Ecosystem Approach for the management of human activities in the Mediterranean

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UNEP/MAP – MED POL

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Barcelona Convention and Protocols

Convention/Protocol	Adopted	In force
Convention for the protection of the marine environment and the coastal region of the Mediterranean (Barcelona Convention)	1976 Amended 1995	2004
Protocol for the protection of the Mediterranean Sea against pollution from land-based sources and activities (LBS Protocol)	1980 Amended 1996	2008
Protocol concerning specially protected areas and biological diversity in the Mediterranean	1995	1999
Protocol for the prevention and elimination of pollution of the Mediterranean Sea from ships and aircrafts or incineration at sea	1976 1995	
Protocol for the protection of the Mediterranean Sea against pollution resulting from the exploration and exploitation of the continental shelf and the seabed and its subsoil (Offshore Protocol)	1994	2011
Protocol on the prevention of pollution of the Mediterranean Sea by transboundary movements of hazardous wastes and their disposal	1996	2008
Protocol concerning the cooperation in preventing pollution from ships and, in case of emergency, combating pollution of the Mediterranean Sea	2002	2004
Protocol of Integrated Coastal Zone Management in the Mediterranean	2008	2011

Structure of MAP Secretariat

- Coordination Unit (Athens, Greece)
- MED POL - Programme for the assessment and control of pollution in the Mediterranean Region (Athens, Greece)

Regional Activity Centres (RACs)

- REMPEC - Regional marine pollution emergency response centre for the Mediterranean (Malta)
- BP/RAC - Blue Plan Regional Activity Centre (Sophia Antipolis, France)
- PAP/RAC – Priority actions programme Regional Activity Centre (Split, Croatia)
- SPA/RAC – Specially protected areas Regional Activity Centre (Tunis, Tunisia)
- INFO/RAC Information Regional Activity Centre (Rome, Italy)
- CP/RAC – Regional Activity Centre for Cleaner Production (Barcelona, Spain)

Ecosystem Approach - definitions

"The ecosystem approach is a strategy for the integrated management of land, water and living resources that provides sustainable delivery of ecosystem services in an equitable way."

- **Source: UNEP Ecosystem Management Programme**

"In ecosystem-based management, the associated human population and economic/social systems are seen as integral parts of the ecosystem. Most importantly, ecosystem-based management is concerned with the processes of change within living systems and sustaining the services that healthy ecosystems produce.

Ecosystem-based management is therefore designed and executed as an adaptive, learning-based process that applies the principles of the scientific method to the processes of management."

- **Source: UNEP (2006) Ecosystem-based Management – Markers for Assessing Progress**

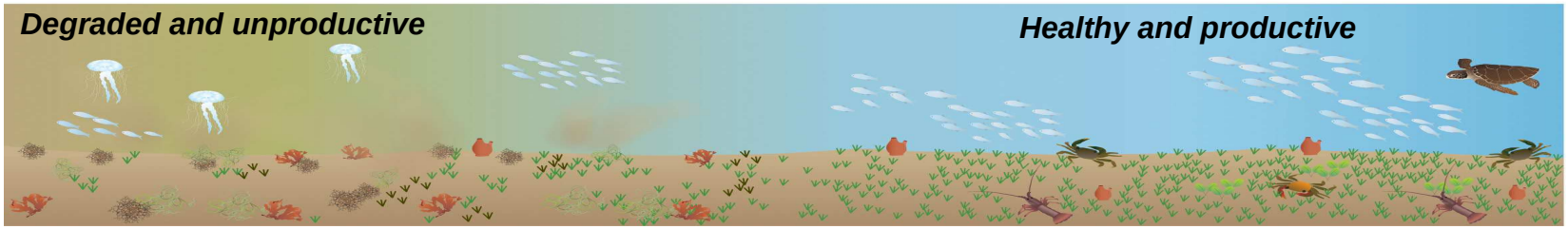
Alternative management options

Unplanned development

The city decides to engage in **minimal planning as the city expands**. Without restrictions in place, the city grows right up to the water's edge. The **shoreline is hardened, and green space is eliminated** in favor of additional development. Roads cut directly through wetlands and coastal plains, damaging them irreparably. Agriculture is unregulated and unzoned. As a result**, urban and agricultural run-off** become a significant issue and water quality and coastal recreation are compromised.

Planning with an ecosystem perspective

The city decides to invest in **urban planning** that includes consideration of the surrounding coastal and marine ecosystem. It keeps urban run-off to a minimum by keeping green space and other porous surfaces intact. It prioritizes **maintaining the natural shoreline by including a buffer between development and the coast**. It elevates roads to minimize damage to **sensitive wetlands**. Agriculture is primarily **organic**, and does not abut the coastline. Residents continue to enjoy the coastal recreation opportunities because the **water is clean and productive**.



Core elements of EBM

Core elements that must be put into practice at some point in an EBM process:

1. Recognizing connections within and across ecosystems

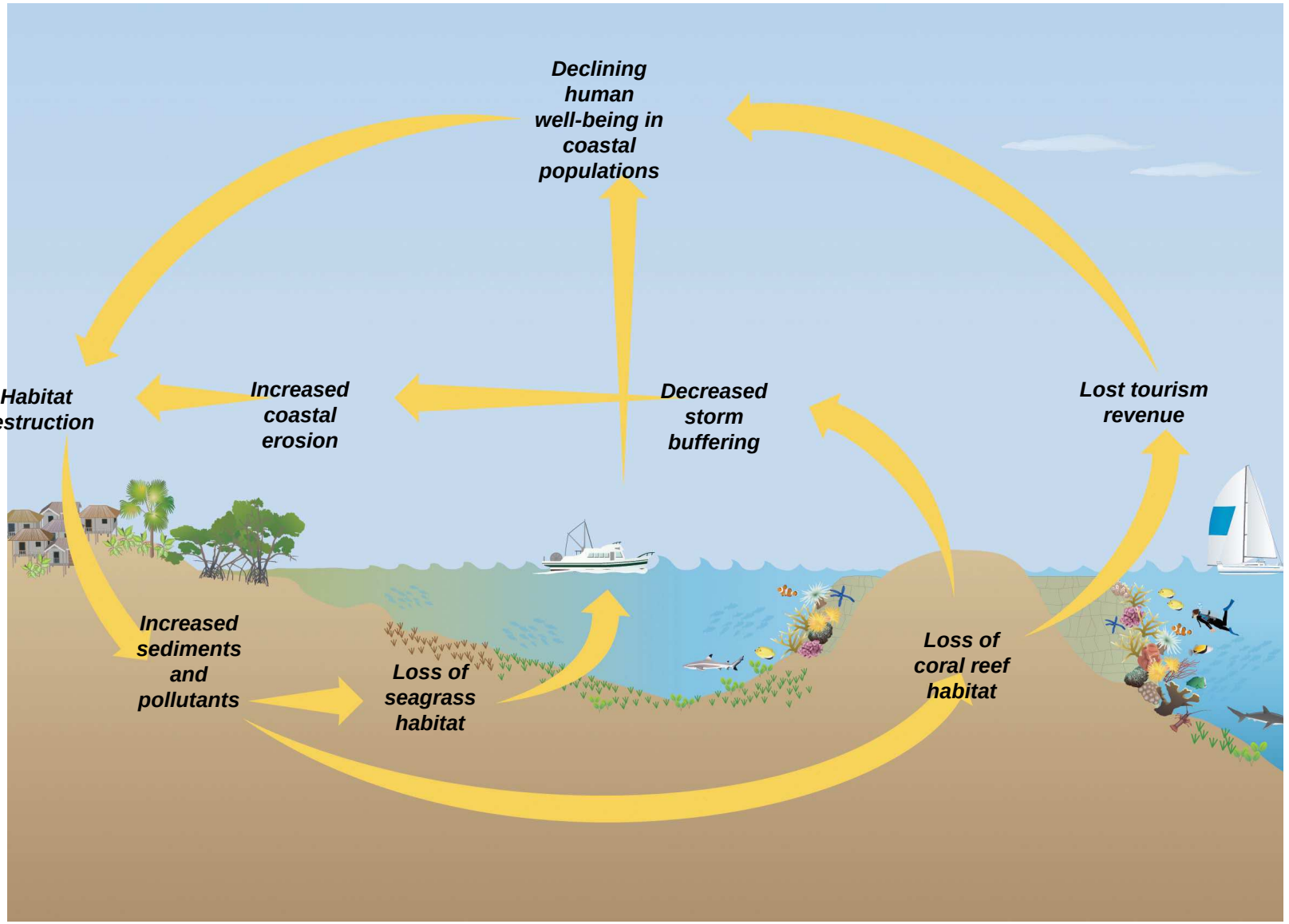
2. Utilizing an ecosystem services perspective

3. Addressing cumulative impacts

4. Managing for multiple objectives

5. Embracing change, learning, and adapting

1) Connections within and across ecosystems



2) Ecosystem services perspective

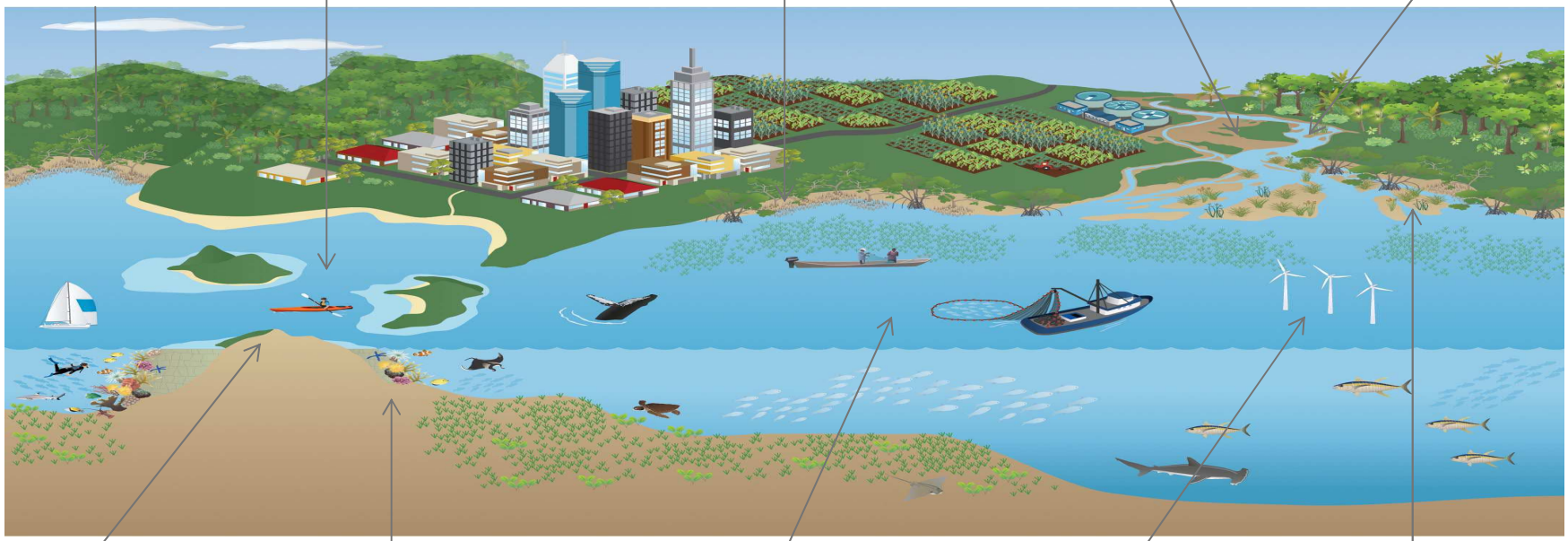
Mangroves and saltmarshes act as natural filters, trapping harmful sediments and excessive nutrients

Scenic coastlines, islands, and coral reefs offer recreational opportunities

Estuarine seagrasses and mangroves provide nursery habitat for commercial targeted fish and crustacean species.

Healthy rivers provide drinking water for communities and water for agriculture

Streamside vegetation reduces erosion and traps pollutants



Offshore reefs create sand and protect the shoreline from severe storms.

Healthy coral reefs are hotspots of marine biodiversity and can be a source for new medicines and health care products

Sustainable fisheries provide food, create jobs, and support local economies

Offshore energy provides power to support coastal development.

Marine ecosystems including seagrasses, mangroves, and saltmarshes act as carbon sinks, reducing greenhouse gases.

3) Understanding and addressing cumulative impacts

Intensive fishing

Intensive fishing + Agriculture

Intensive fishing + Agriculture + Coastal development

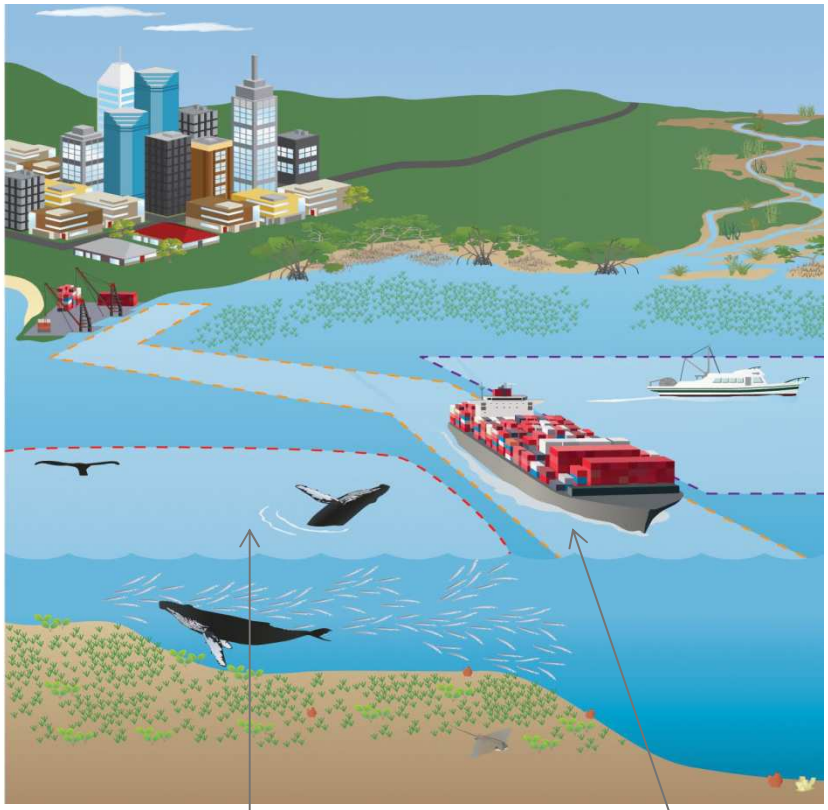
4) Managing for multiple objectives

Conflicting uses

Shipping corridor passes through important feeding habitat for endangered whales, causing collisions.

Bottom fishing in the whale habitat leads to ocean floor disturbance and a decline in food sources for whales.

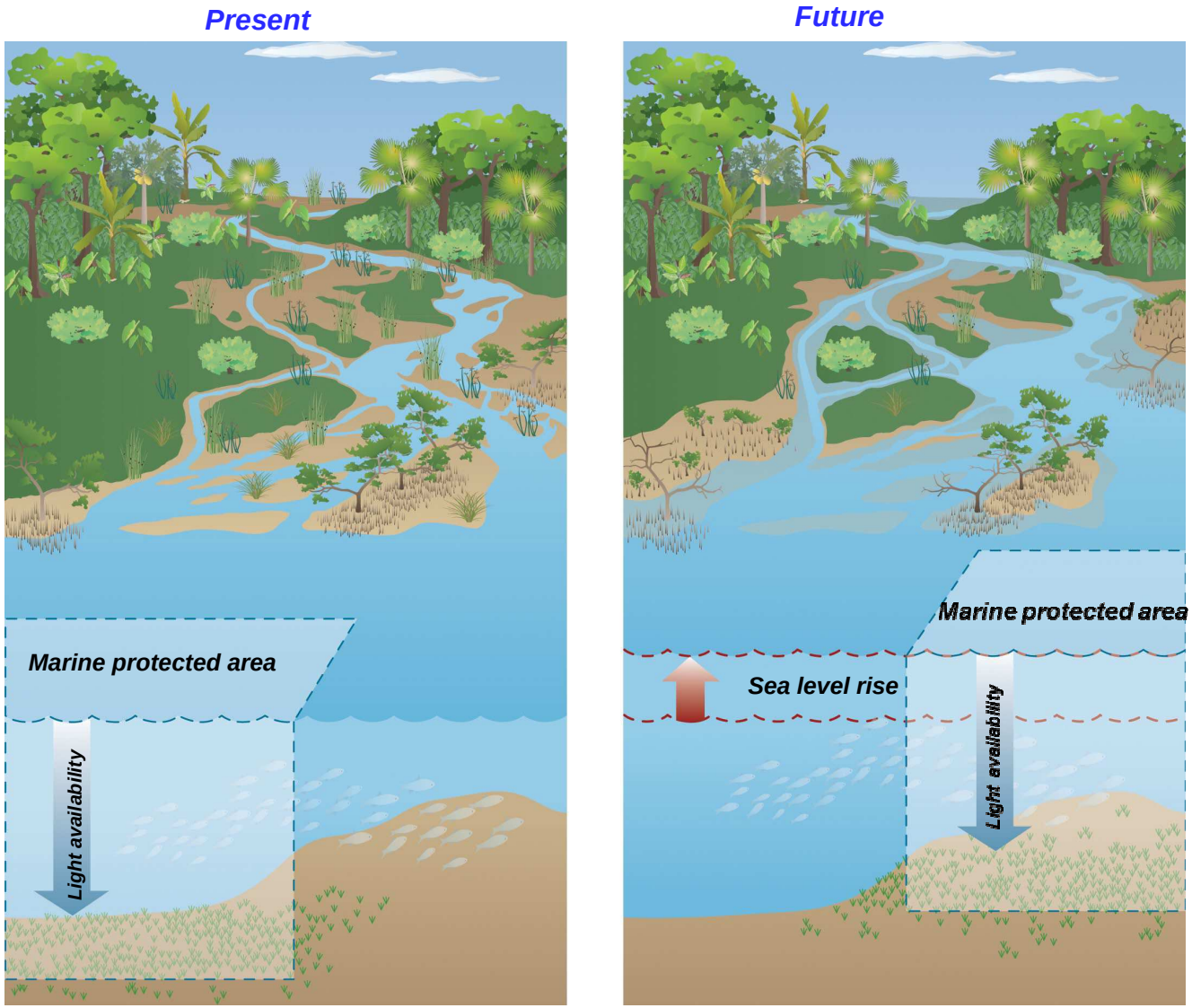
Accommodating uses and reducing conflict



Key whale feeding habitat is closed to shipping traffic and fishing, and whale mortality decreases. Ocean floor recovers from fishing activity, biodiversity increases, and ecosystem processes are restored.

Shipping corridor is re-routed and new zones are created to support sustainable fishing in less sensitive habitats.

5) Embracing change, learning and adapting



Ecosystem Approach - ECAP

- **Decision IG 17/6 in Annex II (15th Meeting of the CoP Barcelona Convention, Almeria, Spain, 2008)**

"to progressively apply the ecosystem approach to the management of human activities that may affect the Mediterranean marine and coastal environment"

- **the Ecosystem Approach is the overarching principle of MAP's 5 years strategy**

Road map - steps

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

Vision and Strategic goals

Vision:

"A healthy Mediterranean with marine and coastal ecosystems that are productive and biologically diverse for the benefit of present and future generations".

Strategic goals:

- **To protect, allow recovery and, where practicable, restore the structure and function of marine and coastal ecosystems thus also protecting biodiversity, in order to achieve and maintain good ecological status and allow for their sustainable use.**
- **To reduce pollution in the marine and coastal environment so as to minimize impacts on and risks to human and/or ecosystem health and/or uses of the sea and the coasts.**
- **To prevent, reduce and manage the vulnerability of the sea and the coasts to risk induced by human activities and natural events**

UNEP/MAP –ECAP vs EU MSFD

Common steps

- Prepare an Initial Assessment
- Decide on Ecological Objectives (vs Descriptors MSFD)
- Decide on Operational Objectives and Indicators (vs Criteria and indicators MSFD)
- Determination of Good Environmental Status
- Setting of Environmental Targets
- Development of Integrated Monitoring programmes
- Development of Programmes and Measures

Initial assessment geographical division in 4 sub-regions

Initial assessment conclusions – Mediterranean

COP 17, UNEP(DEPI)/MED IG.20/Inf.8, Feb. 2012

The pressures and impacts include:

- **Coastal development and sprawl, driven by urbanization and tourism development, leading to habitat loss and degradation, and erosion/ shoreline destabilization**
- **Overfishing, and incidental or by-catch, affecting community structure, ecological processes, and delivery of ecosystem services**
- **Destructive fishing, including bottom trawling and fishing methods resulting in benthic disturbance**
- **Contamination of sediments and biota caused by pollution, primarily from urbanization and industry, but also from anti-foulants and atmospheric inputs of hazardous compounds**
- **Nutrient over-enrichment, leading sometimes to eutrophication and hypoxia, more regularly leading to ecological imbalances (reduced water quality and growth of algae)**
- **Disturbance and pollution caused by maritime industries, including shipping, energy, aquaculture, and desalination (operational as well as disaster-related)**
- **Invasive species spread, in many cases mediated by climate changes**
- **Degradation of transitional or estuarine areas, which serve as critical nursery areas for commercial fisheries and also support unique assemblages of species**

Ecological Objectives, Operational Objectives and Indicators

Ecological Objectives, Operational Objectives and Indicators adopted by the 17th COP, Paris, France, 2012

The Ecological Objectives, Operational Objectives and indicators were adopted as provided for in step 4 and 5 of the Ecosystem Approach roadmap in Almeria.

In particular the Operational Objectives were derived from the Ecological Objectives with a view to making them measurable and facilitating the choice of indicators.

The shaded cells indicate that further research and knowledge is required for the quantification of this indicator

Ecological Objective 1
8 indicators

Ecological Objective	*Operational Objectives*	*Indicators*
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.	**1.1 Species distribution is maintained**	***1.1.1 Distributional range change***
		1.1.2 Area covered by the species (for sessile/benthic species)
	1.2 Population size of selected species is maintained	***1.2.1 Population abundance***
		1.2.2 Population density
	1.3. Population condition of selected species is maintained	***1.3.1 Population demographic characteristics (e.g. body size or age class structure, sex ratio, fecundity rates, survival/ mortality rates)***
	1.4 Key coastal and marine habitats are not being lost	***1.4.1 Potential / observed distributional range of certain coastal and marine habitats listed under SPA protocol***
		1.4.2 Distributional pattern of certain coastal and marine habitats listed under SPA protocol
		1.4.3 Condition of the habitat-defining species and communities

Ecological Objective 2
4 indicators

Ecological Objective	*Operational Objectives*	*Indicators*
Non-indigenous species introduced by human activities are, to the maximum extent possible, at levels that do not adversely alter the ecosystem	**2.1 Non-indigenous species introductions are minimized to the maximum extent possible**	***2.1.1. Spatial distribution, origin and population status (established vs. vagrant) of non-indigenous species***
		2.1.2 Trends in the abundance of introduced species, notably in risk areas
	2.2. The impact of particularly invasive species on ecosystems is limited	***2.2.1 Ecosystem impacts of particularly invasive species***
		2.2.2 Ratio between non-indigenous invasive species and native species in some well studied taxonomic groups

Ecological Objective 3

7 indicators

Ecological Objective	*Operational Objectives*	*Indicators*
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	**3.1 Level of pressure by known commercial fisheries is kept within biologically safe limits**	***3.1.1 Total catch by operational unit***
		3.1.2 Total effort by operational unit
		3.1.3 Catch per unit effort (CPUE) by fishery
		3.1.4 Ratio between catch and biomass index (hereinafter catch/biomass ratio).
		3.1.5 Fishing mortality
	3.2 The reproductive capacity of stocks is maintained	***3.2.1 Age structure determination (where feasible)***
		[3.2.2 Spawning Stock Biomass (SSB)]

Ecological Objective 4
4 indicators

Ecological Objective	*Operational Objectives*	*Indicators*
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	**4.1 Ecosystem dynamics across all trophic levels are maintained at levels capable of ensuring long -term abundance of the species and the retention of their full reproductive capacity**	***4.1.1 Production per unit biomass estimates for selected trophic groups and key species, for use in models predicting energy flows in food webs***
	4.2 Normal proportion and abundances of selected species at all trophic levels of the food web are maintained	***4.2.1 Proportion of top predators by weight in the food webs***
		4.2.2 Trends in proportion or abundance of habitat-defining groups 4.2.3 Trends in proportion or abundance of taxa with fast turnover rates
		4.2.3 Trends in proportion or abundance of taxa with fast turnover rates

Ecological Objective 5
6 indicators

Ecological Objective	*Operational Objectives*	*Indicators*
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.	**5.1 Human introduction of nutrients in the marine environment is not conducive to eutrophication**	***5.1.1 Concentration of key nutrients in the water column***
		5.1.2 Nutrient ratios (silica, nitrogen and phosphorus), where appropriate
	5.2 Direct effects of nutrient over-enrichment are minimized	***5.2.1 Chlorophyll-a concentration in the water column***
		5.2.2 Water transparency where relevant
		5.2.3 Number and location of major events of nuisance/toxic algal blooms caused by human activities
	5.3 Indirect effects of nutrient over- enrichment are minimized	***5.3.1 Dissolved oxygen near the bottom, i.e. changes due to increased organic matter decomposition, and size of the area concerned****

* Monitoring to be carried out where appropriate

Ecological Objective 6
4 indicators

Ecological Objective	*Operational Objectives*	*Indicators*
Sea-floor integrity is maintained, especially in priority benthic habitats	***6.1 Extent of physical damage to the substrate is kept within acceptable limits***	***6.1.1 Distribution of bottom impacting activities anchoring***
		6.1.2 Area of the substrate affected by physical alteration due to the different activities
	6.2 Impact of benthic disturbance in key benthic habitats is minimized	***6.2.1 Impact of bottom impacting activities12 in priority benthic habitats***
		6.2.2 Change in distribution and abundance of indicator species in priority habitats

Ecological Objective 7
9 indicators

Ecological Objective	*Operational Objectives*	*Indicators*
Alteration of hydrographic conditions does not adversely affect marine ecosystems.	**7.1 Impacts to the marine and coastal ecosystem induced by climate variability and/or climate change are minimized**	***7.1.1 Large scale changes in circulation patterns, temperature, pH, and salinity distribution***
		7.1.2 Long term changes in sea level
	7.2 Alterations due to permanent constructions on the coast and watersheds, marine installations and seafloor anchored structures are minimized	***7.2.1. Impact on the circulation caused by the presence of structures***
		7.2.2 Location and extent of the habitats impacted directly by the alterations and/or the circulation changes induced by them: footprints of impacting structures
		7.2.3 Trends in sediment delivery, especially in major deltaic systems
		7.2.4 Extent of area affected by coastal erosion due to sediment supply alterations
	7.3 Impacts of alterations due to changes in freshwater flow from watersheds, seawater inundation and coastal freatic intrusion, brine input from desalination plants and seawater intake and outlet are minimized	***7.3.1. Trends in fresh water volume delivered to salt marshes, lagoons, estuaries, and deltas; desalinisation brines in the coastal zone***
		7.3.2. Location and extent of the habitats impacted by changes in the circulation and the salinity induced by the alterations
		7.3.3 Changes in key species distribution due to the effects of seawater intake and outlet

Ecological Objective 8
7 indicators

Ecological Objective	Operational Objectives	Indicators
The natural dynamics of coastal areas are maintained and coastal ecosystems and landscapes are preserved	**8.1 The natural dynamic nature of coastlines is respected and coastal areas are in good condition**	***8.1.1. Areal extent of coastal erosion and coastline instability***
		8.1.2 Changes in sediment dynamics along the coastline
		8.1.3 Areal extent of sandy areas subject to physical disturbance[1]
		8.1.4 Length of coastline subject to physical disturbance due to the influence of manmade structures
	8.2 Integrity and diversity of coastal ecosystems, landscapes and their geomorphology are preserved	***8.2.1 Change of land-use[2]***
		8.2.2 Change of landscape types
		8.2.3 Share of non-fragmented coastal habitats

[1] Physical disturbance includes beach cleaning by mechanical means, sand mining, beach sand noursihment
[2] Land-use classss according to the classification by Eurostat-OCDE, 1998: http://unstats.un.org/unsd/environment/q2004land.pdf

Ecological Objective 9
7 indicators

Ecological Objective	Operational Objectives	Indicators
Contaminants cause no significant impact on coastal and marine ecosystems and human health	**9.1 Concentration of priority[1] contaminants is kept within acceptable limits and does not increase**	***9.1.1 Concentration of key harmful contaminants in biota, sediment or water***
	9.2 Effects of released contaminants are minimized	***9.2.1 Level of pollution effects of key contaminants where a cause and effect relationship has been established***
	9.3 Acute pollution events are prevented and their impacts are minimized	***9.3.1 Occurrence, origin (where possible), extent of significant acute pollution events (e.g. slicks from oil, oil products and hazardous substances) and their impact on biota affected by this pollution***
	9.4 Levels of known harmful contaminants in major types of seafood do not exceed established standards	***9.4.1 Actual levels of contaminants that have been detected and number of contaminants which have exceeded maximum regulatory levels in commonly consumed seafood[2]***
		9.4.2 Frequency that regulatory levels of contaminants are exceeded
	9.5 Water quality in bathing waters and other recreational areas does not undermine human health	***9.5.1 Percentage of intestinal enterococci concentration measurements within established standards***
		9.5.2 Occurrence of Harmful Algal Blooms within bathing and recreational areas

Ecological Objective 10
3 indicators

Ecological Objective	Operational Objectives	*Indicators*
Marine and coastal litter do not adversely affect coastal and marine environment[1]	**10.1 The impacts related to properties and quantities of marine litter in the marine and coastal environment are minimized**	***10.1.1 Trends in the amount of litter washed ashore and/or deposited on coastlines, including analysis of its composition, spatial distribution and, where possible, source***
		10.1.2 Trends in amounts of litter in the water column, including microplastics, and on the seafloor
	10.2 Impacts of litter on marine life are controlled to the maximum extent practicable	***10.2.1 Trends in the amount of litter ingested by or entangling marine organisms, especially mammals, marine birds and turtles***[2]

Ecological Objective 11
2 indicators

Ecological Objective	Operational Objectives	*Indicators*
Noise from human activities cause no significant impact on marine and coastal ecosystems	**11.1 Energy inputs into the marine environment, especially noise from human activities is minimized**	***11.1.1 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 animals***
		11.1.2 Trends in continuous low frequency sounds with the use of models as appropriate

Next steps ECAP

- ***Establishment of GES for different Ecological Objectives***
- ***Definition of threshold values (boundaries) to asses achievement of Good Environmental Status (GES)***
- ***Setting of targets for a specific status (on EO, OO or criteria level) of the marine environment***
- ***Assess National capacities (institutional, technical) for the implementation of the integrated MAP monitoring programme and draft a capacity building programme***
- ***Evaluate the associated cost for the implementation of the integrated MAP monitoring programme***
- ***Standardize reporting for the integrated monitoring programme***
- ***Establish information flow (data, information) between countries to be developed in line with EU SEIS principles***

Challenges

- Establish synergies with International (as Convention on Biological Diversity and the GFCM) and regional (MSFD) initiatives for the application of ECAP in the Mediterranean, have to be built in order to avoid duplication of work and/or assure harmonization of efforts and minimisation of cost
- The road-map and timeline proposed for the implementation of the activities for the gradual application of the ECAP, could be jeopardised because of national political, institutional, technical and financial constrains.


Thank you