Identifying recent scientific developments and gaps in biodiversity protection in the Mediterranean

Dania Abdul Malak

Director of ETC-UMA

Interreg Mediterranean EUROPEAN UNION BIODIVERSITY PROTECTION

"Bridging the Science-Practice-Policy Gaps in Mediterranean Biodiversity Protection"

23-24 October 2017, Barcelona

MED Biodiversity Protection Community

Outline

1. The Mediterranean basin is a globally unique Biodiversity Hotspot with high diversity and endemism of flora and fauna but is subjected to an alarming increase in human impacts

2. Increasing Pressures, with some global threats such as Climate Change and Marine Pollution are emerging

3. Cumulative Impacts reduce the overall resilience of ecosystems and have been underestimated in the Mediterranean

4. Effective biodiversity management is needed using an ecosystem-based approach: identifying trans-boundary priority areas for intervention is crucial

5. PANACeA is a necessary response to address multiple pressures using integrated monitoring protocols and transferable management tools

Outline

1. The Mediterranean basin is a globally unique Biodiversity Hotspot with high diversity and endemism of flora and fauna but is subjected to an alarming increase in human impacts

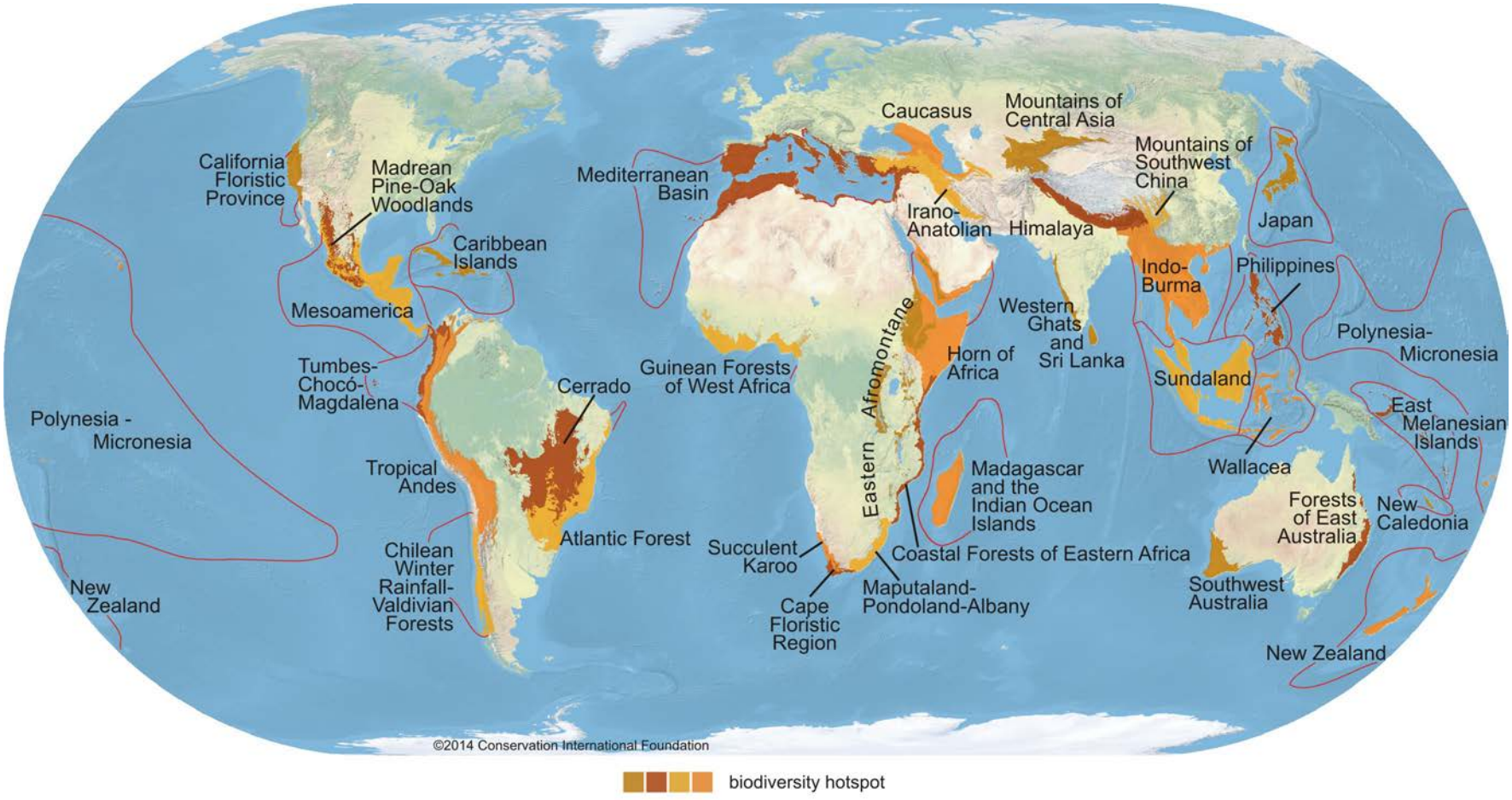
2. Increasing Pressures, with some global threats such as Climate Change and Marine Pollution are emerging

3. Cumulative Impacts reduce the overall resilience of ecosystems and have been underestimated in the Mediterranean

4. Effective biodiversity management is needed using an ecosystem-based approach: identifying trans-boundary priority areas for intervention is crucial

5. PANACeA is a necessary response to address multiple pressures using integrated monitoring protocols and transferable management tools

Mediterranean Basin – Biodiversity hotspot



Conservation International (conservation.org) defines 35 biodiversity hotspots — extraordinary places that harbor vast numbers of plant and animal species found nowhere else. All are heavily threatened by habitat loss and degradation, making their conservation crucial to protecting nature for the benefit of all life on Earth.

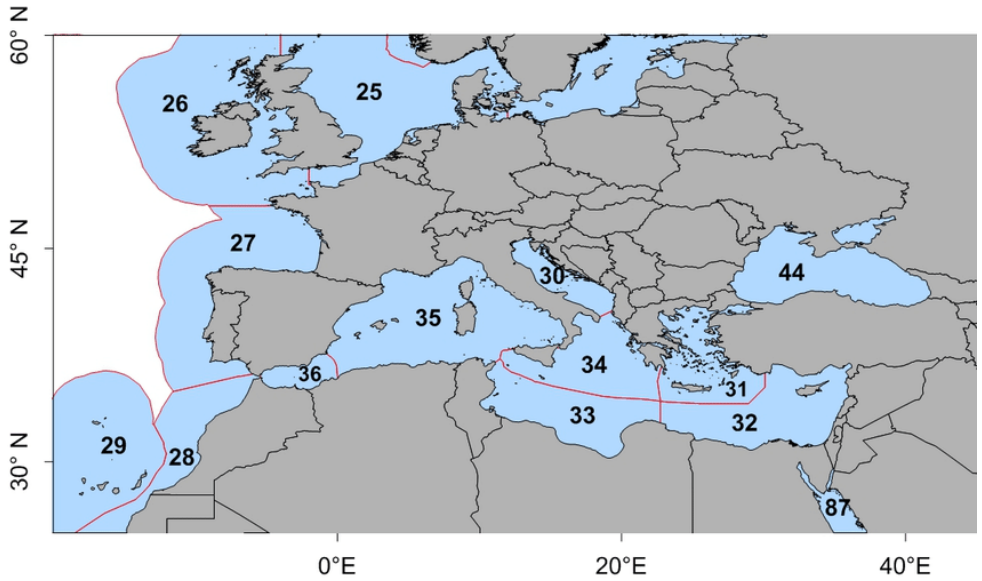
Mediterranean endemism and Biodiversity

- 0.3% global oceans' volume, 7% global marine species
- 12,000 species, 20-30% endemism (Bianchi and Morri 2000, Boudouresque 2004 Briand and Giuliano 2007)
- High rate of endemism reflects Messinian Event relics (Miocene circa 6 m) and Atlantic recolonisation (Peres 1985; Fredji 1992; Boero 2003).
- Isolation and evolution of deep-water fauna in two different basins, (Cartes 2004).
- High selective pressure that resulted in current Mediterranean floral and faunal complexity.
- Biodiversity hot spot for conservation: high rate of endemism, threatened species and historical and increasing human pressure (Myers et al. 2000, Mittermeier 2004, Shi et al. 2005).

Ecologically unique

- 7 Marine Ecoregions identified containing characteristic, geographically distinct assemblages of natural communities and species (Spalding et al. 2007):
  - –Ecoregions according to ecological and physical characteristics of the coastal and shelf areas
  - –Irregularity of the coastline, geomorphology, and geologic events resulted in current Mediterranean floral and faunal complexity.

- South and East Mediterranean contribute to 5 ecoregions and completely represent 2 : Tunisian Plateau / Gulf of Sidra, Levantine Sea



Outline

1. The Mediterranean basin is a globally unique Biodiversity Hotspot with high diversity and endemism of flora and fauna but is subjected to an alarming increase in human impacts

2. Increasing Pressures, with some global threats such as Climate Change and Marine Pollution are emerging

3. Cumulative Impacts reduce the overall resilience of ecosystems and have been underestimated in the Mediterranean

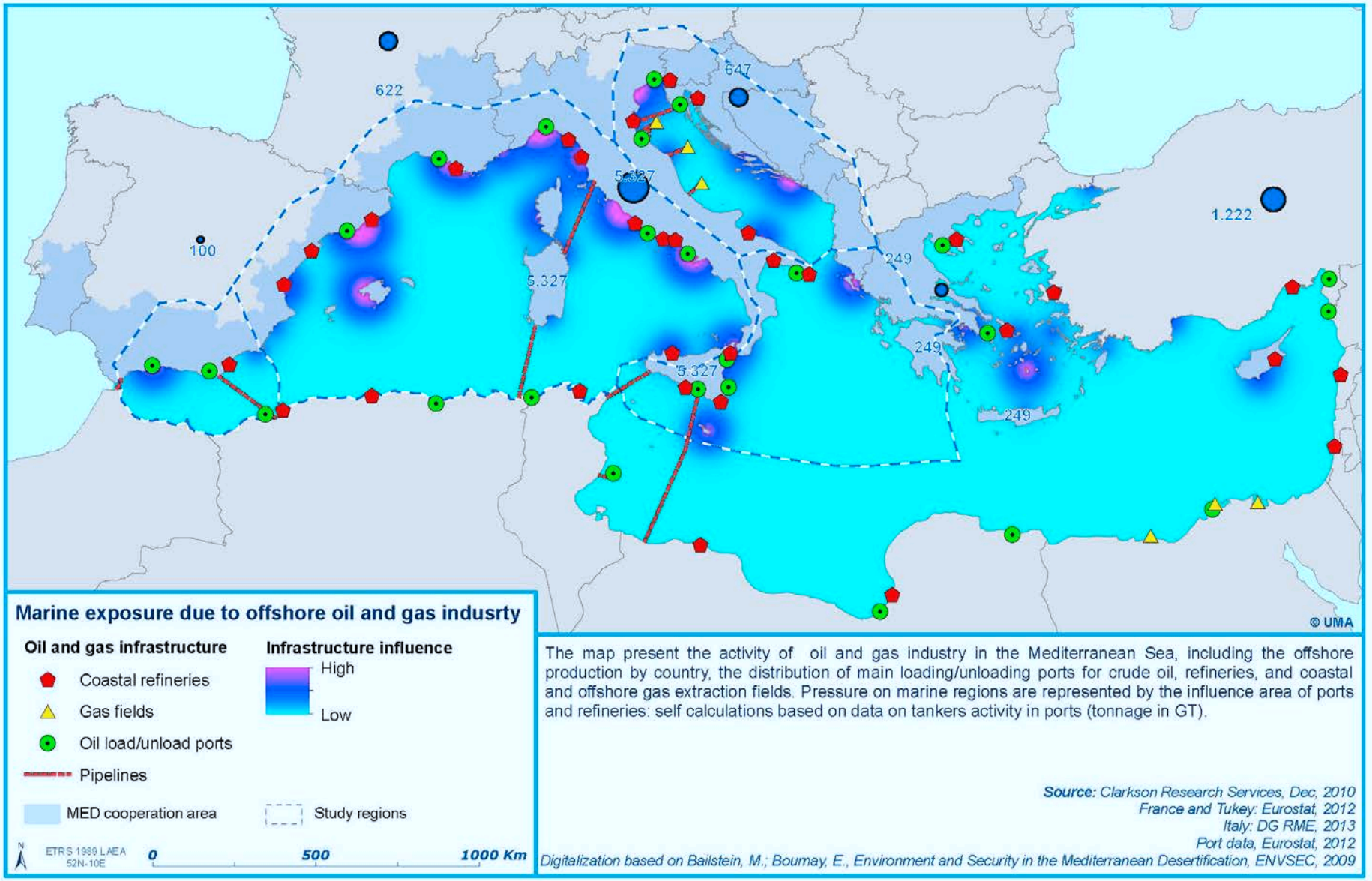
4. Effective biodiversity management is needed using an ecosystem-based approach: identifying trans-boundary priority areas for intervention is crucial

5. PANACeA is a necessary response to address multiple pressures using integrated monitoring protocols and transferable management tools

Drivers and Pressures on ecosystems

Major Drivers	Socio-economic Benefits (% GVA)	Intensity (%) and Nature of Pressure (GES of MSFD)	
Coastal Tourism	41%	30%	▪ Waste disposal (sewage and solid waste) ▪ Physical alteration of coastlines and landscapes ▪ Loss and disturbance of biodiversity ▪ Selective extraction of species
Maritime Transport	27%	19%	▪ Introduction of alien invasive species ▪ Pollution: oil and its derivatives ▪ Underwater noise
Fisheries & Aquaculture	16%	17%	▪ Overfishing of target species ▪ Mortality of non-target populations of fish ▪ Discharge: organic matter, antibiotics & biocides
Oil & Gas	11%	9%	▪ Pollution: oil and its derivatives ▪ Physical alteration of coasts and seabed

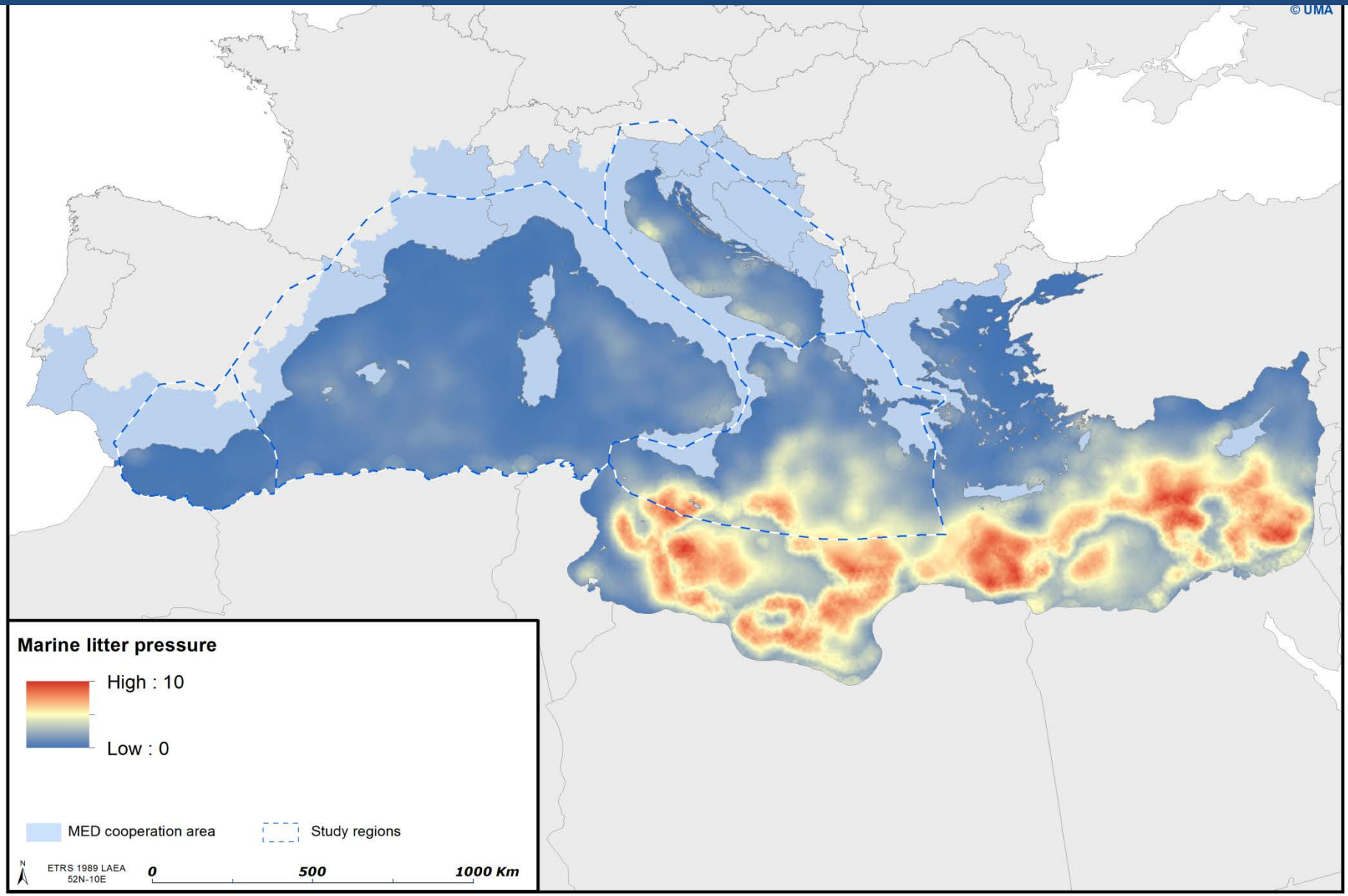
Pressures on the coast and the sea



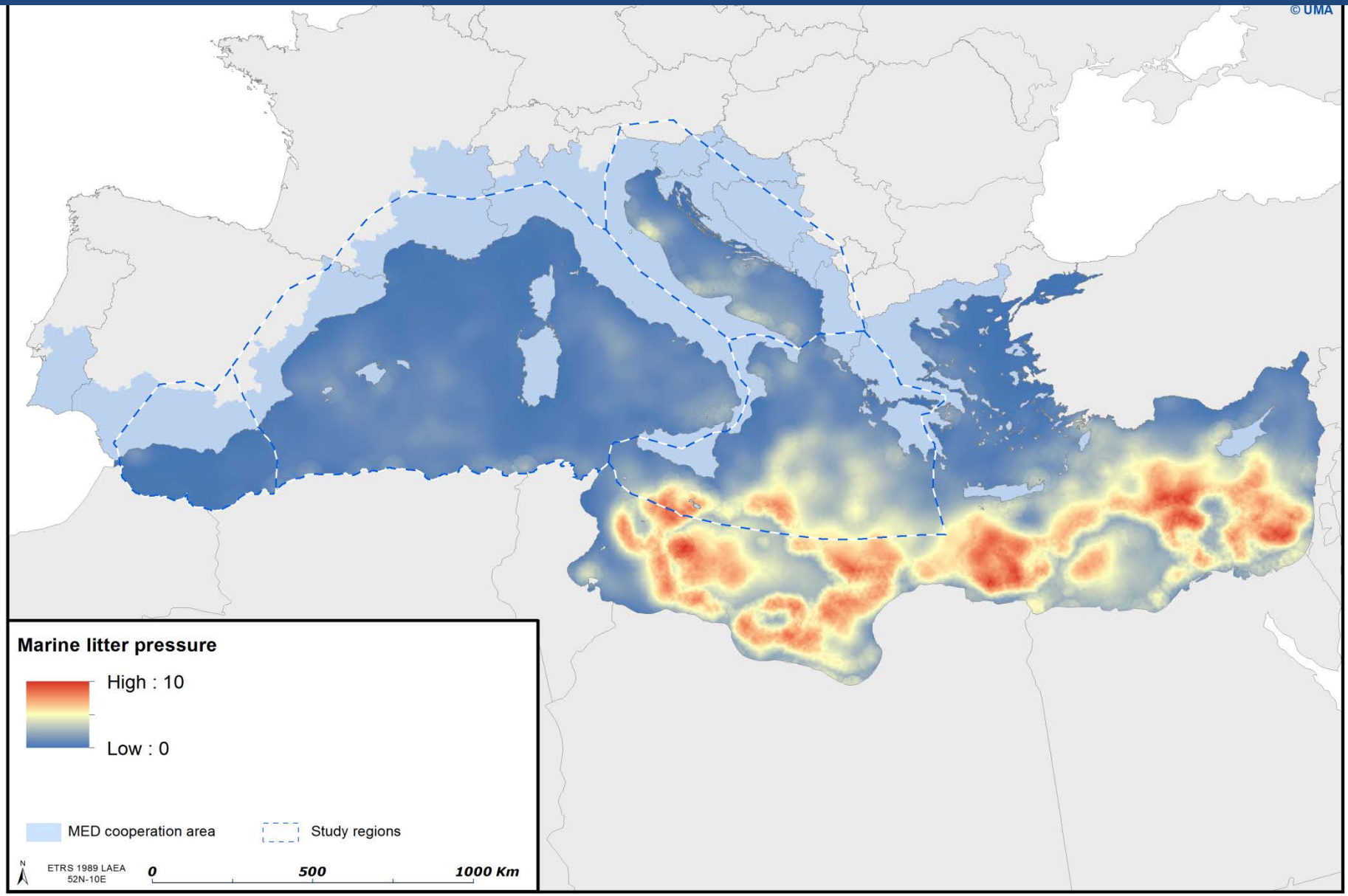
The map present the activity of oil and gas industry in the Mediterranean Sea, including the offshore production by country, the distribution of main loading/unloading ports for crude oil, refineries, and coastal and offshore gas extraction fields. Pressure on marine regions are represented by the influence area of ports and refineries: self calculations based on data on tankers activity in ports (tonnage in GT).

Source: *Clarkson Research Services, Dec, 2010*
France and Tukey: Eurostat, 2012
Italy: DG RME, 2013
Port data, Eurostat, 2012
Digitalization based on Bailstein, M.; Bournay, E., Environment and Security in the Mediterranean Desertification, ENVSEC, 2009

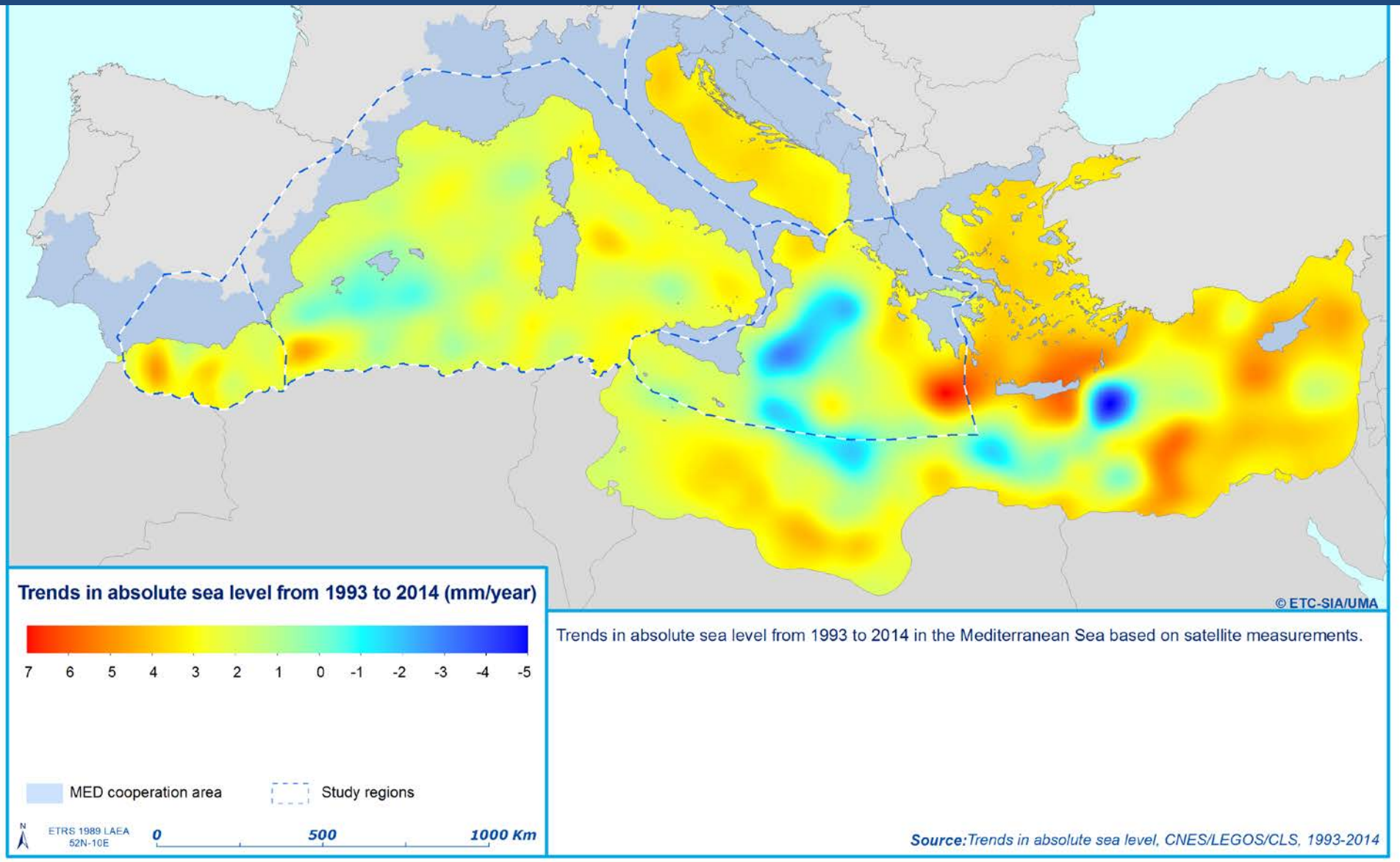
Global emergent threats – Marine Litter



Further discussed in panel 1



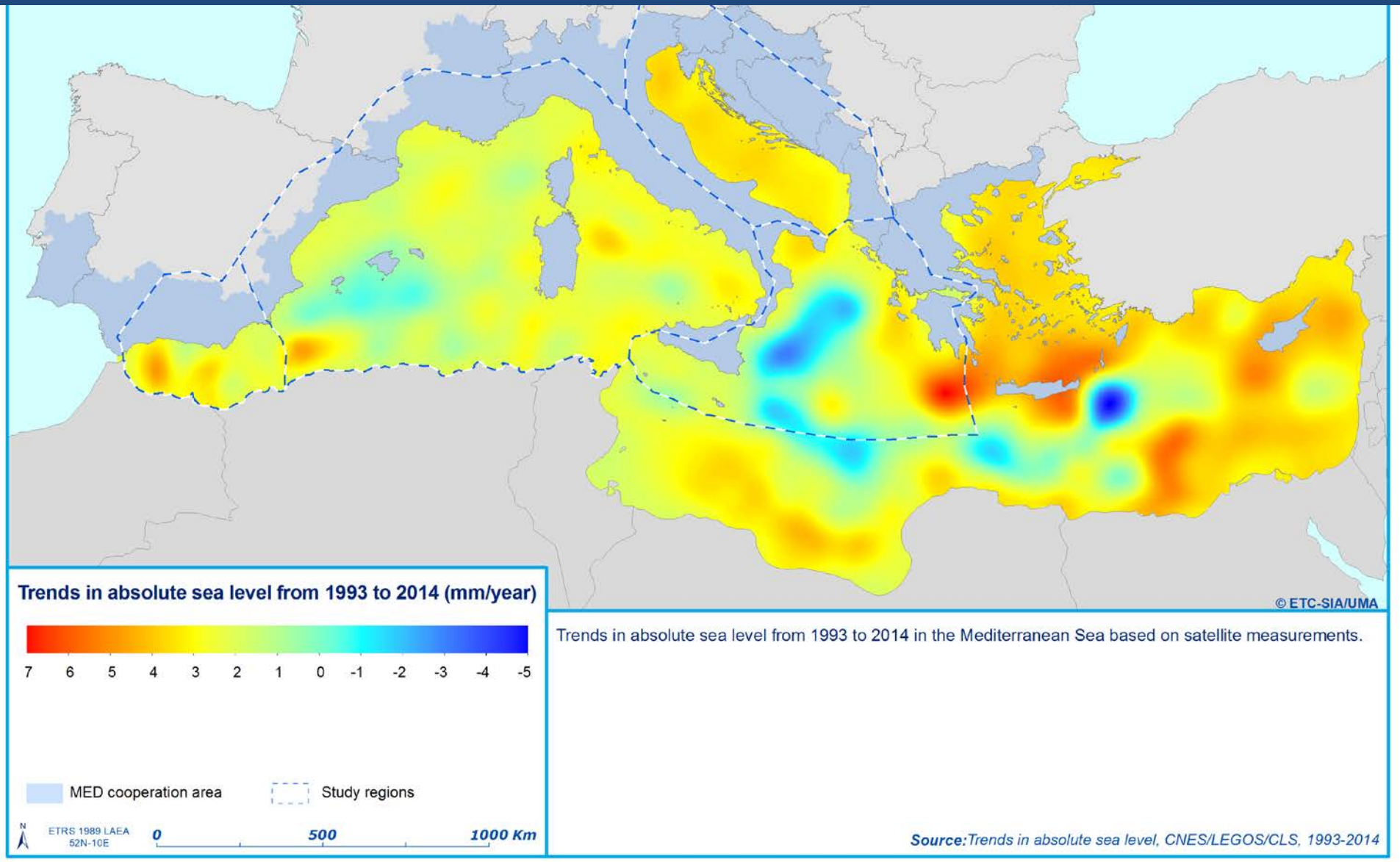
Global emergent threats – Climate Change



Trends in absolute sea level from 1993 to 2014 in the Mediterranean Sea based on satellite measurements.

Source: *Trends in absolute sea level, CNES/LEGOS/CLS, 1993-2014*

Further discussed in panel 1



Trends in absolute sea level from 1993 to 2014 in the Mediterranean Sea based on satellite measurements.

Source: *Trends in absolute sea level, CNES/LEGOS/CLS, 1993-2014*

Outline

1. The Mediterranean basin is a globally unique Biodiversity Hotspot with high diversity and endemism of flora and fauna but is subjected to an alarming increase in human impacts

2. Increasing Pressures, with some global threats such as Climate Change and Marine Pollution are emerging

3. Cumulative Impacts reduce the overall resilience of ecosystems and have been underestimated in the Mediterranean

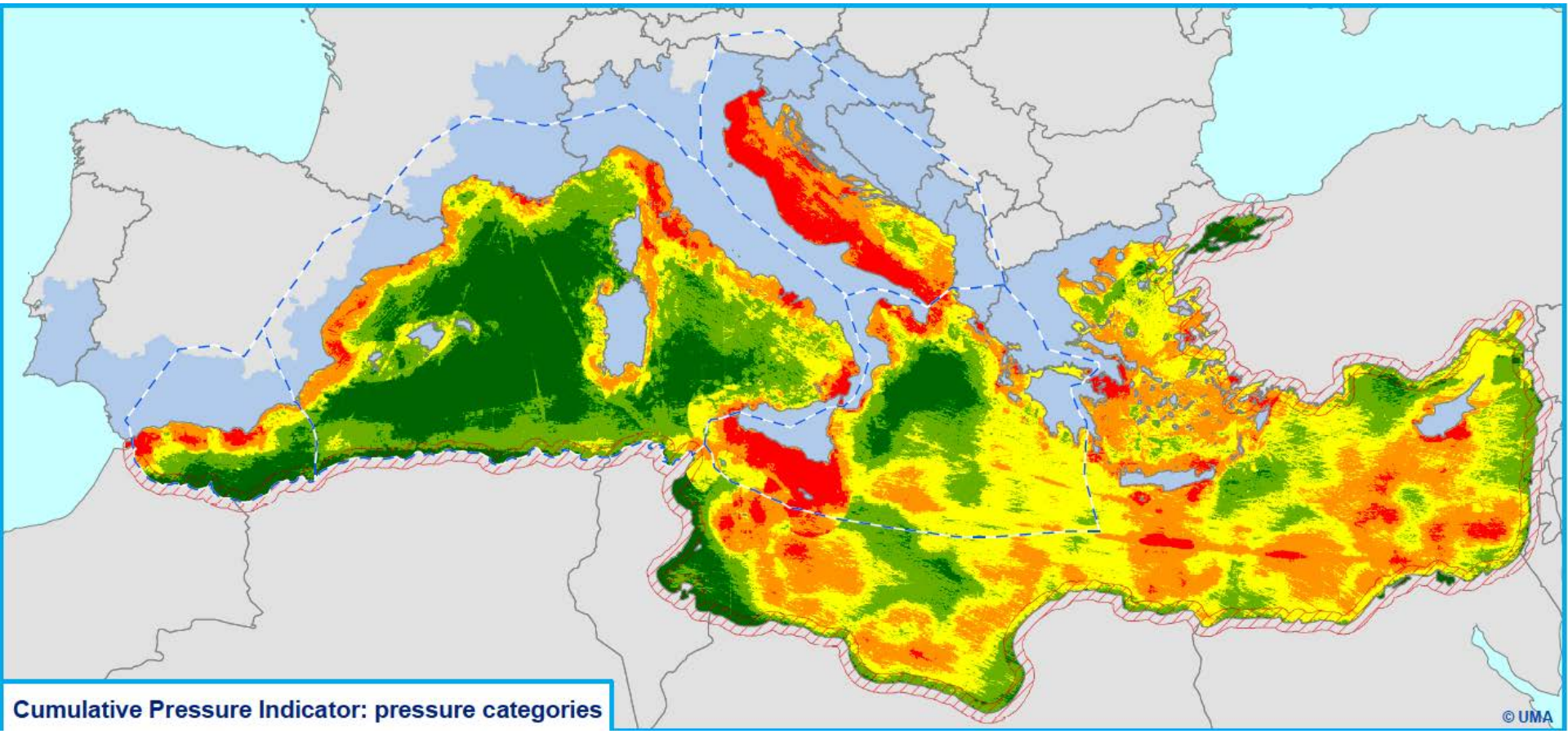
4. Effective biodiversity management is needed using an ecosystem-based approach: identifying trans-boundary priority areas for intervention is crucial

5. PANACeA is a necessary response to address multiple pressures using integrated monitoring protocols and transferable management tools

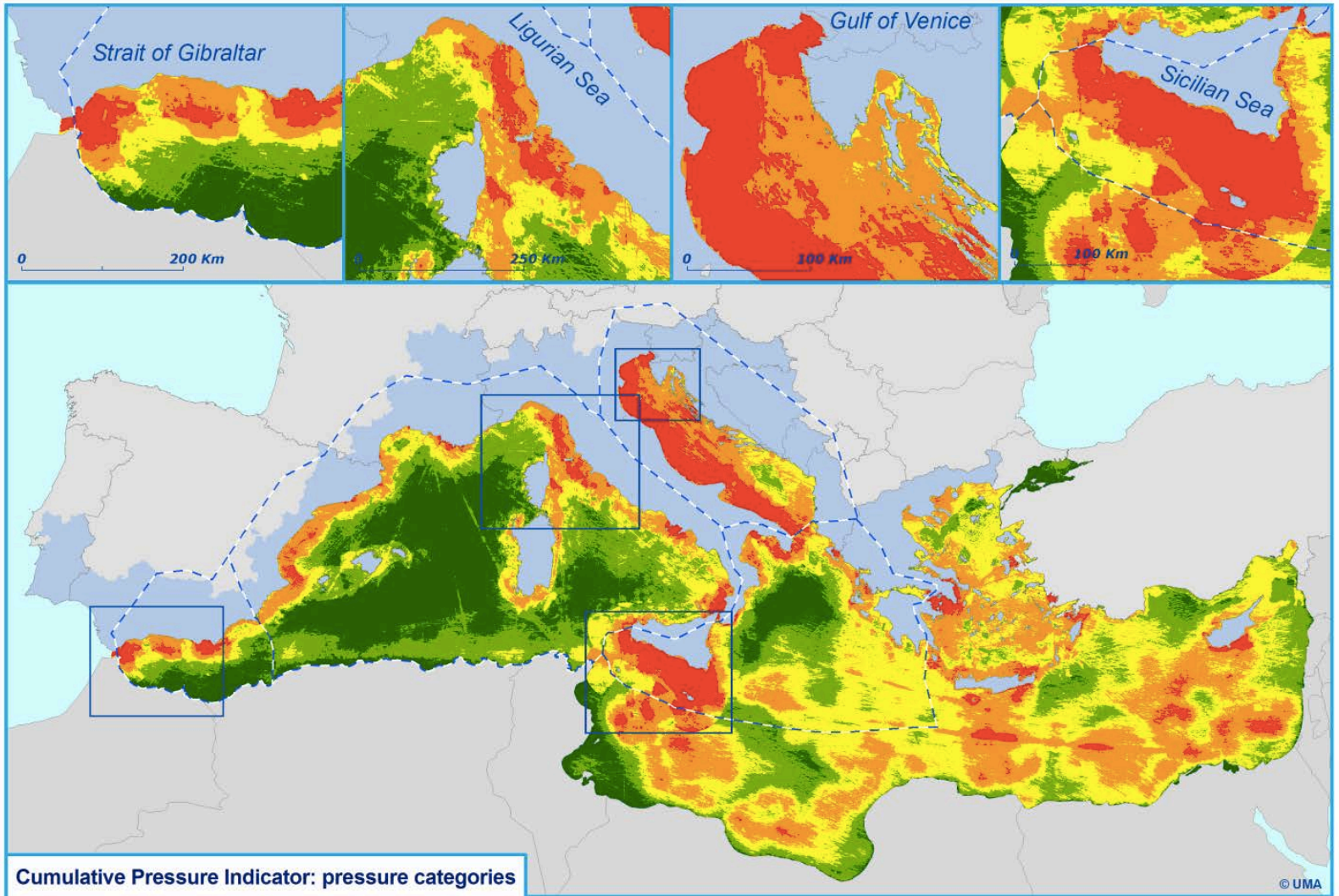
Developing a Cumulative Impacts Index

Layer	Reference data
1. Climate change	Change in sea surface temperature (SST). NCEAS, 2008.
	Sea level rise (SLR) along the European coast. CNES/LEGOS/CNS, 1993-2013.
2. Aquaculture	Fish farms in the Mediterranean Sea. Trujillo et al., 2012.
	Shellfish production areas. EMODnet Human Activities, 2014.
3. Fishing	Fishing ports and fleet statistics. DG-MARE, 2014.
	Marine ecosystems on soft bottoms. NCEAS, 2008.
	Bathymetry. GEBCO, 2014.
	Biodiversity. EMODnet Biology Portal, 2014.
4. Marine litter	Numerical modelling of floating debris in the world's oceans. Lebreton et al., 2012.
	Fifteen-year average of total marine litter in the Mediterranean Sea. IFREMER, 2014.
5. Maritime transport	Marine exposure due to port activity. Eurostat, 2012.
	Ocean-based pollution. NCEAS, 2008.
	Oil spill density. REMPEC, 1977-2014; CNR-IIA, 2012.
6. Coastal tourism	Marinas: number of moorings. Plan Bleu, 2014; Spanish Federation of Associations of Tourist Marinas, 2014; Portbooker.com, 2014; EEA, 2014.

Cumulative Pressure Categories



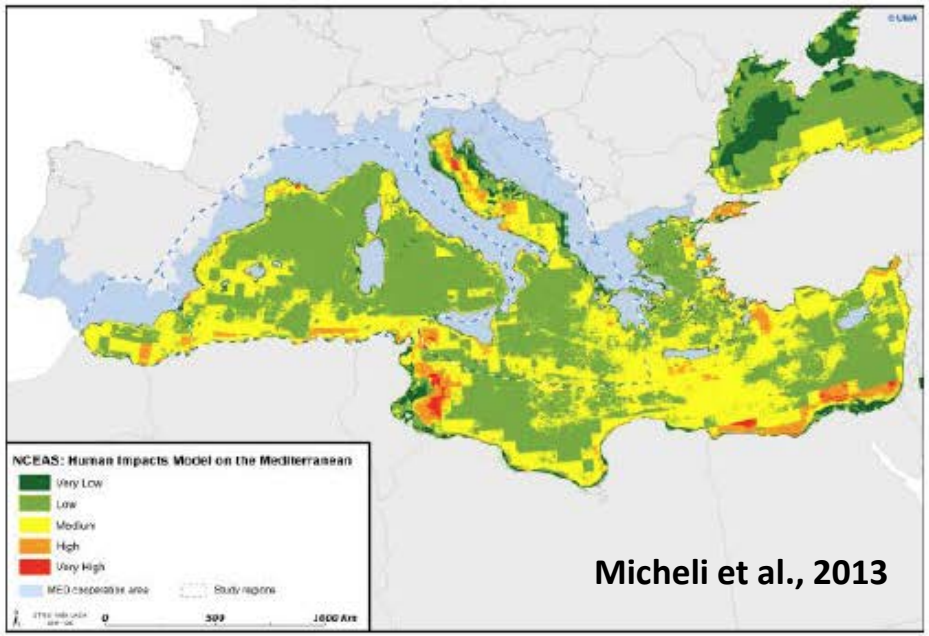
$$P_T = \frac{(W_1 \cdot P_1) + (W_2 \cdot P_2) + (W_3 \cdot P_3) + (W_4 \cdot P_4) + (W_5 \cdot P_5) + (W_6 \cdot P_6)}{6}$$



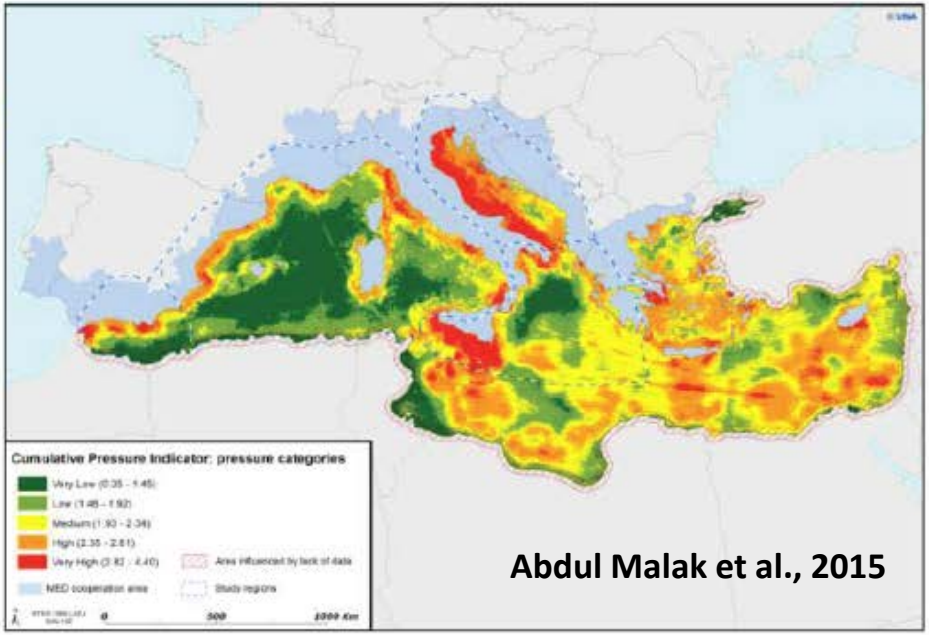
The map represents the Cumulative Pressure Indicator. This indicator combines the effect of six socio-economic and environmental drivers of pressure: climate change, fishing, aquaculture, maritime transport, coastal tourism and marine litter.

Source: ETC-UMA, 2015

Cumulative Pressures underestimated



Micheli et al., 2013



Abdul Malak et al., 2015

- **Micheli et al., 2013 based impact assessment on global data.**
- **Abdul Malak et al., 2015 used regional + global data, validated by regional experts.**
- **There is agreement between the 2 studies at basin level, but less at ecoregion level**

Outline

1. The Mediterranean basin is a globally unique Biodiversity Hotspot with high diversity and endemism of flora and fauna but is subjected to an alarming increase in human impacts

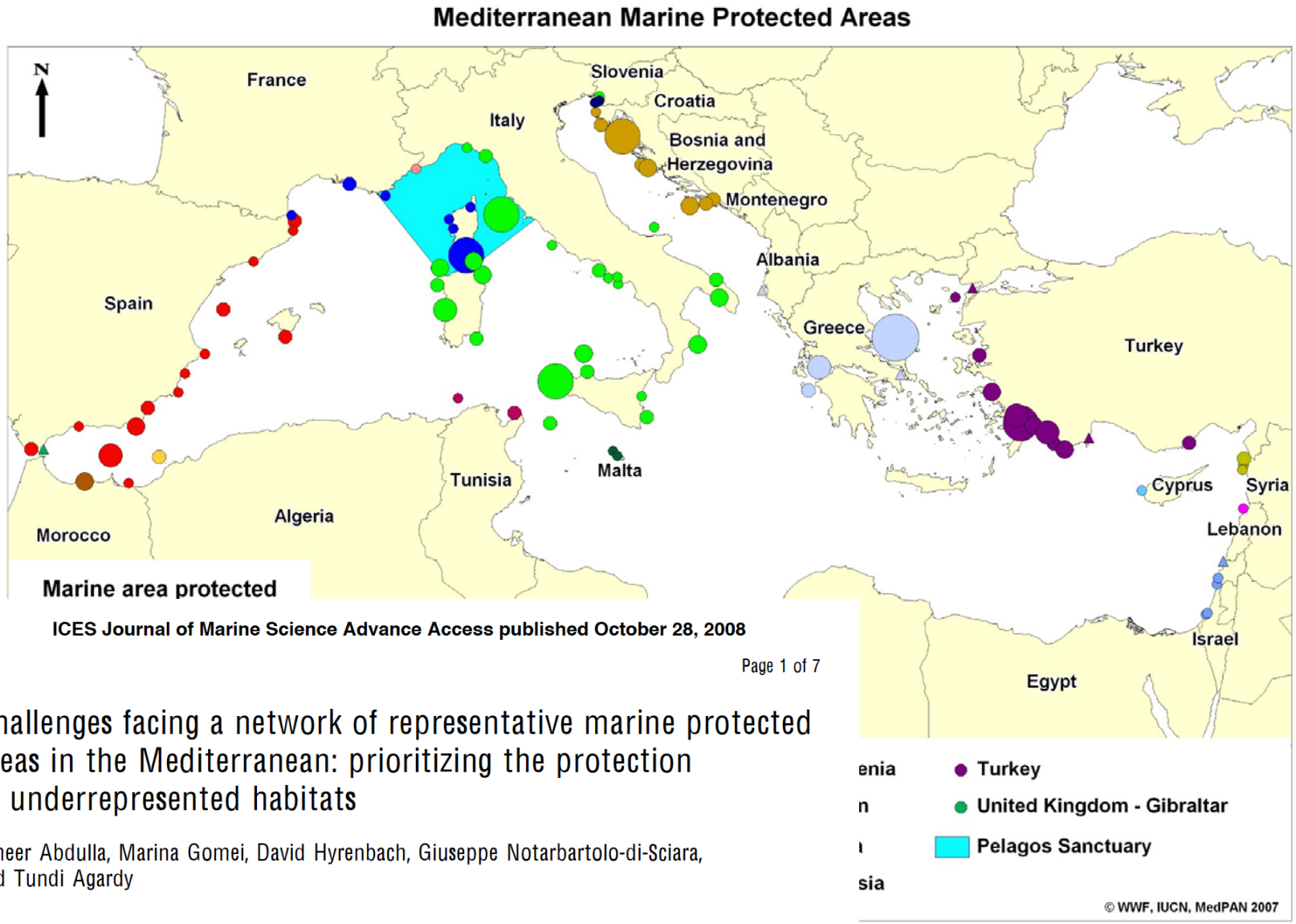
2. Increasing Pressures, with some global threats such as Climate Change and Marine Pollution are emerging

3. Cumulative Impacts reduce the overall resilience of ecosystems and have been underestimated in the Mediterranean

4. Effective biodiversity management is needed using an ecosystem-based approach: identifying trans-boundary priority areas for intervention is crucial

5. PANACeA is a necessary response to address multiple pressures using integrated monitoring protocols and transferable management tools

Marine Protection 2007



ICES Journal of Marine Science Advance Access published October 28, 2008

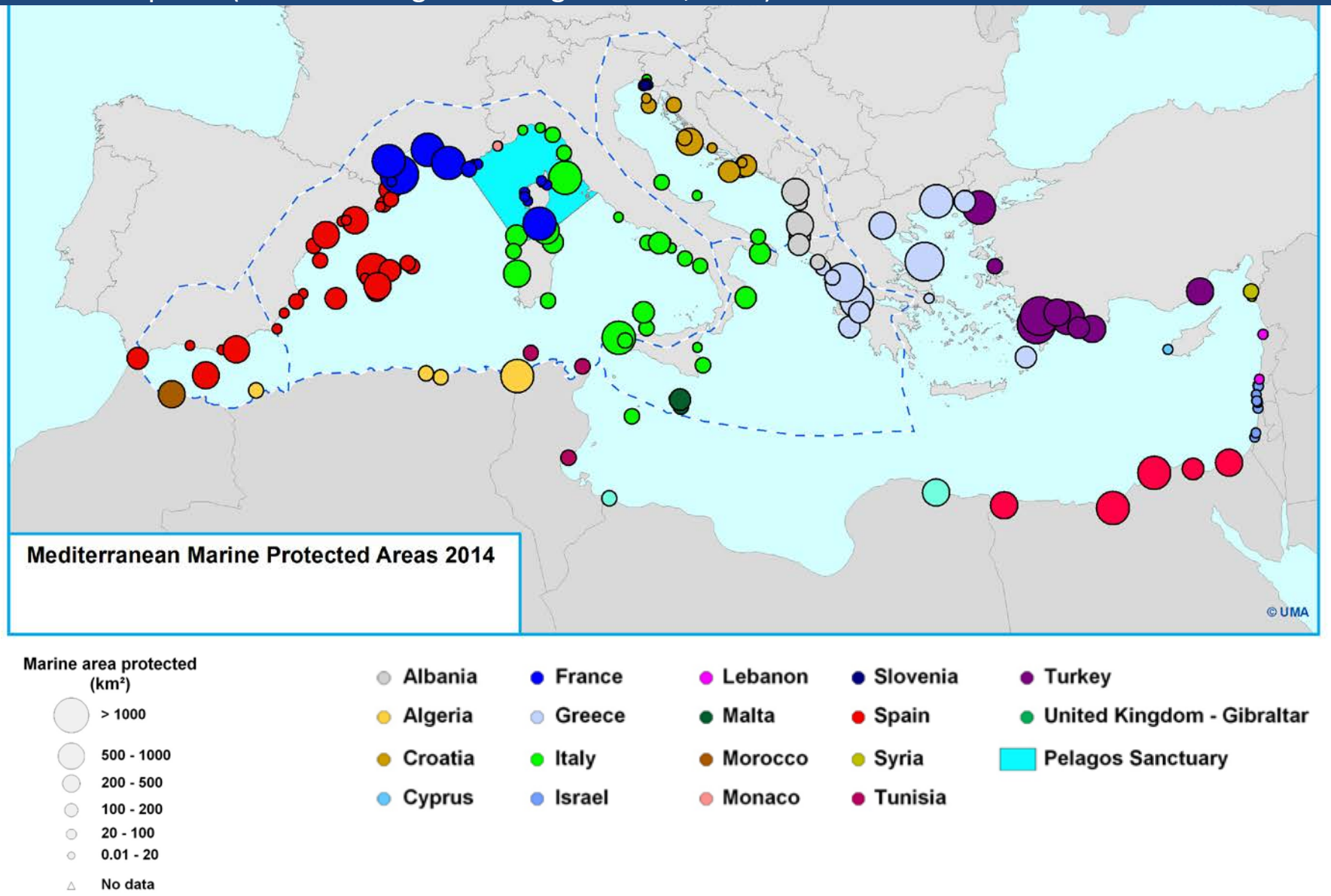
Challenges facing a network of representative marine protected areas in the Mediterranean: prioritizing the protection of underrepresented habitats

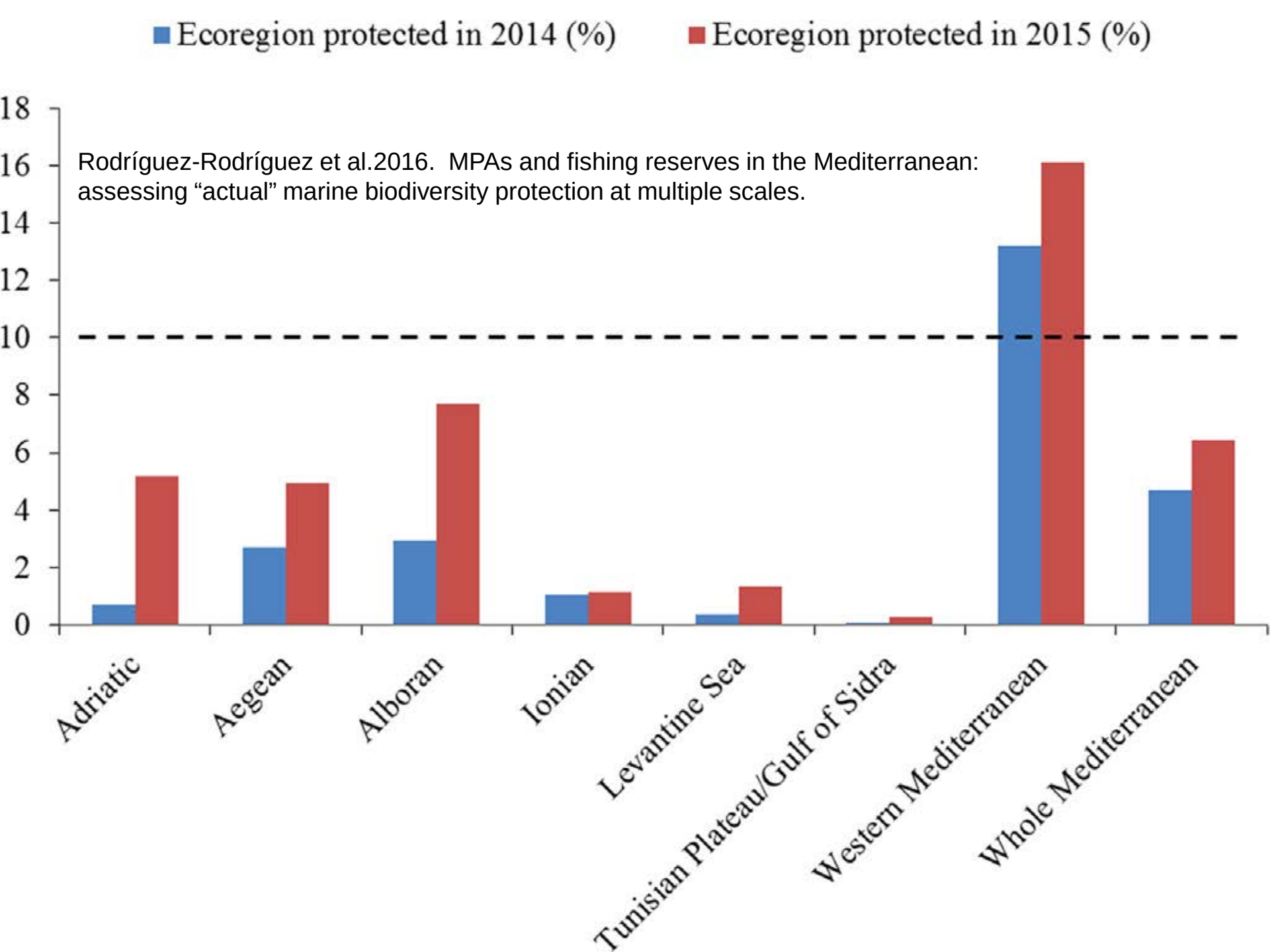
Ameer Abdulla, Marina Gomei, David Hyrenbach, Giuseppe Notarbartolo-di-Sciara, and Tundi Agardy

Abdulla, A., Gomei, M., Hyrenbach, D., Notarbartolo-di-Sciara, G., and Agardy, T. 2009. Challenges facing a network of representative marine

Marine Protection 2014

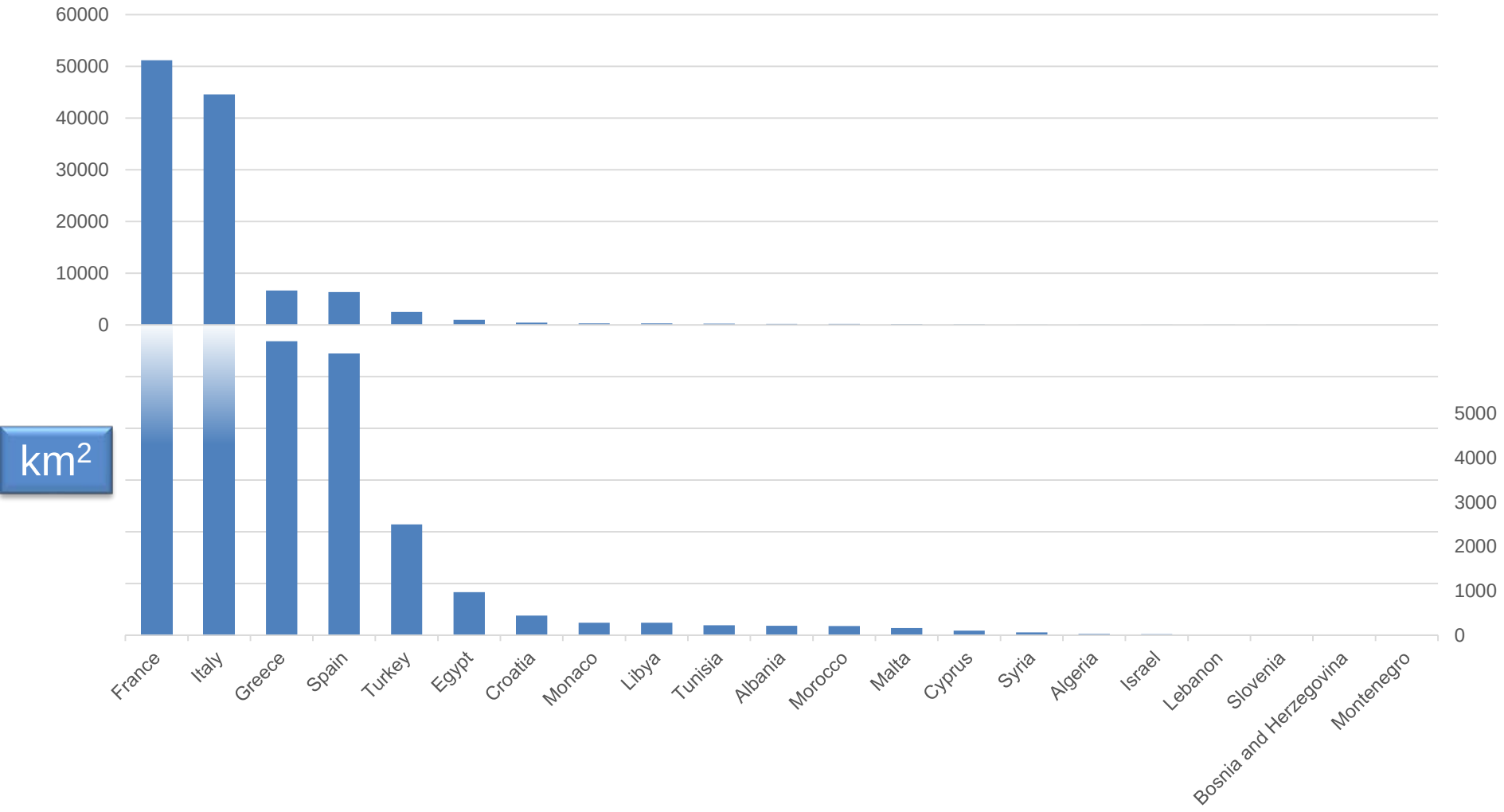
MAPAMed update (source: Rodriguez-Rodriguez et al., 2016)




Ecoregion protected in 2014 (%)
Ecoregion protected in 2015 (%)
18
16
14
12
10
8
6
4
2
0
Rodríguez-Rodríguez et al.2016. MPAs and fishing reserves in the Mediterranean: assessing “actual” marine biodiversity protection at multiple scales.
Adriatic
Aegean
Alboran
Ionian
Levantine Sea
Tunisian Plateau/Gulf of Sidra
Western Mediterranean
Whole Mediterranean

Marine Protection in km²

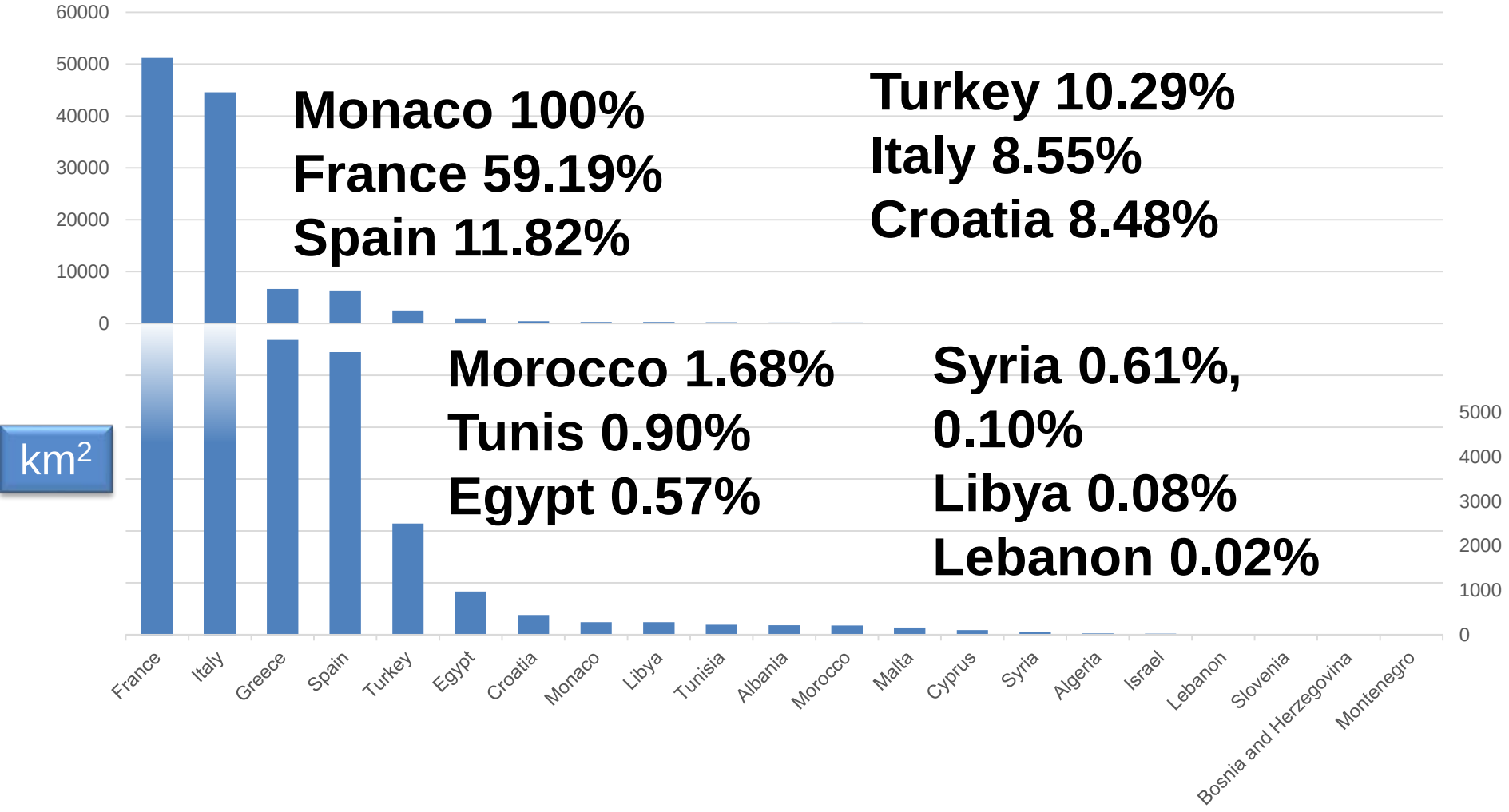
MAPAMed 2014 update (source: Rodriguez-Rodriguez et al., 2016)



Marine Protection in km²

MAPAMed 2014 update (source: Rodriguez-Rodriguez et al., 2016)

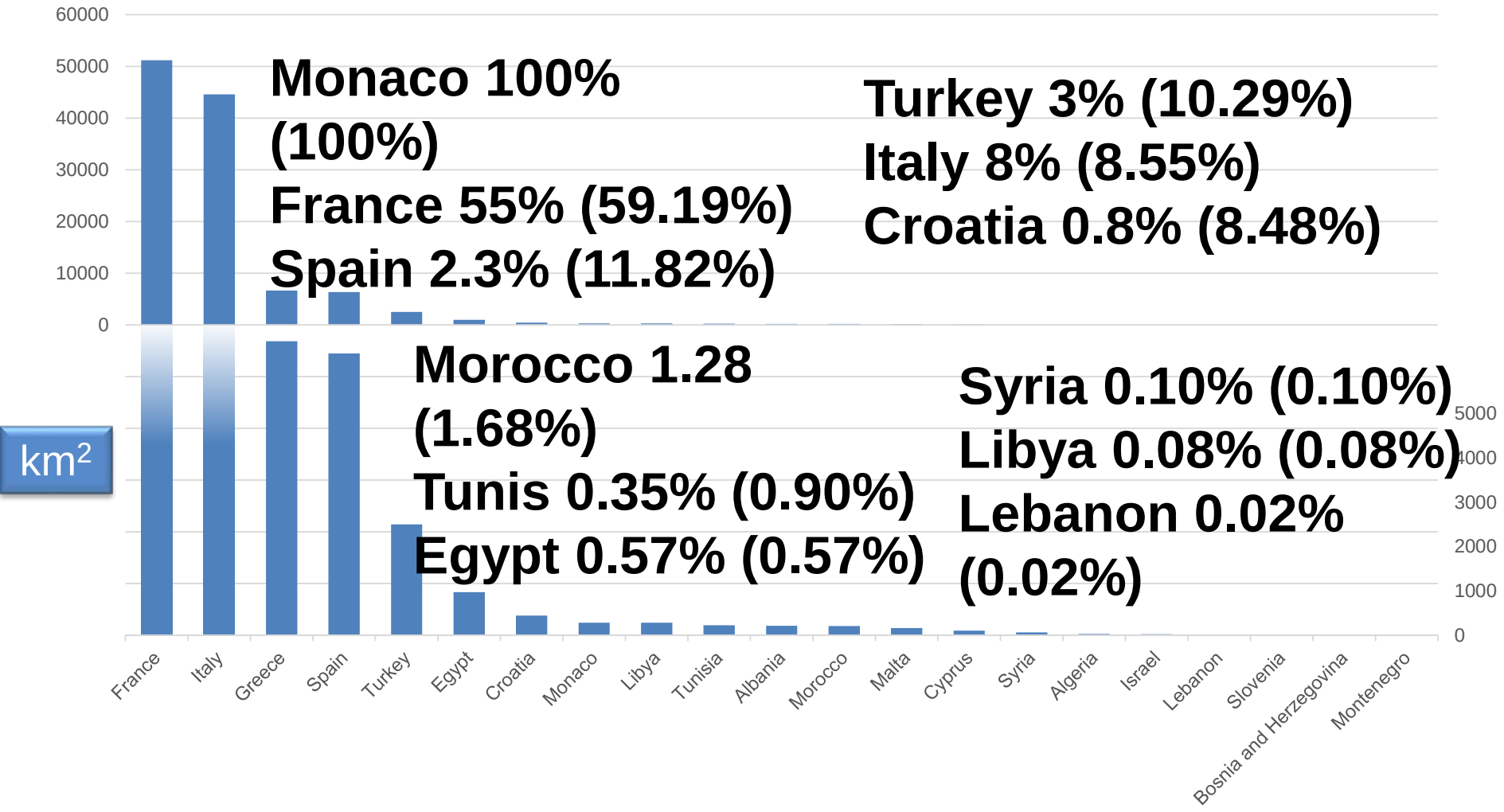
CBD Aichi Target 11 and SDG 14.5 of 10% EEZ Conservation



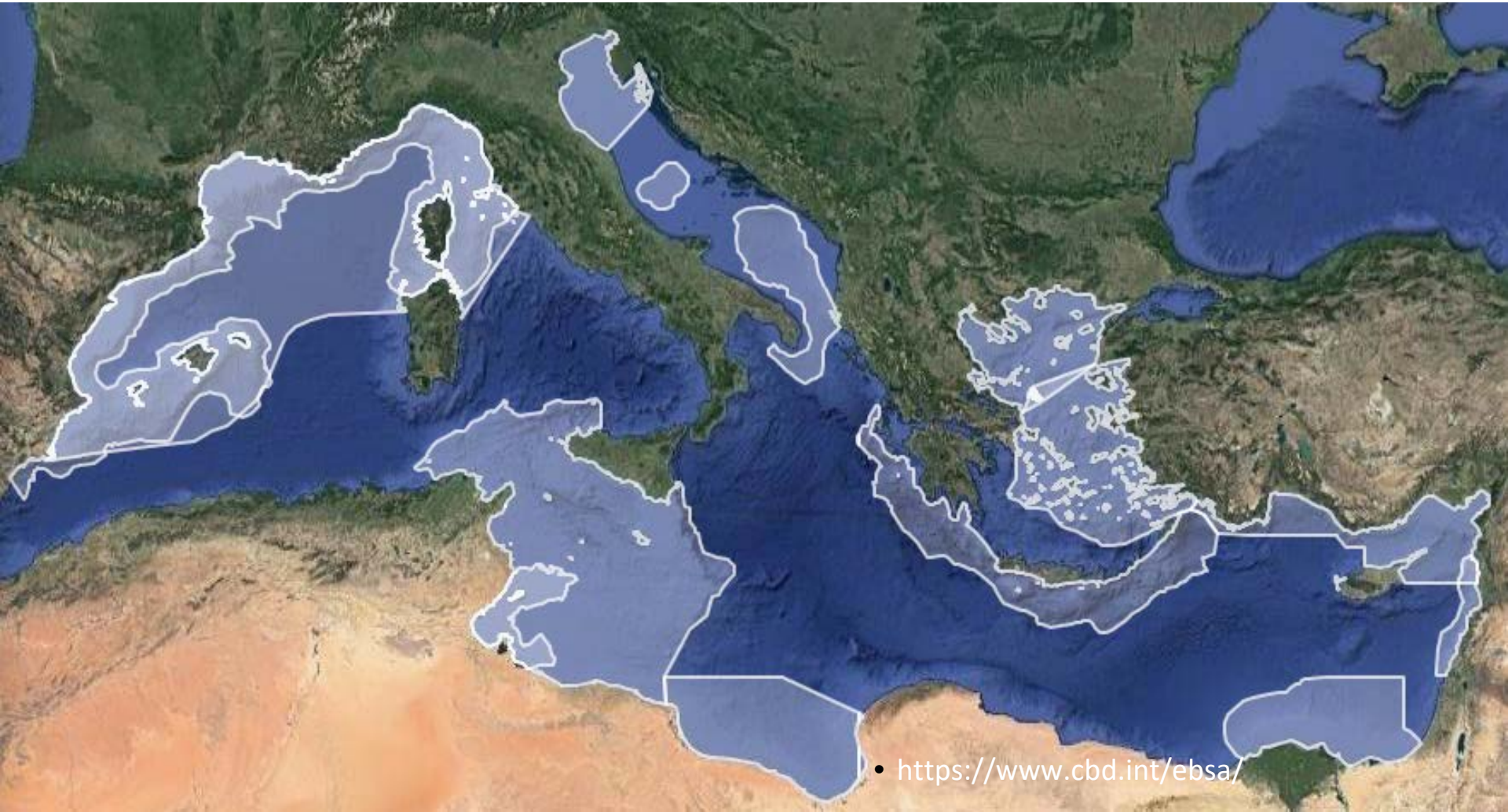
Marine Protection in km²

MAPAMed 2014 update (source: Rodriguez-Rodriguez et al., 2016)

Actual Management

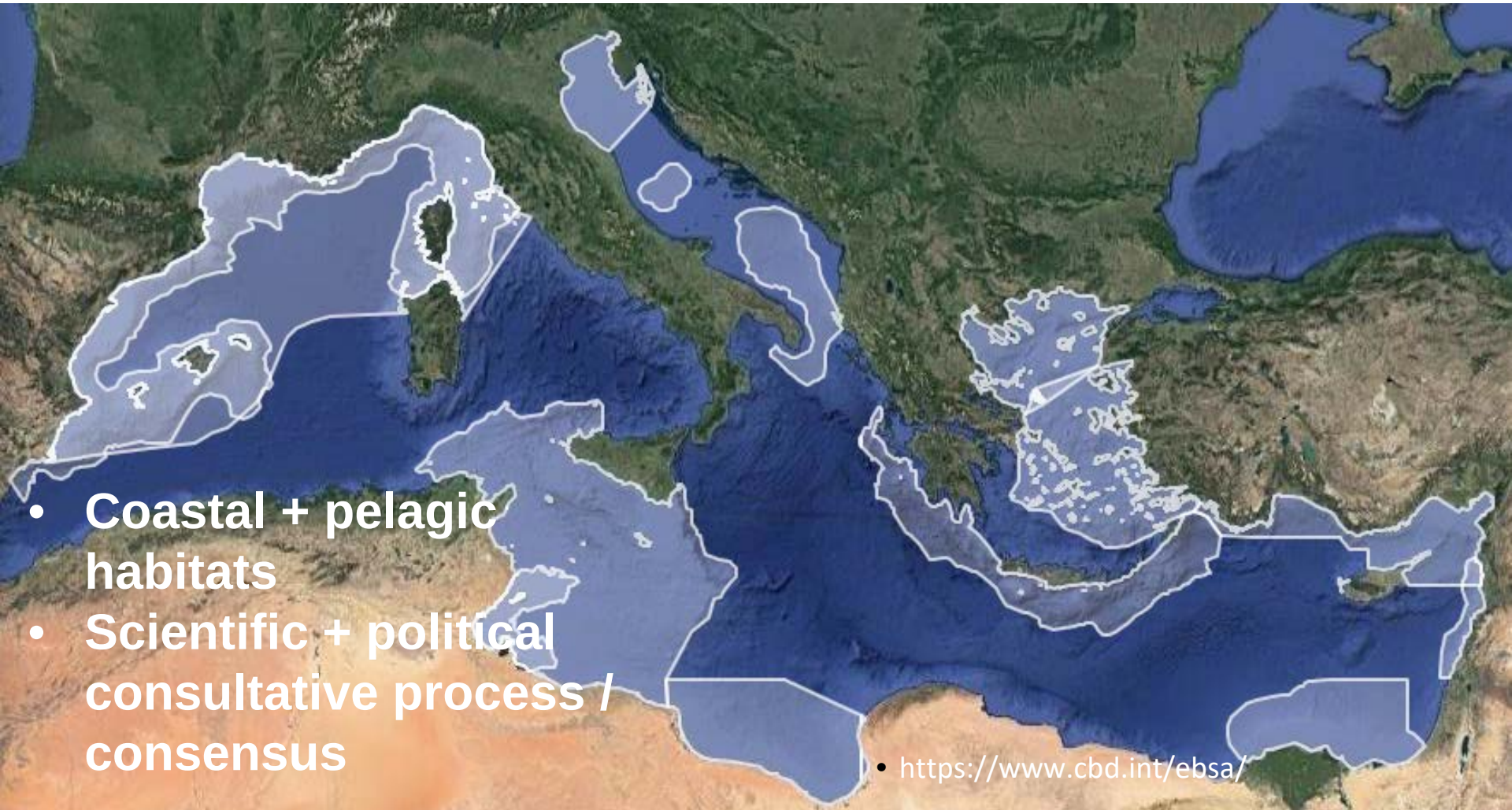


CBD Ecologically and Biologically Significant Areas (15 EBSAs)



- https://www.cbd.int/ebsa/

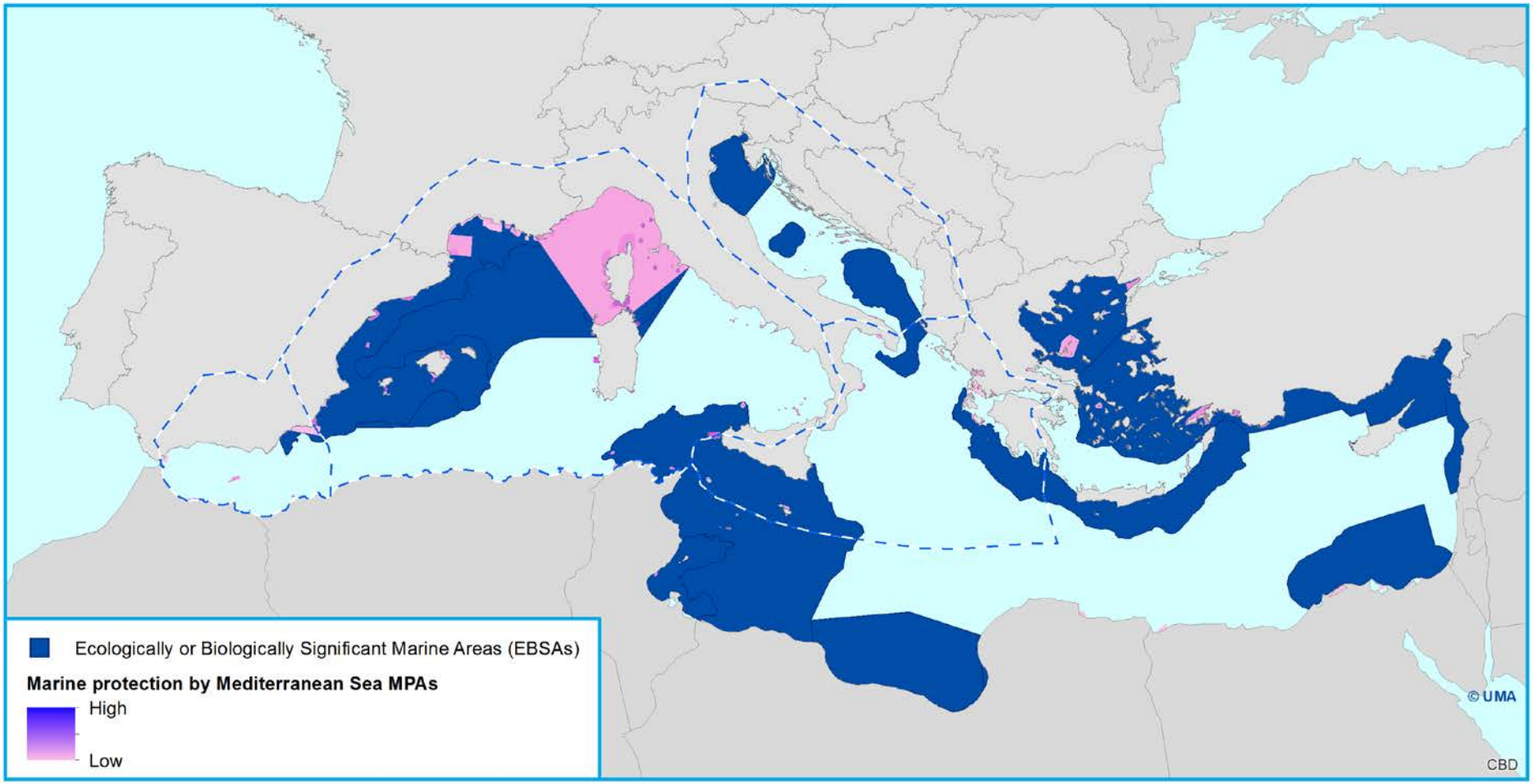
CBD Ecologically and Biologically Significant Areas (15 EBSAs)



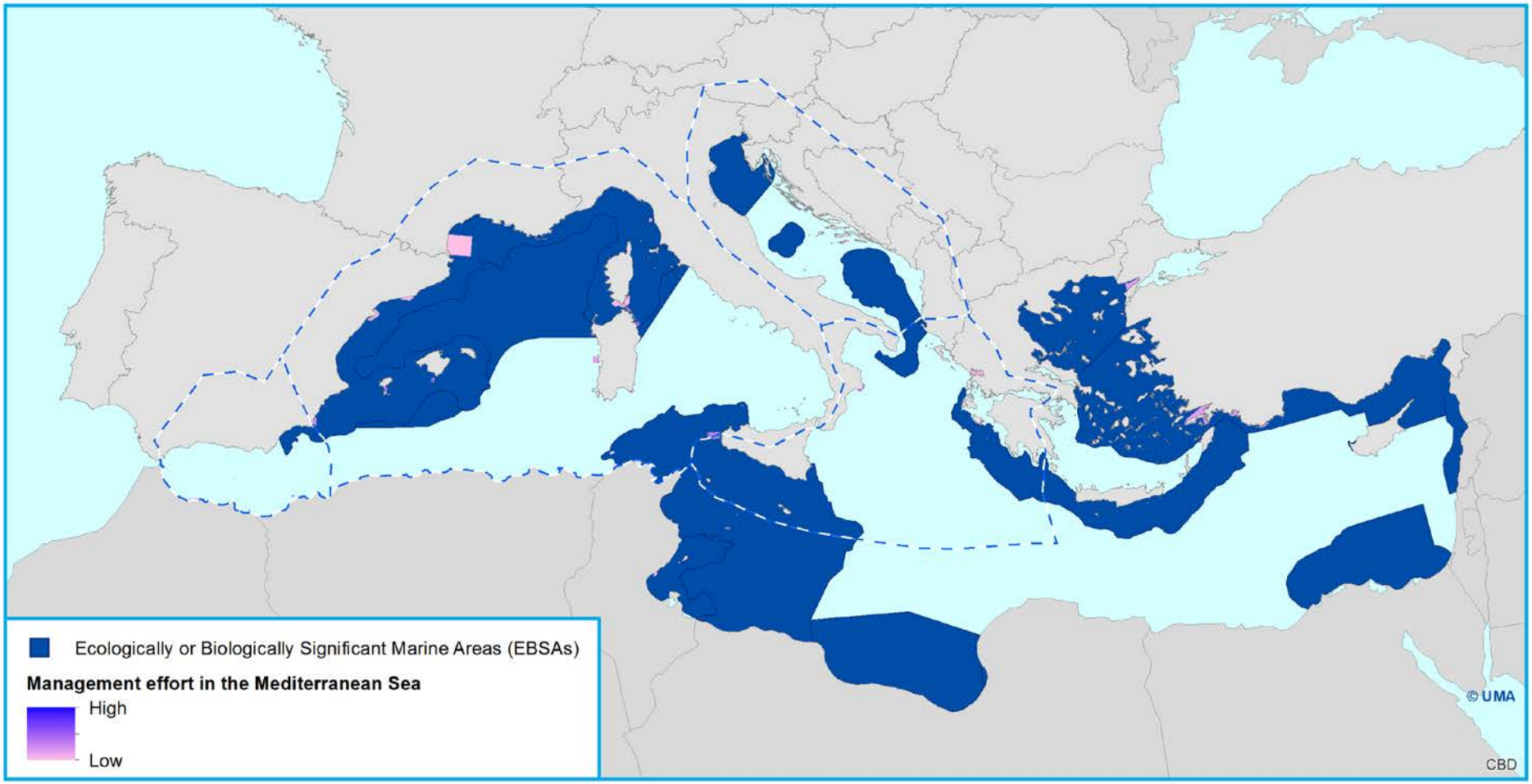
- **Coastal + pelagic habitats**
- **Scientific + political consultative process / consensus**

- https://www.cbd.int/ebsa/

Legal “Protection”



Actual Management



Outline

1. The Mediterranean basin is a globally unique Biodiversity Hotspot with high diversity and endemism of flora and fauna but is subjected to an alarming increase in human impacts

2. Increasing Pressures, with some global threats such as Climate Change and Marine Pollution are emerging

3. Cumulative Impacts reduce the overall resilience of ecosystems and have been underestimated in the Mediterranean

4. Effective biodiversity management is needed using an ecosystem-based approach: identifying trans-boundary priority areas for intervention is crucial

5. PANACeA is a necessary response to address multiple pressures using integrated monitoring protocols and transferable management tools

PANACeA - Streamlining management efforts in protected areas for enhanced nature protection in the Mediterranean

PANACeA´s role is to synthesize results of relevant regional projects in the Mediterranean to:

- **provide evidence and reliable data on effective transferable measures and protocols,**
- **reduce pressures on Mediterranean biodiversity and**
- **ensure the adequate provision of ecosystem services**

BIODIVERSITY PROTECTION
STRENGTHENING BIODIVERSITY AND ECOSYSTEMS

Project co-financed by the European Regional Development Fund

panacea-med@uma.es

www.interreg-med.eu

Download and share this document!

BioProtection @MedCommunity3_2 #PANACeA_Med

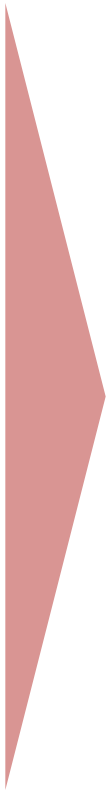
Biodiversity Protection Community

PANACeA Biodiversity Protection

UNIVERSIDAD DE MÁLAGA ETC UMA MedCités MedCities AMB Àrea Metropolitana de Barcelona unimed UNEP MAP Plan Bleu CPMR CRPM REGIONAL ENVIRONMENTAL CENTER Montenegro

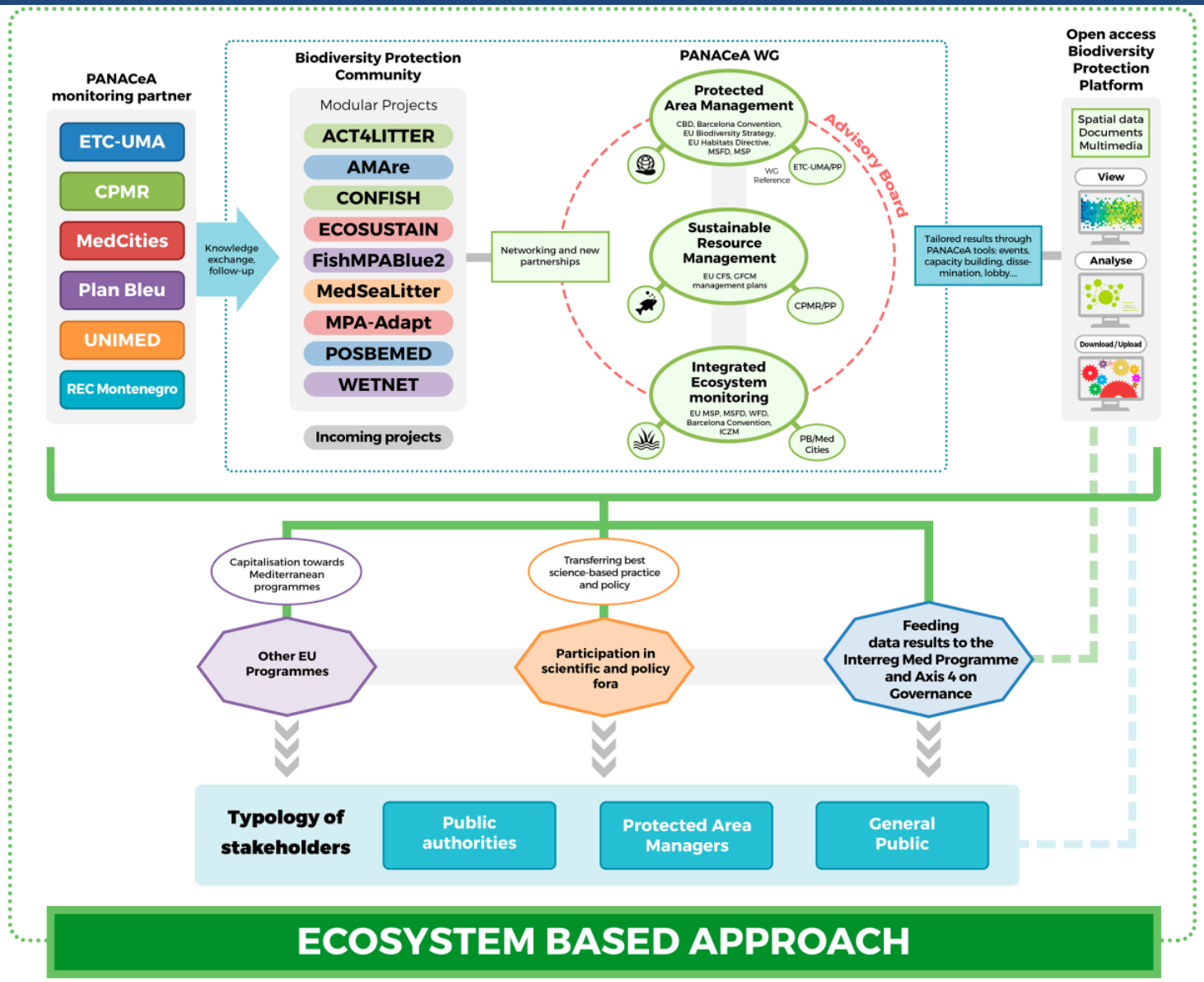
Biodiversity Protection Community

PANACeA Modular projects
AMAre marine spatial planning and protected areas
CONFISH network of fish stock recovery areas
ECOSUSTAIN protected areas
FishMPABlue2 governance of artisanal fisheries in protected areas
MEDSEALITTER marine waste management
MPA-ADAPT adaptation of marine protected areas to climate change
POSBEMED managing Posidonia for beaches and dunes
WETNET wetland governance
ACT4LITTER marine litter in marine protected areas



PANACeA Horizontal approach
Engage stakeholders in tailoring outcomes as evidence-based tools for multi-level management and policy
Provide recommendations based on Modular project results
Means to reinforce regulations & enhance protection effectiveness awarded by legal channels
Guide legal management measures of natural resources whose purpose is not strictly biodiversity conservation in the Mediterranean
Address transboundary cooperation and integration of PAs in territorial development strategies

Working approach



Dania Abdul Malak

ETC-UMA Director

daniaabdulmalak@uma.es

MED Biodiversity Protection Community

https://biodiversity-protection.interreg-med.eu

Project co-financed by the European Regional Development Fund

The MED Biodiversity Protection Community is featured by PANACeA