



# Reality and Prospects of Natural Reserves in Arab Countries and Effects of Climate Change



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**Mediterranean  
Action Plan**  
Barcelona  
Convention



*The Mediterranean  
Biodiversity  
Centre*



# Status of Marines Protected Areas in the Mediterranean and Impacts of Climate Change

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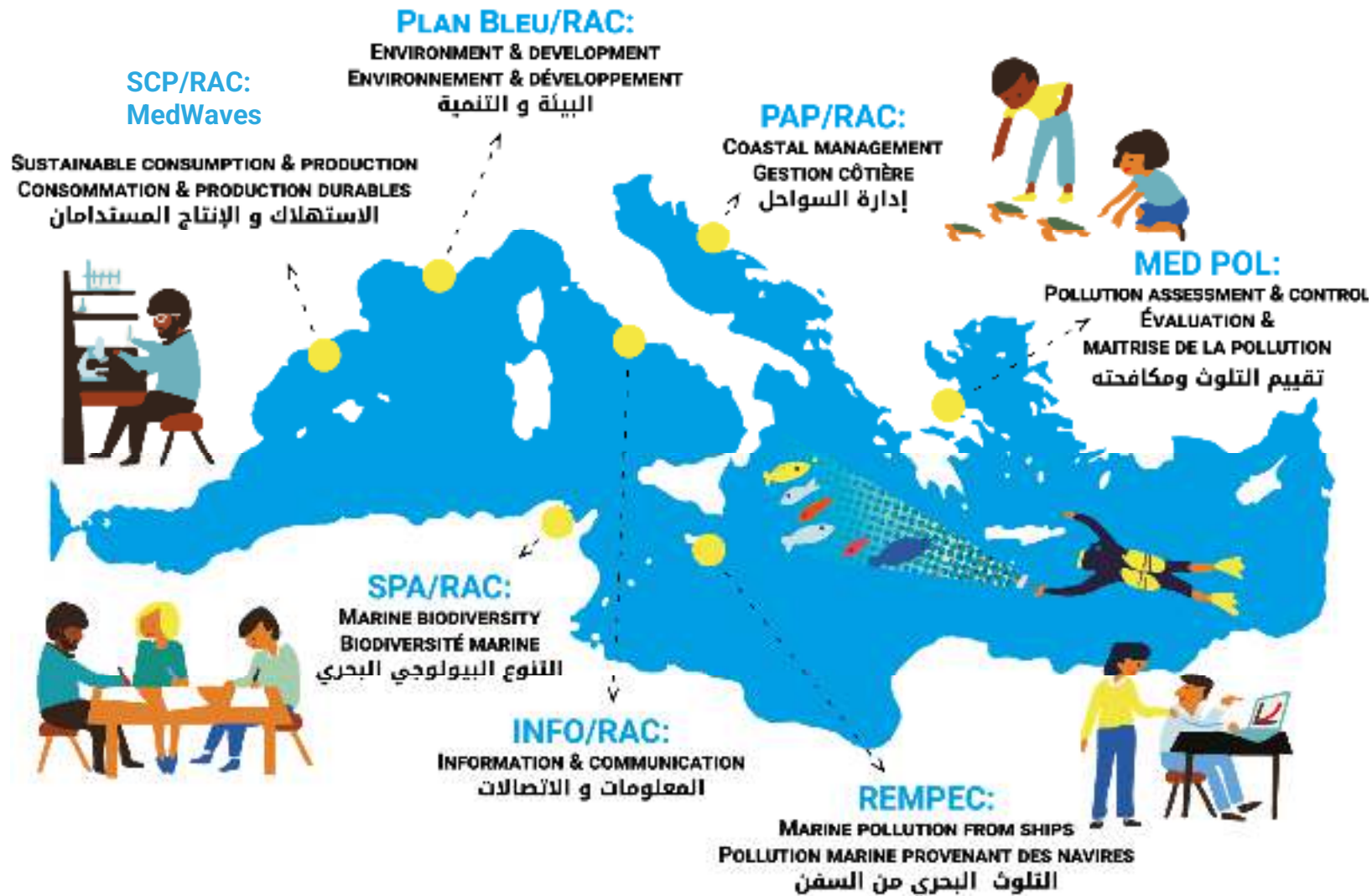


# The UNEP/MAP – Barcelona Convention System

**Coordinating Unit** docked in **UNEP**, based in Athens (Greece).

**MAP Components:** 6 Regional Activity Centers and MED POL Program.

**SPA RAC's** mission is to help the 21 Contracting Parties to the Barcelona Convention implement the **Specially Protected Areas and Biological Diversity Protocol**.



# The Mediterranean a biodiversity hotspot

**SoED**  
2020

State of the Environment and Development in the Mediterranean

Rich biodiversity under threat  
The Mediterranean hosts up to

**18%**

of the marine species known in the world and 17,000 marine species in just 0.3% of the ocean volume.

Highest rate of endemism in the world: 20-30% of marine species are endemic



The emblematic *Posidonia oceanica* has experienced a 30% decline over a period of 50 years and its functional extinction is likely by 2100 (no-action scenario)

**30%**



At least **78** marine species and **168** coastal endangered species



**1,000**

non-indigenous marine species in the Mediterranean, 10% of which are invasive



**48%**

of wetland habitats have disappeared since 1970



**41%**

decrease in marine predators (including mammals)



**9%**

Only of the marine area is officially protected and only 10% of these sites implement management plans

**78%**

of assessed fish stocks are overexploited



## Loss of biodiversity

means loss of services rendered by ecosystems: protection against erosion, water purification, flood and drought mitigation, food supply, pollination, carbon storage, cultural and recreational services,...



#SustainableMED

For more facts visit the State of the Environment and Development in the Mediterranean and its interactive version: [www.sodimed.org/med](http://www.sodimed.org/med)



# The Mediterranean a climate change hotspot where vulnerabilities are exacerbated



State of the Environment and  
Development in the Mediterranean



Warming  
**20%**  
faster than global average

Increased fire risk  
through a longer  
fire season, increasing  
heatwaves and drought



#SustainableMED

Already  
**0.4°C**

Increase in seawater temperature  
(up to +3.5°C by 2100)



Low-lying coastal  
cultural heritage sites  
are threatened by  
flooding and erosion



A decrease of  
**-0.1**

in the pH of the ocean since  
the pre-industrial period, and  
a forecast of -0.4 by 2100



**-30%**

of rainfall in spring/summer  
by 2080 and +10/20% of heavy  
rainfall events outside of summer



**+1.54°C**

increase in air temperature:  
above the global average  
(projection in 2040: +2.2°C  
versus +1.5°C global level)



## Sea level rise

between 0.43 and 2.5 m by 2100, depending on  
scenarios and projections. Increased risk for the  
20 million people living below 5m of current sea level



### Consequences

- heat waves
- coastal erosion
- fires
- invasive species
- acidification of the sea
- floods
- modification of migrations and  
risk of extinction of certain species
- quality aquaculture fishing
- agriculture production

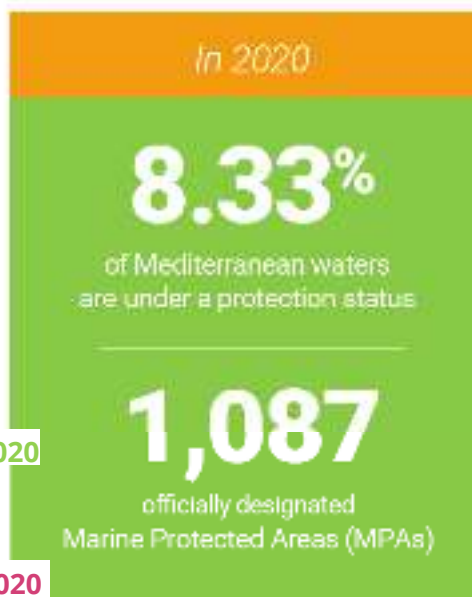
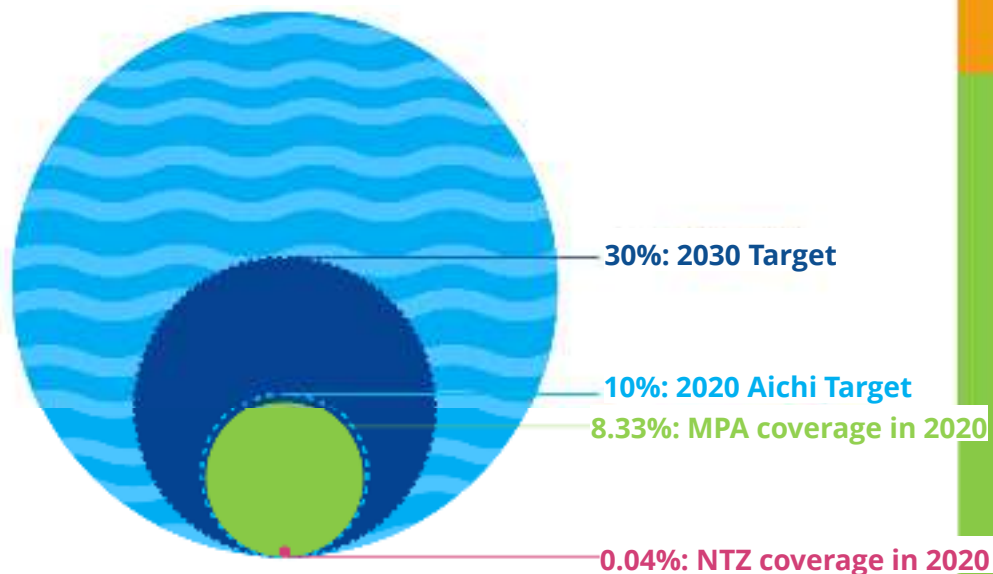






## The System of Mediterranean MPAs in 2020

The Mediterranean Sea



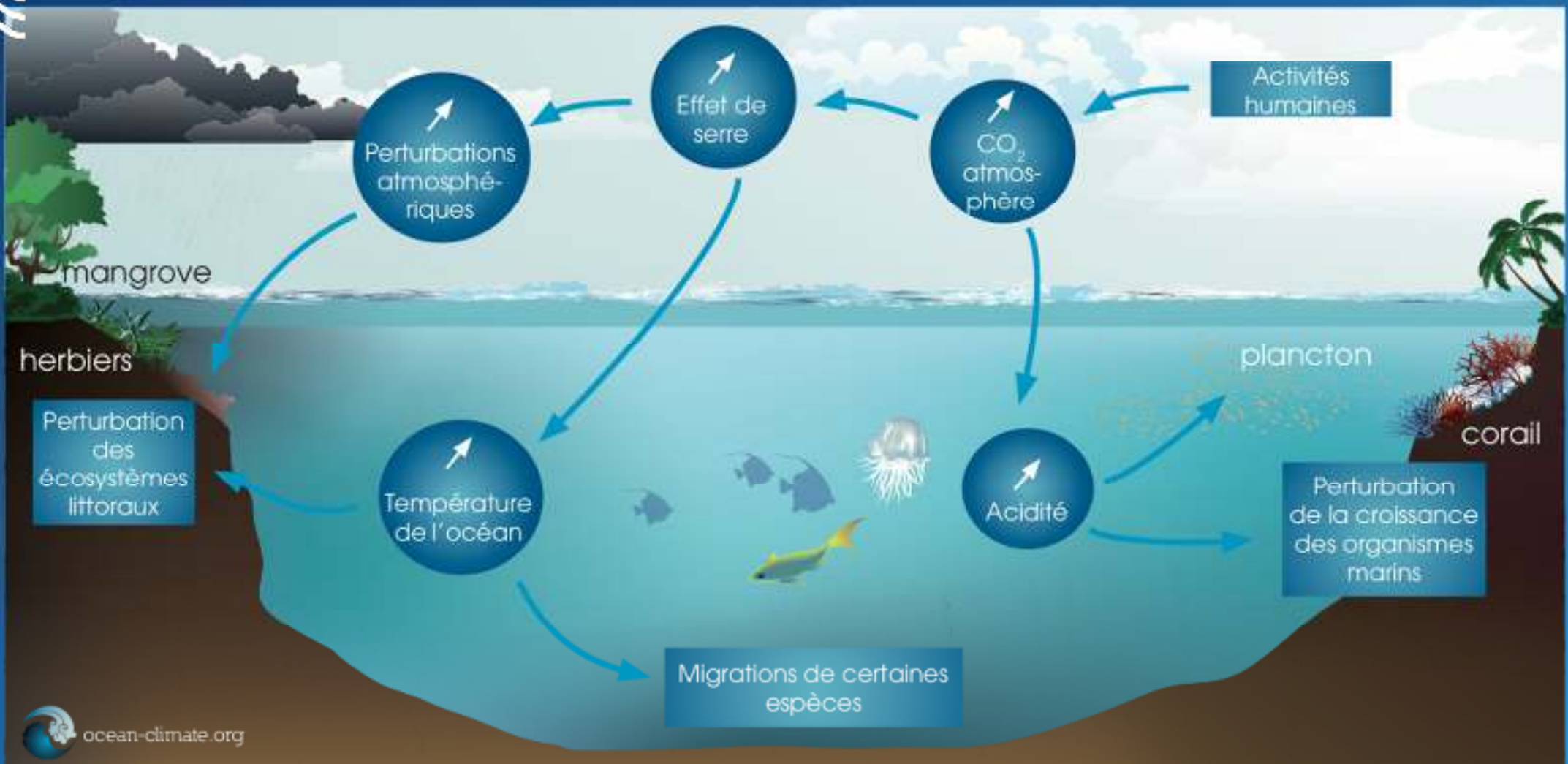
### The Mediterranean Targets by 2030 are :



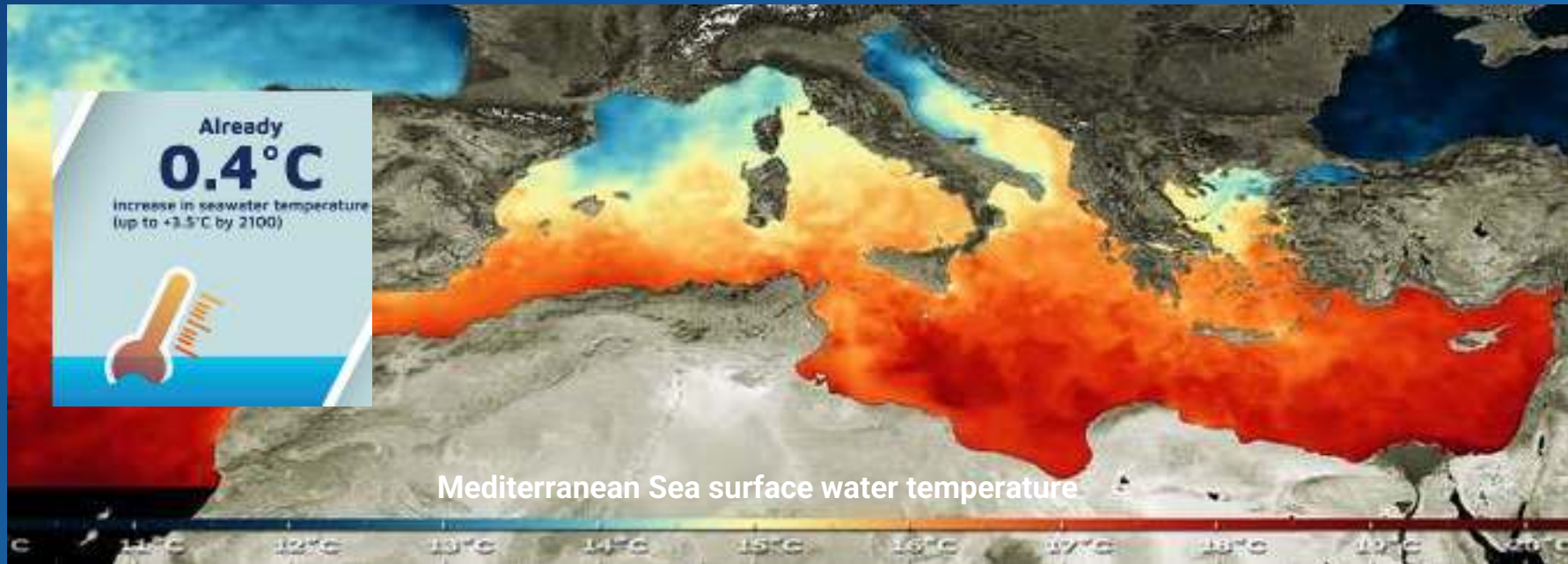
# Impacts of climate change on marine and coastal biodiversity







## Changes in the distribution of native species



Changes in species distribution, with the dominance of warm-water species leading to a reduction in specific diversity.

These species are extending their range into areas where they were previously absent or rare.

**(Northward progression)**

Example : *Thalassoma pavo*

The Ornate wrasse is one of the best examples, its range having **expanded by more than 1,000 km.**



## Changes in the distribution of native species

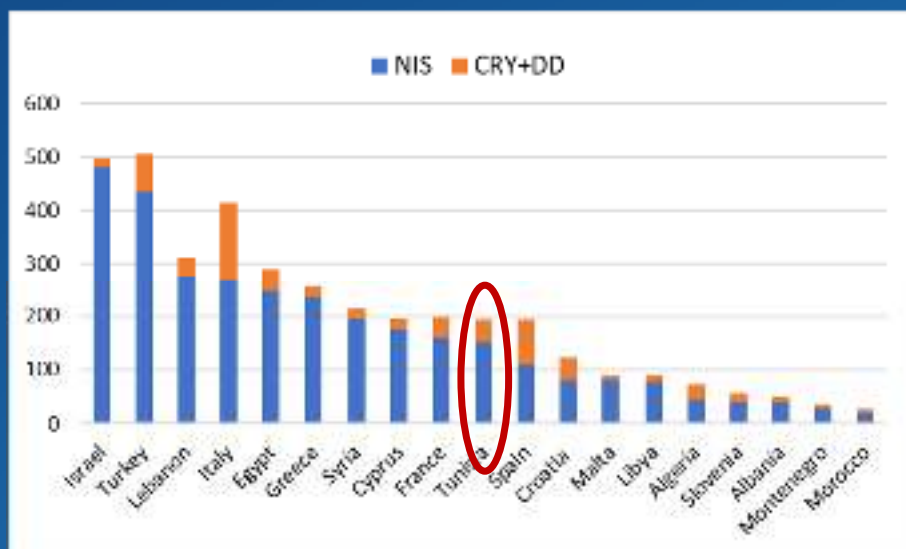


In 2019, a nest of the green turtle *Chelonia mydas*, discovered at Rjich in Tunisia for the first time .

In 2023, there were additional loggerhead turtle (*Caretta caretta*) nesting occurrences reported in Algeria and Spain, indicating an expanding range.

## Non-Indigenous Species: basic data at regional and national levels

Warmer water temperatures in the Mediterranean are a factor that **favors the establishment and proliferation of introduced Non-Indigenous Species (NIS)**, especially from warmer seas.



(Sub)region	NIS	Established	Casual	Unknown
EMED	786	570	175	41
CMED	286	180	73	33
ADRIA	207	140	43	24
WMED	322	221	74	27
MED	1011	748	224	39

**About 200 introduced non-indigenous species are reported in Tunisia**

- Strategy and action plan for the prevention, management and control of invasive alien species in Tunisia (2018)



## Spread of Non-indigenous species in the Mediterranean

Non-Indigenous Species can **replace local species** with **high economic value**.

In Tunisia, the **Speckled Shrimp** *Metapenaeus monoceros*, a red sea species, is gradually replacing the local **King Shrimp** *Penaeus kerathurus*.

The shrimp fishery has not declined, but the catches, now made up of **50% non-indigenous species**, have a **lower commercial value** than those made up of local species.

Speckled Shrimp  
*Metapenaeus monoceros*



King Shrimp  
*Penaeus kerathurus*



## Spread of exotic species in the Mediterranean

**Proliferation of the Blue Swimming Crab** *Portunus segnis* in the Gulf of Gabès (locally known as Daech)

This threat should gradually turn into an economic opportunity (stock of 23,000 t/year).



Nowadays, a Proliferation of the **Atlantic Blue Crab** *Callinectes sapidus* is taking place in the Tunisian Coastline.





## Large-scale mortality of macrobenthic communities

More than **30 hard-bottom species** affected by **large-scale mortality phenomena** associated with **increases in water temperature** (repetitive and prolonged heat waves).

Mass mortality of gorgonians in the northwestern Mediterranean and even in Tunisia.

Observations are planned to monitor gorgonian mortality and complete the picture for the whole Mediterranean.





# Future challenges and Urgency for Integrated and Coordinated Action





## Climate change and conservation policies

- **Integrating CC** into conservation actions is a real challenge, with the following objectives:
  - (i) **increase ecosystem resilience** for the long-term maintenance of ecosystem services, and
  - (ii) **increase the resilience of human populations** to the current and future impacts of CC.
  
- It has now been proven that **Marine Protected Areas (MPAs)** enable effective conservation of marine ecosystems.
  
- It is therefore important to accelerate **the establishment of a coherent and resilient network of Marine Protected Areas (MPAs)** to ensure healthy and functional ecosystems in the face of CC.





## Climate change and conservation policies

**MPAs** protect key habitats (mainly seagrass and coralligenous) that :

- are the basis of **underwater life** (reproduction, feeding of commercial and other species)
- offer ways to store and **sequester carbon**





## *Posidonia oceanica* seagrass: a major carbon sink

- Oxygen production by *Posidonia*:  
**14 l/m<sup>2</sup>/d** or **250 millions m<sup>3</sup>/m<sup>2</sup>/y**  
(Lung of the sea)
- **Posidonia meadows** trap and store large quantities of organic carbon (**carbon sink**)
- The carbon sequestration capacity of **Posidonia meadows** is **5 to 20 times** greater than that of Amazonian forests.



# *Posidonia oceanica* meadow in Tunisia: a major ecosystem in need of protection

## Location of *Posidonia oceanica* meadows

	Available <i>P. oceanica</i> surface area (ha)	Surface mapped (%)	Estimated <i>P. oceanica</i> surface (ha)	Seagrass area (0 – 25 m) (ha)	Estimated seagrass area (0 – 35 m) (ha)
Spain	115 904	100 %	115 904	148 088	
France	87 680	100 %	87 680	90 028	
Monaco	14	100 %	14	41	
Italy	337 611	100 %	337 611	326 123	
Slovenia	1	100 %	1	0	
Croatia	31 437	14 %	224 550	202 999	
Bosnia Herzegovina	Not present	100 %	0	690	
Montenegro	51	10 %	512	14 662	
Albania	4 803	100 %	4 803	14 956	
Malta	5 860	100 %	5 860	2 944	
Greece	251 010	100 %	251 010	287 778	
Turkey	39 983	58 %	68 937	74 059	
Cyprus	3 627	23 %	15 770	4 445	
Syria, Lebanon, Palestinian territories	Not present			2 694 + 1 043	
Egypt	No data		0	296	
Libya	1 235	11 %	11 227	62 203	
Tunisia	<b>717 534</b>	81 %	<b>885 844</b>	636 905	
Algeria	4 085	16 %	25 531	16 791	
Morocco	Not present	100 %	0	14 803	
<b>Total</b>	<b>1 600 835</b>		<b>2 035 254</b>	<b>1 901 960</b>	<b>2 298 360</b>

→ 2 million ha of *Posidonia oceanica* in the Mediterranean

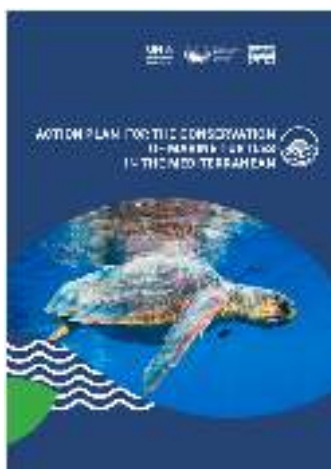
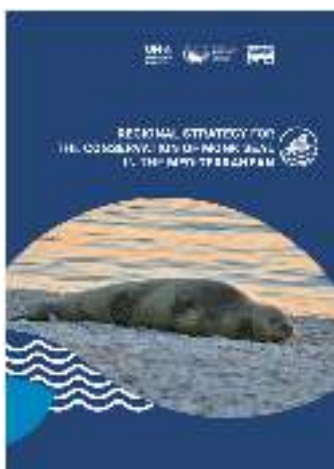
→ Approximately 886,000 ha, equivalent to 38.5% of the total surface area, are located in Tunisian territorial waters.

→ This represents approximately 30% of Tunisian territorial waters.

**National Action Plan (NAP) for the conservation of marine vegetation in Tunisia (to be drawn up in 2021 with the support of SPA/RAC)**

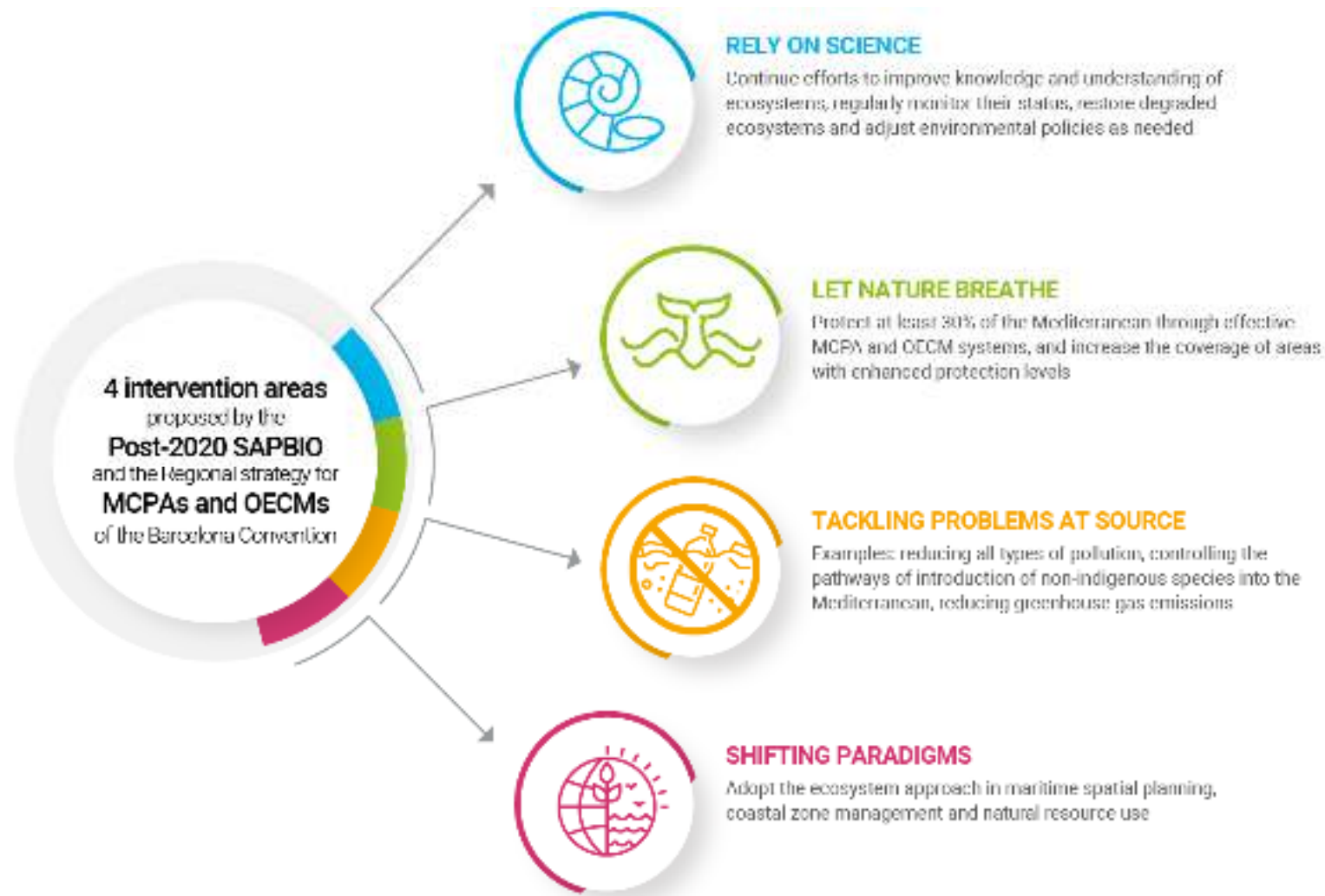


# Regional strategies and action plans for the conservation of areas, species and habitats under the ASP/DB protocol of the Barcelona Convention





# What the Post-2020 SAPBIO proposes for biodiversity recovery





## Questions & Answers

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