



Marine/Maritime Spatial Planning Case Study:

Marine Protected Areas (MPAs) - A Tool for Nature Conservation and Marine/Maritime Spatial Planning

Ibrahim Boubekri

Leibniz Institute for Baltic Sea Research, Warnemünde, Germany

A scenic view of a rocky coastline. In the foreground, there are large, light-colored rock formations. A path leads down to a small, sandy beach. The water is a deep blue, and the sky is clear. The overall scene is bright and sunny.

Overview

1. Introduction to MPAs
2. MPAs effects
3. MPAs benefits
4. MPAs as a tool for MSP

1. Introduction to MPAs

The global context



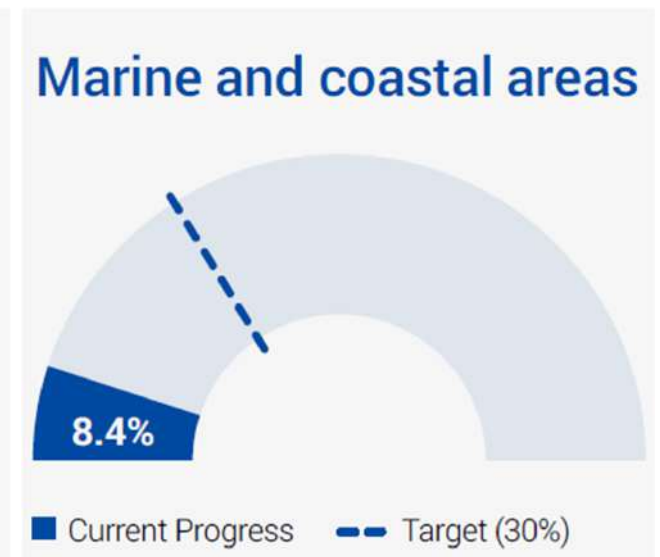
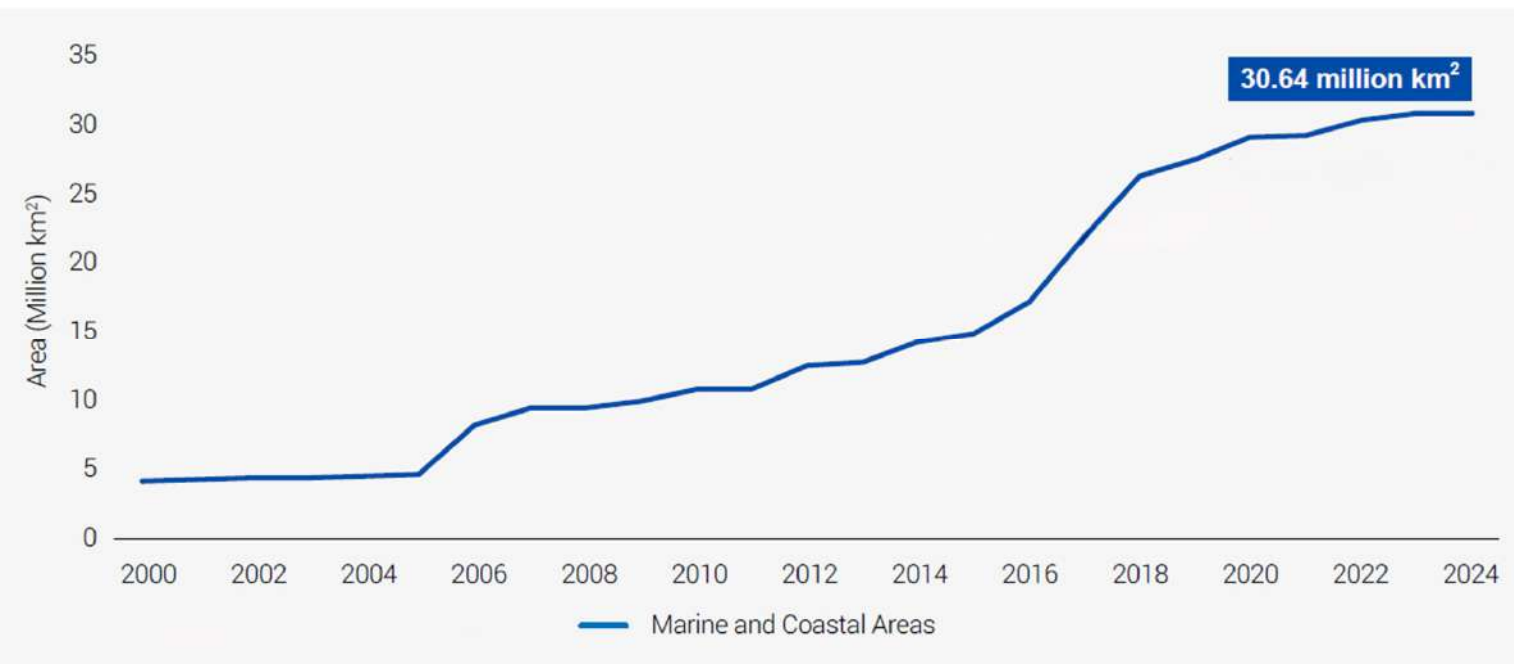
Sustainable Development Goal 14 is about conserving and sustainably using the oceans, seas, and marine resources for sustainable development.

Sachs et al. (2023)

1. Introduction to MPAs

The global context

- **2010:** Convention on Biological Diversity (CBD) adopted **Aichi Target 11**, aiming to protect **10%** of the world's oceans by **2020**.
- **2021:** Kunming-Montreal Global Biodiversity Framework (KM-GBF) set a more ambitious target; protecting **30%** of the world's oceans by **2030** (Target 3), CBD (2022).



Source: UNEP-WCMC and IUCN, 2024.

The global area (km²) covered by marine protected areas between 2000 and 2024.

1. Introduction to MPAs

Definitions



MPAs are globally defined by the **International Union for Conservation of Nature (IUCN)** as:

“A clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values” Dudley (2008).



And by the **World Wide Fund for Nature (WWF)** as:

“An area designated and effectively managed to protect marine ecosystems, processes, habitats and species, which can contribute to the restoration and replenishment of resources for social, economic and cultural enrichment” Reuchlin-Hugenholtz and McKenzie (2015).



1. Introduction to MPAs

Objectives

The primary objective of MPAs is to ensure the **conservation of marine biodiversity** and promote the **sustainable use of marine resources**, particularly through effective fisheries management.

- Rebuild and/or ensure the sustainability of fish stocks and fisheries
- Protect marine biodiversity and critical habitats
- Support sustainable local and traditional marine livelihoods and communities
- Increase resilience to climate change and other environmental changes
- Facilitate scientific research, education, and recreation
- Aid in the resolution of conflicts among multiple stakeholders
- Protect cultural and archaeological sites





1. Introduction to MPAs

Challenges

Challenge category	Specific challenge
Conservation	<ul style="list-style-type: none">➤ Preservation of biodiversity in all its forms➤ Preservation of spawning areas, nurseries, and resting zones for species, and improvement of the diversity of fishery species➤ Restoration of habitats and populations➤ Conservation of cultural and historical heritage
Environmental	<ul style="list-style-type: none">➤ Contribute to climate change mitigation and adaptation➤ Preservation of ecosystem services
Socioeconomic	<ul style="list-style-type: none">➤ Contribute to the development of ecotourism and recreational activities➤ Improvement of local community incomes
Knowledge	<ul style="list-style-type: none">➤ Establish MPAs as reference sites for understanding and monitoring the condition and evolution of marine and terrestrial environments, as well as the impact of human activities
Governance	<ul style="list-style-type: none">➤ Effective management➤ Ensure compliance with sectoral legislation➤ Capacity and skills building and development➤ Communication and education programmes for communities living near the MPA

1. Introduction to MPAs

MPA categories

The IUCN recognizes **six different categories** of MPAs, classified according to their **management objectives**, ranging from **strict nature reserve** (no-take zones where no extraction is allowed) to **protected area with sustainable use of natural resources** (where a range of resource uses is permitted)

- **Category Ia** – Strict nature reserve
- **Category Ib** – Wilderness area
- **Category II** – National park
- **Category III** – Natural monument or feature
- **Category IV** – Habitat or species management area
- **Category V** – Protected landscape or seascape
- **Category VI** – Protected area with sustainable use of natural resources

1. Introduction to MPAs

MPA categories

IUCN category	Local fishing/ collecting	Recreational fishing/ collecting	Traditional fishing/ collecting	Industrial-scale fishing	Collection for research
Ia	No	No	No	No	No*
Ib	No	No	Yes**	No	Yes
II	No	No	Yes**	No	Yes
III	No	No	Yes**	No	Yes
IV	Variable#	Variable#	Yes	No	Yes
V	Yes#	Yes	Yes	No	Yes
VI	Yes#	Yes	Yes	No	Yes

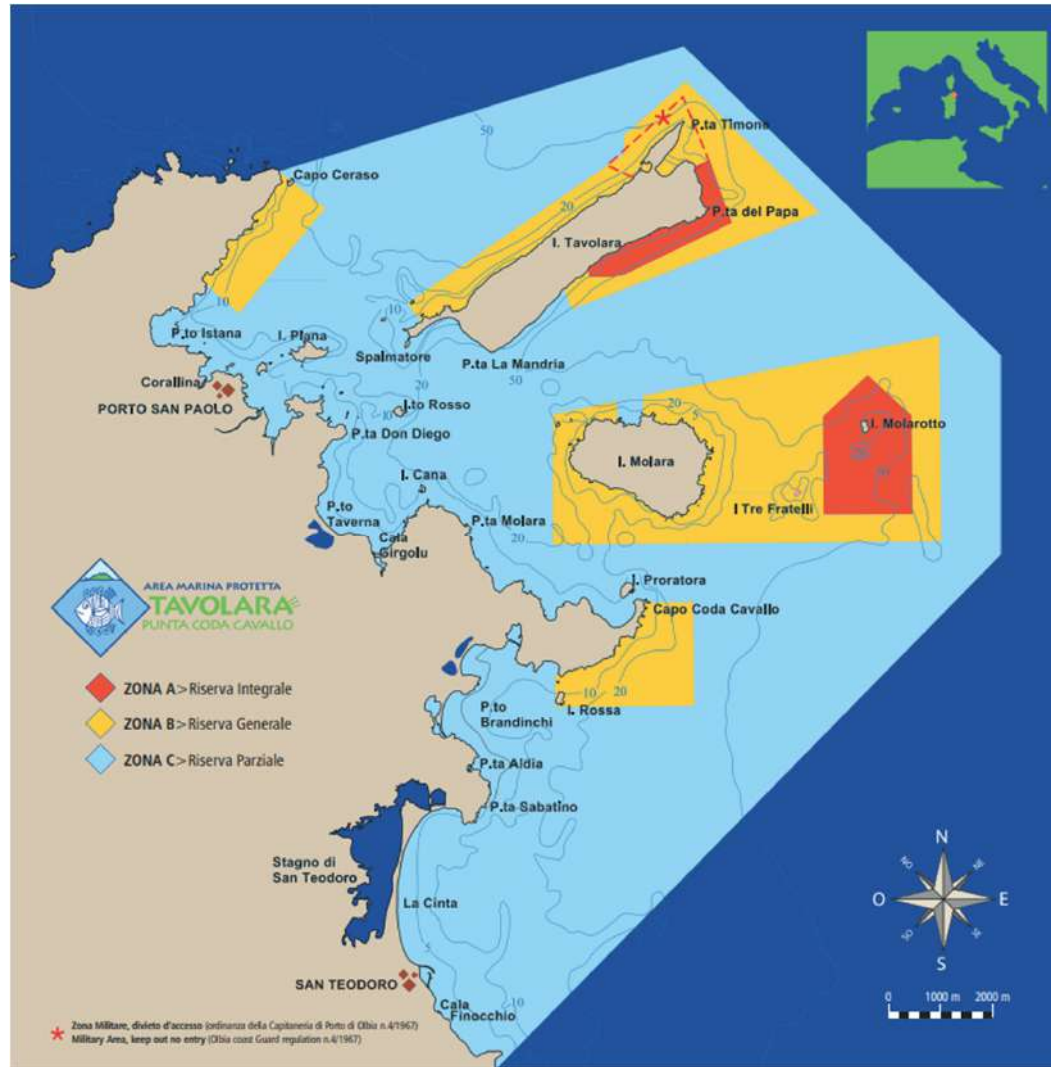
Key:

*	any extractive use of category Ia MPAs should be prohibited with possible exceptions for scientific research which cannot be done anywhere else.
**	in category Ib MPAs traditional fishing/collecting should be limited to an agreed sustainable quota for traditional, ceremonial or subsistence purposes, but not for purposes of commercial sale or trade.
#	whether fishing or collecting is or is not permitted will depend on the specific objectives of the MPA.

Compatibility of fishing/collecting activities in different management categories. Source: Day et al. (2019)

1. Introduction to MPAs

MPA zoning



Uses

Zone A
Integral
reserve

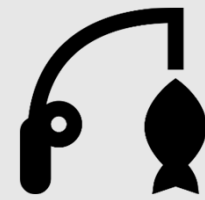
Zone B
General
reserve

Zone C
Partial
reserve

Fish farming



Artisanal fishing



Scuba diving



1. Introduction to MPAs

Establishment criteria

Category	Criteria	Description
Ecological	Habitat quality and diversity	Areas with good habitat quality and diversity across the entire zone (e.g., coral cover, seagrass beds, mangroves, coastal wetlands, mudflats, estuaries, water quality, etc.). These various habitats are suitable depending on the life stage of aquatic organisms
	Fish habitat	Areas that maintain high fish abundance, density, and species richness, or that contain aggregations of spawning fish
	Oceanography	Areas with favourable currents, meaning those that aggregate larvae and organisms within the MPA, but with periodic expulsion to the outside
	Biodiversity and species diversity	Areas with above-average biodiversity and a variety of species that function at different levels of the food chain, from the smallest to the largest
Spatial	Size	Areas that cover at least 20 hectares of important fish habitats
	Location	Areas with favourable connectivity conditions
	Shape / perimeter	An irregular shape, more indented, facilitates the exchange and movement (particularly of juveniles) between the MPA and the surrounding area
Social	Social acceptance	Ensure that no social conflicts arise from the establishment of the MPA
Management	Practical management aspects	Areas where MPA management rules can be established and enforced
	Management quality	Areas where management rules are or will be sufficiently enforced to generate beneficial effects for fisheries, tourism, etc.
Economic	Importance for fishing/tourism activities	Species important to fishermen / habitats of aesthetic importance

1. Introduction to MPAs

Establishment criteria

Category	Criteria
Ecological	➤ Habitat quality and diversity
	➤ Fish habitat
	➤ Oceanography
	➤ Biodiversity and species diversity
Spatial	➤ Size
	➤ Location
	➤ Shape / perimeter
Social	➤ Social acceptance
Management	➤ Practical management aspects
	➤ Management quality
Economic	➤ Importance for fishing/tourism activities

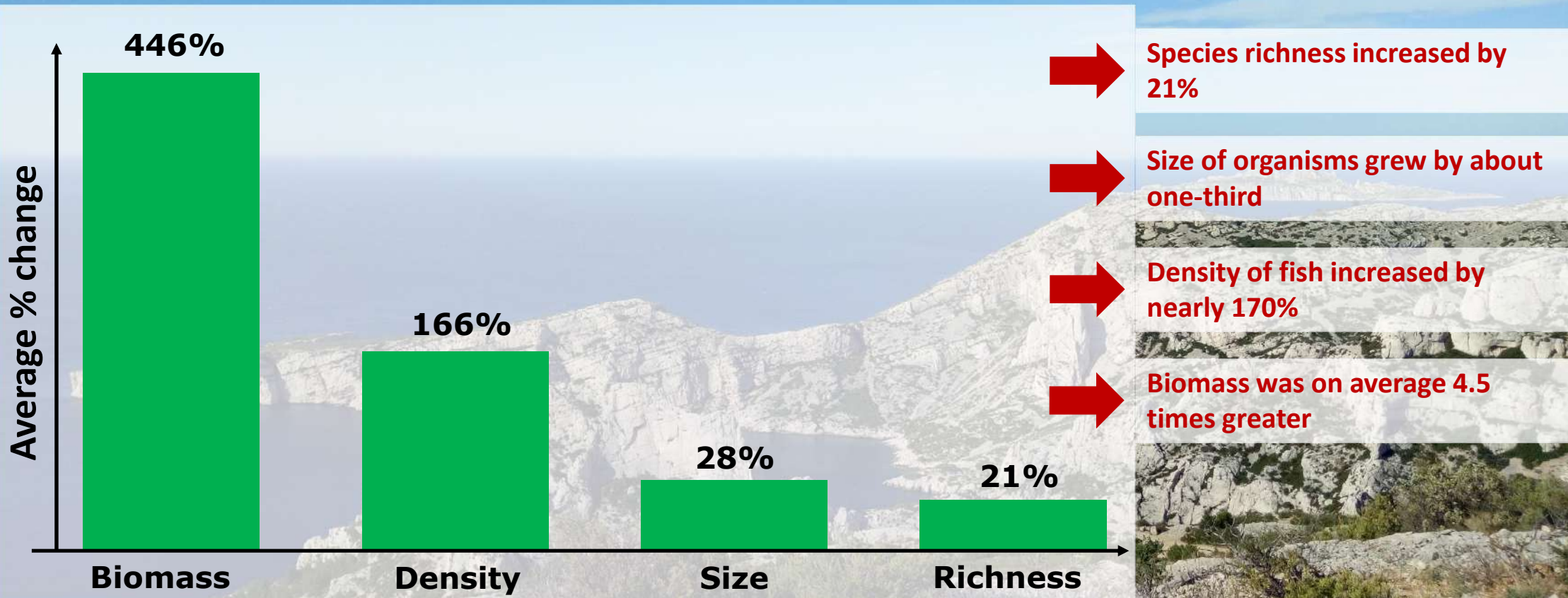
1. Introduction to MPAs

The MPA management cycle



2. Effects of MPAs *Inside their borders*

What happened inside MPAs 5 to 7 years after fishing was prohibited?



Average percent change in biomass, density, organism size, and species richness within fully protected MPAs around the world. Source: Lester et al. (2009).

2. Effects of MPAs *Beyond their borders*

Increase in density
Increase in size

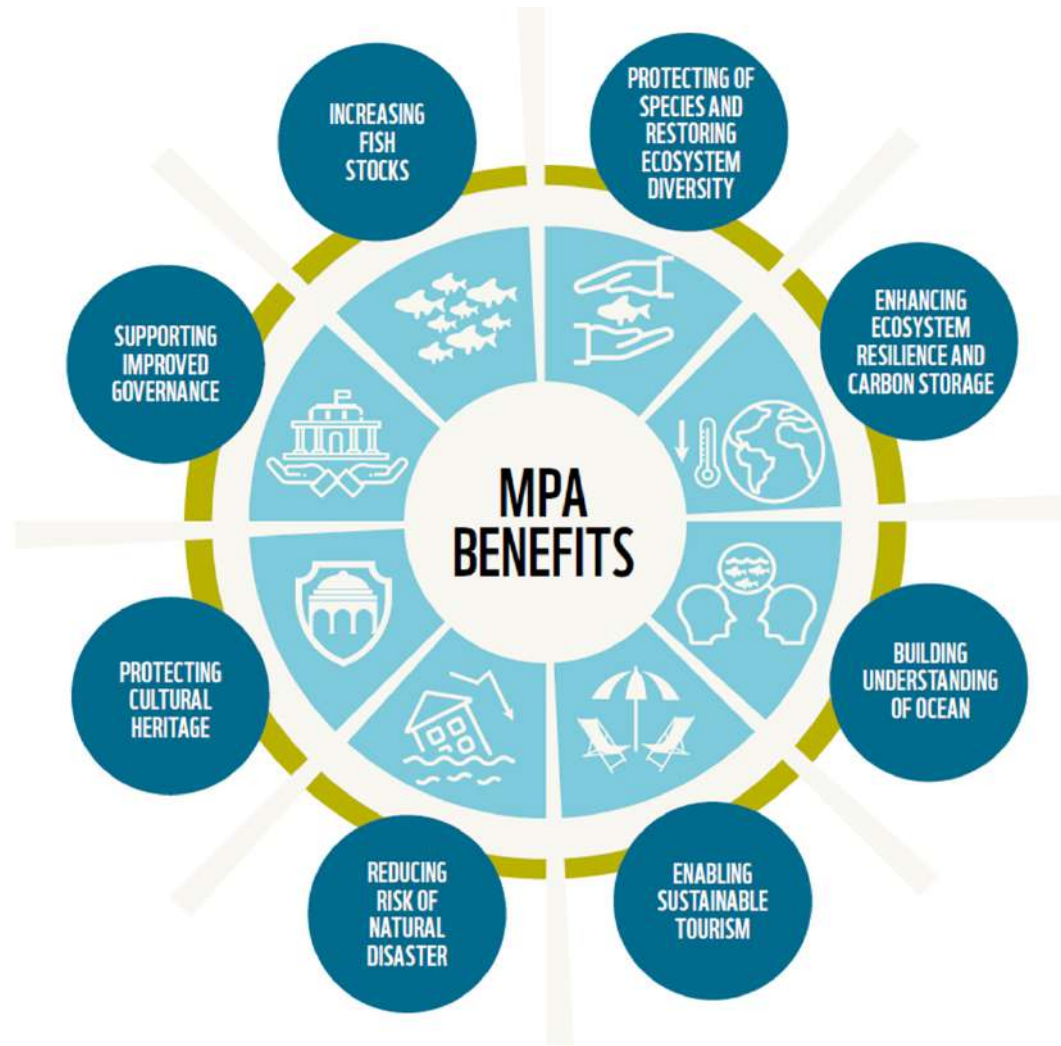
Effects of
MPAs



Spillover: The net emigration of juveniles, subadults and/or adults from the MPA outwards (Di Lorenzo et al., 2016).

The spillover effect is generally expected to operate locally, on spatial scales of **hundreds of metres to kilometres for reef fish** (Roberts et al., 2001).

3. MPAs benefits



Gomei et al. (2021)



3. MPAs benefits

Tourism

Economic contribution of the Great Barrier Reef MPA to Australia, 2012

	Direct expenditure (\$m)	Value-added (\$m)
Tourism	6,410.6	5,175.6
Recreation	332.4	243.9
Commercial fishing	192.5	160.3
Scientific research & management	106.1	98.0
Total	7,041.5	5,677.8

Source: Deloitte Access Economics (2013)

Over 90% of the expenditure in the region of this MPA comes from tourism!

4. MPAs as a tool for MSP

SWOT-analysis

Strengths (Internal, Positive)

- ✓ Support ecotourism and biodiversity
- ✓ Promote long-term fishery sustainability

Opportunities (External, Positive)

- 🚀 Spillover benefits to adjacent areas
- 🚀 Increased tourism flow and economic potential

Weaknesses (Internal, Negative)

- ✗ Restrictions on fishing activities
- ✗ Require significant time to show results

Threats (External, Negative)

- ⚠️ Risk of mass tourism and environmental degradation
- ⚠️ Short-term income loss for local fishers

MPAs serve as a great example of sustainable management of marine and maritime areas. They help reconcile conservation priorities with socioeconomic realities, offering a comprehensive management model for the future of our oceans.



Thank you for your attention!

Universität
Rostock



EFFECTIVE
PROTECTED AND RESTORATION MANAGEMENT • MEDITERRANEAN SEAS

Dr. Ibrahim Boubekri

ibrahim.boubekri@io-warnemunde.de

Leibniz Institute for Baltic Sea Research, Warnemünde, Germany

References

- CBD (2022). Kunming-Montreal Global Biodiversity Framework (GBF). Fifteenth Meeting of the Conference of the Parties to the Convention on Biological Diversity, 2, CBD/COP/15/L.25.
- Day, J., Dudley, N., Hockings, M., Holmes, G., Laffoley, D., Stolton, S., Wells, S., & Wenzel, L. (eds.) (2019). Guidelines for applying the IUCN protected area management categories to marine protected areas. Second edition. Gland, Switzerland: IUCN
- Deloitte Access Economics (2013). Economic contribution of the Great Barrier Reef, Great Barrier Reef Marine Park Authority, Townsville.
- Di Lorenzo, M., Guidetti, P., Di Franco, A., Calò, A., & Claudet, J. (2020). Assessing spillover from marine protected areas and its drivers: A meta-analytical approach. *Fish and Fisheries*, 21(5), 906-915.
- Dudley, N. (Ed.). (2008). Guidelines for Applying Protected Area Management Categories. Gland, Switzerland: IUCN. x + 86pp
- Gomei M., Abdulla A., Schröder C., Yadav S., Sánchez A., Rodríguez D., Abdul Malak D. (2021) [original 2019]. Towards 2020: how Mediterranean countries are performing to protect their sea. Rev. ed., 36 pages
- Lester, S. E., Halpern, B. S., Grorud-Colvert, K., Lubchenco, J., Ruttenberg, B. I., Gaines, S. D., ... & Warner, R. R. (2009). Biological effects within no-take marine reserves: a global synthesis. *Marine Ecology Progress Series*, 384, 33-46.
- OFB (2021). Collectif, Guide d'élaboration des plans de gestion des espaces naturels. Coll. Cahiers techniques n°88, Office Français de la Biodiversité.
- Reuchlin-Hugenholtz, E., McKenzie, E. (2015). Marine protected areas: Smart investments in ocean health. WWF, Gland, Switzerland.
- Roberts, C. M., Bohnsack, J. A., Gell, F., Hawkins, J. P., & Goodridge, R. (2001). Effects of marine reserves on adjacent fisheries. *science*, 294(5548), 1920-1923.
- Sachs, J.D., Lafortune, G., Fuller, G., Drumm, E. (2023). Implementing the SDG Stimulus. Sustainable Development Report 2023. Paris: SDSN, Dublin: Dublin University Press, 2023. 10.25546/102924
- UNEP-WCMC & IUCN (2024). Protected Planet Report 2024. UNEP-WCMC and IUCN: Cambridge, United Kingdom; Gland, Switzerland.