Scienze per l'Ambiente Marino e Costiero

a.a. 2024-2025

GESTIONE E CONSERVAZIONE ECOSISTEMI MARINI - IMPATTI ANTROPICI E CONSERVAZIONE DELLA FAUNA MARINA

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Marine Protected Areas

Conservation on land

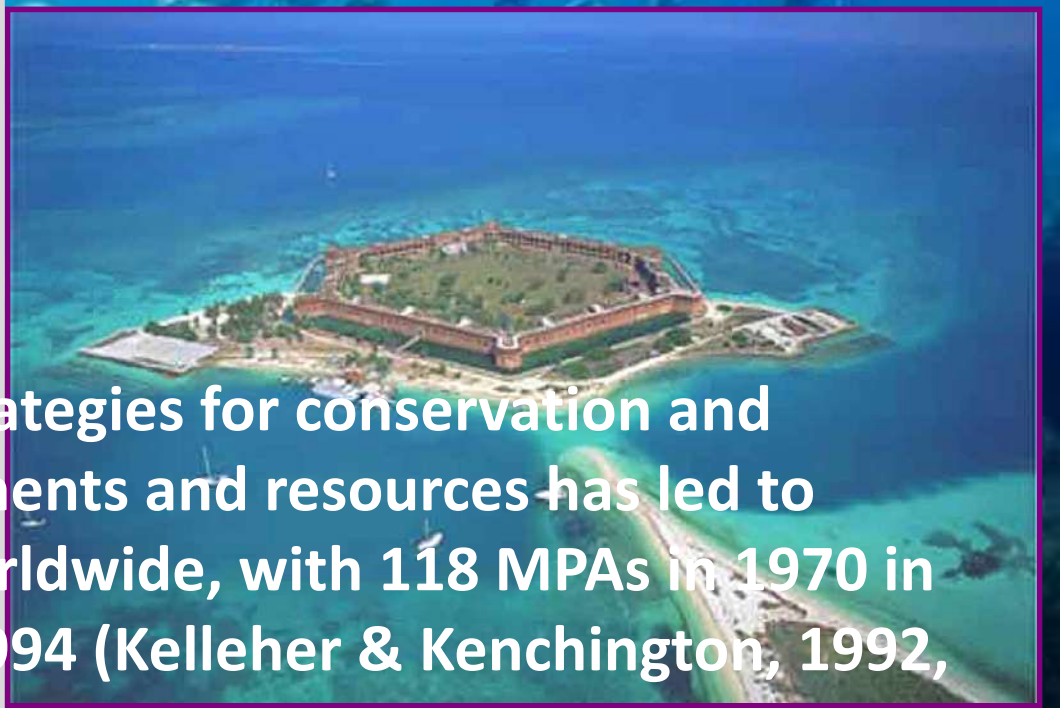
The first protected forests in India more than 2000 years ago (Talbot, 1984);

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).

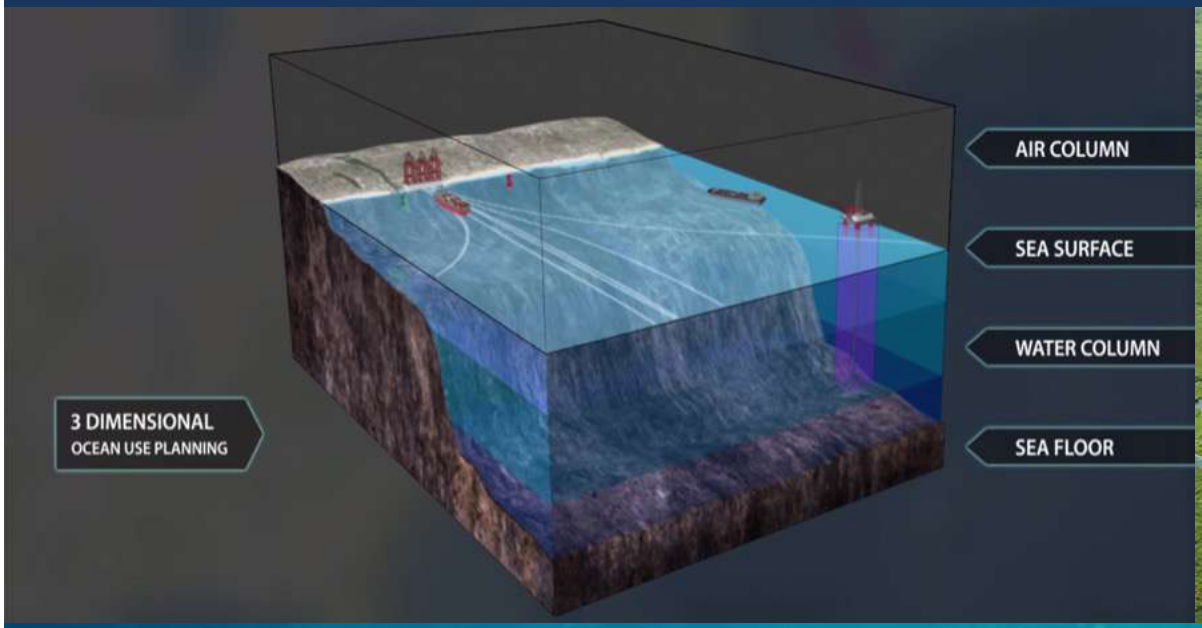
Marine conservation

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: biological

- 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

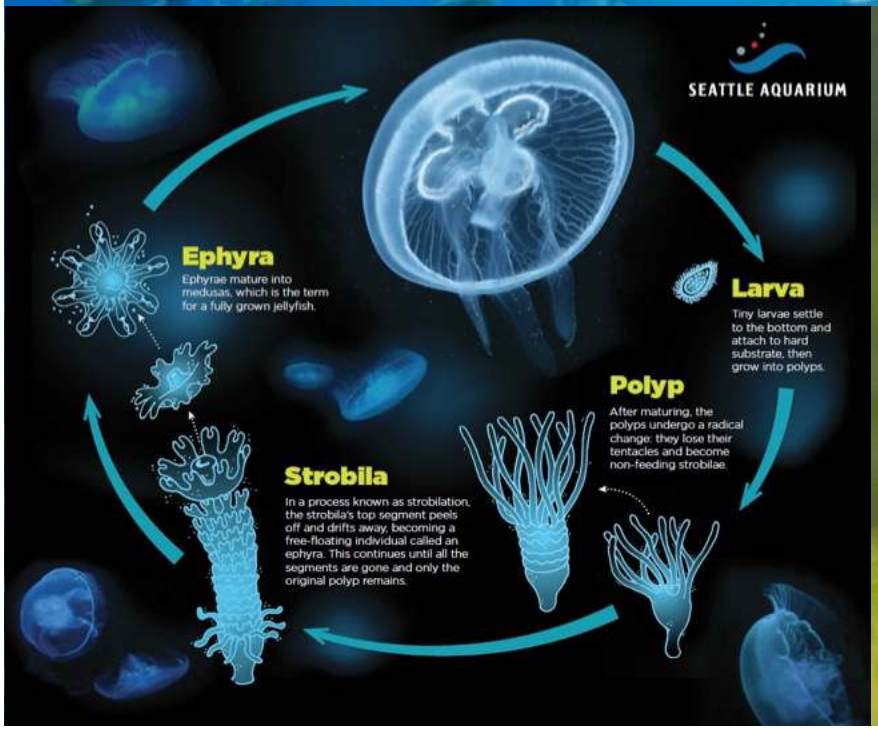
Sensitivity to habitat fragmentation or small scale perturbations: lower in marine systems

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

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: lower 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 on land vs. higher in marine environments

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 within the MPA

Human threats from neighbouring areas

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

Governance and environmental policy

Conservation purposes

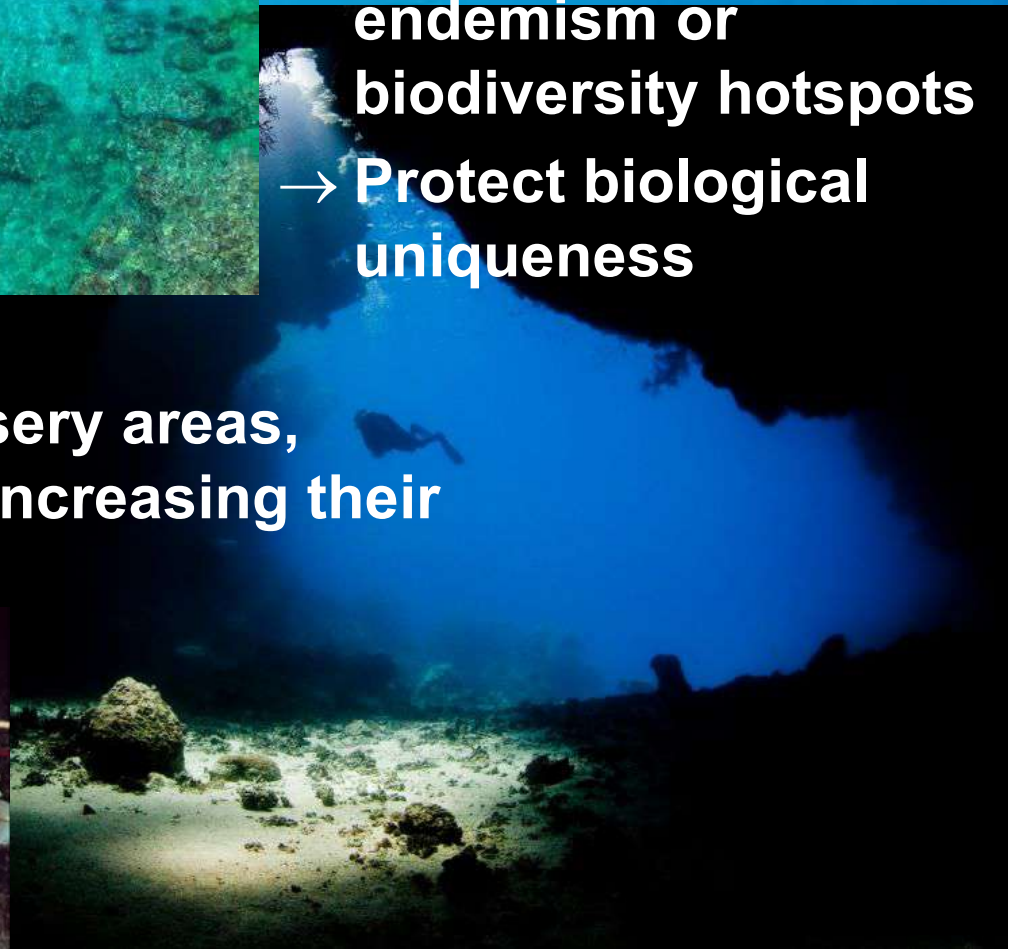
→ Increase or maintain species diversity

→ 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, aesthetic and cultural

Often multipurpose MPAs

Networks to increase complementarity, or connectivity

Restoration purposes

Types of MPAs

IUCN CATEGORY IA: *Strict Nature Reserve*

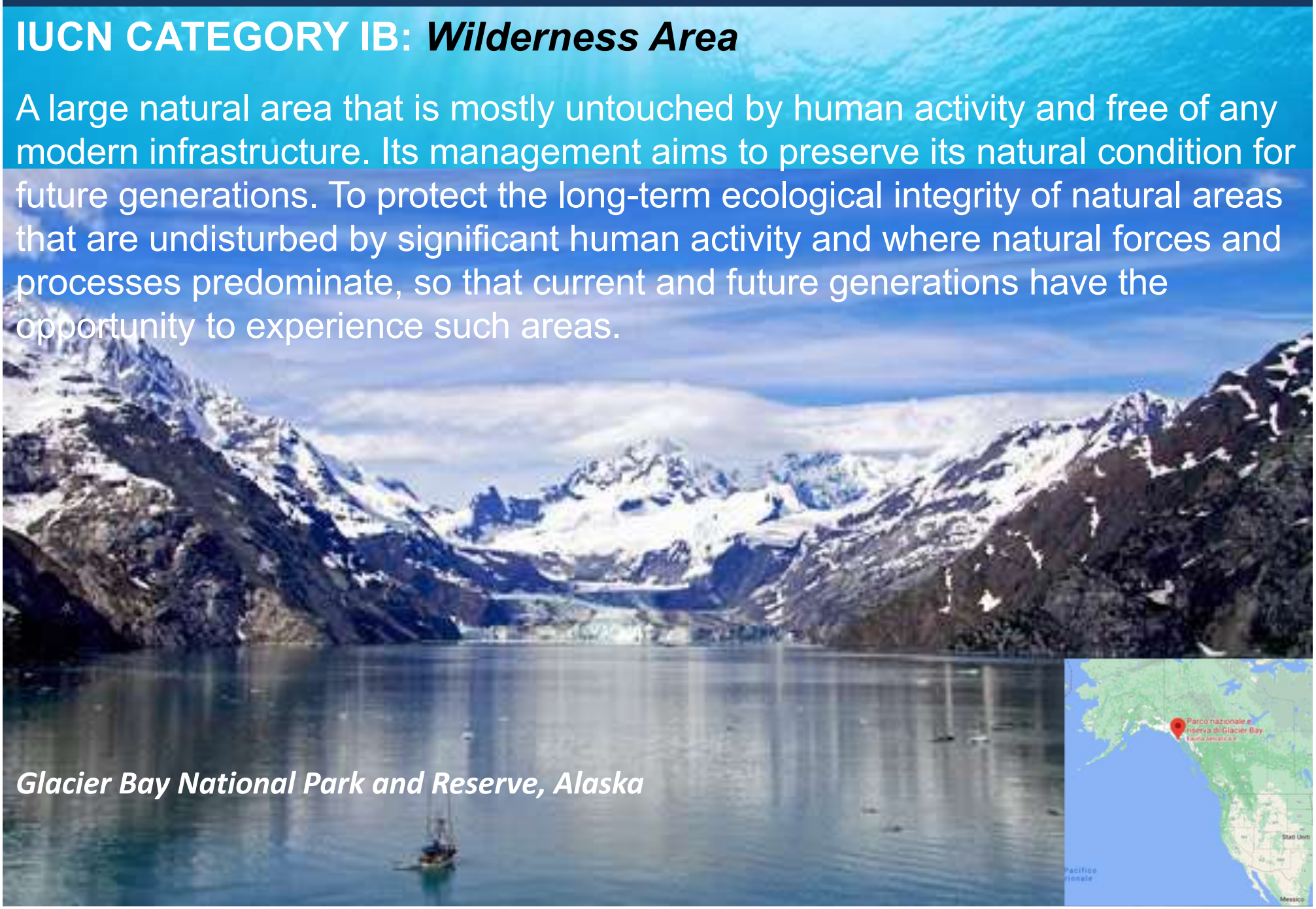
A marine reserve where the ecosystem is particularly fragile and important. Human activity is strictly controlled, consisting of environmental monitoring, scientific surveys, and indigenous practices such as aboriginal subsistence fishing. Indigenous practices have to meet conservation objectives and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

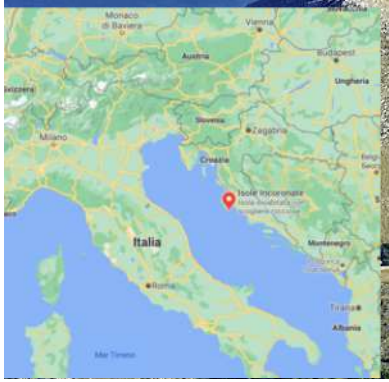


Glacier Bay National Park and Reserve, Alaska

Types of MPAs

IUCN CATEGORY II: *National Park*

A large natural area set aside to protect its natural bjodiversity 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.

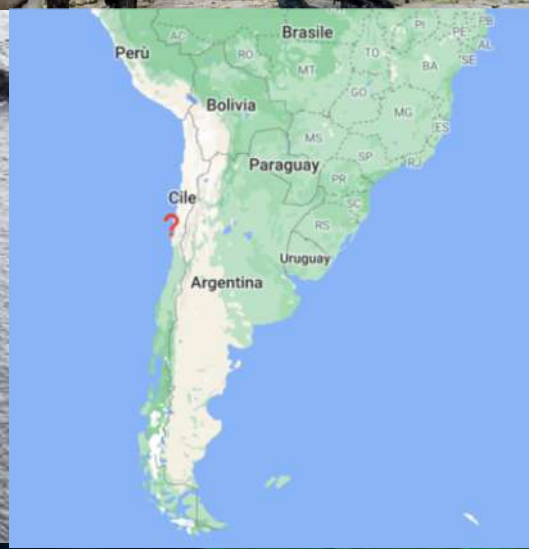
Blue Hole National Monument, Belize

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

Cook Islands

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

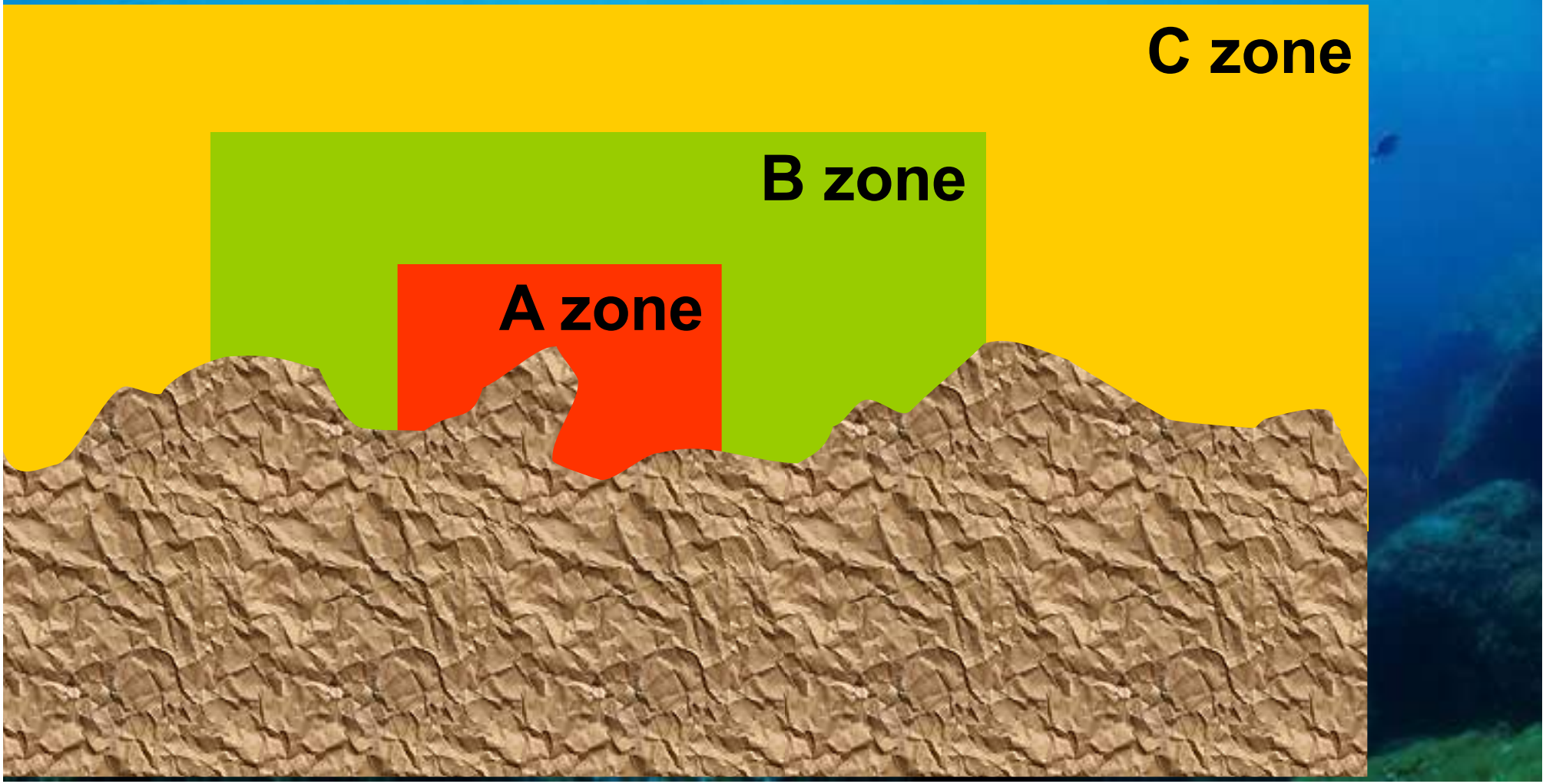
These areas allow an extensive amount of human involvement, usually low-level, non-industrial use of natural resources. With non-industrial harvesting, authorities ensure that conservation as a main aim is still viable within this area.

World Heritage Sites:

Initiated by UNESCO, this area exhibits extensive natural or cultural history. Marine 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



Zonation

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

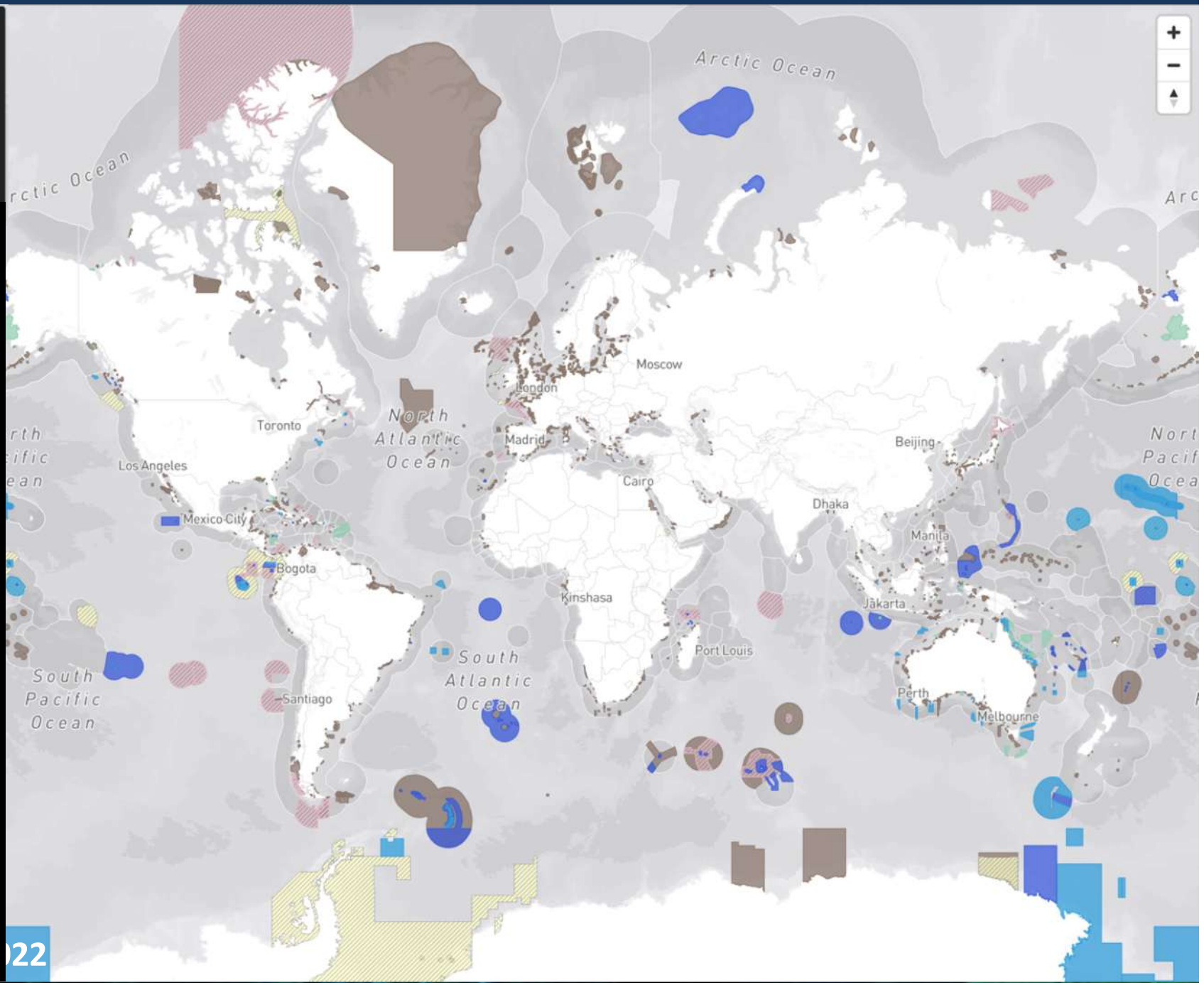
Marine conservation at global scale

8,16%
Percent of the ocean covered by marine protected areas

18.415
Marine Protected Areas

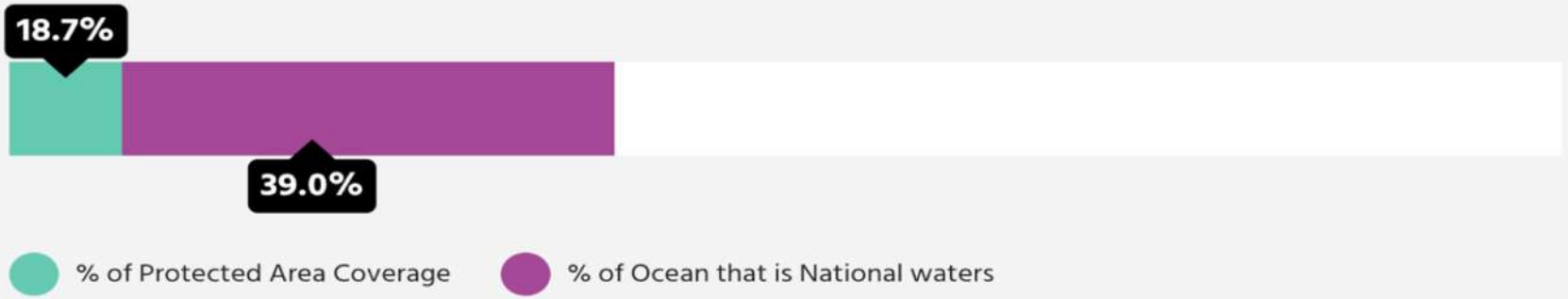
29.583.671km²
Total area protected

3% high protection
3% low protection
2% designated



Marine conservation at global scale

National Waters



High Seas

Africa
16.68% (2,490,508km²)

Asia & Pacific
19.06% (11,690,621km²)

Europe
8.53% (1,496,388km²)

Latin America & Caribbean
24.45% (5,600,471km²)

North America
15.11% (2,160,843km²)

Polar
44.51% (3,046,480km²)

West Asia
1.33% (19,244km²)