

AN ASSESSMENT OF MARINE BIODIVERSITY PROTECTION IN THE MEDITERRANEAN SEA

A threatened global
biodiversity hotspot

France, Occitanie

MBPC partners:



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Introduction

The Mediterranean Sea is a World's biodiversity hotspot. It harbours around 11% of all marine species in less than 1% of the global marine area (Bianchi & Morri, 2000). Furthermore, around 20% of those species are endemic (Coll et al., 2010). Nevertheless, Mediterranean marine biodiversity is under threat by a number of pressures including overfishing, pollution, introduction of alien invasive species, coastal development and rising water temperature and acidity.

Efforts to conserve the Mediterranean environment have been going on for years, notably since the adoption of the Barcelona Convention against marine pollution in 1976 and its expanded version to cover the protection of the broader marine and coastal environment in 1995. Moreover, the entry into force of the Convention on Biological Diversity and the related Habitats Directive in the European Union in 1992 additionally supported conservation actions in the region, especially in the European Union side of the Mediterranean.

As a result of those efforts, an increasing number of marine protected areas (MPAs) have been designated across the Mediterranean Sea representing over 9.5% of the Mediterranean Sea, but mainly in the North-Western Mediterranean (Gomei et al., 2019). When addressing managerial effort, this percentage drops dramatically, with 1.27% of the Mediterranean sea being covered by MPAs that effectively implemented their management plans in 2018 (Gomei et al., 2019). New international protection coverage targets are likely to include 30% of marine and coastal areas being effectively protected by networks of MPAs or Other Effective Conservation Measures (OECMs) by 2030 (CBD, 2021). Additional protection targets by the European Union require that 10% of important areas for biodiversity are designated under legally stringent no-take (M)PAs by 2030, which may further broaden the long-lasting North-South marine protection gap in the Mediterranean (Adbulla et al., 2008).



Assessing protection

Protection afforded to biodiversity largely relies on two main factors: legal protection and managerial protection (Rodríguez-Rodríguez & Martínez-Vega, 2022). Actual protection afforded by area-based conservation measures such as MPAs or OECMs (the effectiveness of legal and managerial measures underpinning them) can only be accurately assessed through resource-consuming site biodiversity monitoring using carefully thought research designs, something rare and unattainable at the scales shown in this study. Thus, some (M) PA protection assessment frameworks that include indicators of effectiveness as quick and easily measured proxies of protection have been developed.

Here, we adapted the MPA Protection Framework (MaPAF; Rodríguez-Rodríguez et al., 2016) with data from MAPAMED 2019 version 2 (MAPAMED, 2022) to update progress on the protection of Mediterranean marine biodiversity. Accordingly, we conceived protection as an additive process entailing two complementary factors:

1. Legal protection and 2. Managerial protection. Legal protection was assessed through two indicators: 1.1. Legal designation, contributing to protection coverage targets, and 1.2. Regulation stringency, contributing to strict protection targets. Managerial protection was assessed via two indicators: 2.1. Existence of a management authority for the site, and 2.2. Existence of a management plan that is fully implemented (Table 1). Both indicators are expected to contribute to effective MPA & OECM management targets. Thus, a site can be legally protected (typically, an MPA), by management measures (e.g. an OECM), attaining different degrees of conservation to their biodiversity. Therefore a site that has been endowed a stringent legal designation category which has an appointed managerial authority that fully implements the site's management plan is assumed to have greater protection than a site with opposite characteristics.

Table 1: Methodological outline of the assessment of Mediterranean marine protection

Factor	Indicator	Values
1. Legal protection	1.1. Legal designation	1.1.1. Yes 1.1.2. No
	1.2. Regulation stringency	1.2.1. Lenient regulation: Multiple-use MPAs 1.2.2. Stringent regulation: Reserves
2. Managerial protection	2.1. Existence of management authority	2.1.1. Yes 2.1.2. No
	2.2. Fully implemented management plan	2.2.1. Lenient regulation: Multiple-use MPAs 2.2.2. Stringent regulation: Reserves



The Mediterranean Sea is a World's biodiversity hotspot. It harbours around 11% of all marine species in less than 1% of the global marine area. Furthermore, around 20% of those species are endemic.

DATA

We considered MPAs all MAPAMED 2019 v2 (MAPAMED, 2022) categories that were included as such in the database plus some 'Sites of conservation interest' that are commonly reported as (M)PAs and that have some sort of legal or managerial protection, including: proposed Sites of Community Importance, Biosphere Reserves, Ramsar sites and World Heritage Sites. We considered potential OECMs (thus, potential conservation), the following categories in MAPAMED that may have some legal or managerial conservation but are not MPAs: potential OECMs (including all Fisheries Restricted Areas and Particularly Sensitive Sea Areas), Cetaceans Critical Habitats and Ecologically or Biologically Significant Areas.

We complemented MAPAMED data with national MPA data (N=3) provided by the Ministry of Ecology, Spatial Planning and Urbanism of Montenegro, to show some successful recent efforts to conserve marine biodiversity in that country in the framework of the Mediterranean Biodiversity Protection Community project.

For boundaries, we used the official Mediterranean Sea layer from the Barcelona Convention in MAPAMED 2019 v2. For ecoregions, we used the marine regions and subregions in the Marine Strategy Framework Directive, also in MAPAMED 2019 v2.

- 9.42% of the Mediterranean is covered by 1280 MPAs, notably in inshore waters (19% vs 6% coverage in offshore waters).
- The Western Mediterranean (23.04%) and the Tunisian Plateau/Gulf of Sidra (1.31%) ecoregions are the ecoregions with the greatest and smallest MPA coverage, respectively.
- Only 0.11% of the Mediterranean Sea is covered by legally stringent reserves.
- 83.79% of the MPA area has an allocated management authority.
- Just 2.49% of the MPA area has a fully implemented management plan.
- Potential OECMs cover 90% of the Mediterranean Sea.

RESULTS

The 2019 version 2 of MAPAMED included 1277 MPAs (906 Natura 2000 sites, 257 nationally designated MPAs, 62 Ramsar sites, 39 SPAMIs, 9 Biosphere Reserves, 3 World Heritage Sites and the Pelagos Sanctuary) and 43 potential OECMs (18 Critical Cetacean Habitat sites, 15 EBSAs, 9 FRAs and one PSSA).

MPA coverage by the end of 2019 reached 9.42% of the whole Mediterranean, slightly below the 10% CBD target set for 2020 (Figure 1). Compared to previous studies, recent increases in protected area designation seem to have occurred to different degrees in all ecoregions.

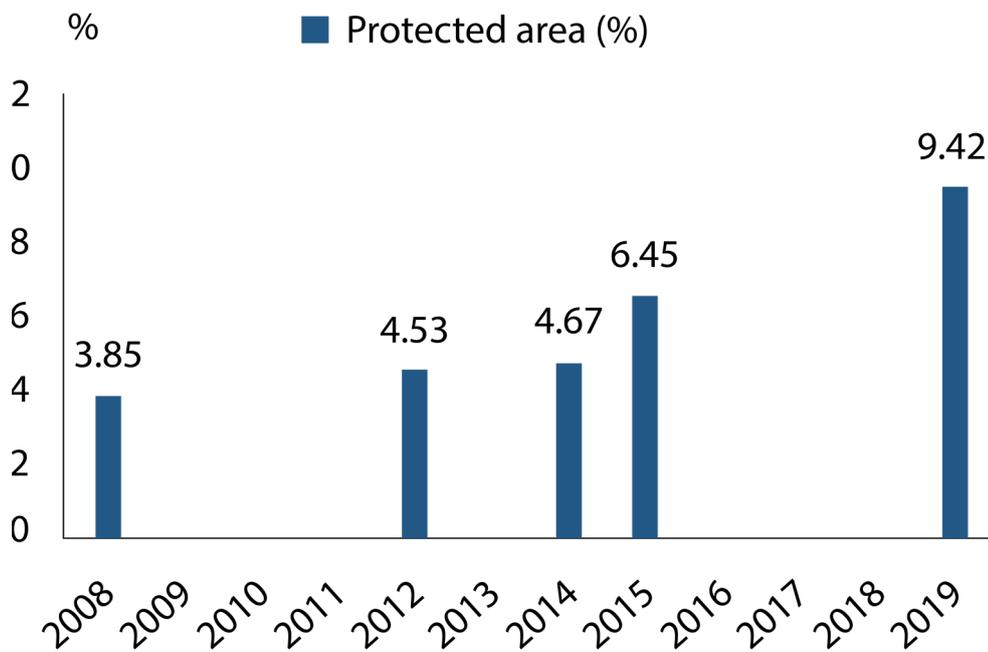


Figure 1. Progress in marine protected area coverage in the Mediterranean Sea

MPA coverage from our assessment was very uneven, with territorial waters nearly doubling the protection coverage target Mediterranean-wide, and more than doubling it in the Western Mediterranean ecoregion, with a large contribution by the Pelagos Sanctuary. Nevertheless, MPA coverage in the other ecoregions was much lower, almost negligible in offshore waters (Table 2). When potential OECMs were considered, the potential marine protection coverage reached an astonishing 90.5% overall, with the Deepwater FRA covering approximately 70% of all the Mediterranean area (Figure 2).

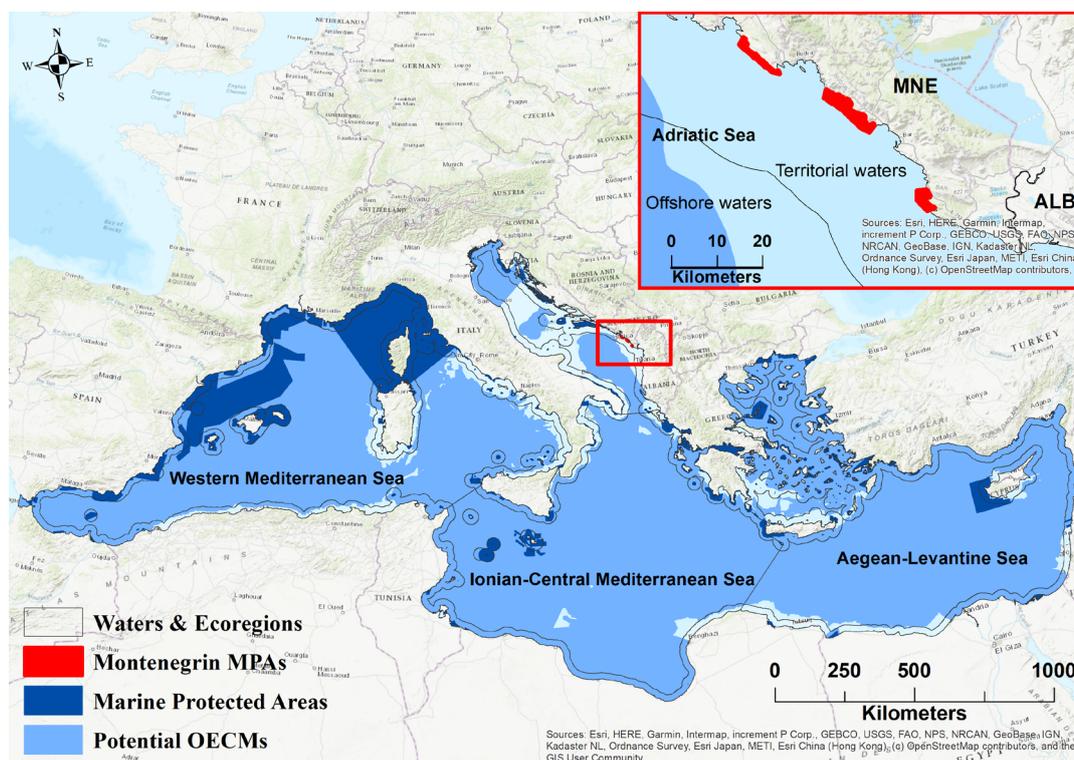


Figure 2. Coverage of marine protected areas and potential Other Effective Conservation Measures in the Mediterranean Sea by type of water (territorial or offshore), and ecoregion. The zoomed map shows the new MPAs in Montenegro.

Legally stringent reserves covered a minimal fraction of just territorial waters (0.43%). In the Ionian Sea and Central Mediterranean ecoregions, reserve coverage was null (Figure 3). Whereas almost 84% of all designated MPA area had some appointed managerial authority overall, that figure rose to 97% in the Western Mediterranean but was much lower in the other ecoregions, with values of 50% or less. Only a tiny proportion (2.49%) of the MPA area was fully managed, namely in the territorial waters of the Western Mediterranean and Adriatic ecoregions (Table 2).

Table 2. Results of the assessment of marine biodiversity protection in the Mediterranean Sea, by ecoregion and distance from the coast

Spatial scale	Area (km²)	Potential Protection coverage (%)	Potential OECM coverage (%)	MPA coverage (%)	Management authority (% of MPA area)	Fully implemented Man. plan (% of MPA area)	Reserve coverage (%)
<i>Western Mediterranean Sea</i>	845,216	91.79	91.50	21.65	96.74	2.95	0.28
Territorial waters	205,875	76.45	75.28	37.05	96.26	7.02	1.12
Offshore waters	639,341	96.73	96.73	16.69	97.07	0.04	0.01
<i>Ionian Sea and Central Mediterranean Sea</i>	772,672	95.83	95.40	2.60	50.14	0.57	0.00
Territorial waters	121,237	82.08	79.31	15.25	45.72	0.62	0.00
Offshore waters	651,435	98.39	98.39	0.25	99.88	0.00	0.00
<i>Adriatic Sea</i>	139,279	51.21	47.28	4.90	22.69	2.57	0.24
Territorial waters	67,256	33.98	25.85	10.12	22.72	2.57	0.49
Offshore waters	72,023	67.30	67.30	0.01	0.00	0.00	0.00
<i>Aegean-Levantine Sea</i>	756,738	91.05	90.62	3.55	36.37	0.81	0.01
Territorial waters	248,063	81.41	80.10	8.82	44.69	0.99	0.04
Offshore waters	508,676	95.75	95.75	0.98	0.00	0.00	0.00
MEDITERRANEAN SEA	2,513,910	90.47	89.98	9.42	83.79	2.49	0.11
Territorial waters	642,432	74.99	72.73	19.21	75.50	4.74	0.43
Offshore waters	1,871,470	95.91	95.91	6.06	92.82	0.04	0.00

¹ Including MPAs and potential OECMs

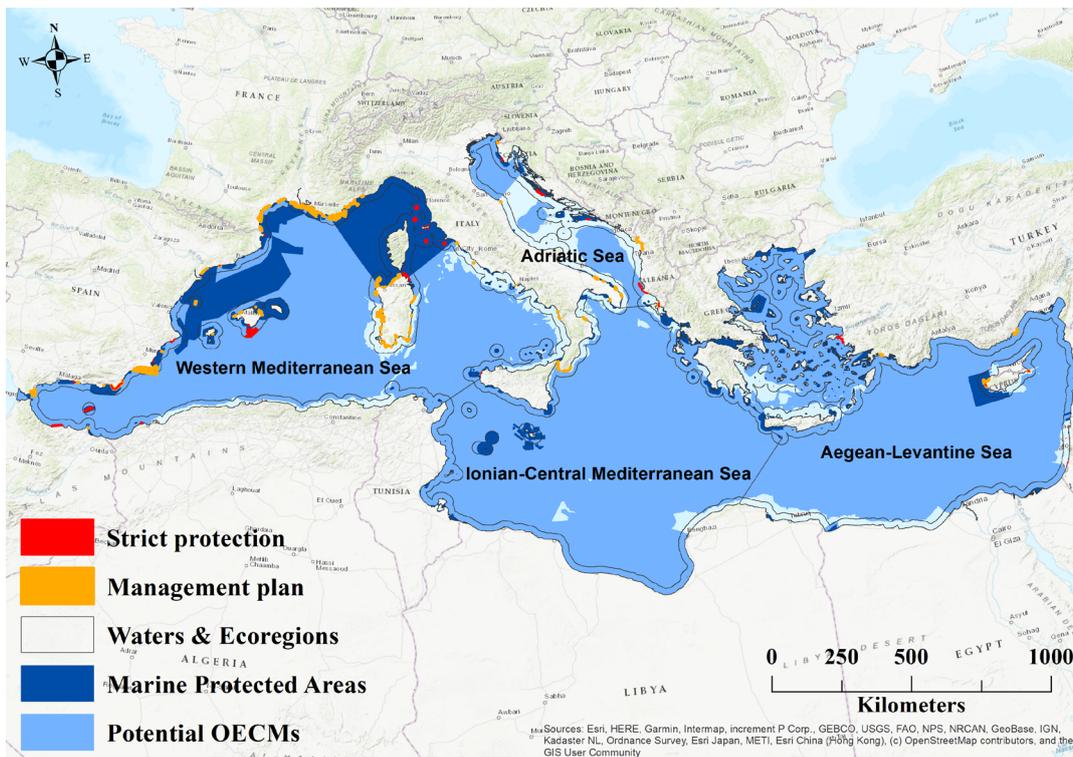


Figure 3. Marine protected areas (MPAs) with stringent legal protection (Reserves, in red) and MPAs with fully implemented management plans (in orange) according to the whole MPA area and potential Other Effective Conservation Measure area in the Mediterranean Sea by ecoregion.

METHODOLOGICAL REMARKS

Protection afforded to biodiversity largely relies on two main factors: legal protection and managerial protection.

Some generalisations to the data had to be made. One was assuming that all Biosphere Reserves, Ramsar sites and World Heritage Sites had some legal or managerial measures in place as, in some cases, their designation just entails their inclusion in international lists. This may have provided an over-optimistic picture of Mediterranean marine protection. Other generalisation was assuming that potential OECSs had neither management authorities nor fully implemented management plans, as such fields were shown as ‘Not reported’ in MAPAMED 2019 v2 (MAPAMED, 2022). This would result in an underestimation of actual marine protection from this assessment.

CONCLUSIONS

Mediterranean marine protection coverage in 2019 more than doubled compared to 2007 figures (Abdulla et al., 2008). However, as already stated more than a decade ago, protection coverage is still insufficient according to past and, even more, oncoming international targets (CBD, 2021). MPA coverage is also very biased towards inshore waters and among ecoregions, with the Western Mediterranean leading the efforts by far, notably as a result of the designation of the Pelagos Sanctuary (France, Italy, Monaco) and the Mediterranean Cetacean Corridor (Spain). Large protection coverage gaps remain in the Southern and Eastern parts of the Mediterranean. All ecoregions would however exceed the likely new international area-based protection coverage targets at 30% if potential OECSs were recognised, notably the huge Deepwater FRA. Even with the recognition of such OECSs, the issue of managing such a massive sea area in order to ensure effective conservation is a much greater challenge.

Insufficient as protection coverage may currently be, actual **legal and managerial protection across the Mediterranean** are worrisome in the face of numerous increasing pressures and **do not seem to have substantially improved in more than a decade** (Adbulla et al., 2008; Gomei et al., 2019). Mediterranean MPAs seem to still be overwhelmingly designated under lenient legal regimes and without management plans or else, with management plans that are not implemented. For instance, of the two largest Mediterranean MPAs, the Pelagos Sanctuary, designated in 1999, has just passed a management plan and is starting to develop some of its management measures with sporadic external support, like that of the MBPC. The other large MPA, the Cetacean Migration Corridor, still lacks a management plan despite having been designated in 2018. Under those circumstances, **achieving effective biodiversity conservation in the Mediterranean Sea will be unlikely even if international coverage targets will eventually be met.**



Kefalonia island, Greece

Key Recommendations



1

Encouraging and assisting, where needed, southern and eastern Mediterranean countries to notably increase their marine protection coverage through MPAs or OECMs in biodiversity important areas.

2

Designating large enough no-take MPAs or exclusion zones in the most ecologically valuable areas of existing MPAs or in unprotected areas.

3

Ensuring resourceful management bodies and plans for MPAs and, where needed, OECMs, according to their vulnerability and size.

4

Promoting the recognition of FRAs, PSSAs and nationally relevant areas as OECMs and ensuring their effective management through multi-sectoral and multilateral cooperation.

5

Engaging stakeholders in managerial activities aimed at monitoring, researching, sustainably using and conserving marine biodiversity.

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THE MEDITERRANEAN BIODIVERSITY PROTECTION COMMUNITY

A collaborative Mediterranean community representing around 300 institutions are bringing together their work to identify the most effective mechanisms to manage and protect Mediterranean biodiversity.

The results of MBPC projects (ACT4LITTER, AMARE, CONFISH, ECOSUSTAIN, FISHMPABLUE2, MEDSEALITTER, MPA-ADAPT, MPA NETWORKS, MPA ENGAGE, PHAROS4MPAS, PLASTICBUSTERSMPAS, POSBEMED, TUNE UP, WETNET) are being streamlined to offer holistic solutions that bridge science, practice and policy to priority environmental challenges through an action roadmap implemented by several working groups.

The overall aim of the Biodiversity Protection Community is to increase the current understanding, knowledge and awareness of multiple environmental threats and promote best practices and Ecosystem-based Management tools as a response to address cumulative pressures and impacts affecting protected areas and functional ecosystem units in the Mediterranean.



Villasimius, South Sardinia, Italy



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