



Biological Conservation & Marine Protected Areas (MPAs)

Marine Protected Areas: Status, Design, Marine Spatial Planning



PHOTOS- Garrabou et al. 2017 – Scientific Reports



Mediterranean MPAs in numbers – now days status & future perspectives

7.14%

Surface under protection status (179,798 km²)
- 1231 MPAs and Other Effective Area-based Conservation Measures
- 186 MPAs of national status: 1.60%
- 888 marine Natura 2000 sites: 2.37%
- 3 GFCM Fisheries Restricted Areas: 0.62%
- Pelagos Sanctuary for marine mammals: 3.47%

* The above percentages cannot be added because there are overlaps between sites and not all sites are mentioned

0.04%

Surface under stronger protection (no-go, no-take or no-fishing zones)

+ 1.8%

of surface under designation compared to the last status of Mediterranean MPAs in 2012, including:

- 6 national status MPAs (21,827 km² added)
- 391 marine Natura 2000 sites (34,458 km² added)

* The MARIANED database lists in 2016 a greater variety of sites than in 2012 including sites designated before 2012

>100

Potential sites identified to become MPAs or be subjected to other spatial conservation measures in 12 countries

90.05%

Share of the total Mediterranean surface under designation located in European waters

Perspectives

Aichi objective 11 is not limited to reaching 10%. Having "effectively and equitably managed" MPAs and OECMs by 2020 implies that numerous qualitative improvements be made, in link with:

- Legal frameworks and governance
- Availability of adequate funding
- Systematic management planning
- Appointment of sufficient permanent staff
- Regulations and surveillance
- Stakeholder engagement
- Integration with Marine Spatial Planning

1- Since the Exclusive Economic Zones (EEZ) in Mediterranean countries are not yet all established, the EEZ coverage is estimated. Pioniers Marine Institute, World of EEZ was used as an indicator for the calculation of these percentages. They may vary from the surface declared by the States and are not binding for the authors and partners of this paper.

Dataset: MPAs: MARIANED, the database on Sites of Interest for the conservation of marine environment in the Mediterranean Sea. MARIANED/IMM/FAO/SPA, October 2016 revision. Countries: Natural Earth Admin 31, Countries 2016

LEGEND

- MPAs of national status
- Marine Natura 2000 sites
- Pelagos Sanctuary for marine mammals
- Particularly Sensitive Sea Area
- Parc International Marin des Bouches de Bonifacio
- SPAMIs
- Fisheries Restricted Areas (GFCM)
- UNESCO Biosphere reserves
- UNESCO world heritage sites
- Ramsar Sites
- Depth >1000m

SPAIN¹
Under designation: 11.66% (20,459 km²)
National status: 0.96% (2,242 km²)
Marine Natura 2000: 11.84% (30,411 km²)
Stronger protection: 16 sites (116 km²)

MOROCCO¹
Under designation: 2% (376 km²)
National status: 1.14% (214 km²)
Potential sites identified: 9

ALGERIA¹
Under designation: 0.03% (44 km²)
National status: 0.00% (26 km²)
Stronger protection: 1 site (9 km²)
Potential sites identified: 0

TUNISIA¹
Under designation: 1.01% (1,020 km²)
National status: 0.13% (130 km²)
Stronger protection: 2 sites (161 km²)
Potential sites identified: 7

FRANCE¹
Under designation: 60.17% (53,292 km²)
National status: 15.37% (13,616 km²)
Marine Natura 2000: 11.13% (9,859 km²)
Stronger protection: 8 sites (74 km²)

MONACO¹
Under designation: 100% (283 km²)
National status: 0.08% (0.24 km²)
Stronger protection: 2 sites (0.25 km²)

ITALY¹
Under designation: 9.97% (48,890 km²)
National status: 0.56% (3,012 km²)
Marine Natura 2000: 1.2% (6,468 km²)
Stronger protection: 27 sites (155 km²)
Potential sites identified: 22 (0.25 km²)

SLOVENIA¹
Under designation: 4.33% (8 km²)
National status: 0.39% (0.7 km²)
Marine Natura 2000: 4.04% (8 km²)
Stronger protection: 1 site (0.46 km²)

CROATIA¹
Under designation: 9.51% (5,314 km²)
National status: 1.11% (622 km²)
Marine Natura 2000: 94.9% (5,268 km²)
Stronger protection: 4 sites (158 km²)

MONTENEGRO¹
Under designation: 0.35% (26 km²)
National status: 0.34% (26 km²)
Potential sites identified: 4

ALBANIA¹
Under designation: 1.63% (181 km²)
National status: 1.63% (181 km²)
Stronger protection: 2 sites (106 km²)
Potential sites identified: 3

GREECE¹
Under designation: 1.55% (7,666 km²)
National status: 0.72% (3,544 km²)
Marine Natura 2000: 1.43% (7,163 km²)
Stronger protection: 2 sites (2 km²)
Potential sites identified: 3

TURKEY¹
Under designation: 12.58% (6,111 km²)
National status: 12.38% (6,044 km²)
Stronger protection: 3 sites (30 km²)

CYPRUS¹
Under designation: 10.76% (10,069 km²)
National status: 0.01% (6 km²)
Marine Natura 2000: 0.75% (713 km²)

SYRIA¹
Under designation: 0.04% (4 km²)
National status: 0.04% (4 km²)
Potential sites identified: 3

LEBANON¹
Under designation: 0.21% (41 km²)
National status: 0.21% (41 km²)
Potential sites identified: 14

MALTA¹
Under designation: 0.34% (190 km²)
National status: 0.34% (189 km²)
Marine Natura 2000: 0.34% (190 km²)

LIBYA¹
Under designation: 0.09% (313 km²)
National status: 0.09% (313 km²)
Potential sites identified: 20

EGYPT¹
Under designation: 2.68% (4,542 km²)
National status: 0.3% (514 km²)

ISRAEL¹
Under designation: 4.58% (1,270 km²)
National status: 4.58% (1,270 km²)

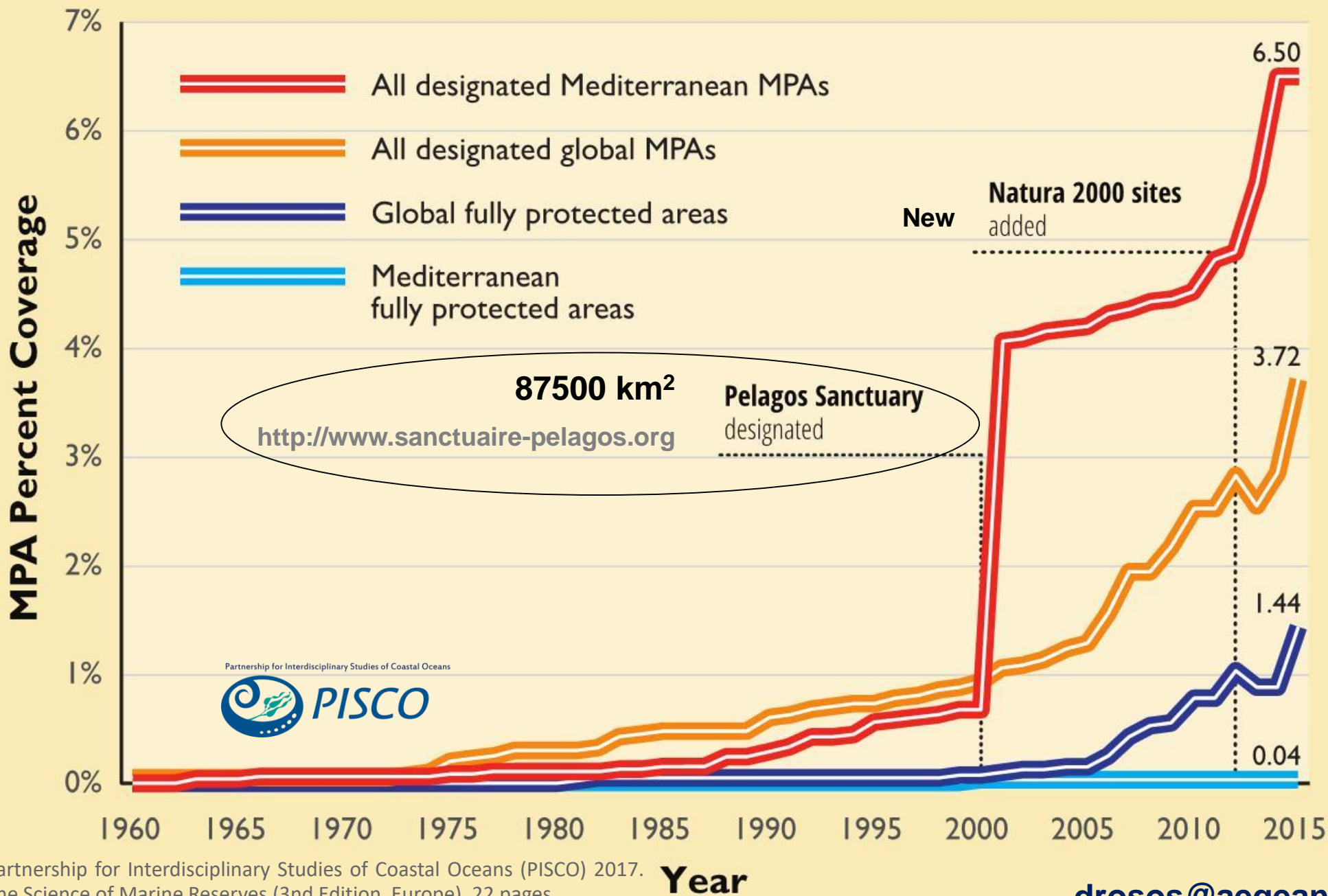
GOAL: protect at least 10% of the Mediterranean through the establishment of MPAs by 2020! (Convention on Biological Diversity - IUCN)

drosos@aegean.gr



Mediterranean MPAs in numbers – now days status & future perspectives

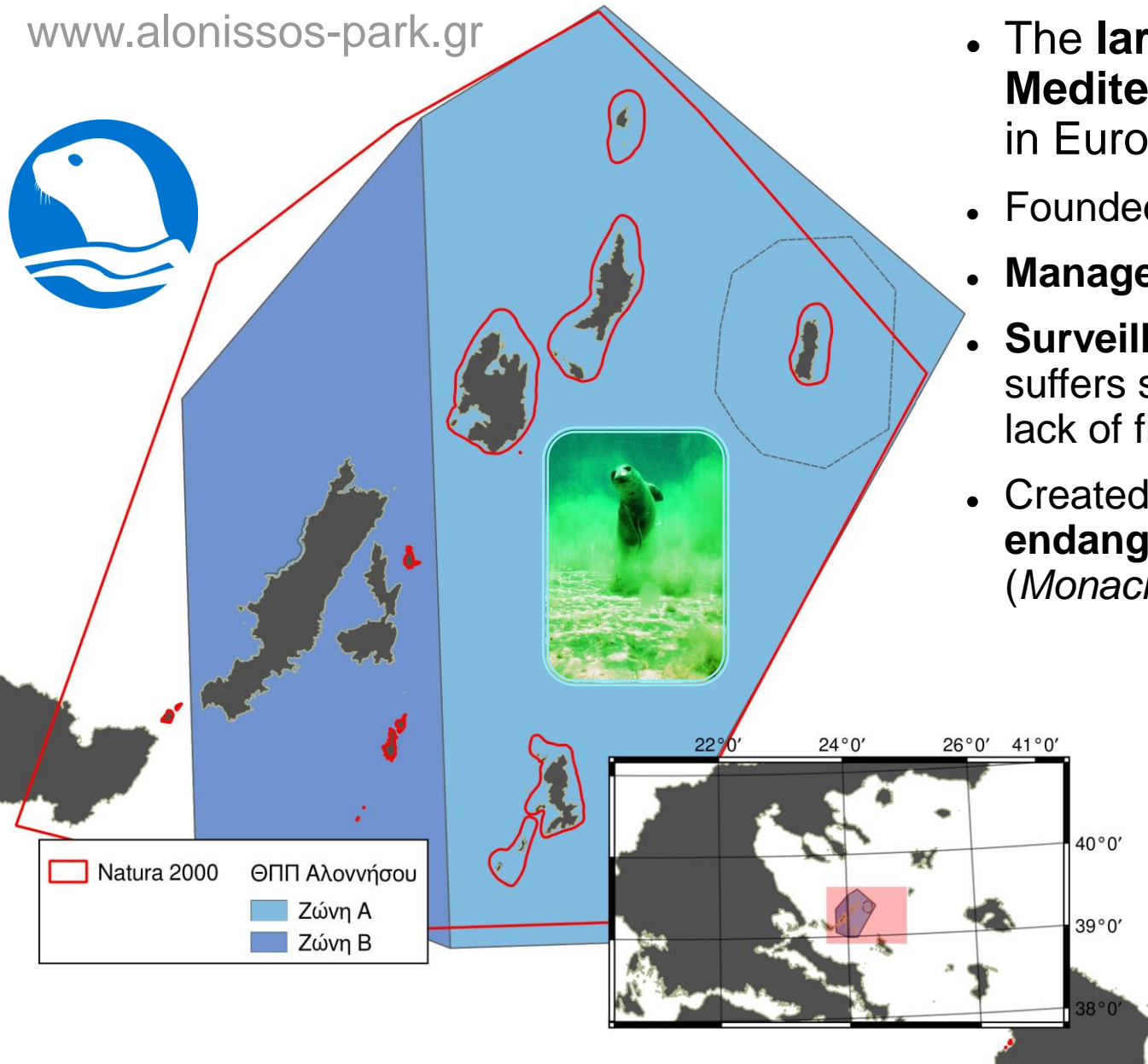
Global and Mediterranean MPAs



MPAs in Greece

National Marine Park of Alonnisos Northern Sporades N.M.P.A.N.S.

www.alonissos-park.gr



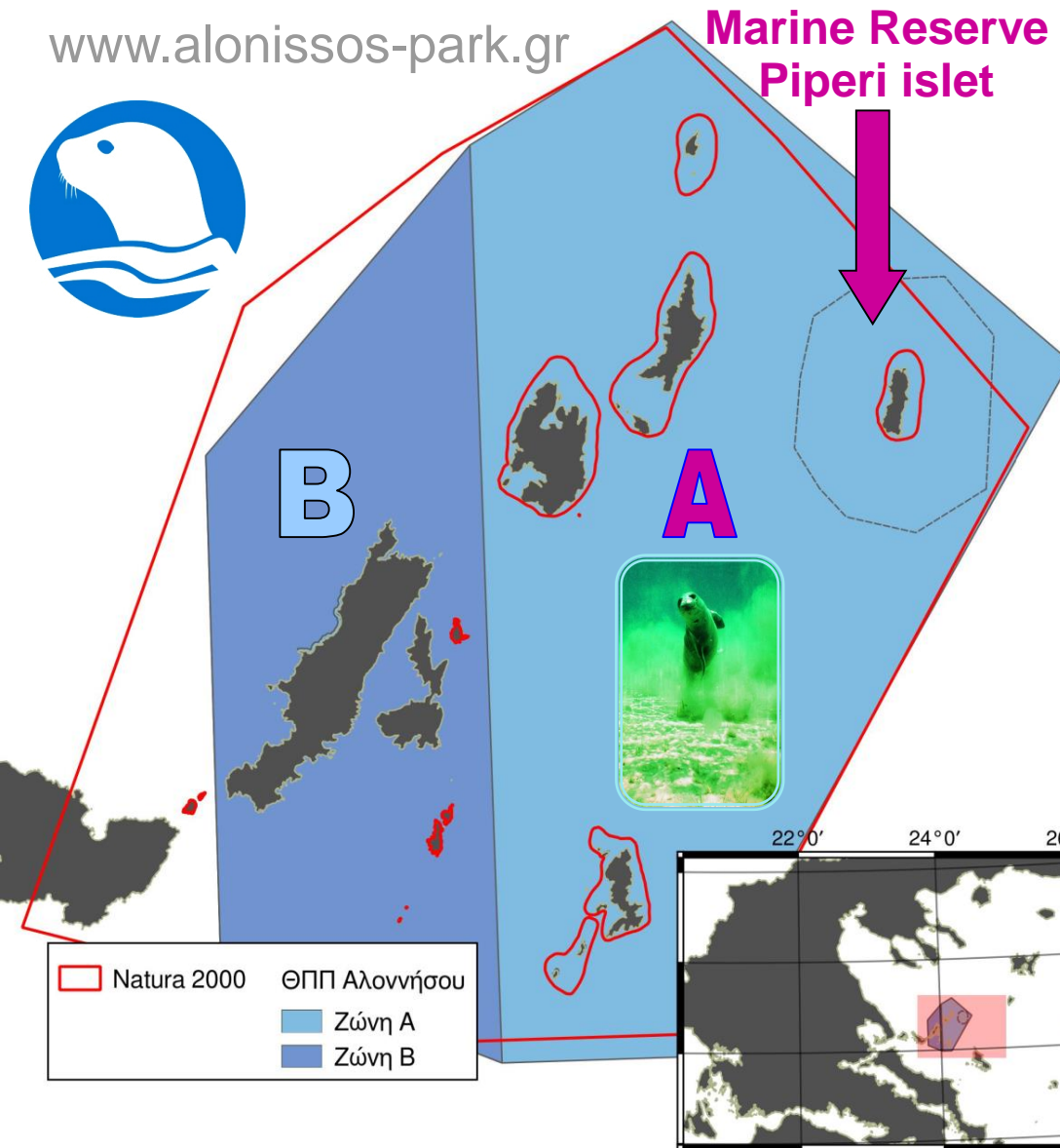
- The **largest MPA** in the **Mediterranean** and one of the largest in Europe **2260 km²**.
- Founded in **1992**
- **Management Body** activated in **2003**
- **Surveillance** system started in **2007**, but suffers several problems (mainly related to lack of financial & human resources)
- Created for the protection of the **endangered Mediterranean Monk Seal** (*Monachus monachus*)

“The Management Body is understaffed with **three** members scientific staff and **two** rangers (guards).”
<http://www.medpan.org>

MPAs in Greece

National Marine Park of Alonnisos Northern Sporades N.M.P.A.N.S.

www.alonissos-park.gr



Zone A

- **Strict protection.** To enter the area a special permit (ειδική άδεια) is needed from the Management Body (Φορέας Διαχείρισης).

Zone B

- **Multiple use MPA,** including several villages and tourist destinations.

Natura 2000 sites

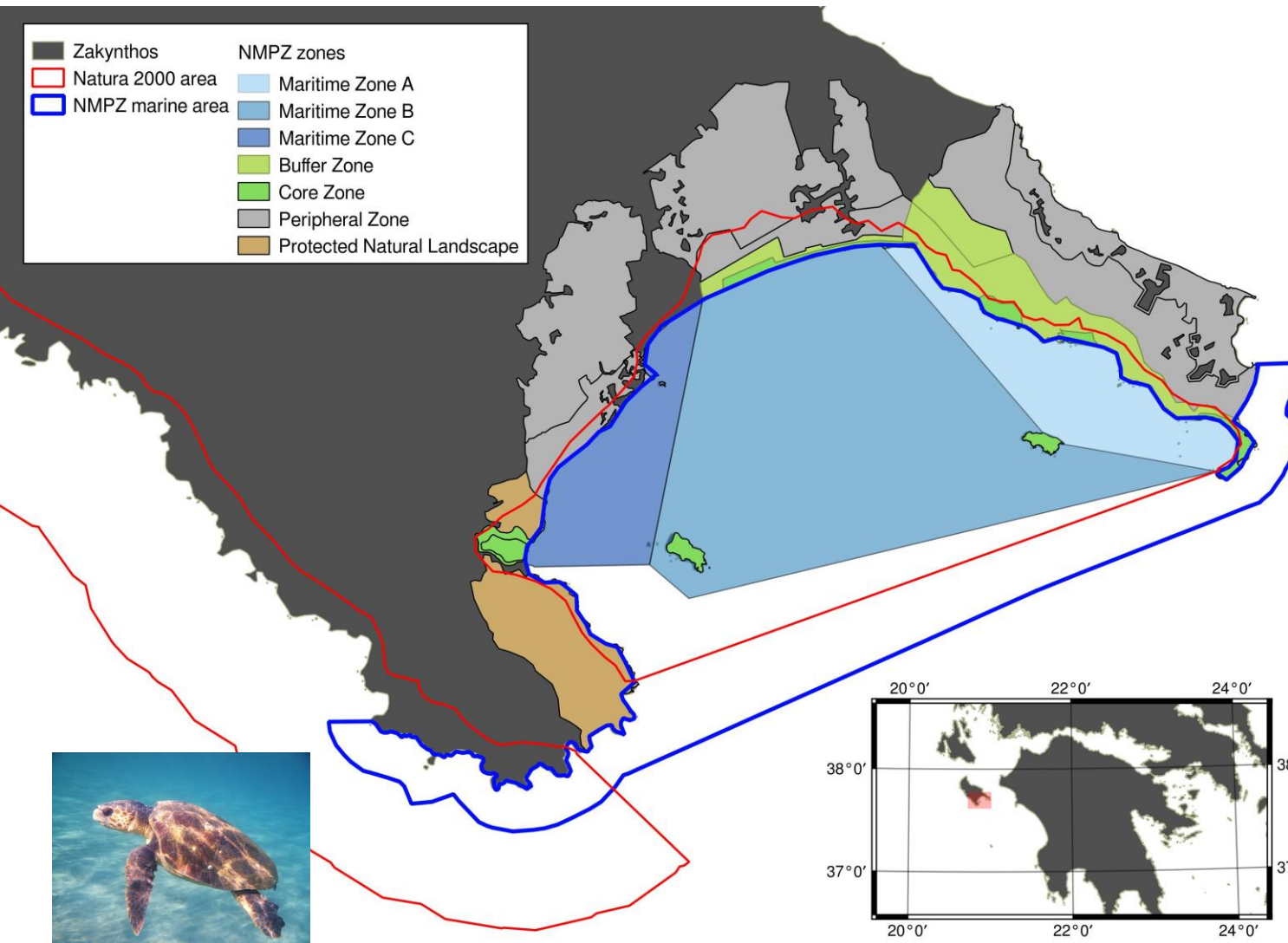
- **Large overlap with NATURA 2000 sites.**

- Long list of **regulations** regarding fisheries, boating & anchoring, and overnight stay (διανυκτέρευση).

www.hcg.gr/alieia/ETHPAVS/alonisos.html

MPAs in Greece

National Marine Park of Zakynthos N.M.P.Z.



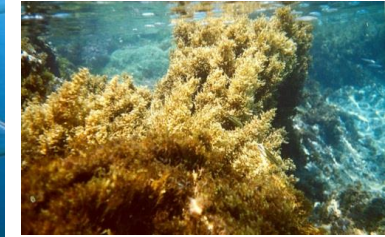
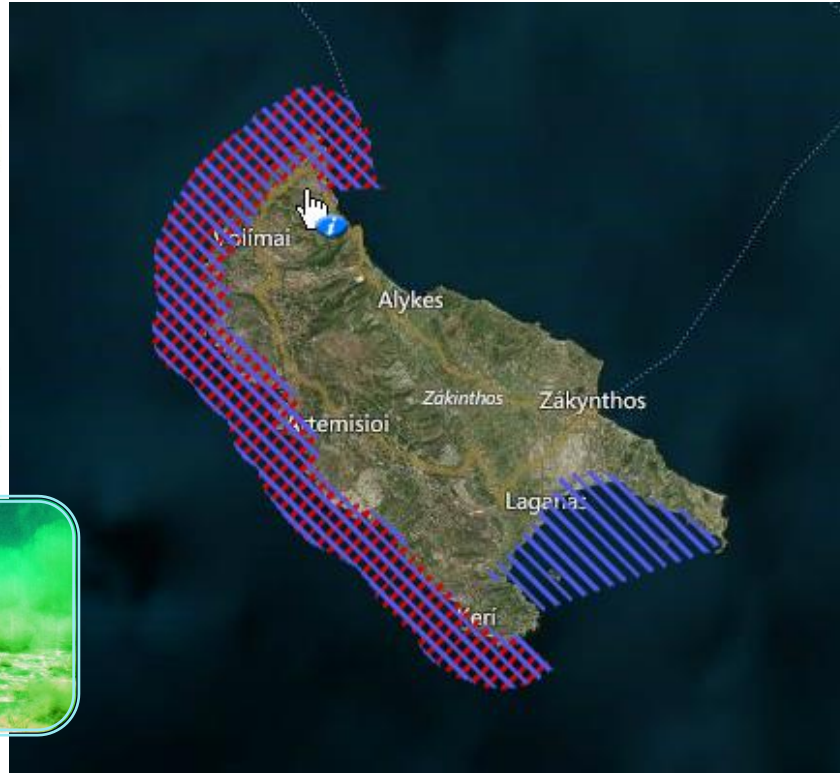
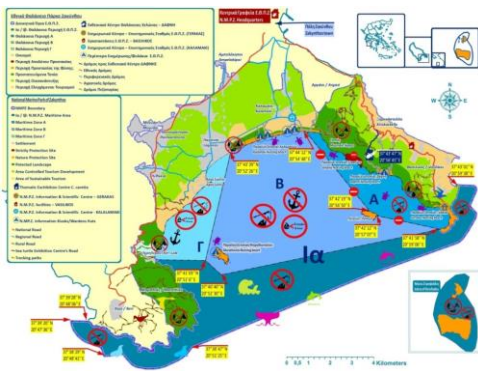
- **Founded in 1999, the 1st Protected Area with a Management Body in Greece**
- **Covers a Marine area of 87 km²**
- **The most important nesting sites for the loggerhead sea turtle *Caretta caretta* in the Mediterranean.**
- **Includes Laganas Bay and Strofades islets.**
- **Largely overlaps with Natura 2000 sites.**

Main purpose the protection of the loggerhead sea turtle *Caretta caretta*



MPAs in Greece

National Marine Park of Zakynthos N.M.P.Z.



- ❑ Management Committee of the MB: 11 Members (President of the MC – Scientist with an expertise on Environmental Issues, Ministry of the Environment, Regional Government, Ministry of Agriculture & Fisheries, Ministry of Maritime Affairs, Municipality, Stakeholders, Environmental NGOs)
- ❑ Personnel: 13 Scientific & Administration (BIOLOGISTS, OCEANOGRAPHERS, ICTHYOLOGISTS, ENVIRONMENTALISTS, ENVIRONMENTAL ECONOMISTS, etc)
- ❑ Nature Guards: 19 on a yearly basis
- ❑ Average Budget: ~1.000.000 Euro/Year
- ❑ 90% EU, Green Funding, State Funding, 10% EU Funding Research Programmes); Other Funds(< 2%)



Mediterranean MPAs – useful web sites



www.medpan.org/web/database/home

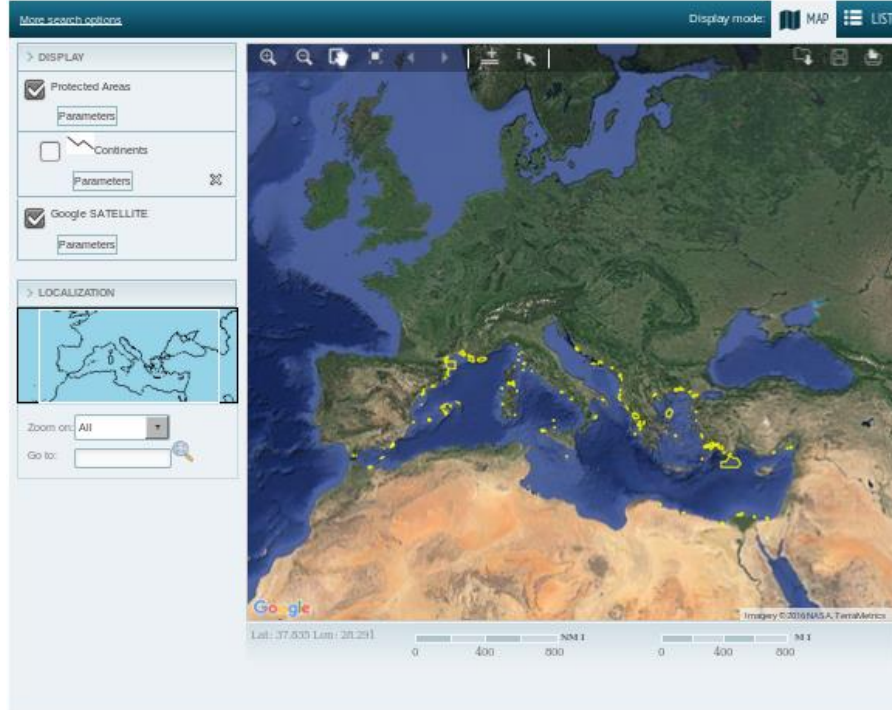


Important notice:

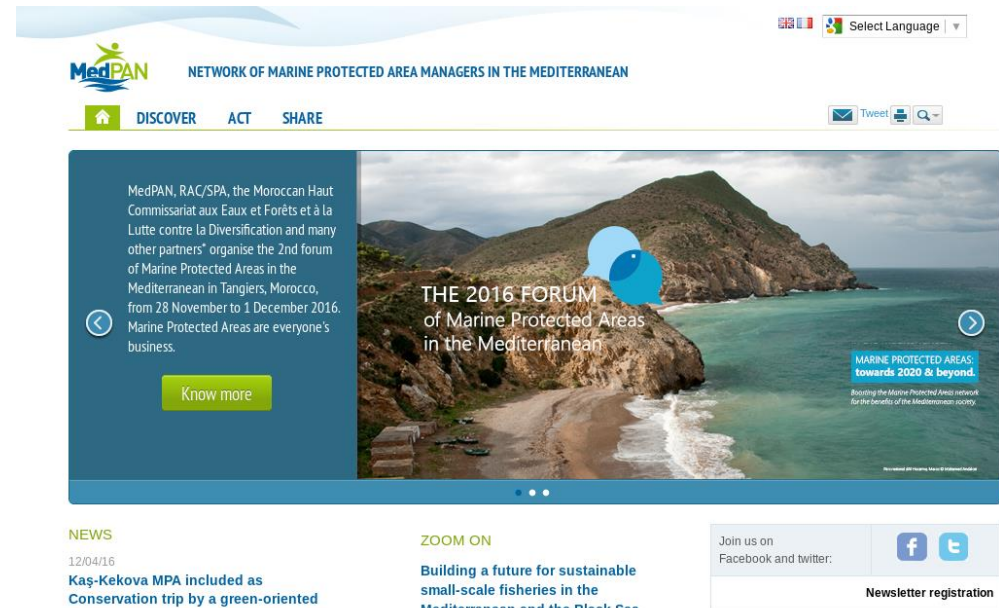
The online version of MAPAMED database has not been updated since 2012 due to technical problems. However, an up-to-date version of MAPAMED dataset has been maintained and is available free of charge. Should you be interested in getting this dataset, please do not hesitate to contact Bruno Meola (bruno.meola@medpan.org) and/or Dhia Guezguez (dhia.guezguez@rac-spa.org).

Please specify in your request why you need the MAPAMED dataset for; indeed, apart from the fact that it allows us to have an idea of the use of these data, we are interested in every projects/ studies that are directly or indirectly related to marine conservation in the Mediterranean Sea.

Besides, we are currently working on redesigning the online viewer. Please come back at the end of 2016 to discover the new version!



www.medpan.org



shapefiles (of Greece):

<http://cdr.eionet.europa.eu/gr/eea/cdda1>



Mediterranean MPAs – useful web sites

<http://natura2000.eea.europa.eu>

Natura 2000 Network Viewer

LEGEND

- Natura 2000 sites
- Scale between 1:100,000 and 1:10,000,000
- Habitats Directive Sites (pSCI, SCI or SAC)
- Scale between 1:100,000 and 1:10,000,000
- Birds Directive Sites (SPA)

LAYERS

- Natura 2000 sites
- Nationally designated areas (CDDA)
- Corine land cover 2006
- Biogeographical regions
- LIFE projects
- Land parcels purchased with LIFE co-funding

<http://ec.europa.eu/environment/nature/natura2000/data>

Mediterranean MPAs – useful web sites



<http://natura2000.eea.europa.eu>

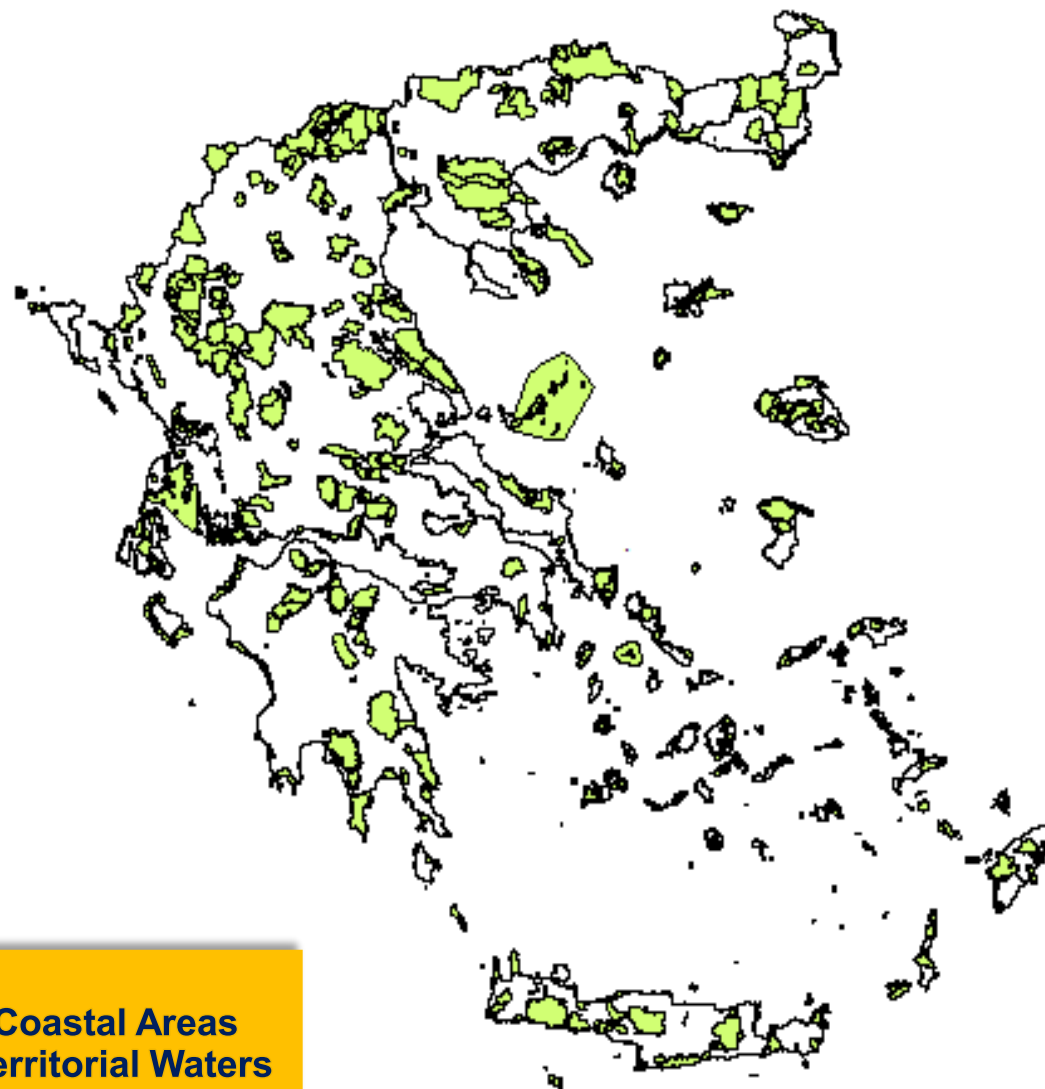
Natura 2000 Sites Network in Greece - 1996

Πίνακας. Κατανομή των περιοχών του Δικτύου NATURA 2000 στην Ελλάδα

Περιφέρειες	Αριθμός περιοχών NATURA
Μακεδονίας – Θράκης	78
Ηπείρου - Δυτικής Μακεδονίας	40
Θεσσαλίας - Στερεάς Ελλάδας	53
Πελοποννήσου, Δυτικής Ελλάδας & Ιονίου	65
Αττικής	10
Αιγαίου	73
Κρήτης	52
ΣΥΝΟΛΟ	371

Η έκταση των περιοχών του δικτύου NATURA 2000 στην Ελλάδα ανέρχεται σε 4.294.205 ha και καλύπτει το 27,3% της χέρσου και το 16,1% του παράκτιου και θαλάσσιου χώρου και το 5,5% των χωρικών υδάτων).

- 16% of the Greek Coastal Areas
- 5.5% of the Greek Territorial Waters





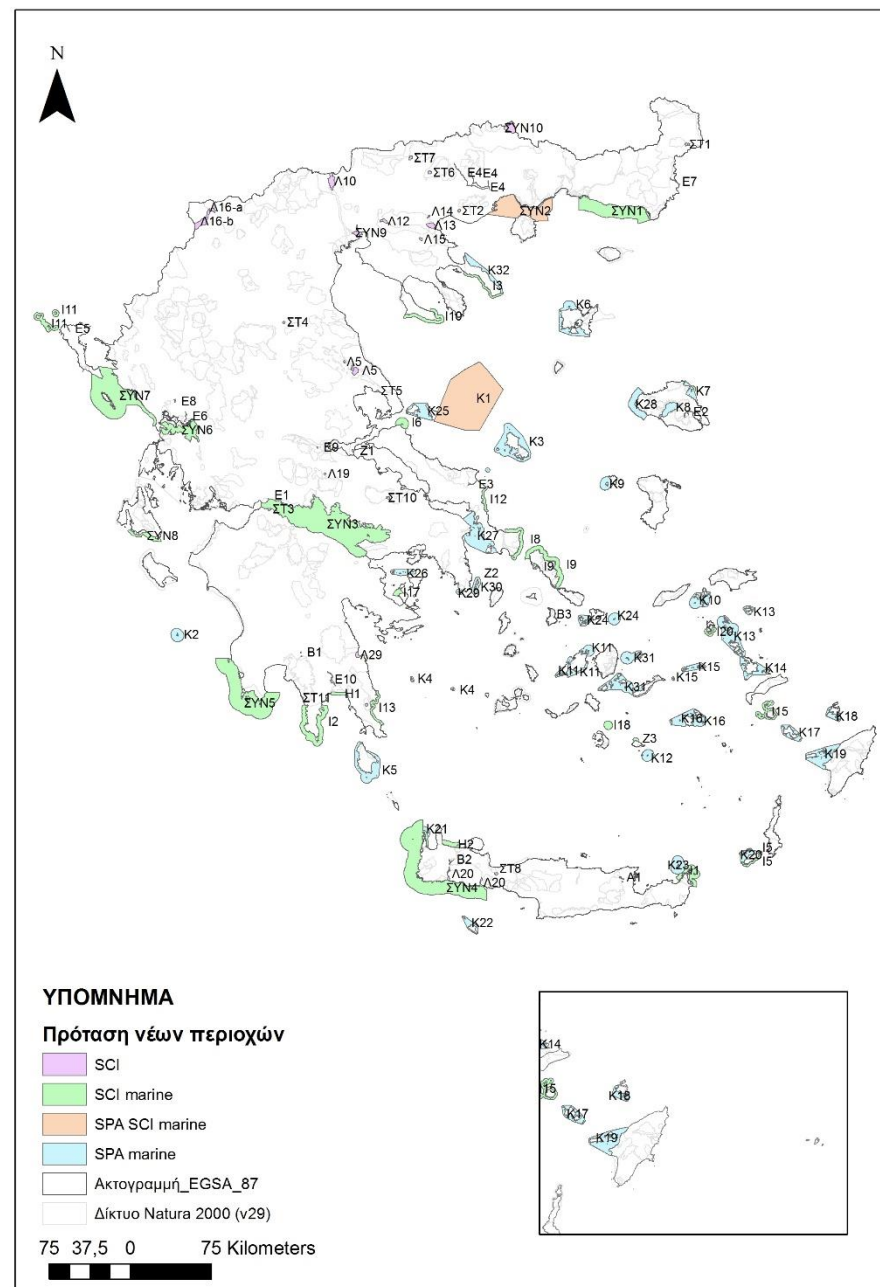
Mediterranean MPAs – useful web sites

Natura 2000 Sites Network in Greece – December 2017

Συγκεντρωτικός Πίνακας επέκτασης εκτάσεων Δικτύου NATURA 2000 (Ιούνιος 2016)

ΤΥΠΟΣ	Αριθμός	Έκταση χέρσου (ha)	Έκταση θάλασσας (ha)
TKΣ χερσαίοι	39	47.433	
TKΣ θαλάσσιοι	28		1.011.293
ΖΕΠ θαλάσσιοι	32		844.343
TKΣ – ΖΕΠ θαλάσσιοι	1		75.686
ΣΥΝΟΛΟ	100	47.433	1.931.322

□ 20% of the Greek Territorial Waters





Can MPAs provide Economic & Social Benefits to the local Society?

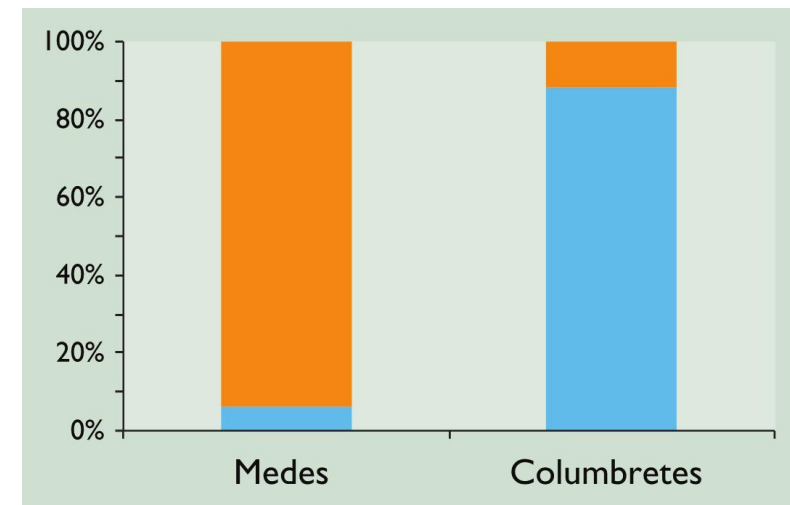
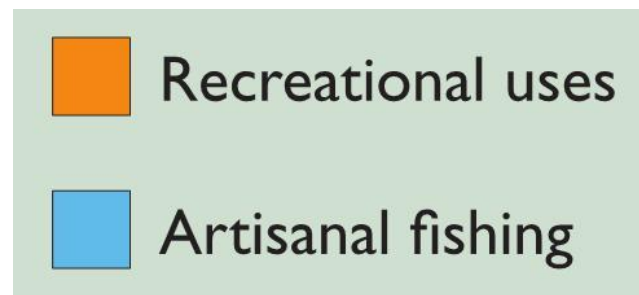
MPAs can benefit Local Communities as:

- More fish, invertebrates and marine plants **improve the state of ecosystems**
- **Healthier ecosystems** with more abundant, large and diverse organisms **attract more tourists, especially ‘alternative’ (= ecological friendly) touristic activities** (e.g. Diving Tourism)
- **Replenishment of fish-stocks** through the spillover and dispersal effects also enhance **fisheries** (therefore the Fishermen income)

A study on 12 MPAs in Spain & France showed that: The income generated by Fishing and SCUBA diving in an MPA can be 2.3 times higher than the average management costs.

Well designed, enforced and managed MPAs can generate more revenue than their coast.

But the **area** and the **management scheme** determines who will benefit the most.



Can MPAs provide Economic & Social Benefits to the local Society?

Medes islands - Spain

1983 fishing ban

1990 increase of protection

3-zone MPA

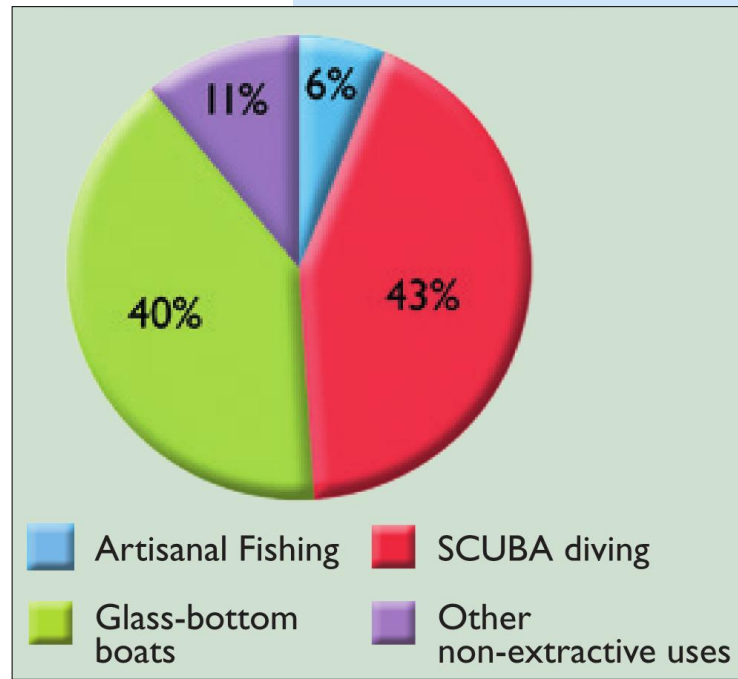
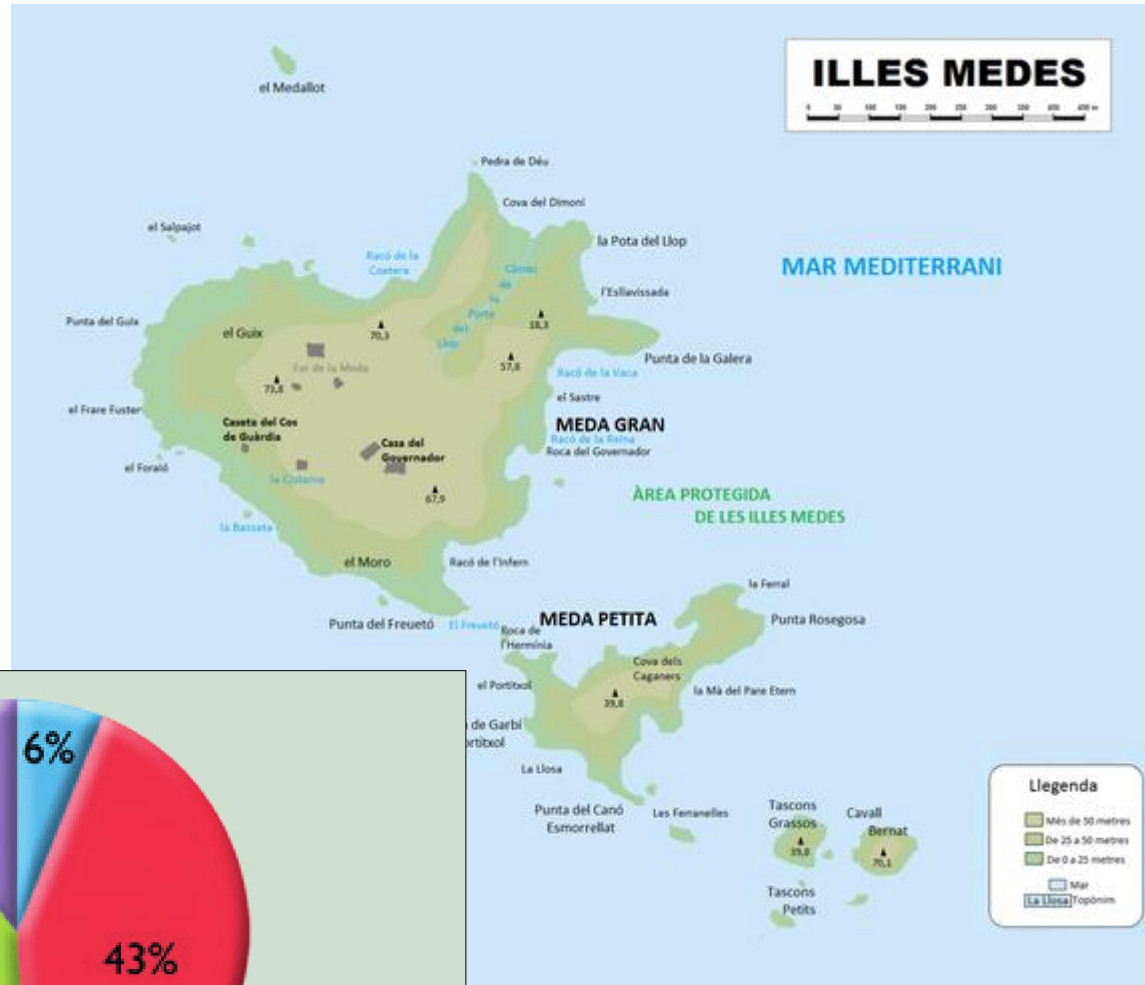
<4 km coastline

Fully protected area ~ 0.5 km²

Generates

10 million euros / year

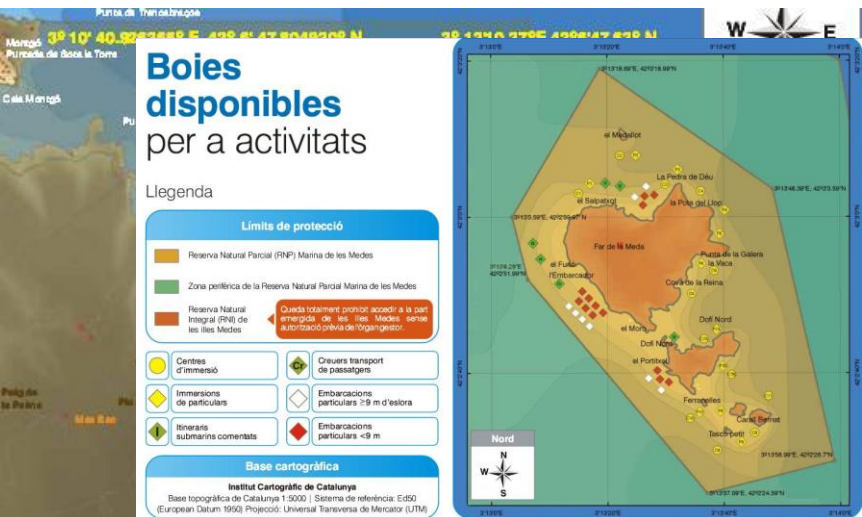
> 80 % due to Diving & Glass-bottom Boats.



Merino et al. 2009 – ICES Journal of Marine Science 66:147-154



Can MPAs provide Economic & Social Benefits to the local Society?



Both fishing & diving regulations

74.224 dives / year to distribute between all the licensed centers



Place	Protection	Place	Protection	Place	Protection
El Guix	Medium	La Vaca	Low	Tascó Petit	Medium
El Salpatxot	Medium	La Reina	Medium	Ferranelles	Low
El Medallot	Restricted	Dofi	Low	Ferranelles 2	Low
La Pedra de Déu	Medium	Tascó Gros	Medium	L'Embarcador del Francès	Medium
La Pota del Llop	High	Carall Bernat	Medium	El Sant Istiu	Medium

Our Dive Centre is authorized to the following amount of dives per year:



Name	# Dives	Name	# Dives	Name	# Dives
El Guix	270	La Vaca	355	CarallBernat	277
El Salpatxot	259	La Reina	105	Tascó Petit	257
La Pedra de Deu	239	El Dofi	359	Ferrenelles 1	232
La Pota del Llop	124	El Tascó Gros	187	Ferrenelles 2	241
L'E. del Francès	175	El Sant Istiu	175	Medallot	0

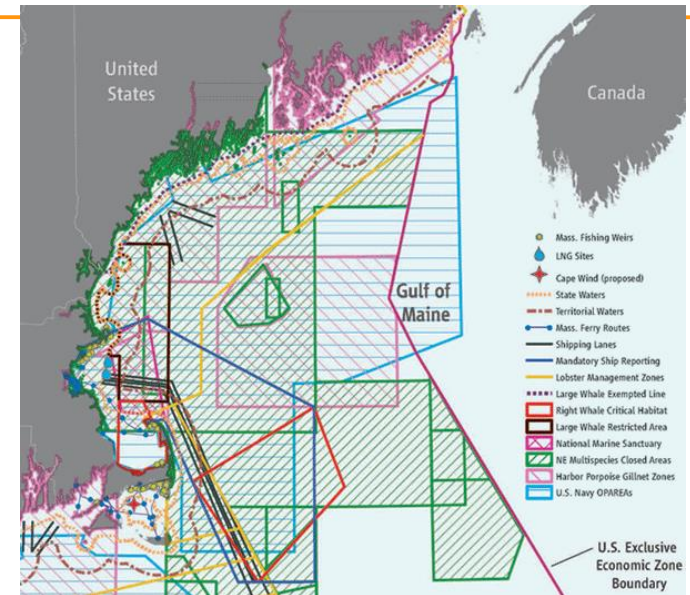
MPA design & Marine Spatial Planning

MPA design depends on specific goals:

- Ecological
- Social
- Cultural
- Economic

These define MPA characteristics regarding:

- Number of MPAs (single MPA or network of multiple MPAs)
- Size
- Placement
- Zoning
- The overall benefits an MPA can provide



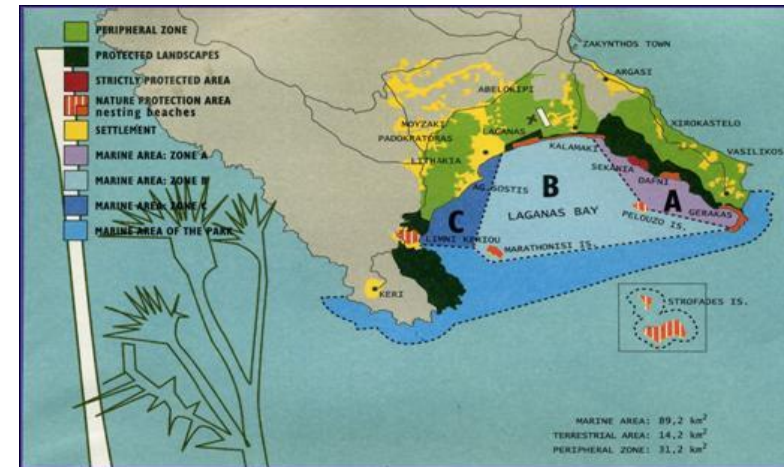
MPA success greatly depends on balancing different goals

MPA design & Marine Spatial Planning - Scientific considerations

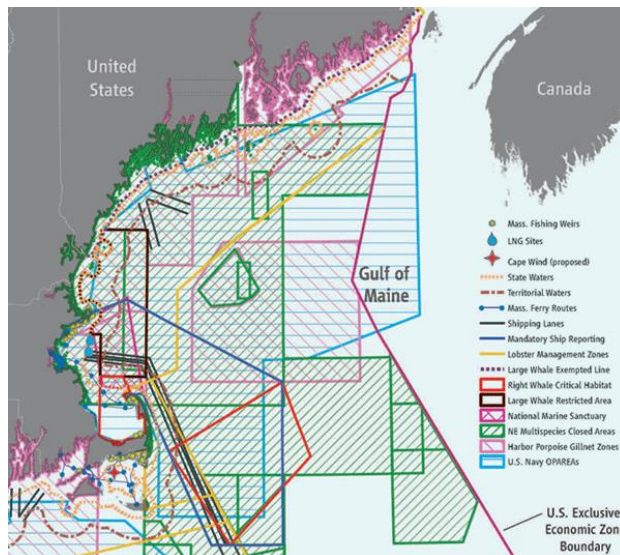
Scientific considerations

Changing the way we design MPAs

From single MPAs



to MPA networks



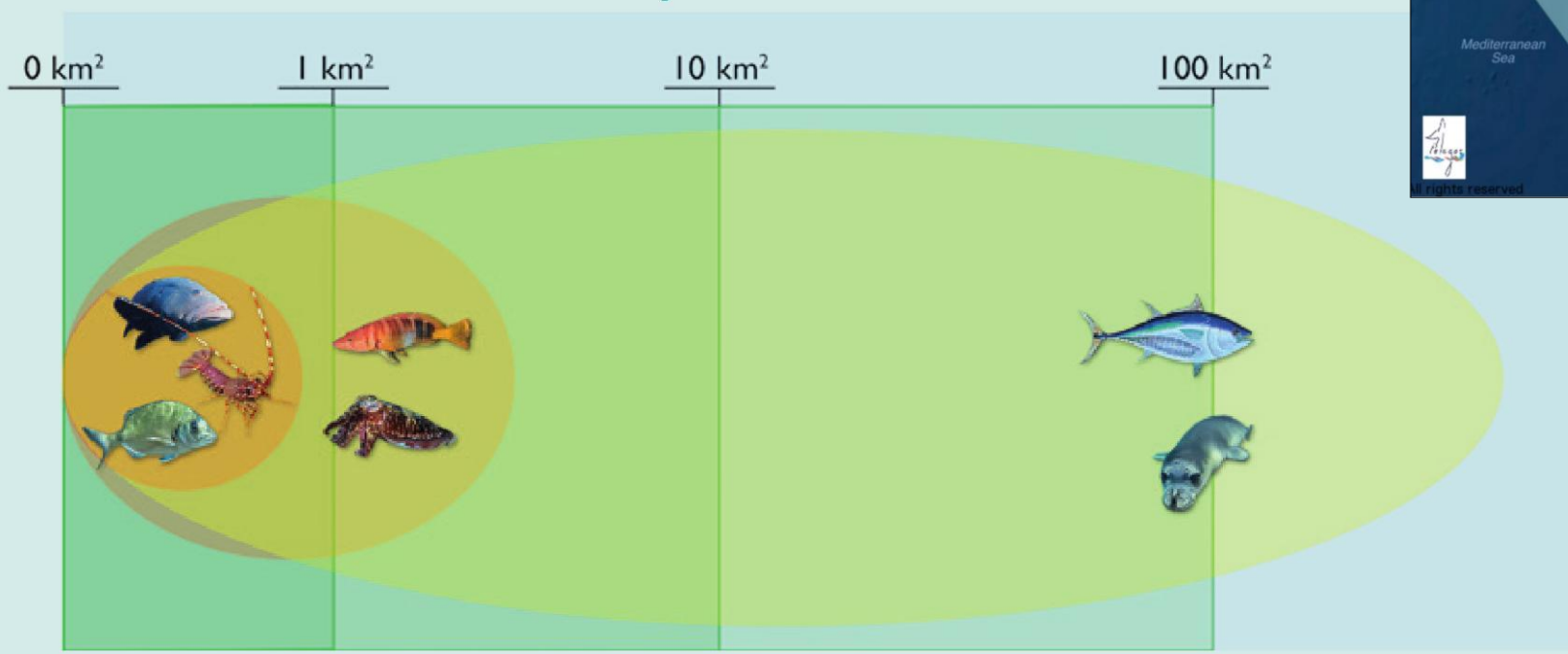
to MPAs / MPA networks as components of Marine Spatial Planning

MPA design & Marine Spatial Planning - Scientific considerations

Scientific considerations

MPA size

Size of Fully Protected Area



MPA networks consist of multiple MPAs that are connected by the movement of juveniles or adults.

Individually, each MPA provides some benefits.

Collectively, if well designed & managed, the network can create significantly greater benefits

MPA design & Marine Spatial Planning - Scientific considerations

Scientific considerations

MPA connectivity

- Different habitats are connected to each other by the movement of species.
- Many species move from one area to the other at different points of their life.
- Eggs & larvae are transported by currents into open waters

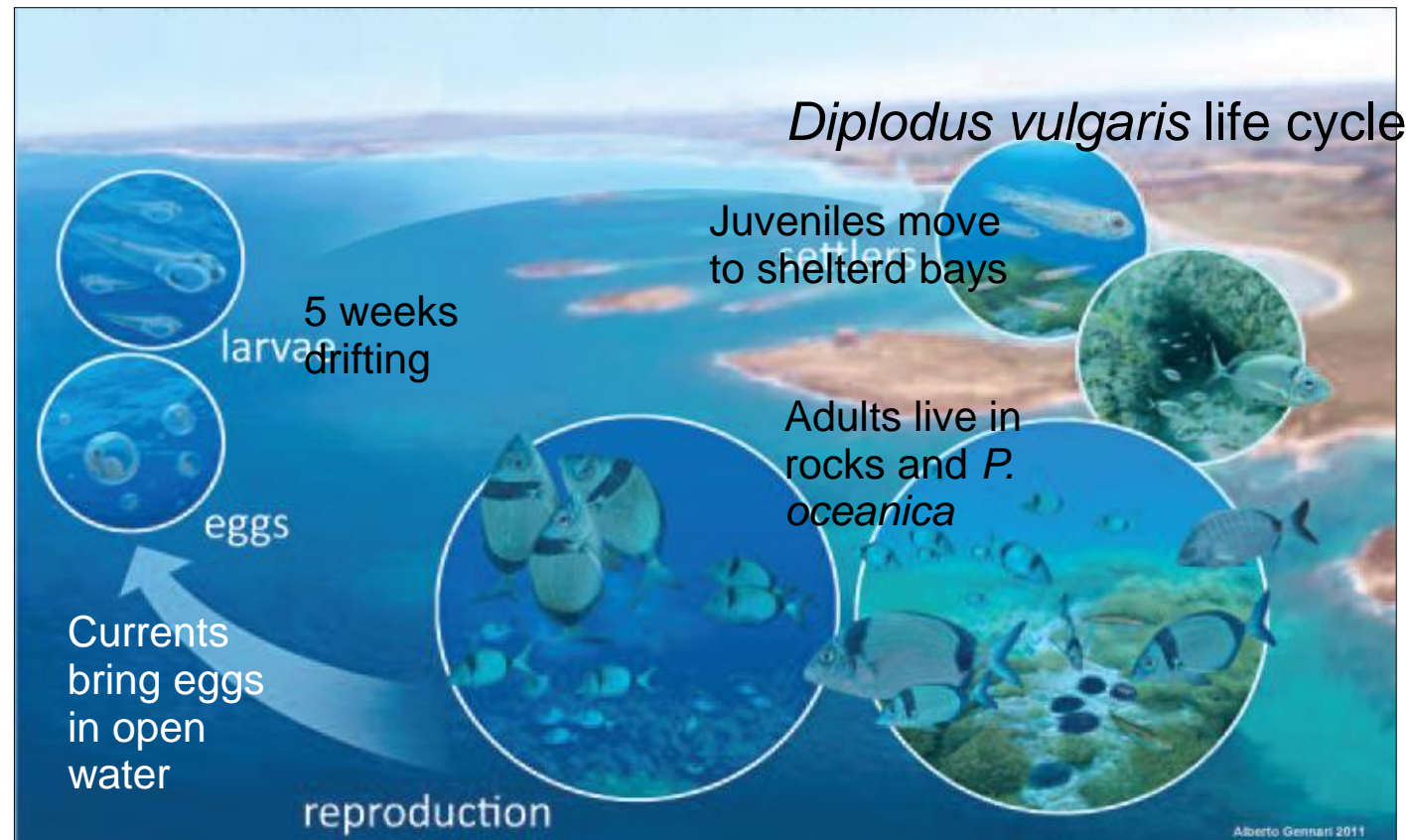
- Juveniles usually swim into sheltered bays.
- Adults move across different habitats for food, shelter & reproduction.

MPAs **must** include a range of habitats.

Problem: Size.

Alternative solution:

Network of MPAs.



MPA design & Marine Spatial Planning - Scientific considerations

MPA networks

Four MPA design principles (CARE)

Conected – provide multiple refuges / or essential fish habitats. Especially important for the younger stages.

Adequate – contains enough of each key habitat to ensure the persistence of target species through time.

Representative – an MPA network should protect the full range of habitats and species (i.e. biodiversity) in a region.

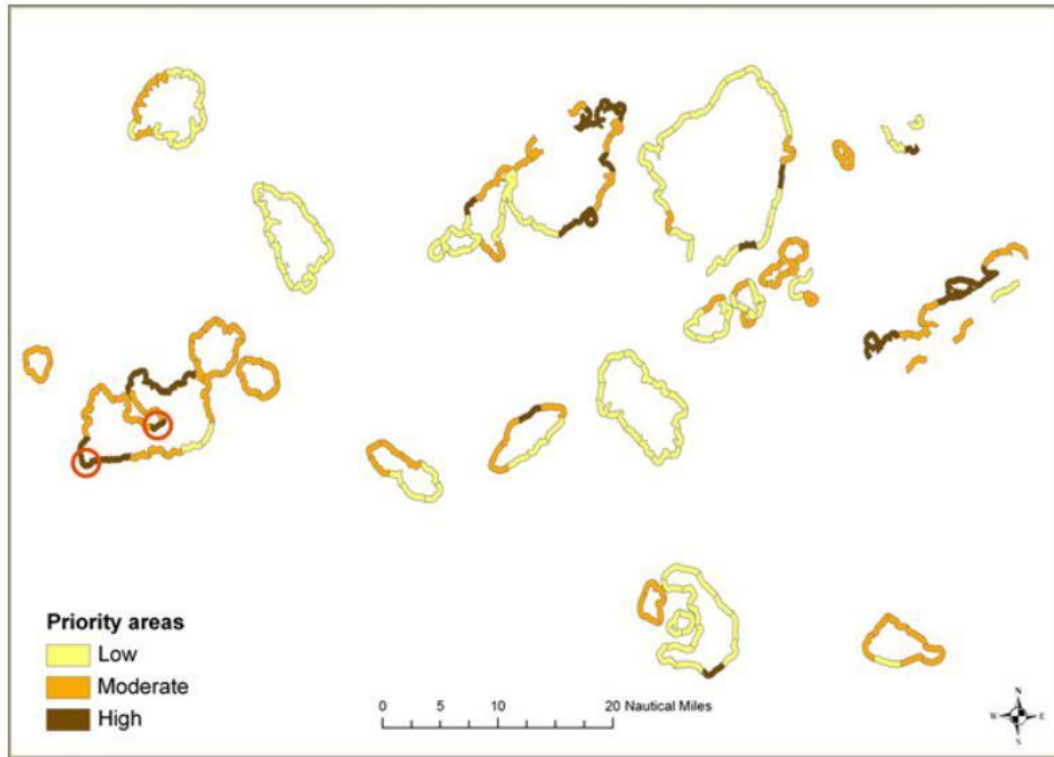
Efficient – a cost **efficient** MPA is one that is **CAR** while minimizing the costs to other human activities.

☉ Small adjustments to a conservation plan are always needed to satisfy ecological goals but also preserve valued human activities.

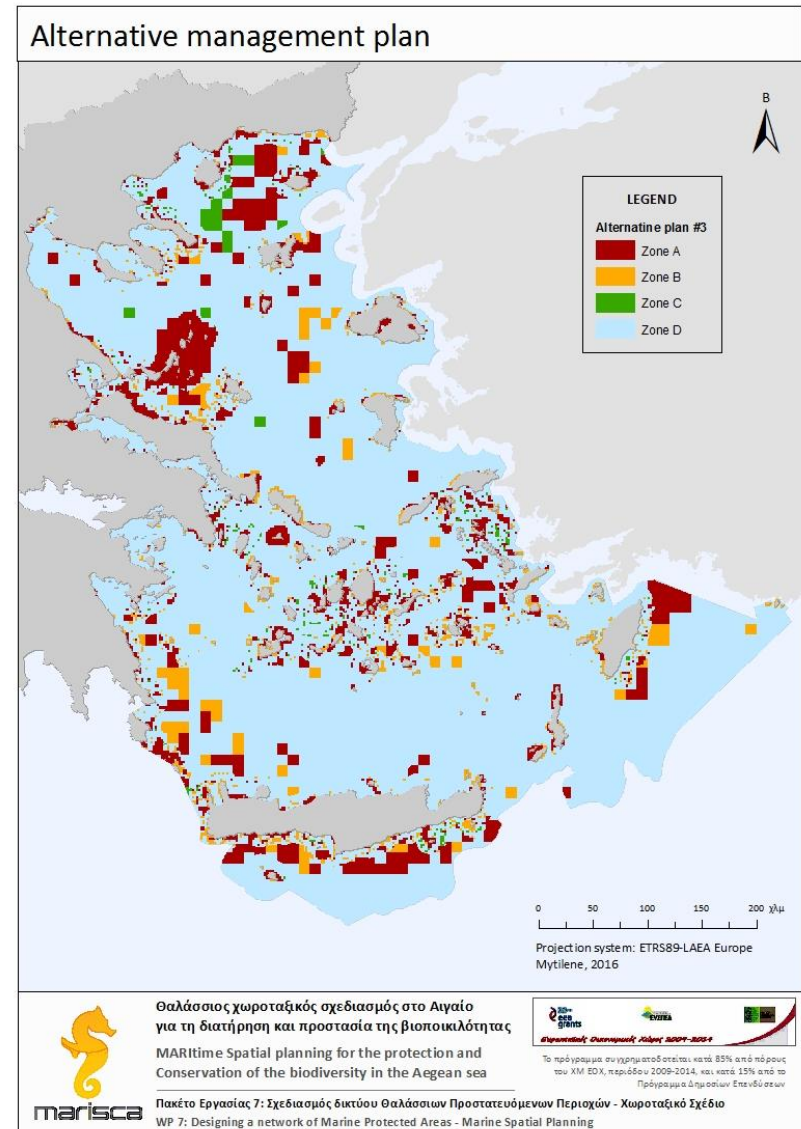


MPA design & Marine Spatial Planning - Scientific considerations

MPA design efforts in the Aegean Sea



Giakoumi et al. 2010 – Designing an MPA network in the Cyclades archipelago



Markantonatou et al. 2017 - Designing an MPA network in the Aegean Sea based within the framework of Marine Spatial Planning (MARISCA Project)

An example – A game

The game: hide and seek (κρυφτό)

The players' rules: make choices regarding

- who is the seeker and how often,
- the time, area, conditions given to hide,
- the way the seeker gets the hiders,
- the point of the watchtower.

The president's rules: follow the specific rules

- who is the seeker and how often,
- the time, area, conditions given to hide,
- the way the seeker gets the hiders,
- the point of the watchtower.

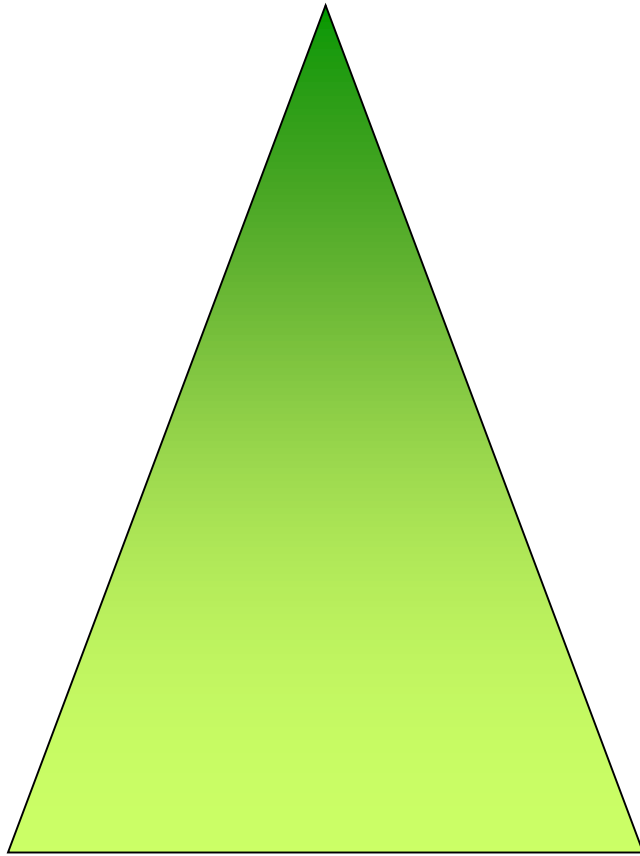
Whose rules would work out best and make the game more enjoyable?

Whose rules are you willing to follow?



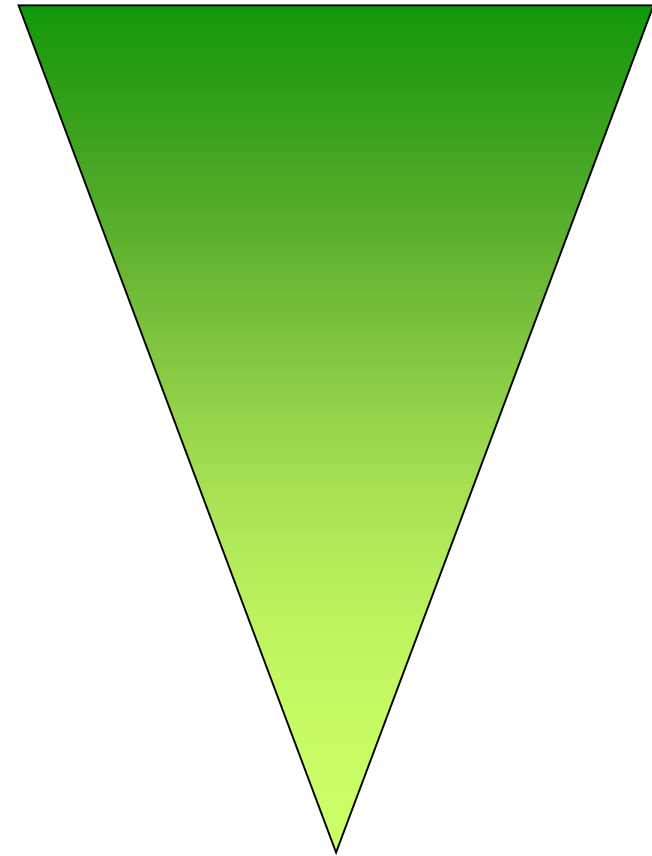


MPA design – Top-down *versus* Bottom-up



Top – down
The president's rules

Versus



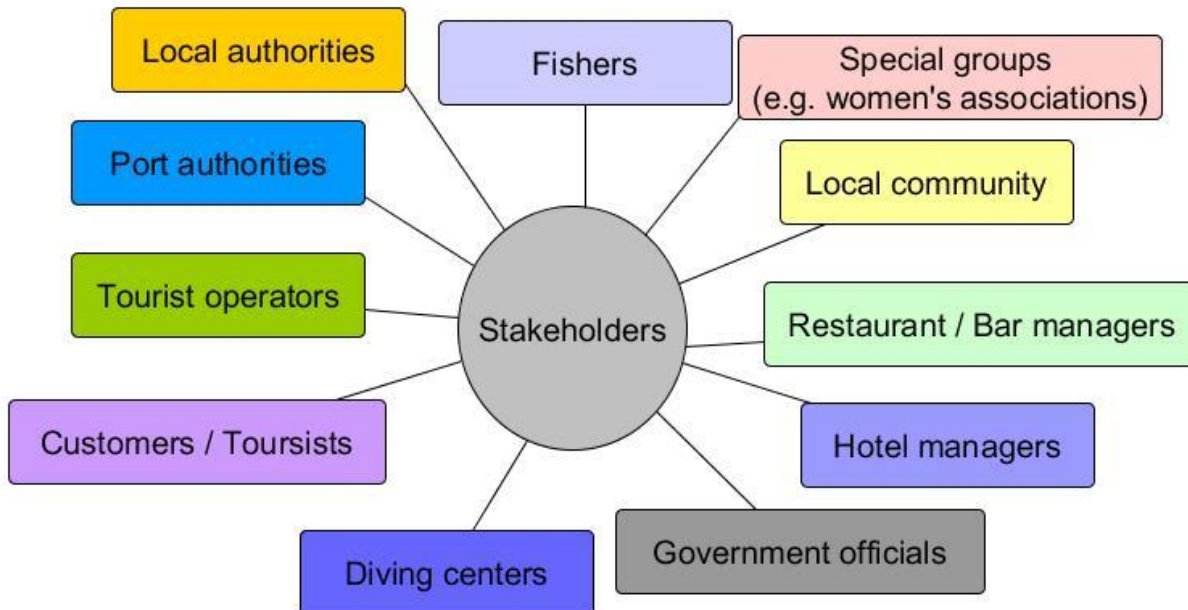
Bottom – up
The players' rules

MPA planning SHOULD BE a participatory procedure

MPA design – following a bottom-up procedure

Engagement of stakeholders & communities in the planning process

1. MPA establishment should involve collaboration among stakeholders with diverse backgrounds.
2. Scientific data should be combined with traditional knowledge.
3. Users who participate in MPA planning are more likely to support and comply with MPA rules.



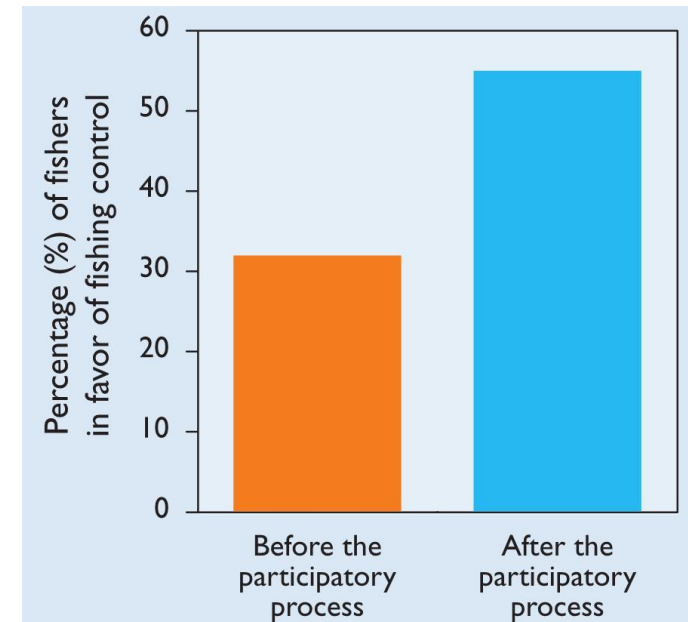
MPA design – following a bottom-up procedure

A study on 27 MPAs showed that participation of stakeholders was the most important factor for the success of the MPAs (source PISCO 2016).

Example: Taza National Park, Algeria

- Established in 2009 by the government without a participatory approach.
- The socio-economic assessment showed that a low percentage of local fishers agreed with its establishment (results – orange bar).
- The Park Authority initiated a participatory, multi-stakeholder process to develop a management plan. It included NGOs, scientists, fishers, tourism operators, local authorities.
- The Action Plan activated in 2012 met its conservation goals. .

It is important for users to see an MPA not just for the ecological benefits but also a way to increase income from fishing / tourism, and improve well-being of the society.



MPA design – ensuring long term benefits

But setting up an MPA has an increased initial cost (e.g. running costs of the MPA, cost of reducing other human activities)

Ways to reduce short-term costs

(examples from other parts of the world)

Alternative activities (e.g. **pesca-tourism**)



Ecolabels for sustainable seafood – used to increase the value of fisheries around MPAs

Investment by public or private partners who make-up for the short-term costs of protection

Allocating **exclusive fishing rights to local fishers** in areas surrounding MPAs or in multi-purpose MPAs

Promoting **alternative livelihoods through training programs** that help in the generation of new jobs and income.

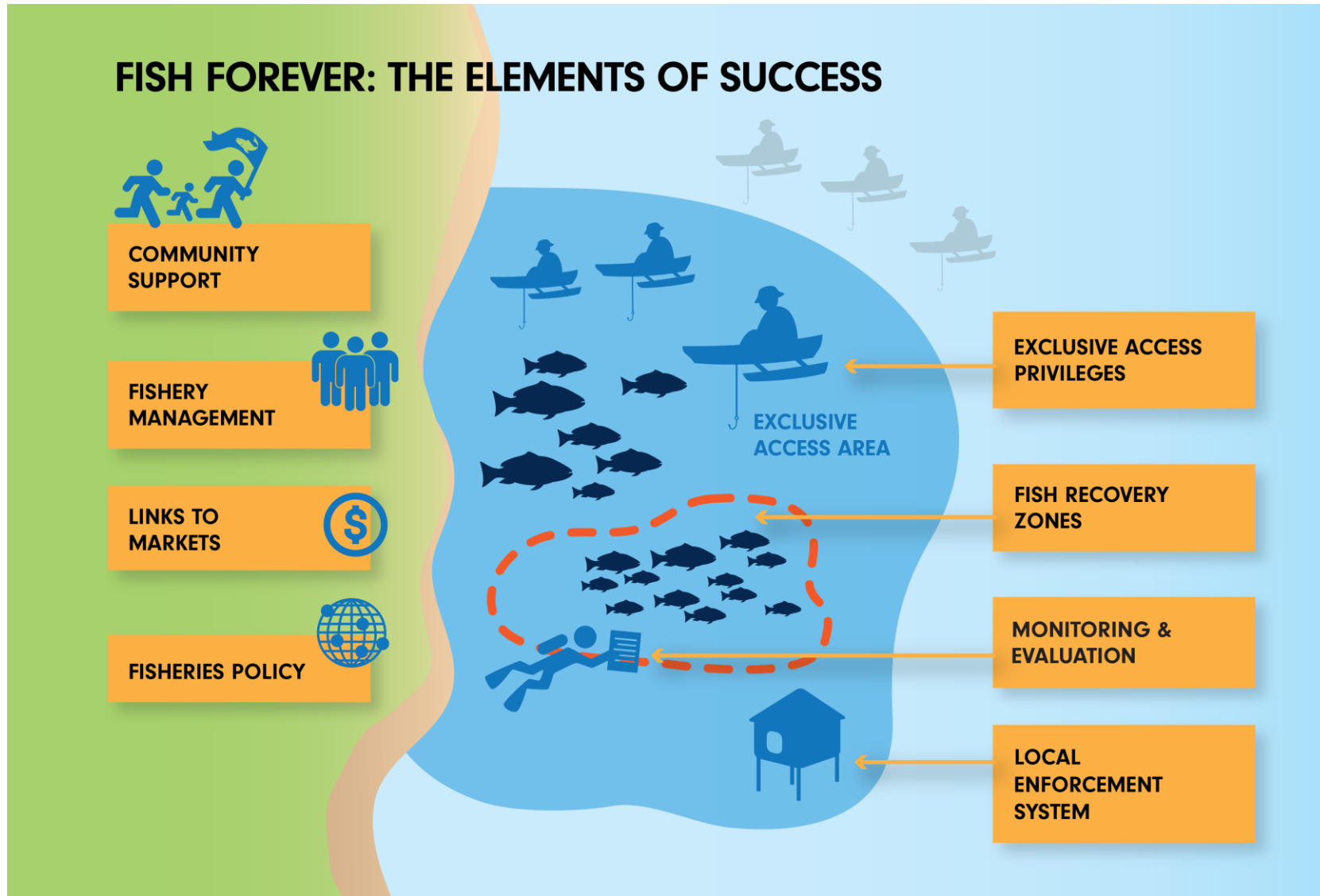
Remember! Long term benefits will overcome short-term costs.

MPAs with good compliance and enforcement become more valuable through time



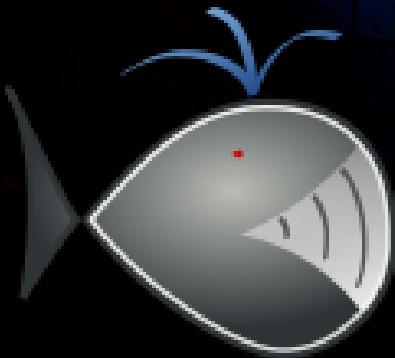
MPA design – ensuring long term benefits

Elements that ensure and sustain long term benefits





Marine Protected Area design & Marine Spatial Planning



Thank you for your protection!

The Science of Marine Reserves, PISCO:

- ✓ video: www.piscoweb.org/publications/outreach-materials/film/science-of-marine-reserves-video
- ✓ booklet: www.piscoweb.org/publications/outreach-materials/science-of-marine-reserves/smr-booklet-versions