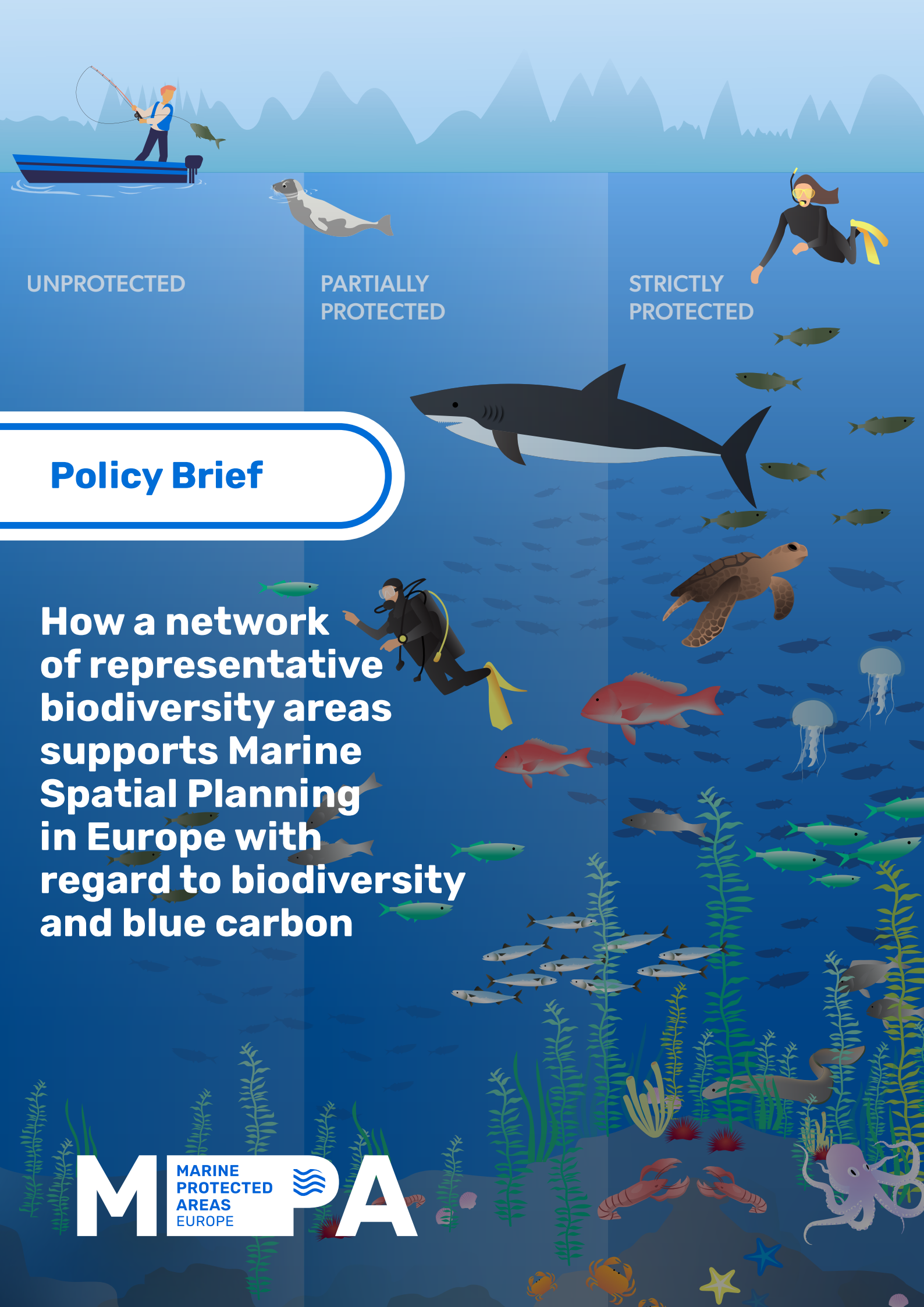


Policy Brief

How a network of representative biodiversity areas supports Marine Spatial Planning in Europe with regard to biodiversity and blue carbon

MPA MARINE PROTECTED AREAS EUROPE

Why coherent MPA planning matters now

The European Union (EU) has committed to protecting at least 30% of its seas by 2030, with 10% under strict protection. The EU Biodiversity Strategy for 2030, the Nature Restoration Regulation (NRR), the Marine Strategy Framework Directive (MSFD), and the revision of the Maritime Spatial Planning Directive (MSPD) require ecologically coherent and effectively managed MPA networks.

Despite progress in nominal coverage, marine protected areas (MPAs) in Europe have insufficient coverage of species and do not form a coherent network. Many designated areas permit activities incompatible with biodiversity conservation. In several cases, MPAs have been designated after sectoral allocations were decided, resulting in protection being located in areas of lowest conflict rather than highest ecological value.

Marine space is also increasingly contested due to renewable energy expansion, fisheries, shipping, aquaculture, and tourism. MSP processes therefore require spatially explicit, basin-scale evidence that integrates biodiversity protection and climate mitigation objectives from the outset. The MPA Europe project has provided such evidence.

Stakeholder insights and governance considerations

MPA Europe engaged nearly 180 organisations across the Baltic, Black, Mediterranean, and North-East Atlantic Seas, including Regional Seas Conventions, national authorities, fisheries advisory bodies, blue economy actors, and non-governmental organisations (NGOs). Overall, MPA Europe partners participated in more than 30 workshops where stakeholders shared:

- Examples of sub-optimal MPAs designation following sectoral allocations within MSP processes;
- Concerns over insufficient protection levels in existing MPAs;
- Misconceptions regarding climate-driven range shifts and connectivity necessitating the movement of MPAs;
- Concerns over fisheries “squeeze” and full and fair participation in MSP processes;
- Capacity constraints in applying complex spatial datasets within MSP.

The science underpinning representative and climate-resilient MPA networks

The MPA Europe project integrated approximately 14 million species occurrence records and environmental variables spanning surface to seabed conditions. Using these data, the project modelled the geographic distributions of over 12,000 marine species at a spatial resolution of approximately 5 km.
The resulting prioritisation (Figure 1) identified a Representative Biodiversity Area (RBA) network that collectively captures:

- All marine biogeographic provinces in European waters;
- The full range of mapped ecosystems;
- A high proportion of habitat-forming (e.g., seagrasses, kelps, corals) and threatened species (relative to other species).

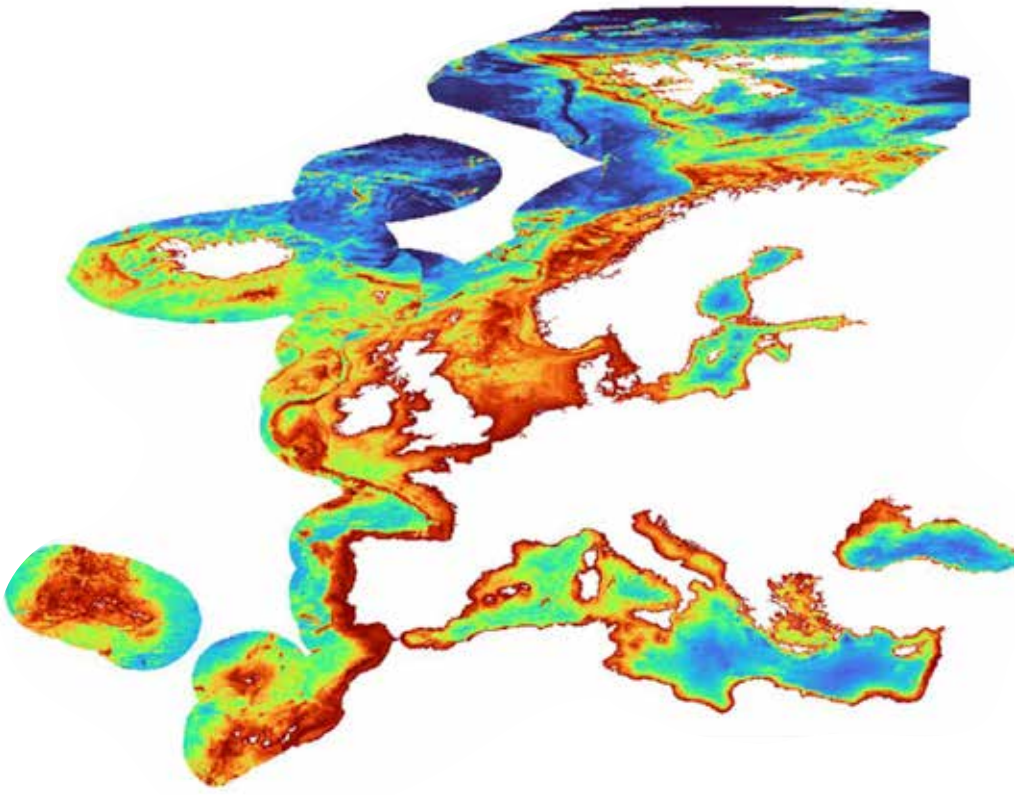


Figure 1. Prioritisation of Representative Biodiversity Areas (RBA) in all European seas (from red, higher prioritisation to dark blue, lower prioritisation).

The analysis showed that the top 10% RBAs included 58% of the species and 30% could include 80% of species. The highest-priority areas alone represented more than 80% of habitat-forming species.

Climate projections to 2100 indicated that species' future distributions remained encompassed within the proposed RBA network. While northward range extensions were expected for some species, most species would still occur in most of their present range. This indicated that a strategically designed network could remain representative under climate change.

In parallel, MPA Europe compiled and modelled sediment organic carbon content across European seas (Figure 2) using the EURO-CARBON database (accessible at: https://zenodo.org/records/17512391).

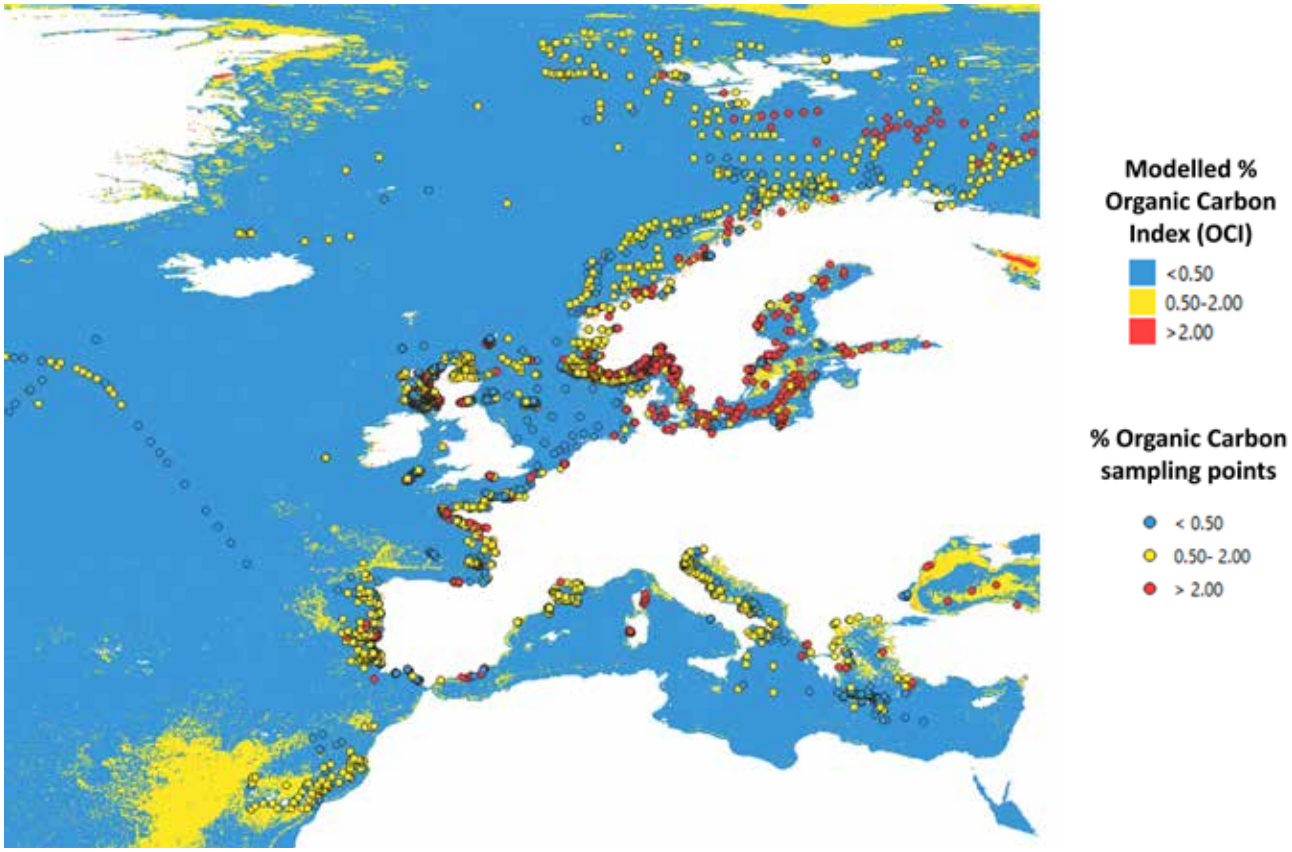


Figure 2. Organic carbon content levels in the seabed of European Seas and High Seas.

High carbon stores were concentrated particularly in fjords, estuaries, and Mediterranean *Posidonia* seagrass meadows. Disturbance from bottom trawling and dredging risks releasing organic carbon stored in sediments into the water column where it would be oxidised to carbon dioxide and potentially released to the atmosphere, directly undermining EU climate mitigation objectives.

Areas of greatest biodiversity and highest carbon stores did not fully overlap. MSP should therefore consider both biodiversity protection and restoration and carbon safeguarding as separate but complementary spatial objectives.

From data to decisions: operational tools for MSP

To facilitate implementation, MPA Europe developed an open-access online atlas (Figure 3) including:

- Species distribution range maps (current and projected under climate change);
- Background environmental layers including seabed organic carbon content;
- Representative biodiversity areas.

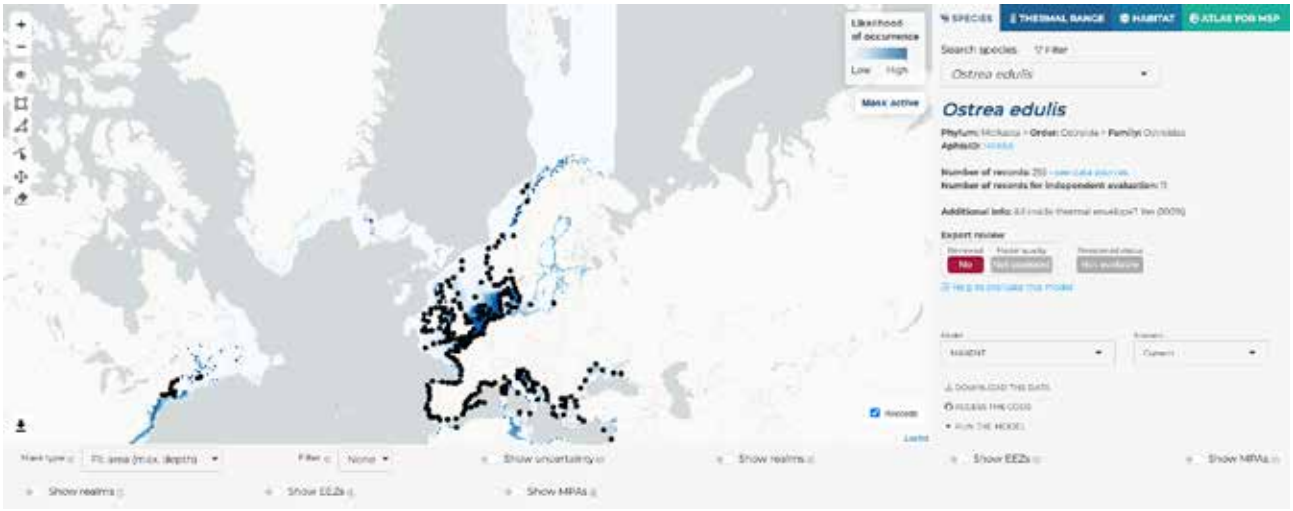
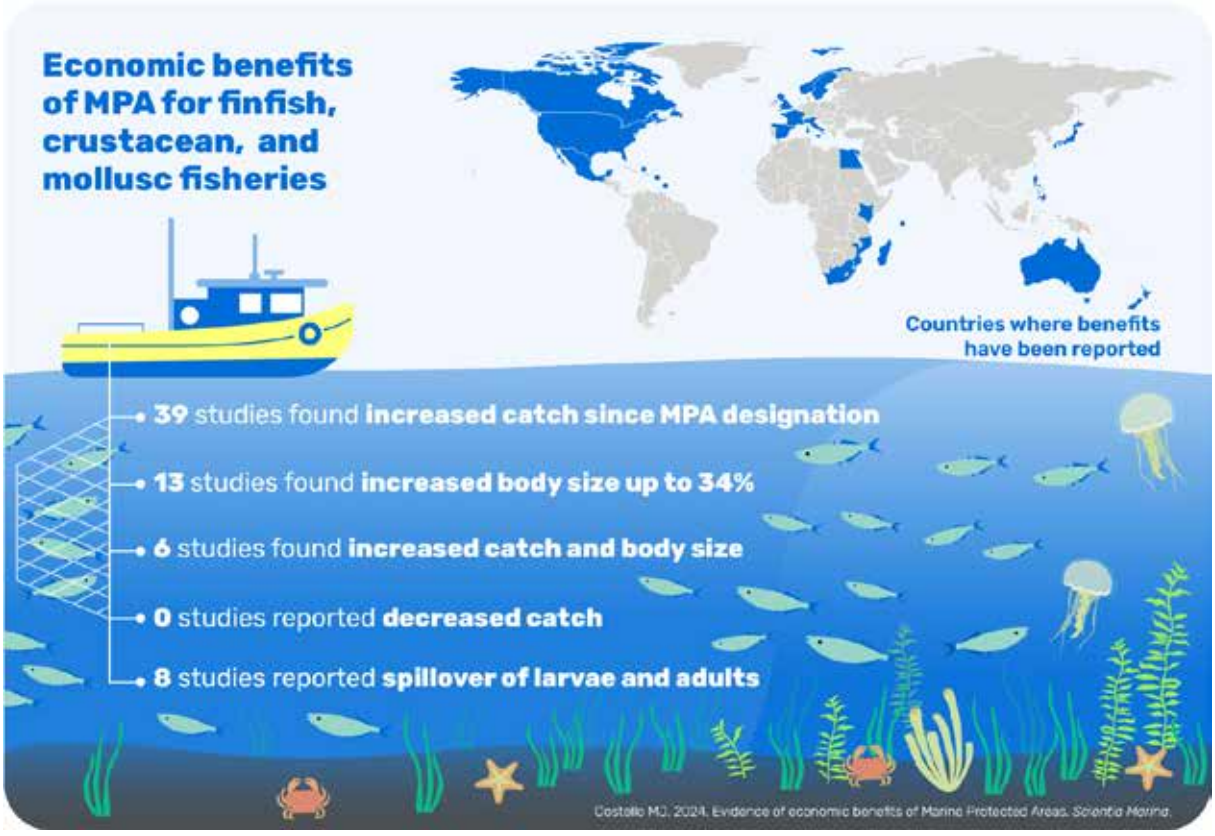


Figure 3. MPA Europe Atlas for MSP platform. Accessible at https://shiny.obis.org/distmaps/.

All data layers are interoperable and publicly accessible, enabling Member States and Regional Seas Conventions to build upon the project outputs within MSP processes.

In addition, MPA Europe reviewed global evidence on fisheries and tourism outcomes associated with MPAs. The review identified 46 published examples of fishery benefits from MPAs. There was no evidence of long-term net fishery losses attributable to MPAs. Spillover effects increased over time, and tourism revenues grew with MPA age. Notably, 91% of fisheries benefiting from MPAs were associated with no-fishing areas. These findings demonstrate that effective protection strengthens long-term ecological and economic resilience.



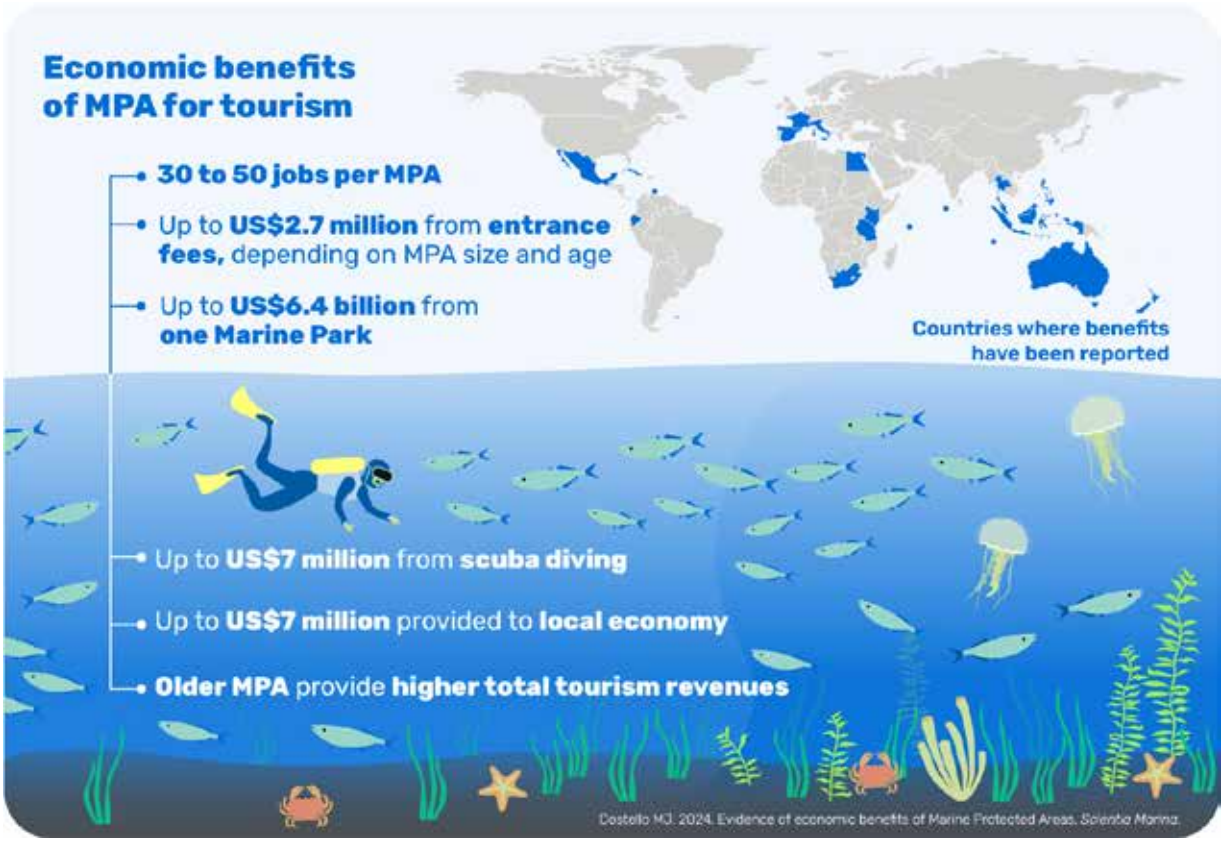


Figure 4. The economic benefits of MPA to fisheries and tourism worldwide.

Recommendations

1. The 10% and 30% Representative Biodiversity Areas should be prioritised
for increasing protection and restoring habitats, through expanding existing MPA, establishing new MPA, recognising OECM and other regulatory measures, to achieve the 2030 targets as part of climate smart Marine and Maritime Spatial Planning (MSP) to implement the Nature Restoration Regulation, Bird and Habitat Directives, Marine Strategy Framework Directive, Maritime Spatial Planning Directive, and EU Biodiversity Strategy.

2. Prioritise action on strictly protected MPA
as strict protection is most effective for ecological restoration and fishery benefits and applies both the precautionary principle and whole ecosystem-based approach to environmental management.

3. Determine new MPA designations with local communities and stakeholders
including MPA boundaries and management informed by local knowledge of species and habitat distributions, and human values; coordinated by local and national government, to ensure social equity and compliance with regulations.

4. Member States and regional seas convention organisations should apply SMARTIE goals
(specific, measurable, attainable, relevant, time-bound, inclusive and equitable) for marine biodiversity protection and MSP.

5. Enable Regional Seas Conventions to lead MPA planning to optimise effective conservation
through transboundary MSP to harmonise sensitivity mapping, ecological objectives and sectoral constraints across borders, so that national plans collectively deliver a coherent basin-scale conservation network.

6. MPA planning, aims, management and reporting, would be clarified and simplified by international standards
such as the IUCN Categories for protected areas and the “MPA Guide”.

7. Prohibit human activities that damage habitats in MPA
to preserve site integrity.

8. Prohibit human activities that disturb seabed areas with high carbon stores
as a precautionary approach to minimise carbon emissions is warranted pending greater scientific understanding.

9. Provide regular training and communications materials to Member states on effective MPA management
practices and climate change effects on marine species and ecosystems, to inform marine protection and restoration, and adaptive climate-smart MSP.

10. The European Commission and Member States should mandate that national species distribution, abundance and associated environmental and sampling data are published
into the international standardised data systems that integrate data to enable ease of data access, reproducibility and reusability; such as EMODnet, OBIS, and GBIF.

How to cite:
Belinda Bramley, Thanos Smanis, Anna Maria Urgeghe, Anna Maria Addamo, Fabrice Stephenson, Christian Lønborg & Mark John Costello. 2026. How a proposed MPA network supports Marine Spatial Planning in Europe with regard to biodiversity and blue carbon. MPA Europe Policy Brief.
https://doi.org/10.5281/zenodo.19590261

Coordinator

mpa-europe.eu info@mpa-europe.eu

MPA Europe, Horizon Europe Grant Agreement no. 101059988 and UKRI Grant Numbers 10067934 JNCC and 10069750 SAMS

Co-funded by the European Union. Views and opinions expressed are however those of the authors only and do not necessarily reflect those of the European Union or UK Research and Innovation. Neither the European Union nor the granting authority can be held responsible for them.

Co-funded by the European Union

UK Research and Innovation