Creating products and knowledge for the Mediterranean

SYNERGY BETWEEN ODYSSEA AND THE IMAP PROGRAMME OF THE UNEP/MEDITERRANEAN ACTION PLAN (BARCELONA CONVENTION)

ODYSSEA PLATFORM USER VALIDATION & OPERATIONAL OCEANOGRAPHY

June 2nd-3rd, 2021

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 727277

Synergy between ODYSSEA and the IMAP programme of the UNEP/Mediterranean Action Plan (Barcelona Convention)

ODYSSEA - Morocco training workshop

" ODYSSEA PLATFORM USER VALIDATION & OPERATIONAL OCEANOGRAPHY"

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UN environment programme

MAP
Mediterranean Action Plan
Barcelona Convention

SPA / RAC

Aichi Biodiversity Targets

2020 Deadline

Date reached

Targets not achieved

Sustainable Development goals

UN environment programme
Mediterranean Action Plan
Barcelona Convention
SPA / RAC

2030 Deadline

Ten years still ahead

Regional Seas: Key Players in Achieving Updated Global Goals at Sea

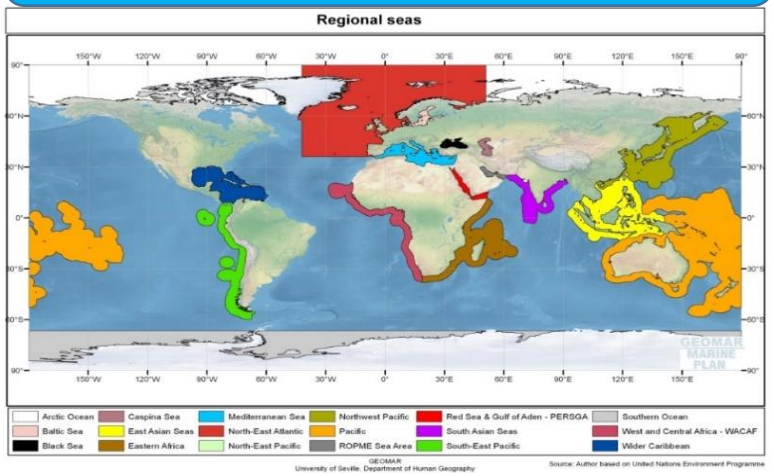
RS governance structures are clearly relevant to the post 2020 GBF implementation in marine regions

Post-2020 Global Biodiversity Framework

Translating global commitments into the blue

Reporting on progress, challenges, gaps

Regional Seas



Post-2020 Regional Seas Strategic Action Plans and Programmes. e.g. Mediterranean Post-2020 SAP BIO

2050 Blue Goals

Facilitating global implementation in 70.9% of Globe

Reporting on progress, challenges, gaps

Barcelona Convention: regional framework

The Barcelona Convention

The Barcelona Convention gathers the 21 Mediterranean riparian States, along with the European Union (EU). It applies to the whole Mediterranean Sea **including areas beyond the limits of national jurisdiction and those for which the territorial delimitation has not yet been defined**. Its geographical coverage may be extended to the littoral as it is defined by each Party within its own territory.

The Barcelona Convention and its 7 Protocols set the legal framework, key principles and obligations for the Mediterranean marine and coastal environmental protection

MAP Coordinating Unit and Components

Convention Protocols and biodiversity

- The **SPA-BD Protocol** aims to preserve the biological diversity of the Mediterranean Sea as delimited in the Barcelona Convention. It also applies to the **seabed and the subsoil of the sea**, along with terrestrial coastal areas designated by each of the Parties, including wetlands.

  Its implementation tool is the Strategic Action Programme for the conservation of Biological Diversity in the Mediterranean Region (SAP BIO) running since 2004 aimed to last 15 years, and to be substituted by the Post 2020 SAP BIO, currently under-elaboration

- Other six Protocols are relevant for different components and conservation needs of Mediterranean Biodiversity, and include: **Land-Based Sources Protocol**, **Integrated Coastal Zone Management** (**ICZM) Protocol, Dumping Protocol, Hazardous Wastes Protocol, Prevention and Emergency Protocol and Offshore Protocol**

UNEP/ MAP Experience

- The Convention and Protocols provide for a range of policy and management approaches and tools including ICZM/MSP and SPAs establishment and management

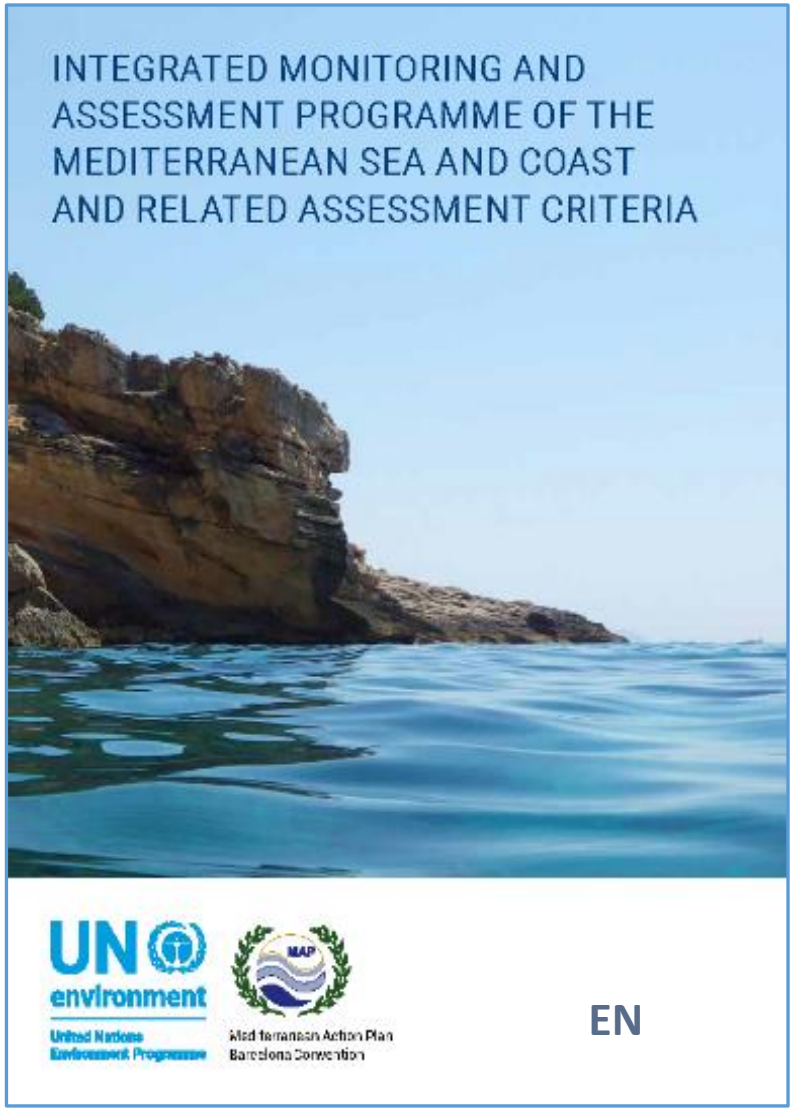
- The Ecosystem Approach is the overarching principle of the UNEP/MAP for integration into all MAP policies

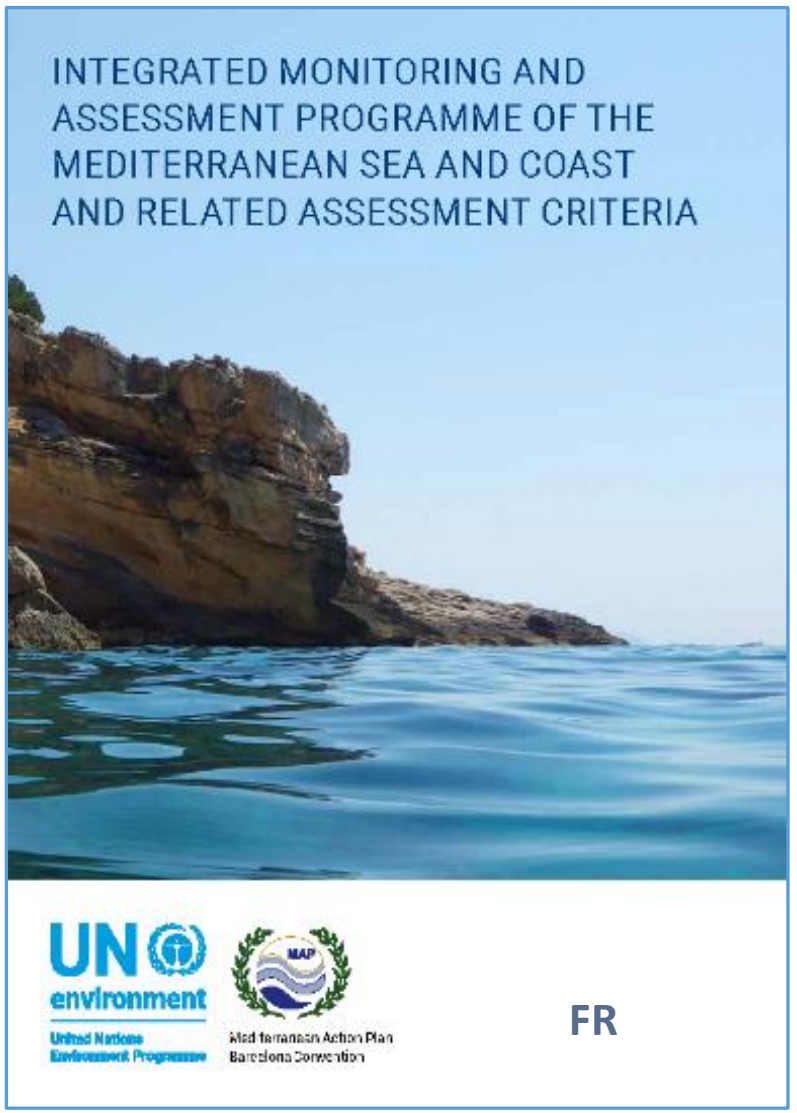
- A specific Roadmap was agreed in 2008 to apply the ecosystem approach in order to define and achieve a Mediterranean Good Environmental Status (GES)

Ecosystem Approach 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 pressure
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

Ecosystem Approach in the Mediterranean





INTEGRATED MONITORING AND ASSESSMENT PROGRAMME OF THE MEDITERRANEAN SEA AND COAST AND RELATED ASSESSMENT CRITERIA (IMAP)

IMAP Ecological Objectives & Indicators

Undewater noise

Marine Litter

Sea food contaminants

Biodiversity

NIS

Fishery

Food webs

Eutrophication

Sea floor integrity

Hydrography

CIs 1,2,3,4,5

CI 6

CIs 7,8,9,0,11,12

EO4

CIs 13, 14

CCIs 26, 27

CIs 22,23,24

EO6

CI 15

CI 20

CIs 17,18,119,21

Pollution /Contaminants

Regular follow up within MAP system on integrated assessment of GES: ongoing

IMAP Ecological Objectives & Indicators

EO 1 Biodiversity

- ✓ Common Indicator 1: Habitat distributional range, to also consider habitat extent as a relevant attribute
- ✓ Common Indicator 2: Condition of the habitat's typical species and communities
- ✓ 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;
- ✓ Common Indicator 8: Total landings;
- ✓ Common Indicator 9: Fishing Mortality;
- ✓ 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
- ✓ Common Indicator 12: Bycatch of vulnerable and non-target species (EO1 and EO3)

EO 5 Eutrophication

- ✓ Common Indicator 13: Concentration of key nutrients in water column
- ✓ Common Indicator 14: Chlorophyll-a concentration in water column

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 4 Marine food webs

EO 6 Sea-floor integrity

IMAP Ecological Objectives & Indicators

UN environment programme | Mediterranean Action Plan Barcelona Convention | SPA/RAC

EO 8 Coastal ecosystems and landscapes

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

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
- ✓ Common Indicator 19: Occurrence, origin (where possible), extent of acute pollution events (e.g. oil spills 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.

EO 10 Marine litter

- ✓ Common Indicator 22: Trends in the amount of litter washed ashore and/or deposited on coastline
- ✓ 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

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

2023 Quality Status Report (QSR) will be elaborated based on the actual field data of IMAP

Indicators for monitoring elements of the draft CBD targets (examples) UNEP/MAP

1	2	3	4	15
Components of the draft Targets **(copy/paste text from CBD/SBSTTA-24/post-2020-monitoring.en.pdf)**	Target Monitoring Elements (copy/paste text from CBD/SBSTTA-24/post-2020-monitoring.en.pdf)	Indicator name	Responsible Institution for the indicator	Comments
T1.2. Prevention of reduction and fragmentation of natural habitats due to land/sea use change	Trends in extent and rate of change of coral reefs	Habitat distributional range Condition of the habitat's typical species and communities	UNEP/MAP-SPA/RAC	also consider habitat extent as a relevant attribute Besides these common indicators, other indicators will be further developed under the ecosystem approach process of the Barcelona convention to assess the impact of the anthropogenic pressures on the benthic ecosystems (Ecological objective 6: Sea-floor integrity is maintained, especially in priority benthic habitats)
	Trends in extent and rate of change of seagrass ecosystems	Habitat distributional range Condition of the habitat's typical species and communities	UNEP/MAP-SPA/RAC	
	Trends in extent and rate of change of wetlands	Location and extent of the habitats impacted directly by hydrographic alterations Length of coastline subject to physical disturbance due to the influence of man-made structures	UNEP/MAP-PAP/RAC	to also feed the assessment on habitat extent;

IMAP gaps addressed by ODYSSEA

Key IMAP knowledge gaps identified in the 2017 Mediterranean Quality Status Report, and how these gaps could be addressed by relevant ODYSSEA data and models. The table is organised by IMAP Ecological Objectives and Common Indicators and includes links to the relevant sections of the 2017 Mediterranean Quality Status Report (2017 MED QSR).

Ecological Objective (EO)	Common Indicator (CI)	Knowledge gaps (identified in the 2017MED QSR)	ODYSSEA data and models	
			ODYSSEA's relevant data parameters	Sensor or modelling system(s)
Biodiversity and Ecosystems (EO1)	Species distributional range – Marine Mammals (CI3 MM)	Marine mammal species distribution ranges, particularly for southern Mediterranean countries	Marine mammal species recognition and distribution	Glider Payload 2 Modular Seafloor Lander type A/B
	Species distributional range – Marine Reptiles (CI3 MR)	Marine turtle species distribution ranges, including breeding, nesting, wintering, feeding and developmental sites	*Potentially marine turtle distribution (to be explored)*	*Glider Payload 2* *Modular Seafloor Lander type A/B*
	Population abundance of selected species – Marine Mammals (CI4 MM)	Abundance and density baseline information for marine mammals.	Cetacean abundance	Glider Payload 2 *Modular Seafloor Lander type A/B*
Non-indigenous species (EO2)	Population and distribution of non-indigenous species (CI6)	Trends in abundance, temporal and spatial distribution and impacts of alien species.	Fauna abundance per unit area of the bed	Surface monitoring type A/B Port survey adapting the HELCOM/OSPAR protocol
			Alien species distribution	Machine learning tools
Harvest of commercially exploited Fish and Shellfish (EO3)	Spawning stock biomass (CI7)	Spawning Stock Biomass reference points for most stocks.	Stock characteristics	Stock assessment at selected Observatories
	Total landings (CI8)	Illegal, unregulated, or unreported fishing activities	Fishing behaviour publications	Twitter harvesting & semantic information fusion capabilities

IMAP gaps addressed by ODYSSEA

Ecological Objective (EO)	Common Indicator (CI)	Knowledge gaps (identified in the 2017MED QSR)	ODYSSEA data and models	
			ODYSSEA's relevant data parameters	Sensor or modelling system(s)
Eutrophication (EO5)	Concentration of key nutrients in water column (CI13)	Key nutrients in the water column in coastal hotspots.	Concentration of key nutrients (nitrate, phosphate, etc.) in the water column	Delft3D-WAQ Water quality modelling system in all Observatories
				External sources (CMEMS model products)
			CDOM concentration in the water column	Glider payload 1
	Chlorophyll a concentration in the water column (CI14)	Chlorophyll *a* concentration in the water column.	Chlorophyll *a* pigment concentration in the water column	Glider payload 1
				Surface monitoring type A or B
				Modular Seafloor Lander type A/B
				Delft3D-WAQ Water quality modelling system in all Observatories
				External sources (CMEMS model and observation products, Sentinel 2A/2B and Sentinel 3A)
Hydrography (EO7)	Location and extent of habitats impacted directly by hydrographic alterations (CI15)	Extent of hydrographic alterations and its intersection with marine habitats.	Seagrass dynamics and distribution	Machine learning tools
		Hydrographic data with detailed temporal and spatial scale.	Hydrographic conditions (currents, waves, suspended sediment loads etc.)	Delft3D-FLOW Hydrodynamic modelling system in all Observatories
				Delft3D-WAQ-SPM suspended sediment modelling system in selected Observatories
Pollution (EO9)	Concentration of key harmful contaminants measured in the relevant matrix (CI17)	Emerging contaminants, contaminants in deep-sea environments, and the dynamics of inputs, streams and distributions of contaminants.	Concentration of key harmful contaminants (e.g. heavy metals, etc.) in the water column	Delft3D-WAQ Water quality modelling system in all Observatories
			Identification of Harmful Algal Blooms	Remote sensing level 2 data using Sentinel 3

IMAP gaps addressed by ODYSSEA

Ecological Objective (EO)	Common Indicator (CI)	Knowledge gaps (identified in the 2017MED QSR)	ODYSSEA data and models	
			ODYSSEA's relevant data parameters	Sensor or modelling system(s)
Pollution (EO9)	Occurrence, origin and extent of acute pollution events and their impact on biota (CI19)	Illegal discharge from ships.	Oil spills accidentally discharged from ships and oil and gas platforms	Remote sensing level 2 data from Sentinel 2
			Extent, trajectory and concentration of oil spills	Delft3D-PART modelling system in selected Observatories
				OpenOil oil spill fate and transport modelling system for all Observatories
Marine litter (EO10)	Trends in the amount of litter washed ashore and/or deposited on coastlines (CI22)	Distribution, quantities and identification of marine litter sources for litter washed ashore or deposited on beaches and coasts at the basin scale.	Estimation of plastics/microplastics sources	OpenOil plastics/microplastics tracking modelling system in selected Observatories
			Beach litter distribution and abundance	Citizen science apps
	Trends in the amount of litter in the water column including microplastics and on the seafloor (CI23)	Distribution and quantities, identification, evaluation of accumulation areas, and detection of litter sources of litter in the water column, including microplastics and on the seafloor.	Litter abundance and type	Glider Payload 3
				Modular Seafloor Lander type B
				Surface monitoring type A/B
			Estimation of distribution of individual particles by following their tracks in time	Delft3D-PART Plastic dispersion modelling system in selected Observatories
			Estimation of plastic/microplastic distribution at the surface, in the water column, benthic sediments, and coasts.	MEDSLIK-II plastics/microplastics tracking modelling system in selected Observatories
		Links between hydrodynamic factors to understand transport dynamics and accumulation zones.	Currents, sea level, water temperature, salinity and density	Delft3D-FLOW Hydrodynamic modelling system in all Observatories
			Plastic dispersion	Plastic dispersion forecasting system
Underwater noise (EO11)	Distribution of loud, low and mid-frequency impulsive sounds (CI26)	Data on underwater noise	Levels of underwater noise	Hydrophones deployed on mobile and static sensor systems at selected Observatories

Implementation status for each Observatory

Observatory	Country	Hydro	Wave	Water	Ecosyst	Oil	Mussel	Erosion	Jellyfish	Wind
Thracian Sea	Greece									
Gulf of Gökova	Turkey									
Valencia	Spain	*Valenciaport has its own such monitoring program*								
Northern Adriatic Sea	Italy									
Gulf of Arzew/ Stora Bay	Algeria									
Gulf of Gabes	Tunisia									
National Park Al-Hoceima	Morocco									
Israel Coastal	Israel									
Nile River Region of Freshwater Influence	Egypt									

(Green = fully implemented; Orange = in progress; White = not envisioned)

Mediterranean Sea Scale: In addition, a fish Species Distribution Model (SDM) was developed for the Mediterranean distribution of *Engraulis encrasicolus*, *Sardina pilchardus*, *Sardinella aurita*, *Scomber colias*, *Scomber scombrus*, *Spicara smaris, Thunnus thynnus* and *Xiphias gladius*, utilizing AquaMaps probability of occurrence data and implementing a novel machine-learning model based on oceanographic and environmental parameters.

Thank you Gracias Merci شكراً

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UN Environment Programme/Mediterranean Action Plan

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

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 727277