University of Trieste: GLOBAL CHANGE ECOLOGY a.a. 2020-2021

Conservation & Management in Marine Protected Areas

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# Marine Protected Areas

# Conservation on land

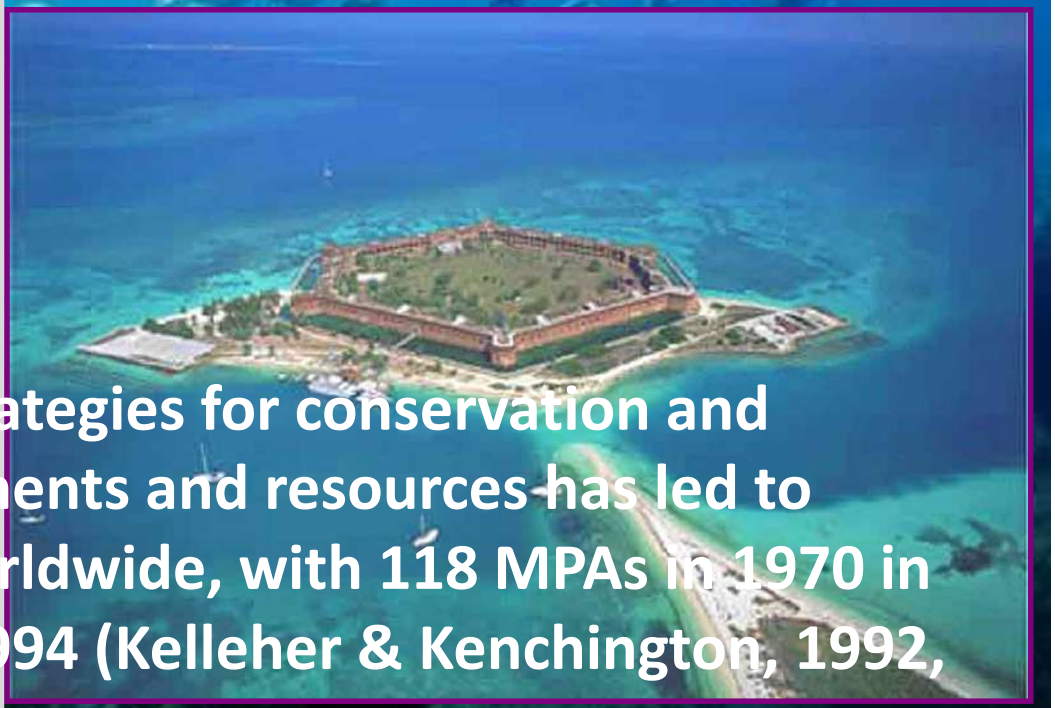

The first protected forests in India more than 2000 years ago (Talbot, 1984);

In Europe (England, Italy, etc.) between XVII and XIX centuries several protected areas were established with the aim of protecting natural resources, but indeed they were hunting reserve only for rich people;

In 1872, the Yellowstone National Park was established as a “place where natural beauty is preserved for the whole society” (Wright, 1996).

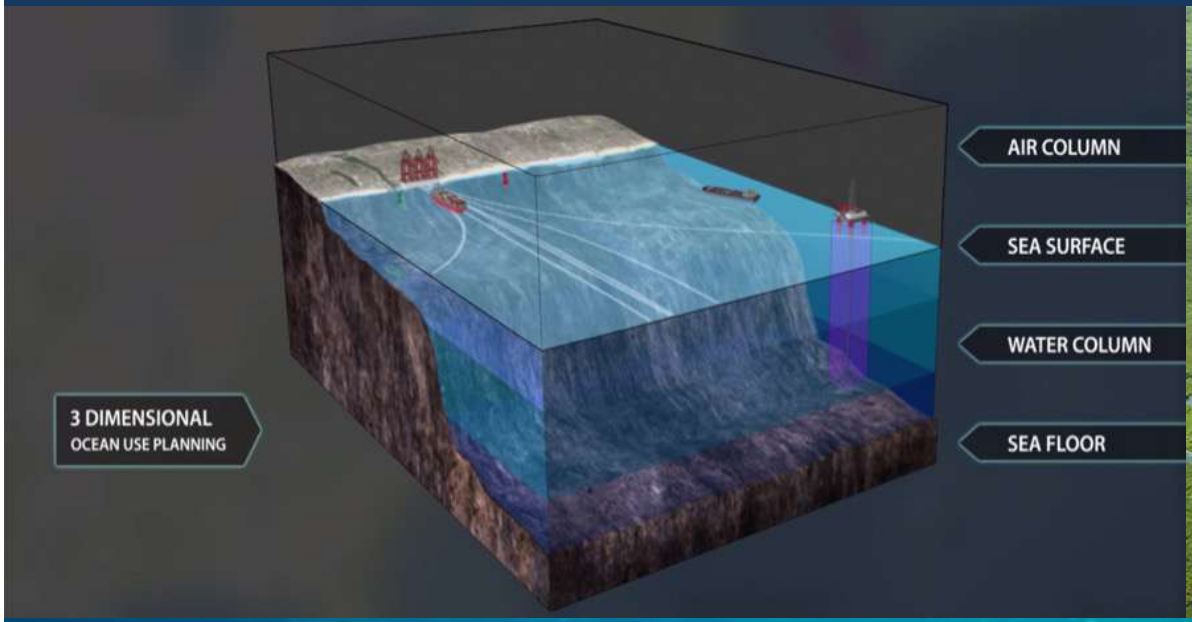
# Marine conservation


The implementation of Marine Protected Areas (MPAs) is relatively recent: the first MPA was probably the Fort Jefferson National Monument created in Florida in 1935 (Gubbay, 1995).



In 1950s the need for suitable strategies for conservation and management of marine environments and resources has led to increase the number of MPAs worldwide, with 118 MPAs in 1970 in 27 countries and 1306 MPAs in 1994 (Kelleher & Kenchington, 1992, Kelleher *et al*., 1995)

# Key differences between terrestrial and marine ecosystems: environmental




**Prevalence of aquatic medium: greater in marine systems**

**Dimensions of species distribution: 2d vs. 3d**

**Scale of matter and energy exchange: greater in marine systems**

**Rates of exchanges: greater in marine systems** (Carr et al., 2003)

# Key differences between terrestrial and marine ecosystems: ecological

- Phylogenetic diversity: greater in marine systems
- Scale of dispersion of organisms: greater in marine systems
- Differences in dispersal among life stages: greater in marine systems
- Reliance on external sources of recruitment: greater in marine systems
- Rates of responses to environmental changes: faster in marine systems

# Key differences between terrestrial and marine environments: ecological

**Sensitivity to habitat fragmentation or small scale perturbations: greater in marine systems**

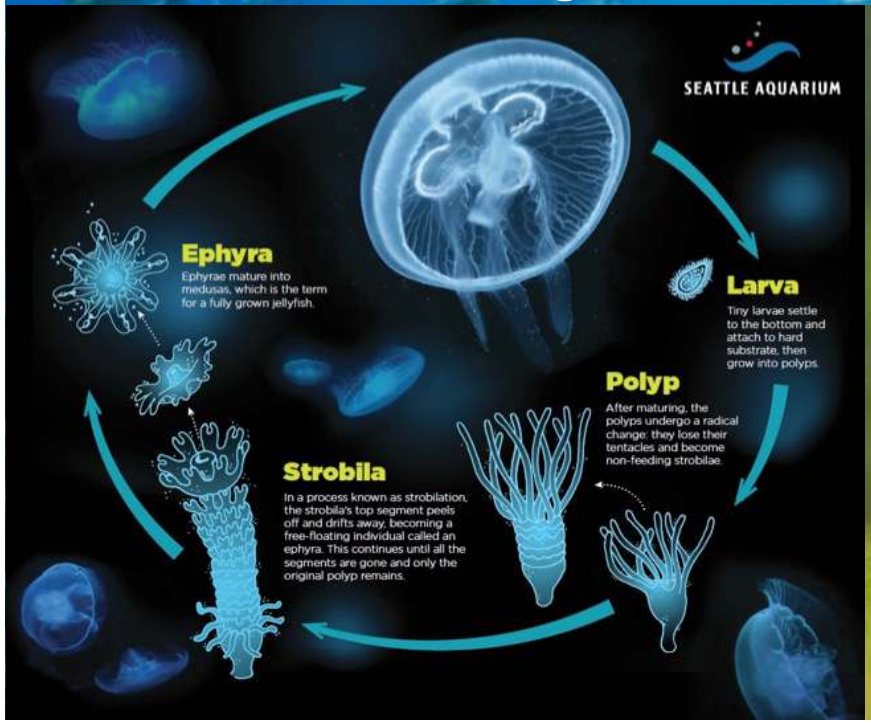
**Response to large-scale events: faster in marine systems**

**Turnover of primary producers: higher in marine systems**

**Length of trophic chains: longer in marine systems**

**Influence of external input of preys/predators: greater in marine systems**

**Prominence of ontogenetic shifts: higher in marine systems**




# Key differences between terrestrial and marine environments: genetic

**Effective population size: larger in marine systems**

**Spatial scale of gene flow: larger in marine systems**

**Interpopulation genetic diversity: greater in marine systems**

# Key differences between terrestrial and marine environments: human threats

**Habitat destruction: larger in terrestrial systems**

**Loss of biogenic habitats: larger in terrestrial systems**

**Trophic levels exploited: lower vs. higher**

# Summary: factors to take into account

Protection purpose(s) (seascape, communities/ecosystems, target species)

Geographic position, size, shape

Connectivity of protected species or communities (network)

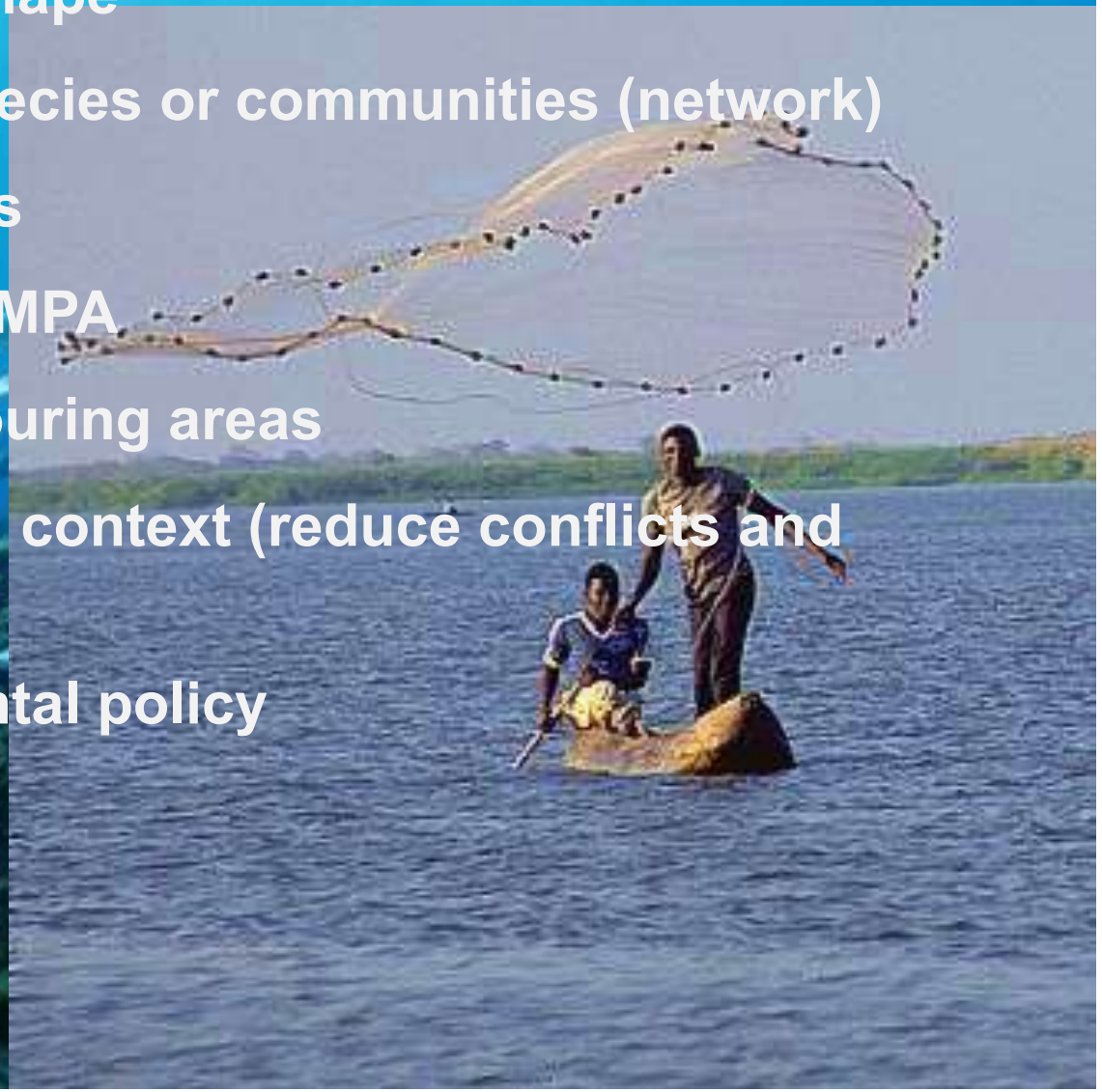
Size of protected populations

Ecological process with the MPA

Human threats from neighbouring areas

Socio-economic and cultural context (reduce conflicts and increasing compliance)

Governance and environmental policy



# Conservation purposes

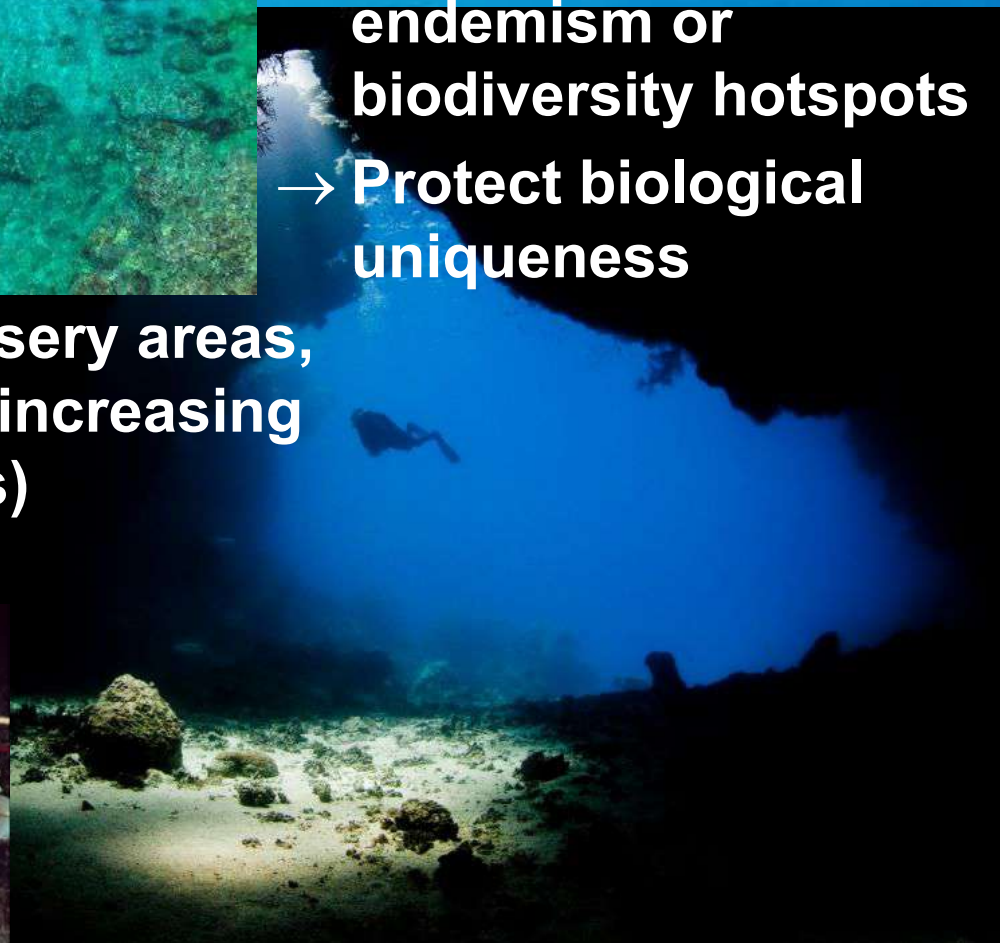
→ Increase or maintain species diversity

→ Protect vulnerable species

→ Protect areas of high endemism or biodiversity hotspots

→ Protect biological uniqueness

→ Protect commercial species (nursery areas, shelter areas, genetic diversity), increasing their abundance (and/or biomass)



# Conservation purposes

→ Protect priority habitats

→ Education, research, aestheti

Often multipurpose MPAs

Networks to increase complementarity, or connectivity

Restoration purposes

# Types of MPAs

## IUCN CATEGORY IA: *Strict Nature Reserve*

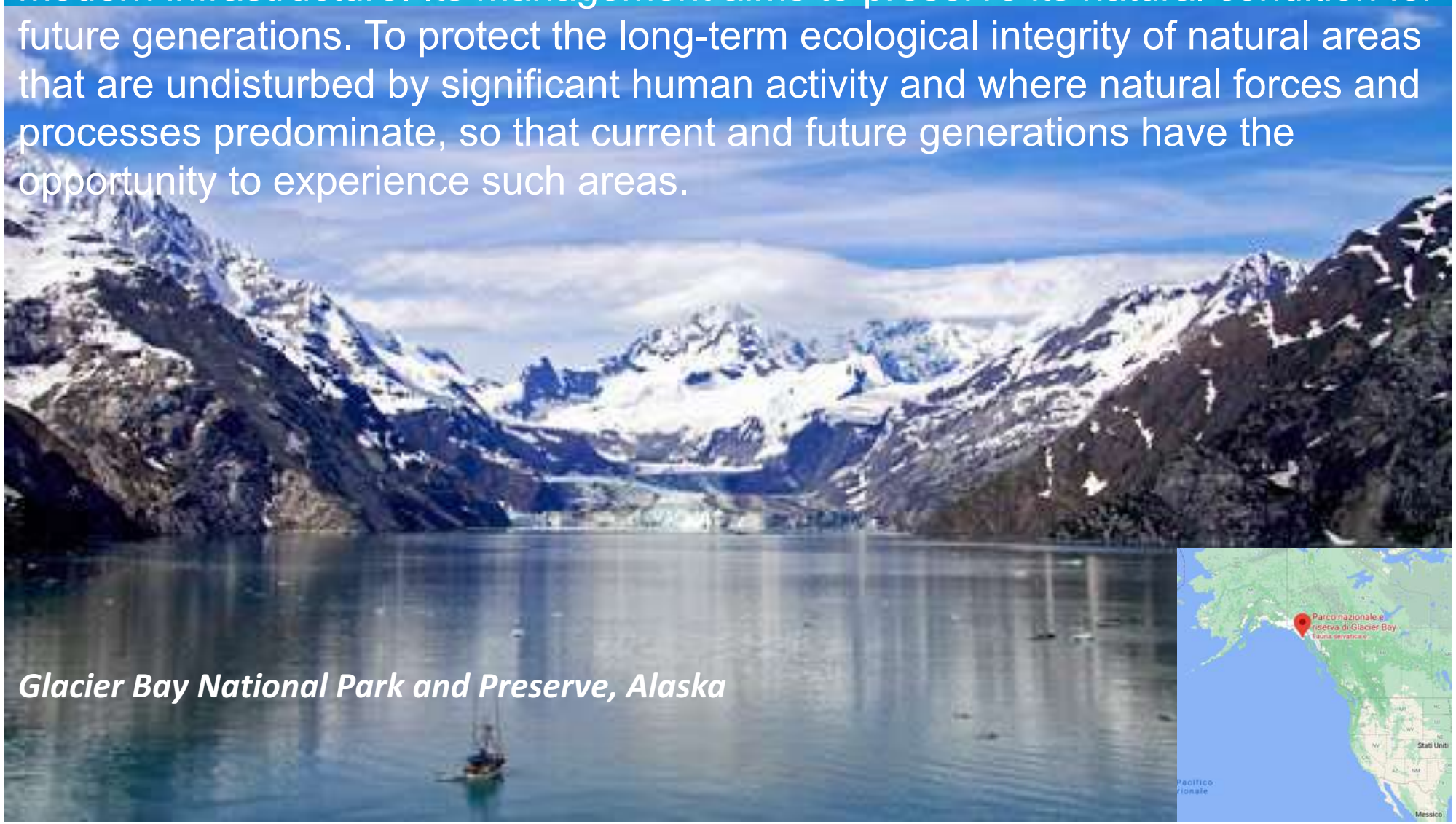
A marine reserve where the ecosystem is particularly fragile and important. Human activity is strictly controlled, consisting of environmental monitoring, scientific surveys, and indigenous practices such as aboriginal subsistence fishing. Indigenous practices have to meet conservation objectives and may be subject to catch limits and other restrictions.

*Channel Islands National Marine Sanctuary, California*

# Types of MPAs

## IUCN CATEGORY IB: *Wilderness Area*

A large natural area that is mostly untouched by human activity and free of any modern infrastructure. Its management aims to preserve its natural condition for future generations. To protect the long-term ecological integrity of natural areas that are undisturbed by significant human activity and where natural forces and processes predominate, so that current and future generations have the opportunity to experience such areas.

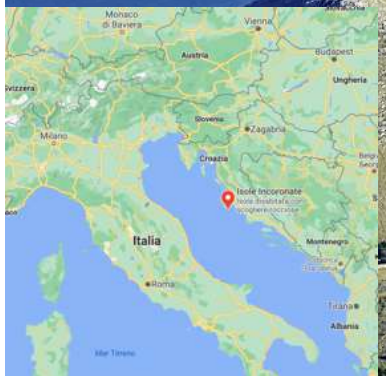



*Glacier Bay National Park and Preserve, Alaska*

# Types of MPAs

## IUCN CATEGORY II: *National Park*

A large natural area set aside to protect its natural biodiversity and ecosystems, but with more lenient policies on human visitation and infrastructure to support education and recreation.




*Kornati National Park, Croatia*

# Types of MPAs

## IUCN CATEGORY III: *Natural Monument*

A small protected area around a natural monument such as a submarine cavern or a seamount, or a man-made monument. The latter must have ecological, historical or cultural significance to qualify. Policies centre around protecting the biodiversity and ecosystems that have formed around these monuments.


***Blue Hole National Monument, Belize***

# Types of MPAs

## IUCN CATEGORY IV: *Habitat/Species Management Area*

A protected area set aside to conserve a specific species or habitat. Policies aim to conserve or restore these species or habitats. Since these areas are so specific, they are commonly set up within a larger MPA to support conservation efforts.

*Isla Chañaral, Cile*

# Types of MPAs

## IUCN CATEGORY V: *Protected Seascape*

One of the more flexible classifications, these areas allow a balanced amount of for-profit human activity. They are established where human activity has greatly influenced the surrounding ecosystem and has formed its own culture, such as ecotourism hotspots and dive sites. However, such activity is allowed on condition that the surrounding biospheres continue to be ecologically protected and restored.

***Apo Island, Philippines***

# Types of MPAs


## IUCN CATEGORY VI: *Protected Area with Sustainable Use of Natural Resources:*

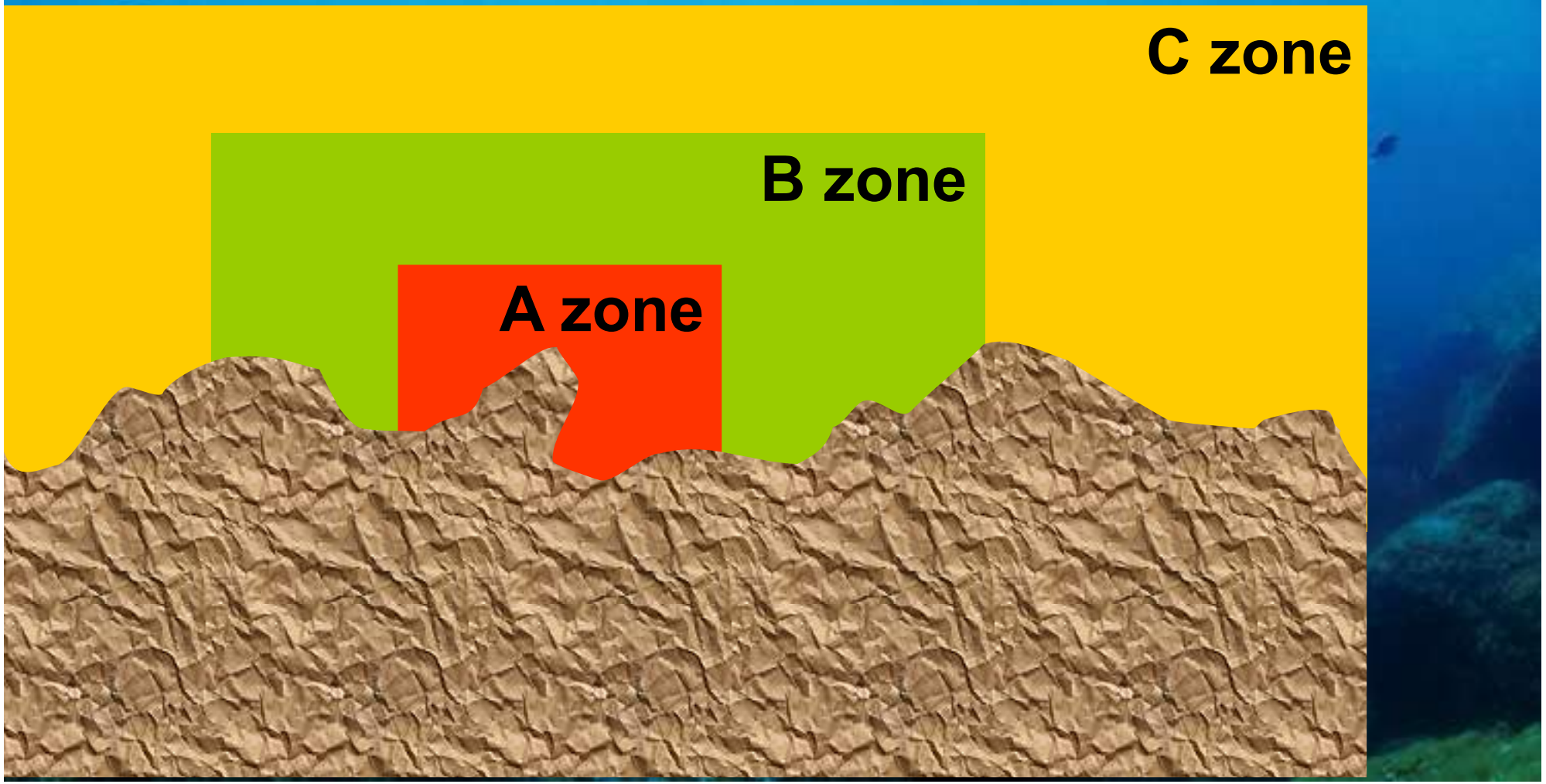
These areas allow an extensive amount of human involvement, usually low-level, non-industrial use of natural resources. With non-industrial harvesting, authorities ensure that conservation as a main aim is still viable within this area.

## *World Heritage Sites:*

Initiated by UNESCO, this area exhibits extensive natural or cultural history. Maritime areas are poorly represented, however, with only 46 out of over 800 sites. (es. Galapagos, Great Barrier Reef)

# Zonation

**Management of MPAs relies, as first, on zonation. This allow to delimit different areas at different protection regimes in order to fulfil conservation purposes and reduce conflicts with neighbouring human populations and influence of human activities**



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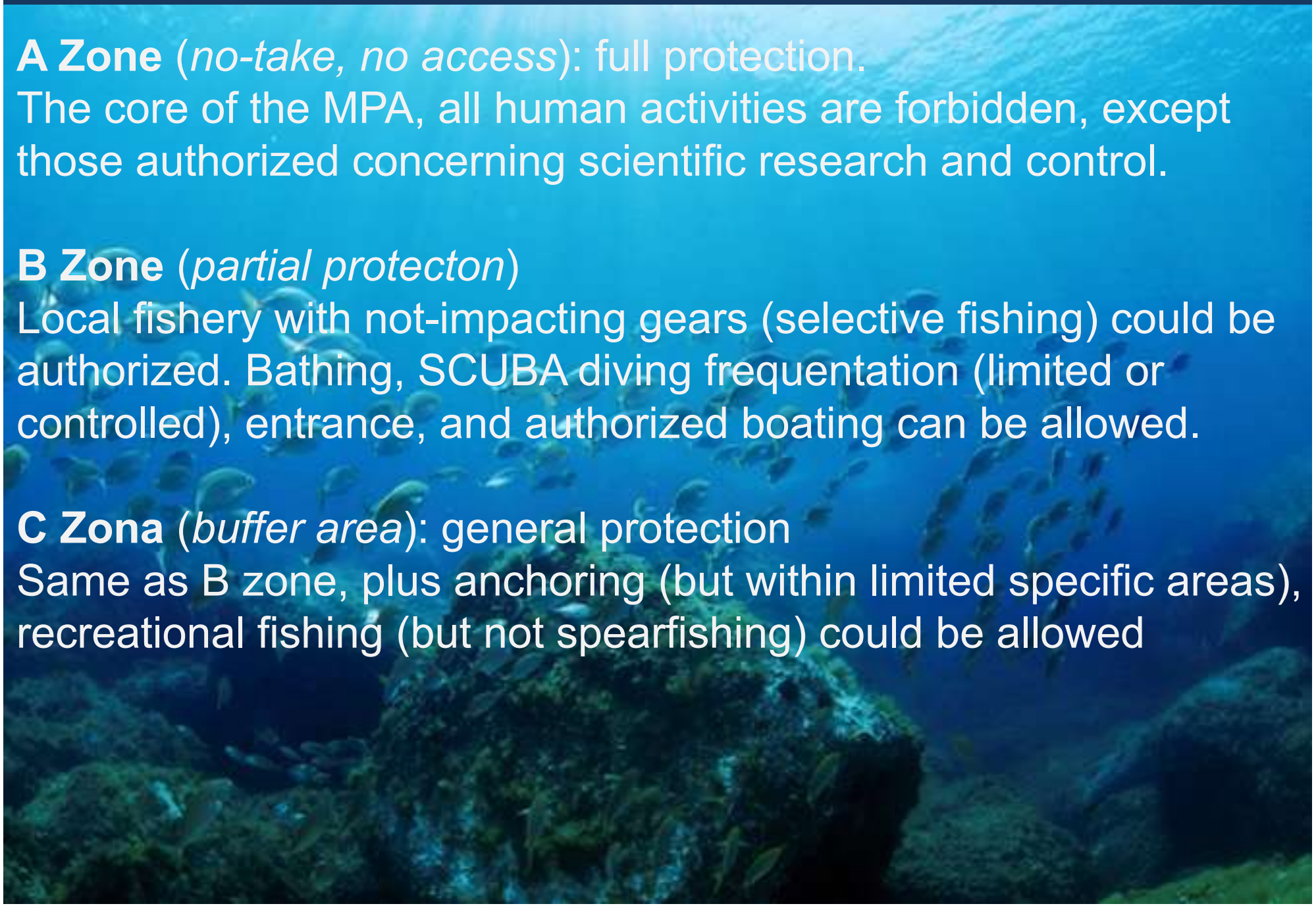
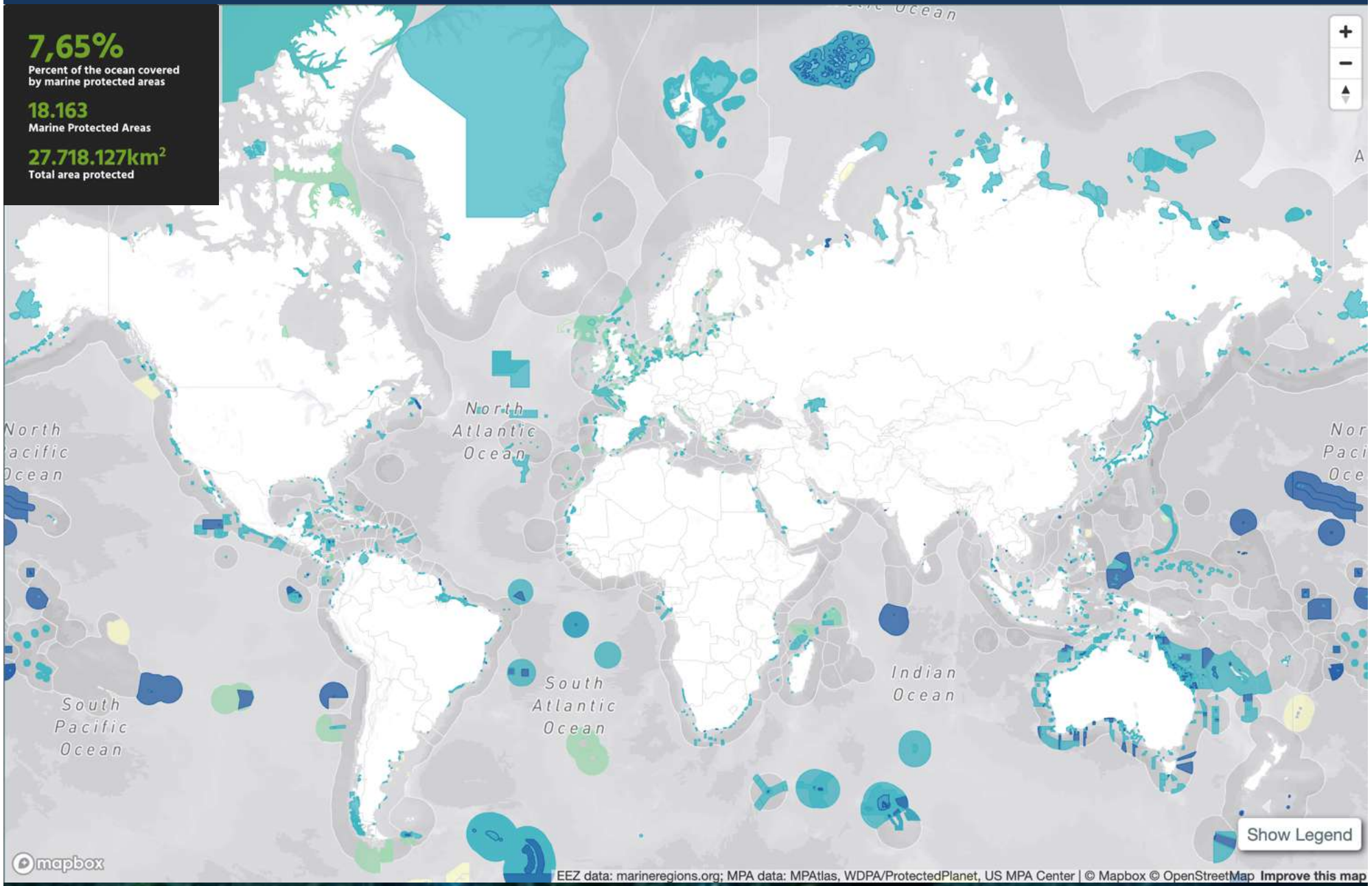


**A Zone** (*no-take, no access*): full protection.
The core of the MPA, all human activities are forbidden, except those authorized concerning scientific research and control.

**B Zone** (*partial protecton*)
Local fishery with not-impacting gears (selective fishing) could be authorized. Bathing, SCUBA diving frequentation (limited or controlled), entrance, and authorized boating can be allowed.

**C Zona** (*buffer area*): general protection
Same as B zone, plus anchoring (but within limited specific areas), recreational fishing (but not spearfishing) could be allowed

# Marine conservation at global scale




UNEP-IUCN, 2021

# Marine conservation at global scale

## National Waters


% of Protected Area Coverage  % of Ocean that is National waters

## High Seas


% of Protected Area Coverage  % of Ocean that is National waters

Africa
**12.35% (1,844,169km²)**

Asia & Pacific
**18.57% (11,333,126km²)**

Europe
**8.44% (1,481,402km²)**

Latin America & Caribbean
**17.51% (4,010,649km²)**

North America
**25.95% (3,711,495km²)**

Polar
**44.78% (3,064,822km²)**