Mediterranean Action Plan
Barcelona Convention

UN environment

Cross-Cutting Issues and Common Challenges: The Methodological Approach for Mapping the Interrelations between Sectors, Activities, Pressures, Impacts and State of Marine Environment for EO5 and EO9

Meeting of CorMon on Coast and Hydrography

Rome, Italy, 21-22 May 2019

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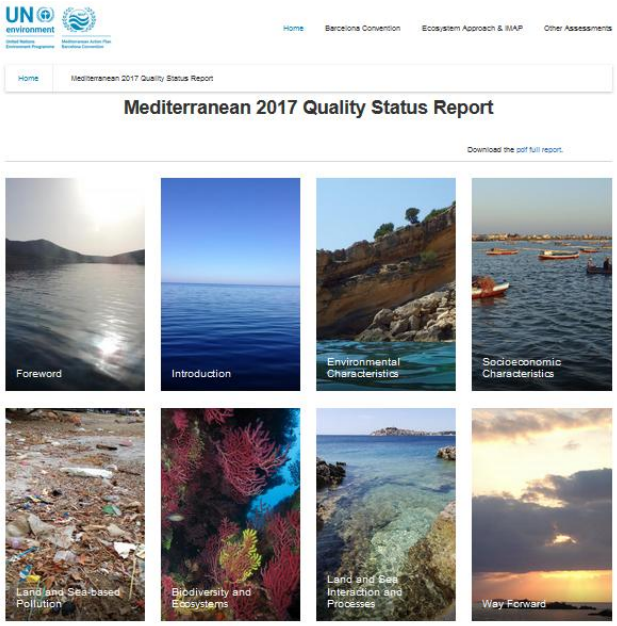
From 2017 MED QSR to 2023 MED:

Key steps and lessons learned

Mediterranean 2017 Quality Status Report

https://www.medqsr.org



Decision IG.23/6 (COP 20, Tirana, Albania, 17-20 December 2017)

- ✓ MED QSR 2023 Roadmap
- ✓ IMAP implemented at national; where applicable sub-regional level:
- ✓ Towards the Fully Data-Based 2023 MED QSR
- ✓ Better linkages pressures/impact/states

2023 MED QSR Roadmap

- In line with the findings of the 2017 MED QSR and Decision IG.23/6, as well the recommendations of the IMAP Best Practices Meeting laid out in UNEP/MED WG.450/3, the Secretariat has prepared the 2023 MED QSR Roadmap and Needs Assessment;

- It provides for a vision of a better integrated and DPSIR-based GES assessment of the 2023 MED QSR along with a short list of key priority needs, main processes and milestones and related outputs;

- 87th Meeting of the Bureau considered and welcomed the 2023 MED QSR Roadmap and Needs Assessment that was thereafter presented to members of the EcAp Coordination Group for written consultation, and consequently concluded by the end of 2018, as requested by COP 20;

- It is being integrated into the proposal of the UN Environment/MAP Programme of Work for 2020-2021 currently under development (included in Annex I of this Report for information purposes);

Main Processes and Milestones of the 2023 MED QSR

1. Scales of Monitoring, Assessment and Reporting to be agreed on
2. Integrated Assessment of GES through development of methodological tools and assessment criteria
3. Implementation of national IMAPs throughout the Mediterranean
4. Delivery of a fully-operational SEIS-based IMAP Info System
5. Development and Implementation of Monitoring Protocols and Data Quality Assurance and Quality Control
6. Technical assistance and support to address knowledge gaps and enhance national capacity
7. Outreach to regional partners to provide input and development of a Communication and Visibility strategy
8. Effective Regional Cooperation

Cross-cutting issues

- The methodological approaches for integrated marine assessments;
- The concrete guidance and steps forward related to **the scales of monitoring and assessment under IMAP** considering current practices are presented in two documents: on cross-cutting issues (UNEP/MED WG.463/5) and approaches of scales of monitoring (UNEP/MED WG.463/8);
- Considering 24 new/updated **pollution assessment criteria** that were approved in Decision IG.23/6 related to 2017 MED QSR adopted at COP 20 (Tirana, Albania, December 2017), a further estimation of sub-regional Mediterranean background assessment concentrations (Med BACs) were calculated from the background concentrations (BCs) recommended at sub-regional scale ***for heavy metals in biota***, whilst the sub-regional Med BACs in sediment have been estimated but not applied (updated assessments related to EO5 and EO9 provided in document UNEP/MED WG.463/Inf.6);

From 2017 Mediterranean QSR towards 2023 Mediterranean QSR: A more integrated approach for GES assessment

Based on the UN Environment/MAP documents (2017 MED QSR, IMAP Guidance) and findings/best practices, the **following issues are crucial to improve GES assessment**:

- ❑ Assessment of pressures/impacts/state interactions identifying, where possible, cause-effect relationships (tools to show pressures/impacts/state interactions);
- ❑ Definition of clear and common aggregation (geographical) and integration rules, including in time and space;
- ❑ Approaches to define assessment scales and areas: regions/sub-regions/subdivisions/finer scales, if needed, using a nested approach;
- ❑ Application of both trends and new/updated IMAP thresholds as appropriate tools for GES assessment!

Ensuring better interaction of pressures, impacts and state in assessing GES

- A two-step process may be recommended:

  i. Assessment of predominant pressures and their impacts, including a mapping when appropriate;
  ii. Assessment of the environmental status of marine ecosystems;

- Different possible approaches were considered by the IMAP Best Practices Meeting:

  - GRID table
  - RISK based approach
  - NEAT approach;

GRID/Table Tool:

Interrelationships between the IMAP Common Indicators/Ecological Objectives (EO) and the main activities/ pressures in the Mediterranean Sea

EO	Common Indicator	Non construction zone	Natural hazards	Natural disasters	Climate change	Agriculture & forestry run offs	coastal urbanization	Damming (demand on water)	Waste water discharges	Industry	tourism frequentation	Yachting	Marine mining	Dredging	Desalinisation	coastal artificialisation	Port operations	Offshore structures	cables and pipelines	Shipping	oil and gaz extraction	renewable energy	Fishing (incl. Recreationnal)	Sea-based food harvesting	Extraction of genetic resources	Aquaculture	Solid waste disposal	Storage of gases	Research and education	defence operations	Dumping of munitions
1	CI1 Distributional range																												*		
	CI2: Condition species																												*		
	CI3 Species distribution																												*		
	CI4 Population abundance																												*		
	CI5 Population demography																												*		
2	CI6 Trends in NIS																														
3	CI7 Spawning stock Biomass																														
	CI8 Total landings																														
	CI9 Fishing Mortality																														
	CI10 Fishing effort																														
	CI11 CPUE/LPUE																														
	CI12 Bycatch																														
4	CI13 Nutrients																														
	CI 14 Chlorophyll-a																														
7	CI 15 Habitats impacted																														
8	CI16 Erosion																														
9	CI17: Key harmful contaminants																														
	CI 18: Pollution effects																														
	CI 19 Acute pollution events																														
	CI20: Seafood Contaminants																														
	CI21 Intestinal enterococci																														
10	CI22 Beached litter																														
	CI 23 Litter at sea																														

(*) mammals

Table1: Interrelationships between the IMAP Common Indicators grouped per Ecological Objectives (examples of EO1 and EO10) and the main activities in terms of pressures in the Mediterranean Sea (ICZM and other Barcelona Convention's Protocols), as presented to the IMAP Best Practices Meeting

Pressures can be considered (i) at source (the activity generating the pressure) or (ii) at sea (the level of pressure in the marine environment)

Activities are listed based on ICZM Protocol and Assessment reports

	Significant contribution of the activity to pressure
	Minor contribution of the activity to pressure
	No activity but possible development of the activity
	No contribution to pressure

Table 1: Furthermore elaborated by MED POL with regards EO5 and EO9

Pressures vs. measured IMAP Common Indicators (EO5 and EO9)	Non-Construction Zone	Natural Hazards	Natural disasters	Climate Change	Agric. and forestry runoffs	Coastal Urbanization	Damming (demand on water)	Waste water discharges	Industry	Tourism frequentation	Yachting	Marine mining	Dredging	Desalinization	Coastal artificialization.	Port operations	Offshore structures	Cables and pipelines	Shipping	Oil and gas extraction	Renewable energy	Fishing (incl. recreational)	Sea-based food harvesting	Extraction of genetic	Aquaculture	Solid waste disposal	Storage of gases	Research and education	Defence operations	Damping of munitions
C13. Nutrients																														
C14. Chlorophyll *a*																														
CI17: Key harmful contaminants																														
CI18: Pollution effects																														
CI19: Acute pollution events																														
C20: Contaminants in seafood																														
CI21: Intestinal enterococci																														

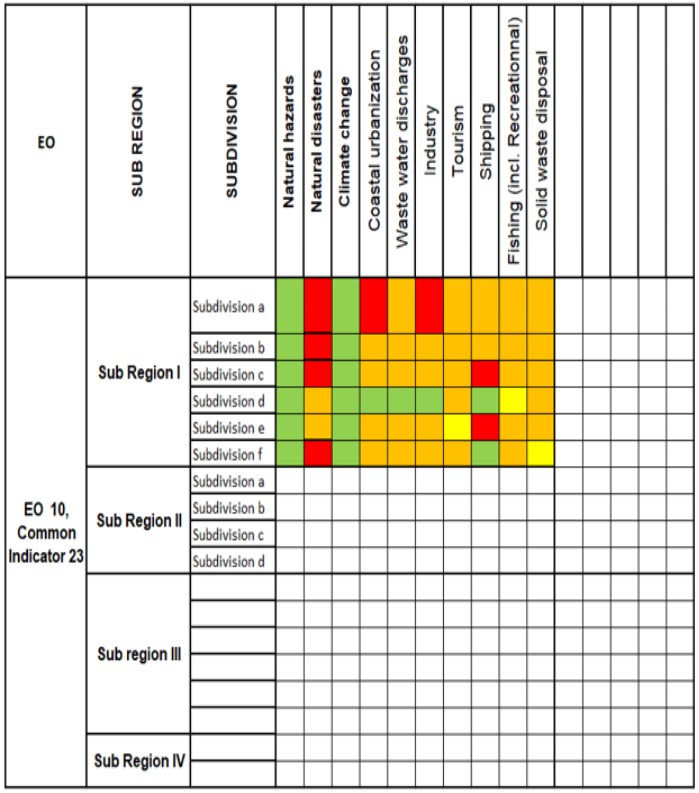
Table 1: Furthermore elaborated by MED POL with regards EO5 and EO9

- Table 1. presents natural and anthropogenic pressures (selected based on the main activities in terms of pressures as provided by ICZM Protocol and other Barcelona Convention`s Protocols) affecting the marine ecosystems and the related measurement through IMAP Common Indicators for EO5 and EO9.

- Following the analysis presented in this table that is based on the expert judgment, CorMon experts can better define/refine specific interactions, for activities contributing to pressures at Common Indicator level.

GRID Tool: Links between IMAP Common Indicators for Selected priority activities at finer scales

Example of EO10



EO	SUB REGION	SUBDIVISION	Natural hazards	Natural disasters	Climate change	Coastal urbanization	Waste water discharges	Industry	Tourism	Shipping	Fishing (incl. Recreationnal)	Solid waste disposal
EO 10, Common Indicator 23	Sub Region I	Subdivision a										
		Subdivision b										
		Subdivision c										
		Subdivision d										
		Subdivision e										
		Subdivision f										
	Sub Region II	Subdivision a										
		Subdivision b										
		Subdivision c										
		Subdivision d										
	Sub region III											
	Sub Region IV											

The GRID Approach can support the **definition of areas/sectors where appropriate reduction and management measures will be needed.**

The GRID Approach provides priorities for baselines, thresholds, targets, and support the monitoring of associated measures' efficiency.

Four sub-regions have been defined, (UNEP(DEPI)/MED WG.363/Inf.21)

Table 2: Furthermore elaborated by MED POL with regards EO5 and EO9

Main updated elements UNEP/MED WG.450/3:

- Sub-regions
- Subdivisions

Scaled GRID pressures/impact approach	SUB-REGIONS	SUB-DIVISIONS	Coastal urbanization	Industry	Offshore structures	…
Common Indicator 14 (Chl-a) (Ecological Objective 5)	Western Mediterranean Sea	North Western (NWMS)				
		Alboran Sea (ALBS)				
		Tyrrhenian Sea (TYRS)				
	Adriatic Sea	North Adriatic (NADR)				
		Middle Adriatic (MADR)				
		South Adriatic (SADR)				
	Central and Ionian Seas	Central (CEN)				
		Ionian Sea (IONS)				
	Aegean and Levantine Seas	Aegean Sea (AEGS)				
		Levantine (LEVS)				
Scaled GRID pressures/impact approach	SUB-REGIONS	SUB-DIVISIONS	Coastal urbanization	Industry	Offshore structures	…
Common Indicator 17 (Contaminants) (Ecological Objective 9)	Western Mediterranean Sea	North Western (NWMS)				
		Alboran Sea (ALBS)				
		Tyrrhenian Sea (TYRS)				
	Adriatic Sea	North Adriatic (NADR)				
		Middle Adriatic (MADR)				
		South Adriatic (SADR)				
	Central and Ionian Seas	Central (CEN)				
		Ionian Sea (IONS)				
	Aegean and Levantine Seas	Aegean Sea (AEGS)				
		Levantine (LEVS)				

Table 2: Furthermore elaborated by MED POL with regards EO5 and EO9

- ***Table 2.*** presents GRID/Table for IMAP integrated assessments under the nested assessment approach.

- The four sub-regions have been already defined for practical reasons and for the purpose of the UN Environment/MAP 2011 Initial Integrated Assessment (UNEP(DEPI)/MED WG.363/Inf.21) and the Med QSR 2017, namely the Western Mediterranean, Ionian and Central Mediterranean, Adriatic Sea and Aegean-Levantine Seas.

- The sub-divisions (i.e. sub-regional seas/basins) have been defined according to availability of database sources for the purpose of development of the assessment criteria for pollution (UNEP(DEPI)/MED WG.427/Inf.3).

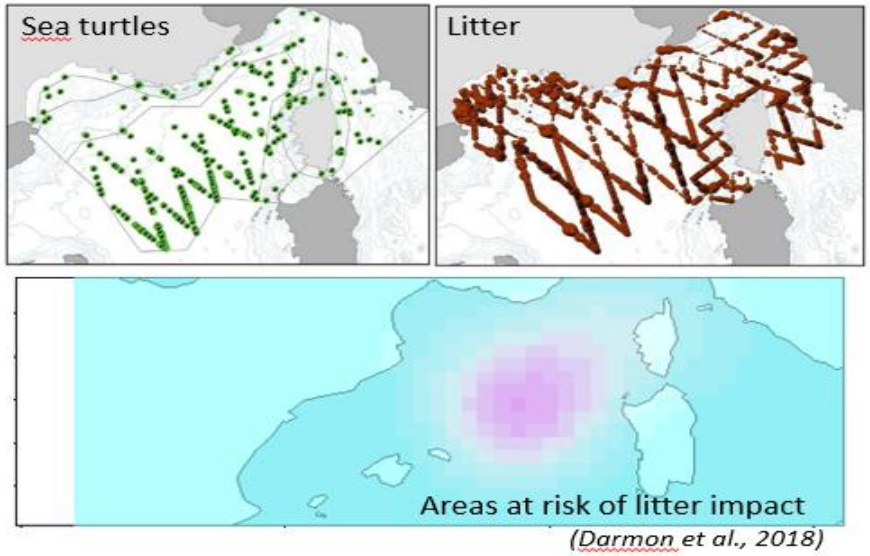
- The sub-divisions might correspond initially to the Contracting Parties` coastal zones and offshore areas. Other sub-divisions may be defined. Downscaling at sub-divisional level is also used under the EU Marine Strategy Framework Directive.

- Following the analysis presented in this table that is based on the expert judgment, CorMon experts can better define/refine specific interactions, for activities contributing to pressures at Common Indicator level in Mediterranean sub-regions and sub-division.

Mapping of pressures/impacts relationships: Risk-based approach

- Principle: to attribute values to the current state (Index Value); to attribute values to pressure and impacts (Impact Index); and assess vulnerability as potential magnitude (degree, extent and significance) of negative impacts;
- A variety of assessment scales are necessary to reflect various ecosystem elements;
- Risk-based approach is **particularly effective** for EOs with patchy distribution and where pressures are at specific locations.

Example: Definition of areas at risk for CI 24 (ingested litter in Sea turtles, after *(Darmon et al., 2018)*



Example: National Application of Risk based Approach in Boka Kotorska Bay Project: MSP based on IMAP

SCOREBOARDS METHOD elaborated by MED POL:

Quantifying pressures/impacts relationships; risk-based approach

- Given the fact that IMAP implementation is at stage when monitoring and assessment scales are to be updated/agreed and tested, as well as aggregation and integration rules fully defined, at present, the semi-quantitative scoreboards method is useful for mapping the interrelation of drivers-pressures-impacts-state-responses of complex processes, such as those present in the marine environment (i.e. to estimate (in %) how many items (activities) exits with the potential to threat the coastal zone, and in the other hand, to provide information of the magnitudes of impact (in %) accordingly)

- In the absence of quantitative assessment criteria, semi-quantitative approaches should be a basis for mapping and quantifying the interrelation of drivers-pressures-impacts-state-responses relying on the best available expert judgment. Scoreboards method is similar to the GRID/Table approach; however, it uses numeric scores (i.e. assignment of a numeric value by categories) rather than colours alone, to allow calculating derived quantitative information.

- With this approach quantitative and qualitative expressions of IMAP, as the measurement system of Barcelona Convention, has been combined, to the purpose of qualifying activities/pressures/impacts.

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SCOREBOARDS METHOD elaborated by MED POL:
Quantifying pressures/impacts relationships; risk-based approach

- Scoreboards method should provide insights on impacts, which are directly relevant to the state-based assessment of the ecosystem. The state-based integrated assessments, combining the state-based Common Indicators, as a set of ecosystem elements, in a holistic manner, should cover the overall pressure-based Common Indicators affecting it.

- **The added value of the combined synthesis of the semi-quantitative approaches and expert judgment is a clear vision on the requirements and responsibilities from both the managerial and measurement systems.**

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SCOREBOARDS METHOD: Cross-cutting issues (interrelationships between the IMAP and the DPSIR framework)

SCORECARDS: SEMI QUANTITATIVE APPROACH

(choose 0, 1, 2 or 3 to estimate impact)

None (0) | Low (1) | Moderate (2) | High (3)

Overall of Pressure-Impact (Ecosystem Services) (%):

	SEAWARD - LAGOONS - ISLANDS - OFFSHORE				IMPACT SCORE	
Economic (Driver)		**Pressure**	**State**	**Impact (Ecosystem)**	**% of total impacts**	**Regional policy (Response)**
	Activity type					**UN Barcelona Convention**
Maritime activities	Awaiting areas (oil tankers, cargo transport, hazardous substances vessels)	Introduction of pollutants (oil hydrocarbons and related organic compounds)	Water column habitats decline	Healthy coastal water and habitats decline	3	Offshore Protocol

SCOREBOARDS METHOD: Cross-cutting issues (interrelationships between the IMAP and the DPSIR framework)

	Offshore platforms (oil and gas exploitation)	Introduction of pollutants (oil hydrocarbons and related organic compounds)	Water column habitats decline	Healthy coastal water and habitats decline	2	Offshore Protocol
		Risk of accidents and spills	Water quality degradation		1	IMO
	Shipping traffic (commercial, ferries, military, cruise liners)	Introduction of pollutants and noise, litter	Water column habitats decline	Healthy coastal water and habitats decline	0	Offshore Protocol
		Risk of accidents or acute spills	Water quality degradation	Healthy coastal water and habitats decline	0	IMO
		Introduction of NIS (ballast water)	Biodiversity and functions alteration	Healthy coastal water and habitats decline	3	IMO
	Dredging (natural environments)	Extraction of soil substrates	Disturbance of sea-floor integrity impaired	Benthic species and habitats deterioration	3	Offshore Protocol
	Offshore energy (renewable)	Occupation of coastal marine space	Surface and pelagic ecosystems altered	Healthy coastal water and habitats decline	3	Offshore Protocol
	Storage of gases	Sub substrate storage (seismic risks)	Disturbance of sea-floor integrity impaired	Healthy coastal benthic habitats decline	3	Offshore Protocol
	Disposal of munition	Dumping of munitions (including bacteriological)	Disturbance of sea-floor integrity impaired	Healthy coastal benthic habitats decline	3	Offshore Protocol
				TOTAL SEAWARD IMPACT (Ecosystem services)	30	

ITEM SCORES
(choose YES/NO)

Yes (1)

NO (0)

Overall items (Ecosystem Services) affecting the ICZM (%) 98.3

	LANDWARD - INLAND				ITEMS SCORE	COASTAL AREA				ITEMS SCORE	SEAWARD - LAGOONS - ISLANDS - OFFSHORE				ITEMS SCORE	
Economic (Driver)		**Pressure**	**State**	**Impact (Ecosystem))**	**% of total items**		**Pressure**	**State**	**Impact (Ecosystem)**	**% of total items**		**Pressure**	**State**	**Impact (Ecosystem)**	**% of total items**	**Regional policy (Response)**
	Activity type				100.0	**Activity type**				98.0	**Activity type**				97.5	**UN Barcelona Convention**
1) Agriculture	Crops (any)	Hydrological alterations	River diversions	Habitats deterioration	1	Crops (any)	Runoff/River (organochlorinated and other chemicals)	Coastal contamination/pollution Eutrophication	Habitats deterioration seafood contamination	0	Crops (effects seaward)	Runoff/River (organochlorinated and other chemicals)	Coastal and offshore contamination/pollution Eutrophication	Ecosystems deterioration Seafood contamination	0	LBS Protocol Hazardous Substances Protocol SAP/MED Regional Plan on the on the phasing out of lindane and endosulfane, Regional Plan on the Phasing Out of DDT; and other similar Regional plans for phasing out POPs

estimate (in %) how many items (activities) exits with the potential to threat the coastal zone

IMPACT SCORES ESTIMATION
(choose 0, 1, 2 or 3 to estimate impact)

None (0)

Low (1)

Moderate (2)

High (3)

Overall of Pressure-Impact (Ecosystem Services) at the ICZM (%) 98.3

	LANDWARD - INLAND				IMPACT SCORE	COASTAL AREA				IMPACT SCORE	SEAWARD - LAGOONS - ISLANDS - OFFSHORE				IMPACT SCORE	
Economic (Driver)		**Pressure**	**State**	**Impact (Ecosystem))**	**% of maximum impact**		**Pressure**	**State**	**Impact (Ecosystem)**	**% of total impacts**		**Pressure**	**State**	**Impact (Ecosystem)**	**% of total impacts**	**Regional policy (Response)**
										98.7	**Activity type**				97.5	**UN Barcelona Convention**
1) Agricultur							d and other chemicals)	lution Eutrophication	Habitats deterioration seafood contamination	1	Crops (effects seaward)	Runoff/River (organochlorinated and other chemicals)	Coastal and offshore contamination/pollution Eutrophication	Ecosystems deterioration Seafood contamination	0	LBS Protocol Hazardous Substances Protocol SAP/MED Regional Plan on the on the phasing out of lindane and endosulfane, Regional Plan on the Phasing Out of DDT; and other similar Regional plans for phasing out POPs

estimate (in %) the magnitudes of impact

Other approaches

UNEP Regional Seas Programme (RSP), Global Environment Facility-Large Marine Ecosystem Projects (GEF-LMEs), as well as the SGD 14 (Agenda 2030) are encouraging and promoting the use of science-based tools, such as the Ocean Health Index (OHI) or the Environmental Vulnerability Index (EVI) (UNEP, 2014).

Contribution of PAP/RAC to cross-cutting issues

Matrix of interactions

- The first Phase of the methodological guidance consists in the elaboration of a matrix of interactions between EcAp EOs and elements of the ICZM Protocol. The proposed matrix is based on the principle of ecosystem-based management to reach GES, as well as on the principles of integration and cumulative impact.

- Matrix consists on cross-check elements of the ICZM Protocol with the EOs organised in four clusters: 1. Biodiversity, 2. Fisheries, 3. Coast and Hydrography, 4. Pollution and Litter.

- Matrix should be directly utilized as an assessment tool supporting decision-making mechanisms at the different levels (regional, sub-regional, national, sub-national): the identification of the spatial and temporal (short, medium and long-term) scales is therefore an essential initial step of the overall analysis, including the elaboration of the matrix of interactions.

Contribution of PAP/RAC to cross-cutting issues

Matrix of interactions

- Various tools can be used to support the matrix updating and improvement.

- One of these is the one above presented developed by MEDPOL, based on the well-known DPSIR (Driver-Pressure-State-Impact-Response) approach, which is also recommended for assessment under the umbrella of the UN Environment/MAP-Barcelona Convention System.

- A brief description of the tool is included in Box 1 of Annex of the Methodological Guidance for Reaching GES through ICZM

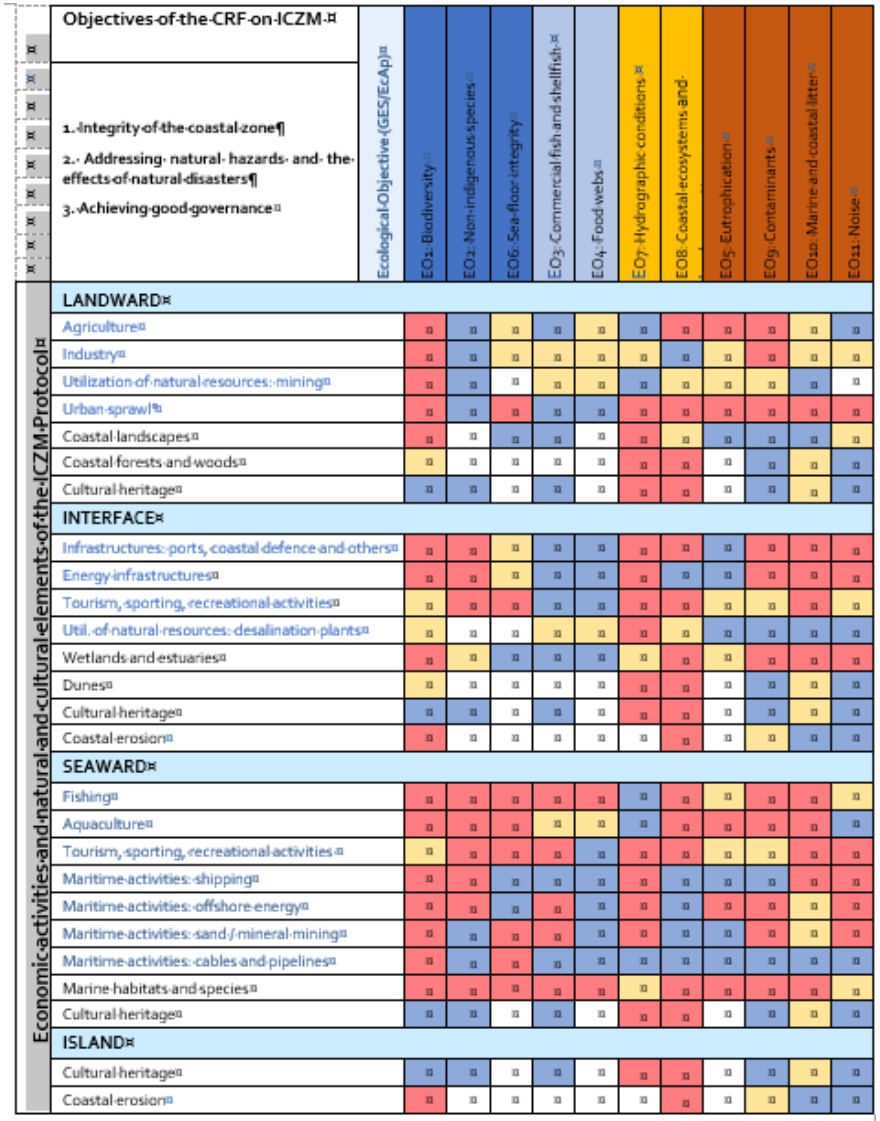

Figure 2: Matrix of interactions between elements of the ICZM Protocol and EOs (red = interaction of high relevance; yellow = interactions of moderate relevance; blue = interactions of low relevance; white = not relevant).

Conclusion of the Meeting of CorMon on Pollution Monitoringt

- ✓ Acknowledged the methodologies proposed for GES-integrated assessment based on DPSIR approach and approved them in principle;
- ✓ Recommended their testing by the Contracting Parties with the view to present related main findings to the next meeting of CorMon on Pollution Monitoring;
- ✓ Recommended to complement these methodologies with the modelling of monitoring data in order to ensure a more reliable quantification of the magnitude of impacts (i.e. scientifically-based scoring);
- ✓ Requested the Secretariat to present these methodologies to the forthcoming Meeting of the MED POL Focal Points in May 2019;
- ✓ Recommended to continue the application of both trends and new/updated thresholds as appropriate tools for GES assessment, whilst both options should complement each other; and
- ✓ Recommended to further implement COP20 Decision IG.23/6 by encouraging the Contracting Parties to further test the Background Assessment Criteria (BACs) and Environmental Assessment Criteria (EACs) and thresholds application on a trial basis at regional and sub-regional levels. This may include possible revision of the current assessment values (BAC, EAC and ERL) for metals and organic contaminants in coastal sediments and bivalves and fish, in particular for HgT, taking into account sub-regional differences.

Thank you

Mediterranean Action Plan Coordinating Unit
Barcelona Convention Secretariat

UN Environment/Mediterranean Action Plan

Barcelona Convention Secretariat

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