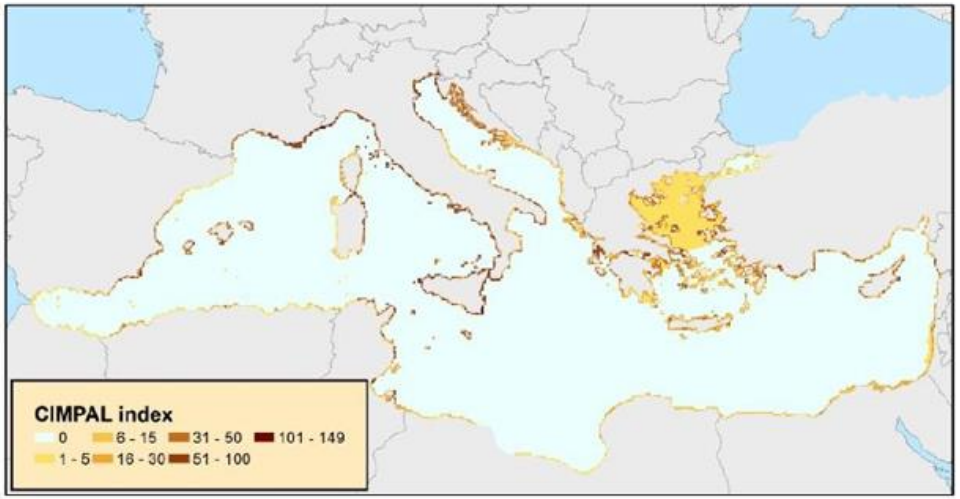


Figure 5: *Map of the cumulative impact score (CIMPAL) of invasive alien species to marine habitats. Modified from Katsanevakis et al (2016).*

Important progress has been made the last decade in creating inventories of non-indigenous species, and on assessing pathways of introduction and the impacts of invasive alien species on a regional scale. The development and regular updating of MAMIAS substantially contributes to address Common Indicator 6.

Nevertheless, research effort currently greatly varies among Mediterranean countries and thus on a regional basis current assessments

Mediterranean countries and thus on a regional basis current assessments and comparisons may be biased. Evidence for most of the reported impacts of alien species is weak, mostly based on expert judgement; a need for stronger inference is needed based on experiments or ecological modelling. The assessment of trends in abundance and spatial distribution is largely lacking. Regular dedicated monitoring and long time series will be needed so that estimation of such trends is possible in the future. NIS identification is of crucial importance, and the lack of taxonomical expertise has already resulted in several NIS having been overlooked for certain time periods. The use of molecular approaches including bar-coding are often needed to confirm traditional species identification.

References

Galil BS, 2012. Truth and consequences: the bioinvasion of the Mediterranean Sea. Integrative Zoology 7 (3): 299–311.

Katsanevakis S, Zenetos A, Belchior C, Cardoso AC, 2013. Invading European Seas: assessing pathways of introduction of marine aliens. *Ocean and Coastal Management* 76: 64–74.

Katsanevakis S, Tempera F, Teixeira H, 2016. Mapping the impact of alien species on marine ecosystems: the Mediterranean Sea case study. *Diversity and Distributions* 22: 694–707.

Nunes AL, Katsanevakis S, Zenetos A, Cardoso AC, 2014. Gateways to alien invasions in the European Seas. *Aquatic Invasions* 9(2): 133–144.

Zenetos A, Gofas S, Verlaque M, Çinar ME, Garcia Raso JE, et al, 2010. Alien species in the Mediterranean Sea by 2010. A contribution to the application of European Union's Marine Strategy Framework Directive (MSFD). Part I. Spatial distribution. *Mediterranean Marine Science* 11 (2): 318–493.

Zenetos A, Gofas S, Morri C, Rosso A, Violanti D, et al, 2012. Alien species in the Mediterranean Sea by 2012. A contribution to the application of European Union's Marine Strategy Framework Directive (MSFD). Part 2. Introduction trends and pathways. *Mediterranean Marine Science* 13(2): 328–352.

Thank you

Mediterranean Action Plan Coordinating Unit
Barcelona Convention Secretariat

UN environment

Stavros Antoniadis
SEIS Project expert
UN Environment/Mediterranean Action Plan
Barcelona Convention Secretariat
Stavros.Antoniadis@unep.org

http://web.unep.org/unepmap/