Conservation 'Identity' and Propensity for Marine Protection in the Mediterranean Sea

זהות "סביבתית שומרת טבע" והנכונות לשמירה הסביבה הימית של הים התיכון

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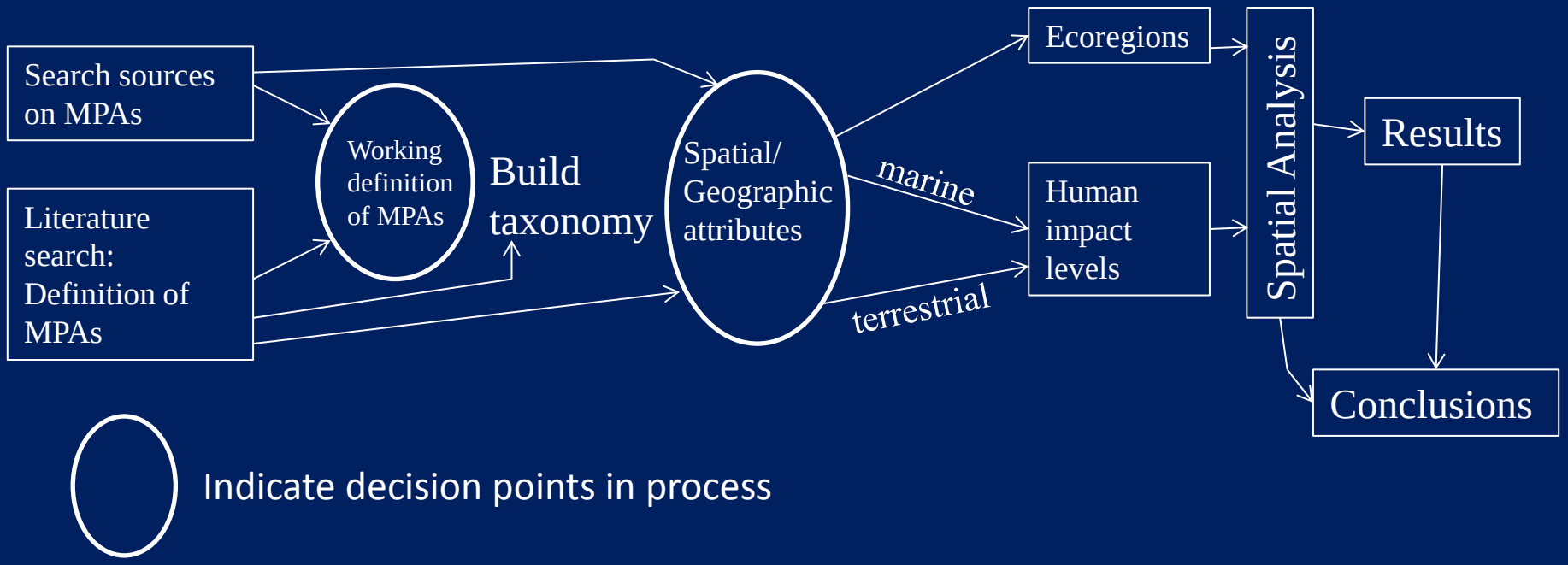
Designation and Management of Marine Reserve Networks (DEMARN)

- Part I— Spatial analysis and characterization of MPAs of the Mediterranean Sea
- Part II— Relationship between "conservation identity" (i.e., propensity for marine conservation) and MPA management regimes
- Part III— Use of the decision support tools (DST) for MPA management and zoning

PART I - Workflow



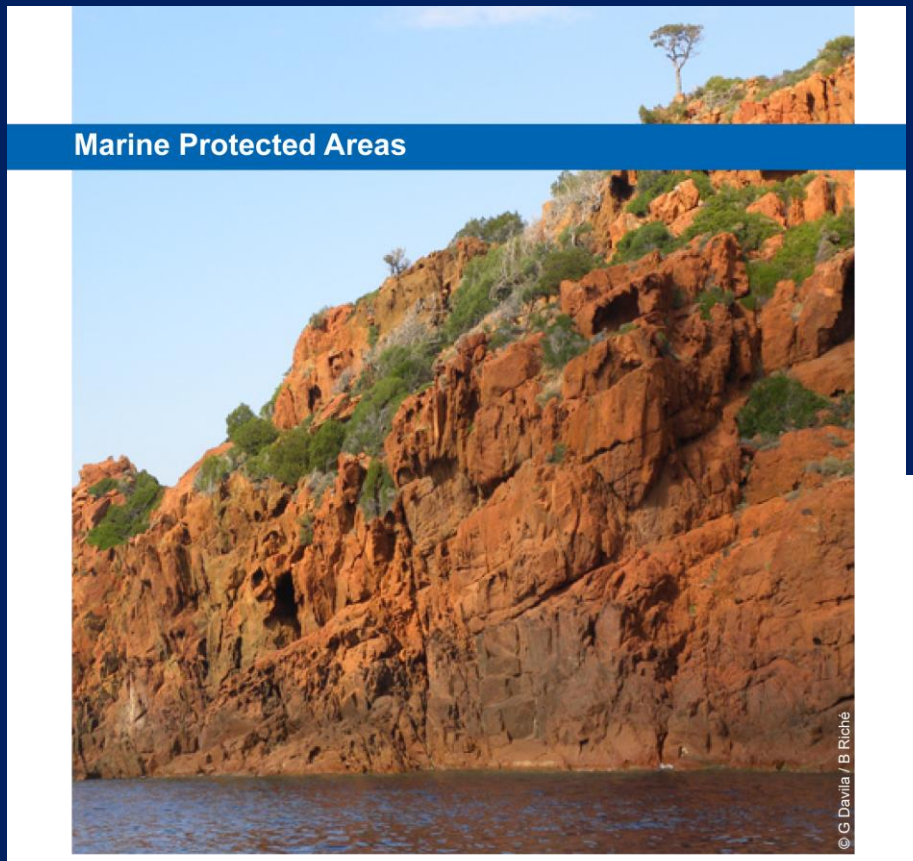
Countries, eco-regions, jurisdictions;
Levels of governance, IUCN protection categories, protection levels;
Areas of intense human impact and activity

PART I – Spatial Analysis

What is an MPA? How many are there?

Study	Sponsors/source	No. of MPAs
Coll et al. 2011	Institut de Ciències del Mar, Spain	105
Abdulla et al. 2008	IUCN, WWF, MedPAN	94
Mouillot et al. 2011	Université Montpellier, France	100
Brouquere 2005	IUCN Centre for Mediterranean Cooperation	120 (W. Med. only)

Marine News - IUCN Global Marine and Polar Programme Newsletter 2010-2011



Mediterranean Sea

Better management for more biodiversity

The Mediterranean Sea, one of the world's biodiversity hotspots, is increasingly threatened by human activities. The creation of Marine Protected Areas (MPAs) can reduce biodiversity loss, as long as these areas are managed effectively. Since July 2010, key actors from 6 European countries have

A threatened sea of worldwide importance

A number of important civilizations developed and expanded worldwide from the Mediterranean shores and lands, notably the Macedonians, Greeks, Carthaginians, Romans, Spaniards, Turks and the French

maritime traffic routes, connecting the Indian and Atlantic oceans with the countries of the Mediterranean basin and the Black Sea.

This long history of human settlements and developments has led to significant alterations to the Mediterranean Sea's natural environment

"According to the last report from the Regional Activity Centre for Specially Protected Areas (SPAs) there are over 750 SPAs in the Mediterranean [Sea] covering 144,000 km2. "

and distribution of native species. The accumulated effects of these threats are of great importance, especially since the Mediterranean basin is considered one of the world's biodiversity hotspots. Out of approximately 12,000 Mediterranean marine native species, 25 to 30% are endemic or exclusively found in the Mediterranean Sea. Conserving Mediterranean marine and coastal biodiversity is therefore crucial to slow current biodiversity loss and reach the Convention of Biological Diversity (CBD) targets for 2020.

Mediterranean MPAs

MPAs are set up with a conservation goal as well as to promote sustainable use of natural resources. They are also important for the preservation of local culture and associated historical features, such as submarine archaeological sites. According to the last report from the Regional Activity Centre for Specially Protected Areas (SPAs) there are over 750 SPAs in the Mediterranean, covering 144,000 km². This includes a diverse array of sites under different protec-

Mediterranean Sea. However, the distribution of these sites is uneven, with a greater proportion occurring in the northern and western part of the basin. The protection figures are still far from the 2020 CBD target, which proposes that we should effectively protect at least 10% of coastal and marine ecosystems.

In addition to increasing the number of MPAs in the Mediterranean, effective management of existing MPAs is crucial to reach intended objectives. A designated MPA without effective management is simply a *paper park* lacking the necessary means and measures to reach its conservation and sustainable use targets.

MedPAN NORTH project

The MedPAN Association was created as a legally independent structure under French law at the end of 2008 to represent managers of Mediterranean MPAs. Its purpose is the establishment and the effective operation of a Mediterranean network of MPAs to support the conservation of regionally important coastal and

2010. It aims to improve the management effectiveness of Mediterranean MPAs. It brings together 12 key actors from 6 European countries bordering the Mediterranean: Spain, France, Greece, Italy, Malta and Slovenia. The main project activities aim to promote innovative aspects of MPA management and a more sustainable management of fisheries and tourism.

IUCN-Med is collaborating closely with MPA managers and leading the project's technical aspects to promote innovative aspects of MPA management. In particular, a harmonized methodology will be provided to Mediterranean MPA managers to assess the effectiveness of their MPAs. IUCN will also assist managers in developing guidelines on how to address climate change and in designing a common strategic orientation and monitoring programme for invasive species.

For more information, please visit:

http://iucn.org/about/union/secretariat/offices/iucnmed/iucn_med_programme/marine_programme/ma-

What are MPAs?

*Any area of **intertidal** or **subtidal** terrain, together with its overlying water and associated flora, fauna, historical and cultural features, which has been reserved by law or other effective means to protect part or all of the enclosed environment. (Resolution 17.38 of the IUCN General Assembly, 1988, reaffirmed in Resolution 19.46, 1994)*

*Any defined area within or adjacent to the marine environment, together with its overlying water and associated flora, fauna, historical and cultural features, which has been reserved by legislation or other effective means, including custom, with the effect that its **marine and/or coastal biodiversity** enjoys a higher level of protection than its surroundings (Convention on Biological Diversity, 2010).*

*Any area of the marine environment that has been reserved by federal, state, tribal, territorial, or local laws or regulations to provide lasting protection for part or all of the **natural** and **cultural resources** therein (U.S. Executive Order 13158 on Marine Protected Areas, 2000).*

Sources of Information

The Network of Managers of Marine Protected Areas in the Mediterranean (MEDPAN)

A Database of the World's Marine Protected Areas

World Database on Protected Areas

World Wildlife Fund

National Oceanic and Atmospheric Administration, USA

International Union for Conservation of Nature

Regional Activity Center for Specially Protected Areas

International Partnership of Science

Marine Protected Areas as Tools for Fisheries Management and Conservation

PROPOSED

CONTAINED EMBAYMENTS

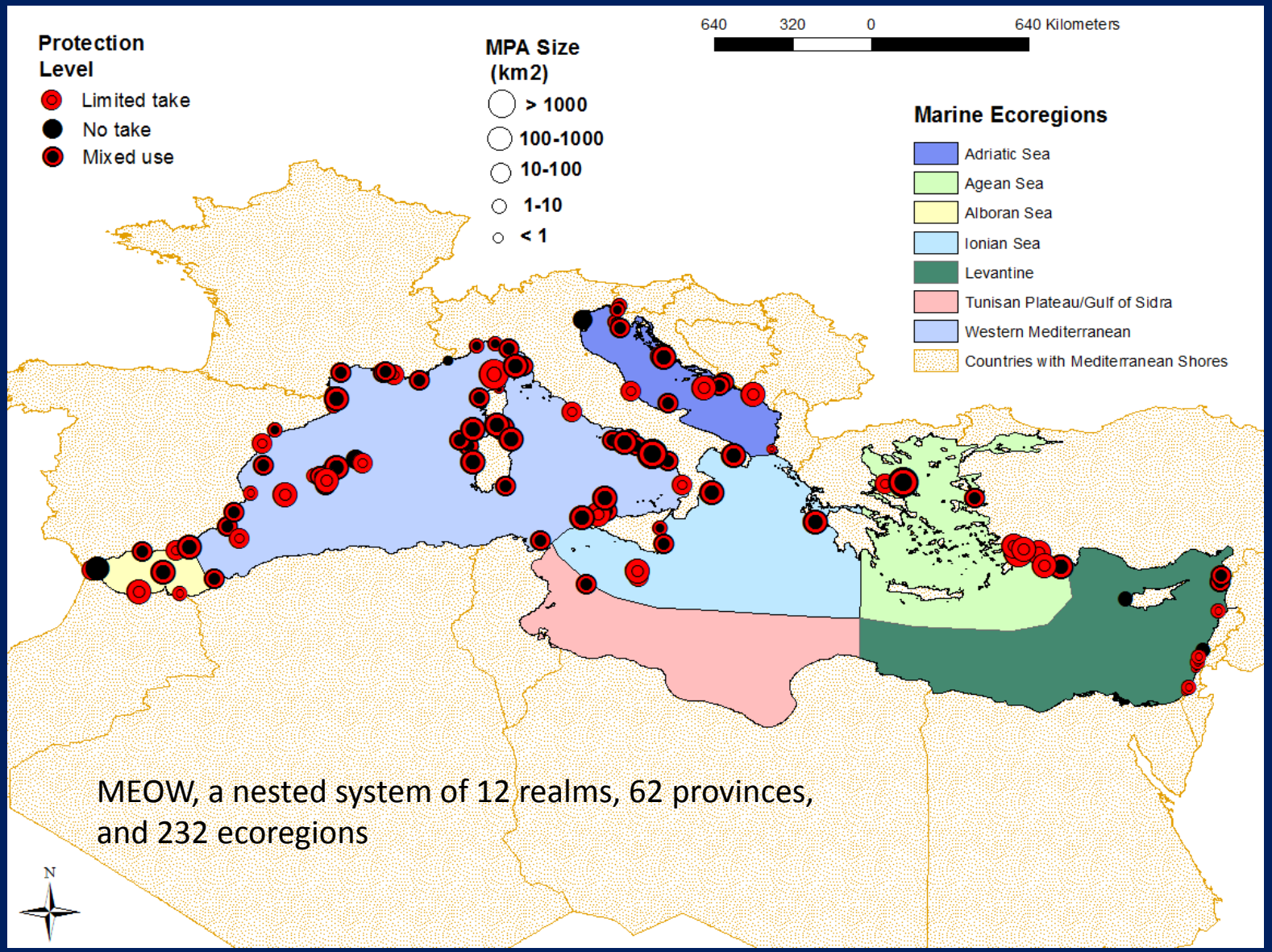
ISLANDS

WETLANDS/LAGOONS

INLAND LAKES

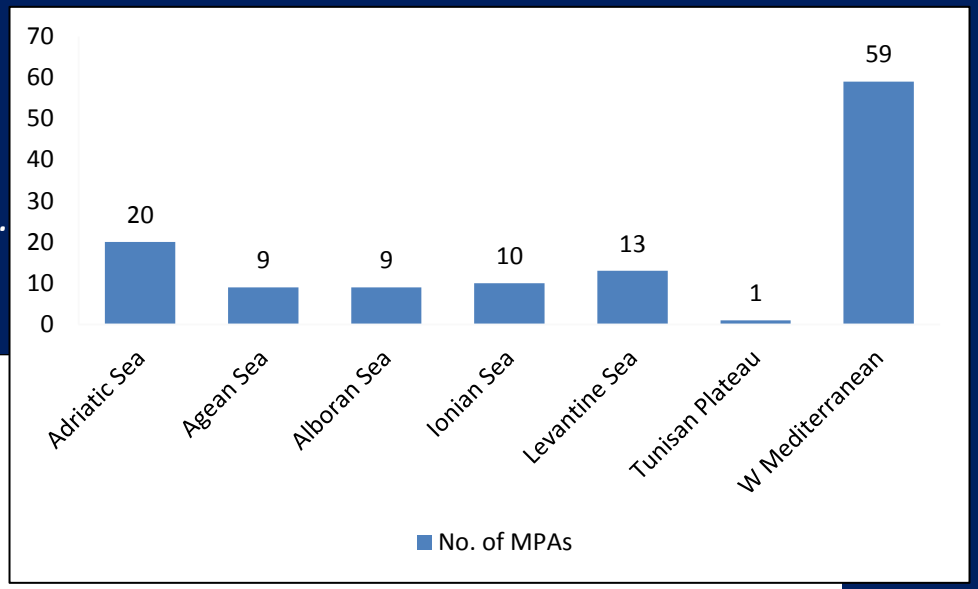
COASTAL FORMATIONS

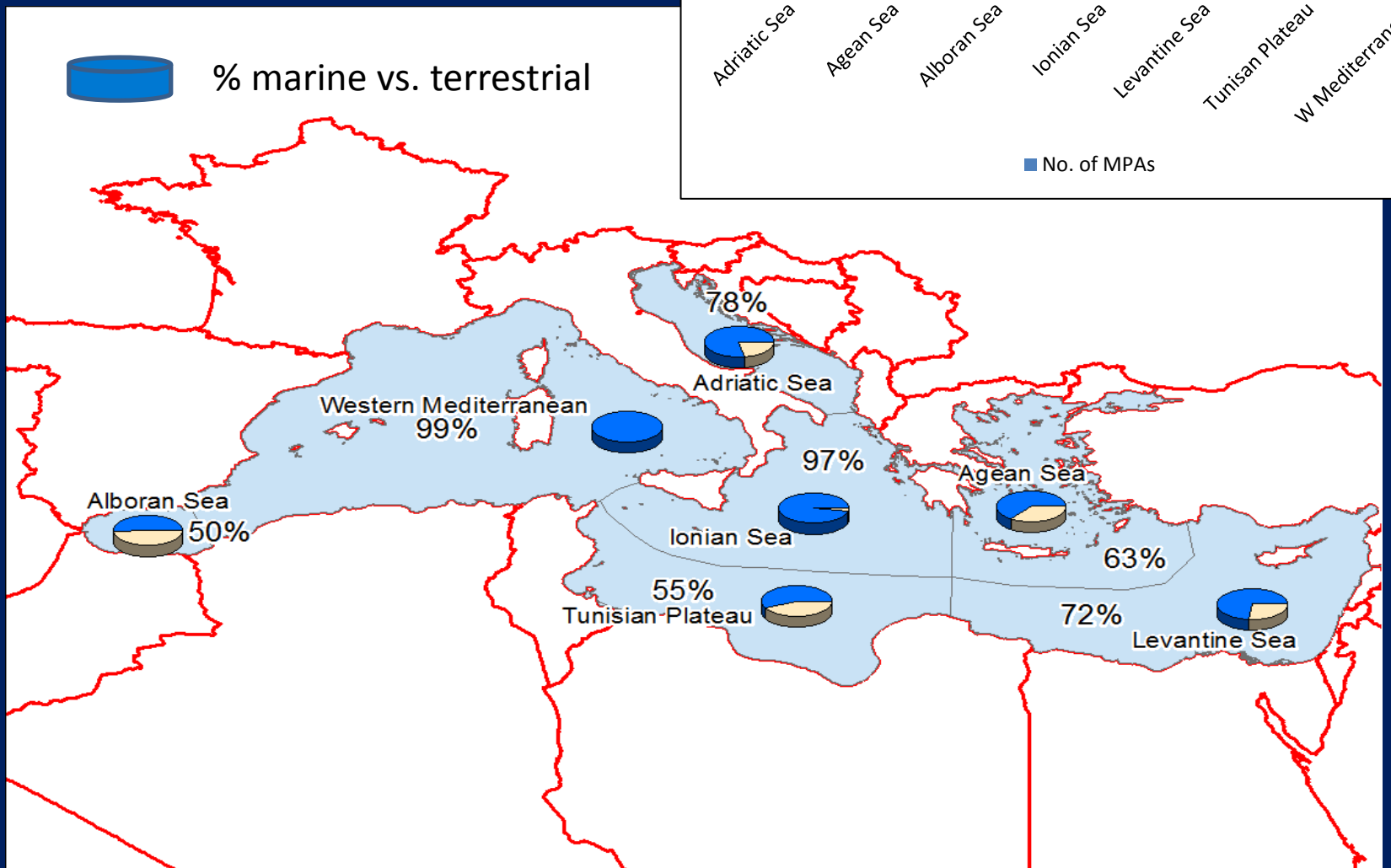
DELTAS & ESTUARIES



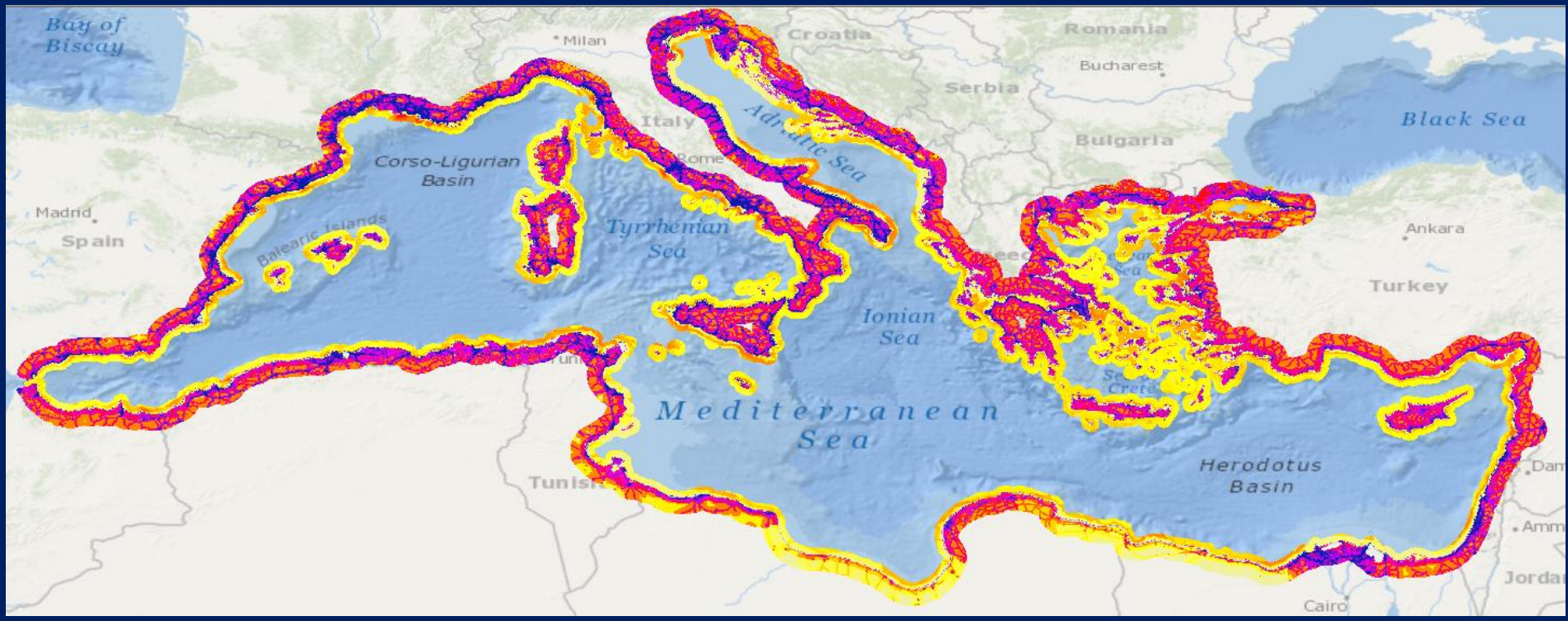
Ecoregions from MEOW:
Spalding, M. D., et al. (2007). "Marine Ecoregions of the World: A Bioregionalization of Coastal and Shelf Areas." *Bioscience* 57(7): 573-583.

Portman, M. E., Nathan, D., Levin, N. (2012) "From the Levant to Gibraltar: A Regional Perspective for Marine Conservation in the Mediterranean Sea"
Ambio — Journal of the Human Environment. 41(7): 670-681



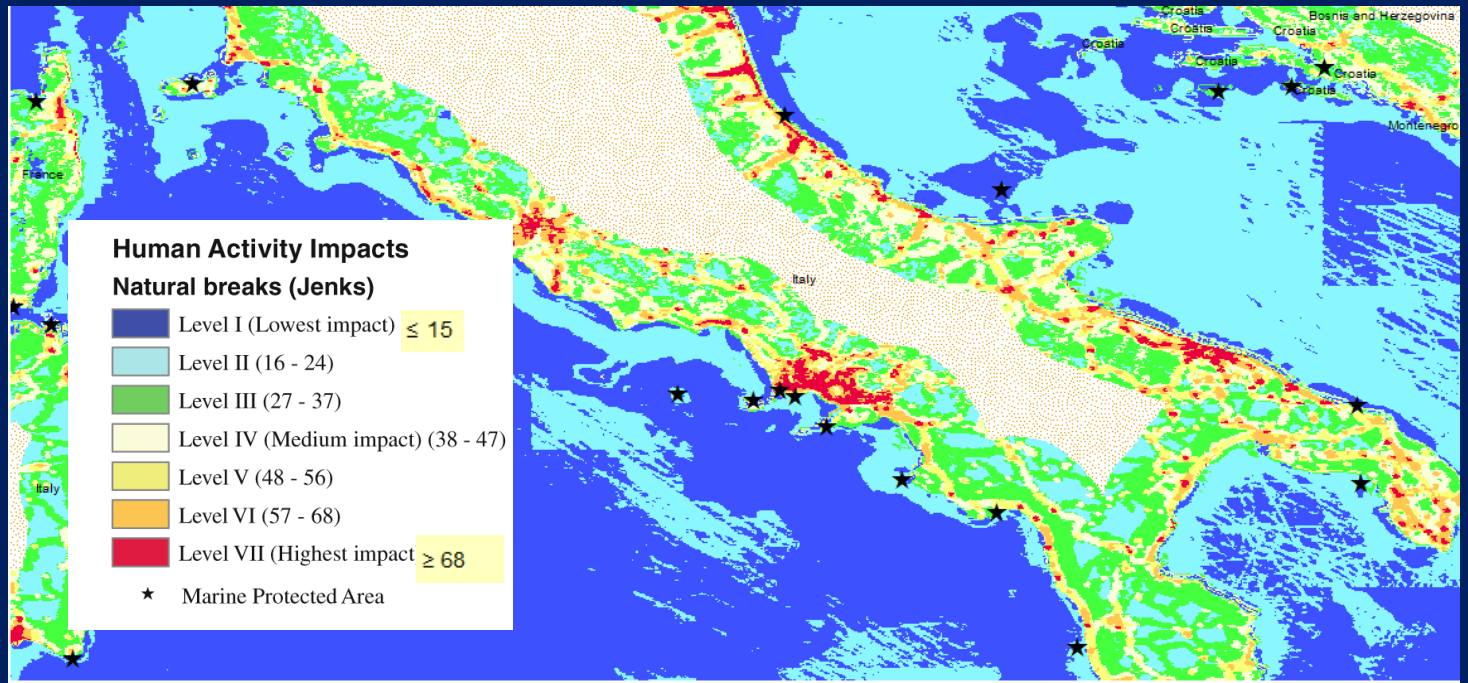


Combined human Impact/activities levels in the coastal zone



Human Activities Models

- Sanderson et al. (2002)'s proxies: human population distribution, urban areas, roads, navigable rivers, and agricultural land uses; Combined influence is normalized by global biomes - **influence** scores (WCS 2011).
- Halpern et al. (2008) used expert opinion to rate the **impact** of marine uses (fishing, mining, etc) on marine ecosystems.
- Standardized and combined at resolution of 1 km^2 cells.



Limitations of the combined raster

- Resolution: global or regional vs. local
- Impacts vs. activities: there are differences that standardization does not account for (impacts – response; activities – pressures)
- Smoothing process conducted for the gap between rasters
- Scores based on averages of the different areas/features

Survey Results

Spatial Extents:

- 16% (19 of 117): more terrestrial than marine area
- 13% < 1 sq km.; 15% have marine areas < 1 sq km

Spatial distribution can be generalized thus:

- Most MPAs are near shores; 94% are within territorial waters
- Most are small 40% < 100 sq km; 30% < 10 sq km
- Most are listed as level IV of the IUCN protection categories
- The average distance between MPAs: 50 km

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THE ROYAL SWEDISH ACADEMY OF SCIENCES

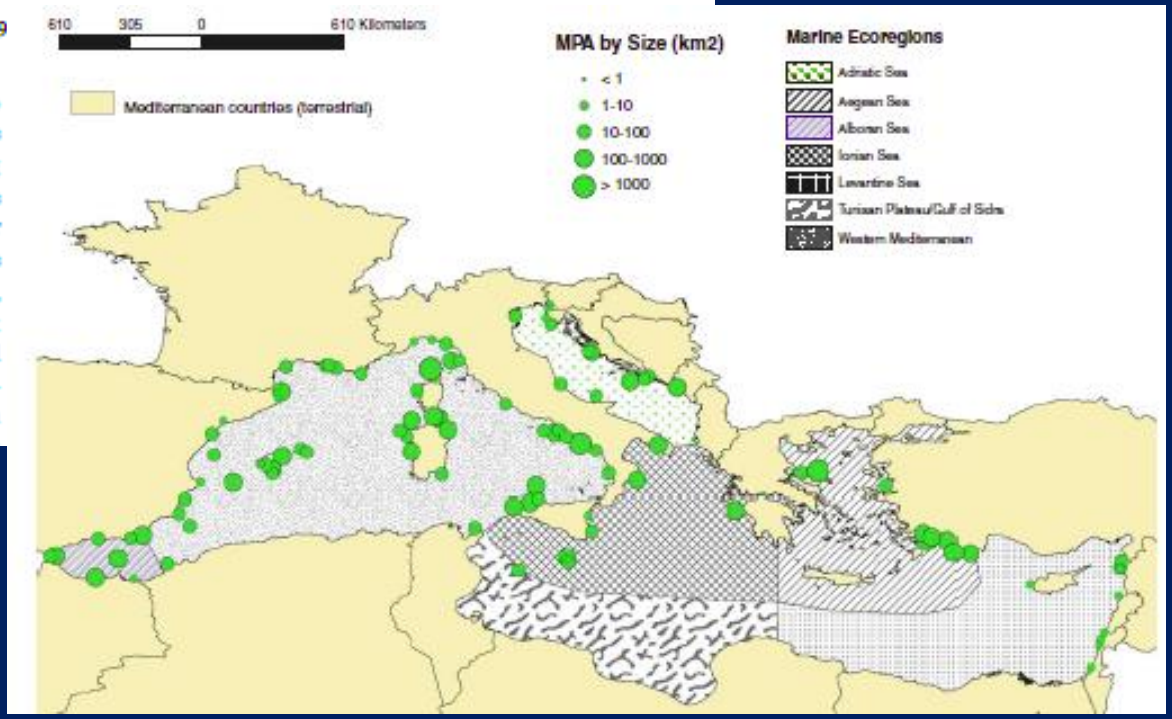
REPORT

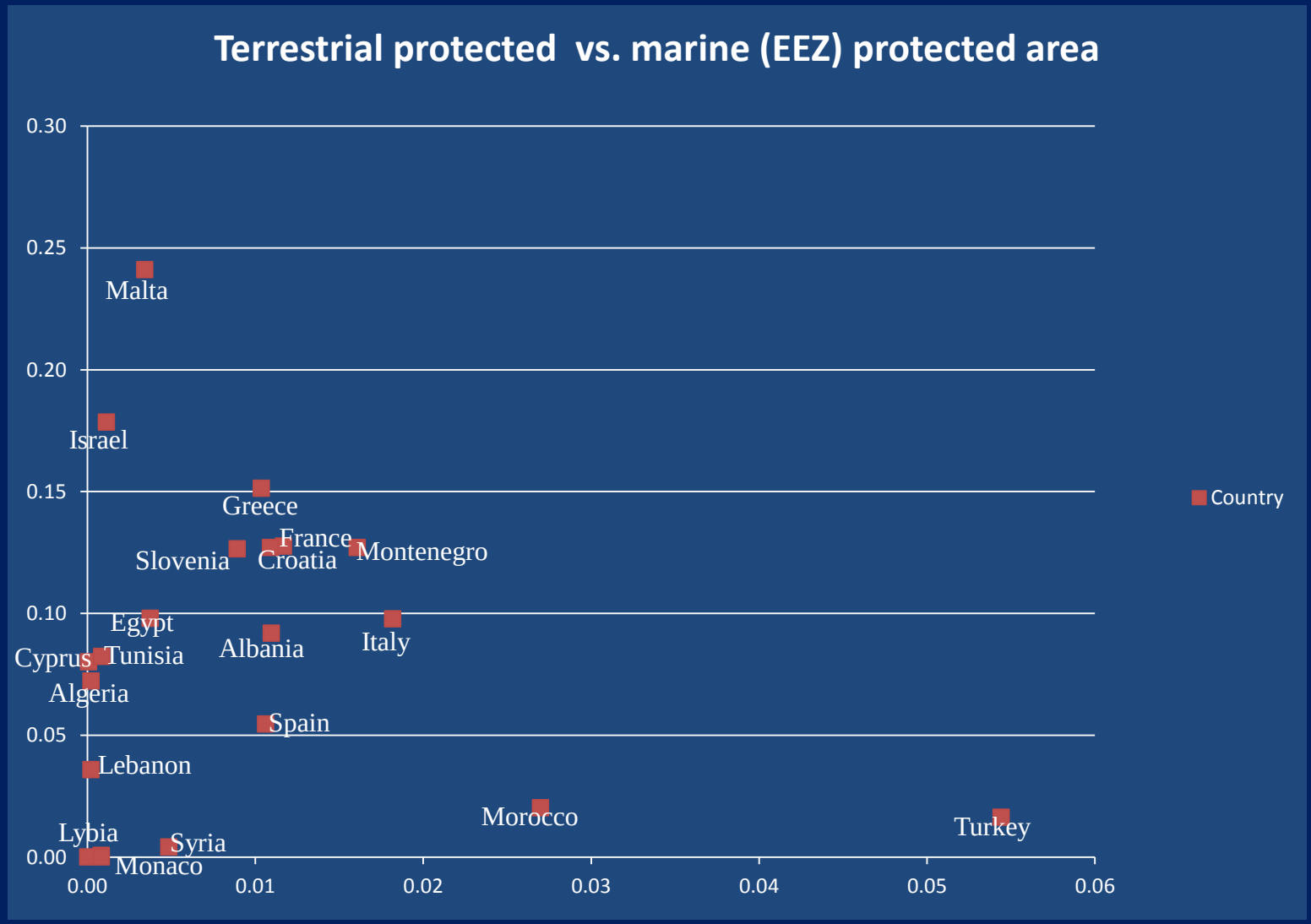
From the Levant to Gibraltar: A Regional Perspective for Marine Conservation in the Mediterranean Sea

Michelle E. Portman, Daniel Nathan, Noam Levin

Received: 25 October 2011 / Revised: 27 February 2012 / Accepted: 9

Abstract Marine protected areas (MPAs) are critical to the well-being of threatened ecosystems and thus can be highly beneficial to humans, especially to those residing nearby. We explore the qualities of 117 MPAs in the Mediterranean basin and develop a taxonomy of their characteristics. We relate the spatial distribution of the MPAs to the various characteristics of the taxonomy (size, distance from shore, protection levels, management regimes, etc.) and to areas of high human impact and influence levels. To do this we use information on biogeographic regions and information from two different human




Terrestrial protected vs. marine (EEZ) protected area
% protected area of terrestrial country area
% protected area of EEZ
0.30
0.25
0.20
0.15
0.10
0.05
0.00
0.00
0.01
0.02
0.03
0.04
0.05
0.06
Malta
Israel
Greece
France
Slovenia
Croatia
Montenegro
Egypt
Albania
Italy
Cyprus
Tunisia
Algeria
Spain
Lebanon
Morocco
Turkey
Lybia
Syria
Monaco
Country

More spatial analysis*

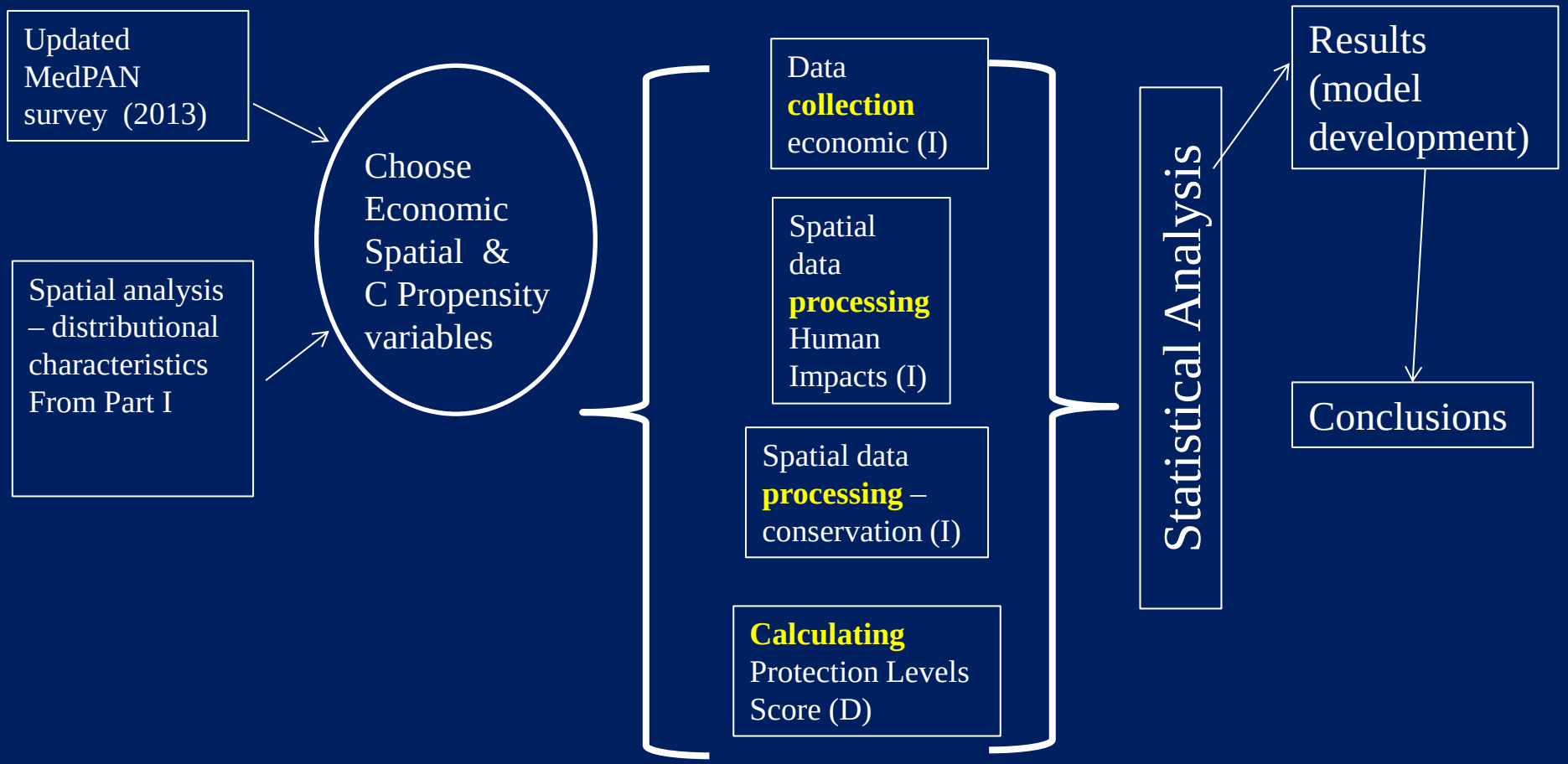
- Turkey has the largest area of MPAs: only 8 but large. A total of 4549 Km^2 (but about half terrestrial within that)
- Spain has the largest number of MPAs: 37; but smaller area. Only 2822 Km^2 but mostly marine (67%)
- In some countries there seems to be preference for proximity of MPAs to high human impact areas more than others.

* From the updated data base (2013)

PART II – Conservation "Identity" and Propensity For Marine Conservation

Linking of country characteristics related to conservation practices to attributes of MPA management plans

PART II - Workflow



Independent Variables – Country Identity

HUMAN IMPACTS

Marine impact average for the territorial Sea (12 nm)

Marine impact average of area within EEZ (200 nm)

Combined marine and terrestrial human impact level (Coastal zone: 50 km + 12 nm)

Average HI of MPA location

CONSERVATION CHARACTERISTICS

% country non-M Protected area

Average MPA size in country

% Country MPA area total (marine + terrestrial)

% Country MPA marine area of EEZ

Length of coast

ECONOMIC

Country per capita GDP

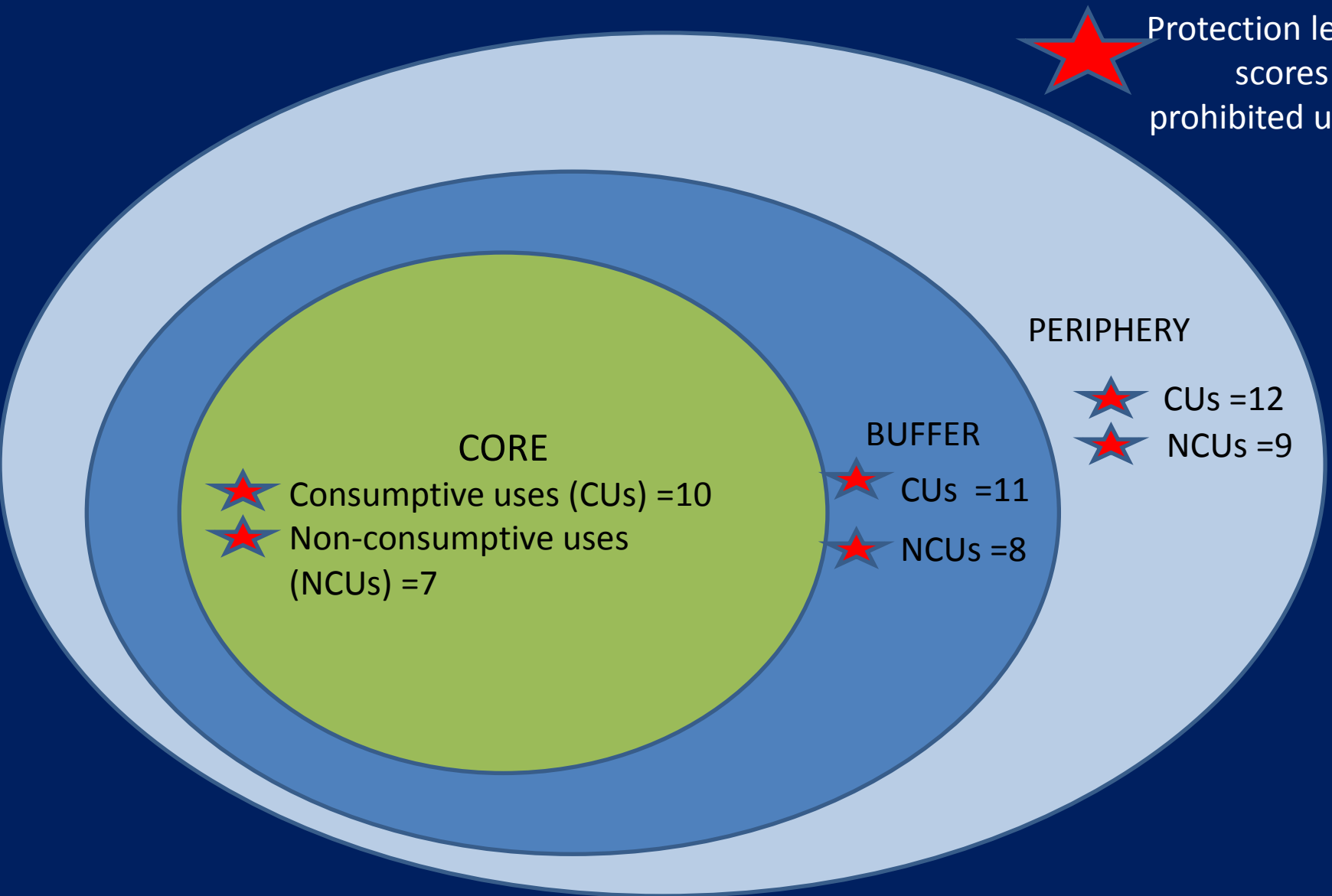
Country Fishing Activity— tonnage, fleet

Country Income from fishing activity in dollars/euros

Assumptions

- Core, buffer, periphery are common protection zones
- Zones that reflect varying protection intentions
- All uses have some impact, but some more than others
- EU countries will be very different than non-EU
- Consumptive uses are distinguished from non-consumptive
  - Consumptive: commercial & recreational fishing; spearfishing
  - Non-consumptive: boating, mooring, education, research, tourism

Dependent Variable
Average MPA protection level



Scoring of protection levels gives expression to the most restrictive conditions in the least restrictive zone

Core	Prohibited	Regulated
Each Consumptive Use	Value=10	Value=4
Each Non-Consumptive Use	Value=7	Value=1
Buffer		
Each Consumptive Use	Value=11	Value=5
Each Non-Consumptive Use	Value=8	Value=2
Periphery		
Each Consumptive Use	Value=12	Value=6
Each Non-Consumptive Use	Value=9	Value=3

Table 1: Scoring system used for protection levels of the Mediterranean MPAs Cumulative score divided by the total number of activities in each MPA.

There are 5 countries that have MPAs but insufficient information on zones

CNTY	PL_uses2
Albania	NONE
Algeria	13.67
Croatia	9.50
Cyprus	7.00
Egypt	NONE
France	11.99
Greece	14.21
Israel	13.25
Italy	13.78
Lebanon	19.38
Lybia	NONE
Malta	15.08
Monaco	5.88
Montenegro	NONE
Morocco	NONE
Slovenia	7.79
Spain	9.94
Syria	7.38
Tunisia	11.21
Turkey	10.71
UK (Gibraltar)	10.00

Libya, Albania, Egypt
Montenegro, Morocco

Cumulative scores are divided by the number of activities listed in the MPA < or = 8

Contribution

To discover:

- whether certain Med countries have a tendency towards marine conservation and if so, why?
- whether a marine conservation tendency is significantly different than one for land conservation
- where establishing spatially managed protected areas using zoning are making the greatest contribution (Are protection level scores associated with high/low impacted (disturbed) areas?)

PART III

How do systematic decision support tools influence the management regimes proposed for MPA design?

OR

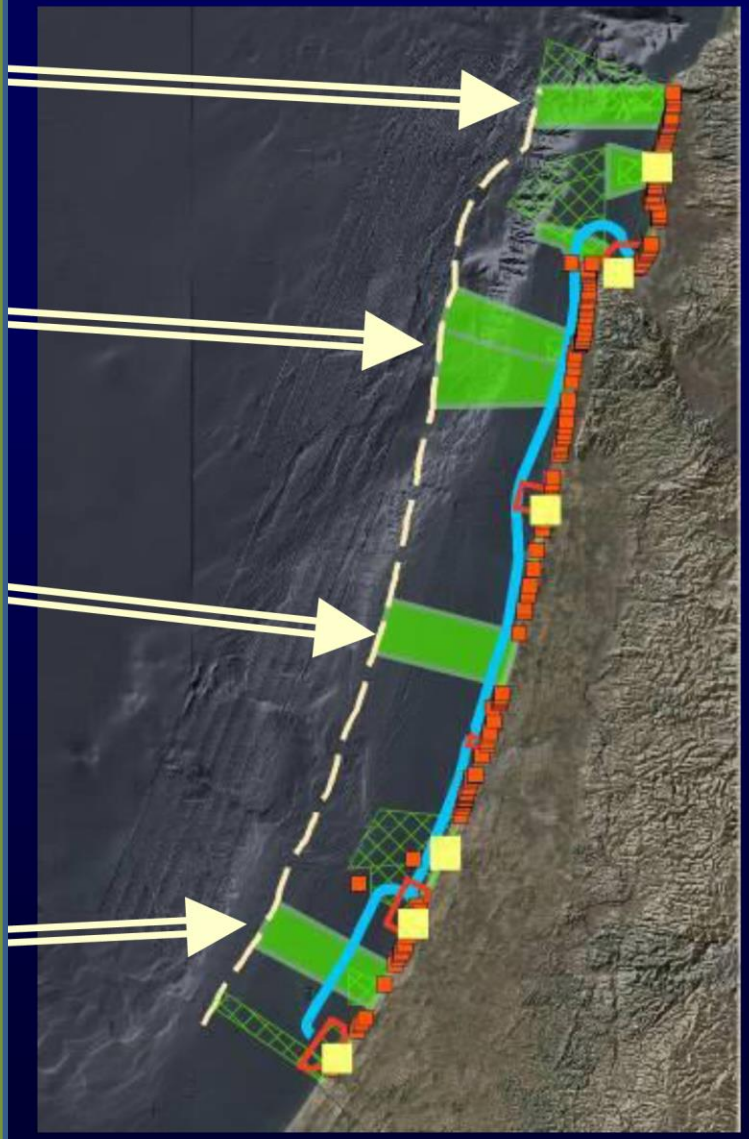
What is missing from the planner's decision making tool-box for the detailed planning of MPAs?

PART III- Use of Decision Support Tools for the Improved Management of MPAs in Israel

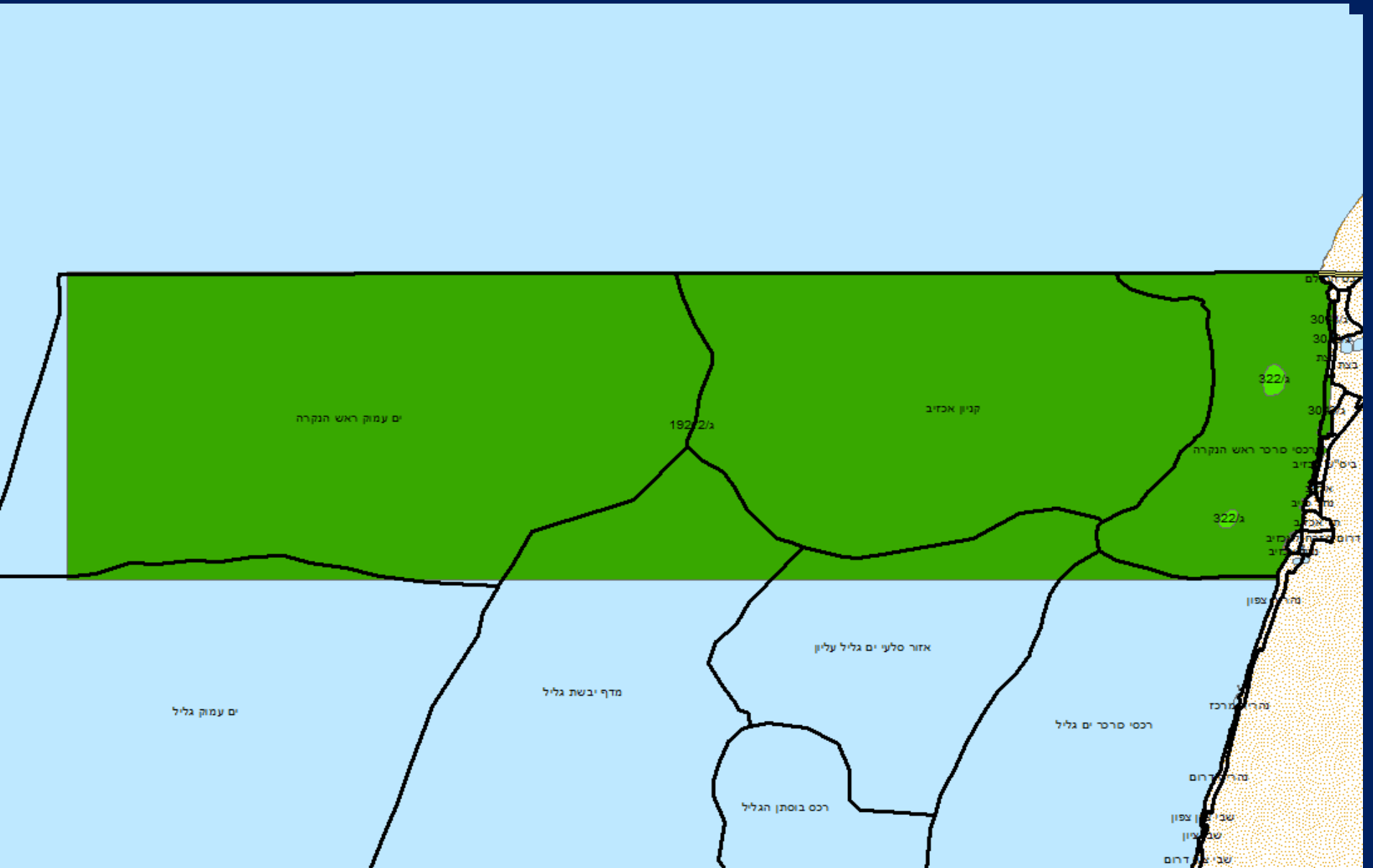
MARXAN – uses an algorithm for determining optimal spatial conservation solution under identified constraints.

ZONATION – Seeks the smallest marginal loss in conservation value based on multiple runs using weighted values.

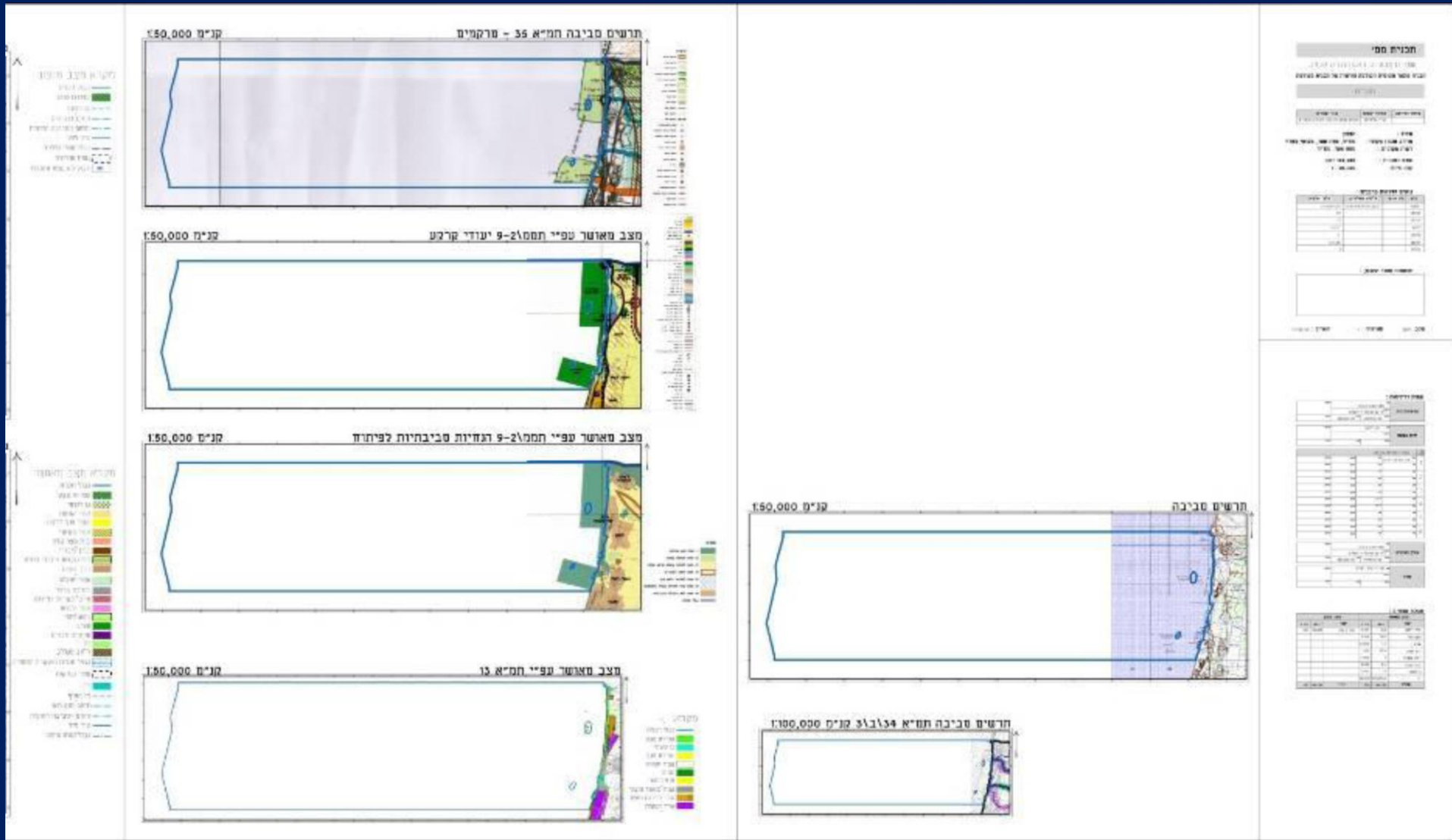
Four new MPAS



Rosh Ha Nikra – Advanced Detailed Planning (Zoning)



Rosh Ha Nikra Marine Reserve Detailed “City” Plan



Comparing three methods

	Spatial Conservation Prioritization		Planning Process
	Zonation	Marxan	Real-life
Meta-algorithm	Accelerated reverse stepwise heuristic	Flexible, but most common: Simulated annealing	
Spatial solution based on	smallest marginal loss in the overall conservation value	Selection frequency of cells	??
Operates via	Derivative of an objective function	Objective function	??
Constraints	Cost and area	Opportunity costs (foregone revenue)	??
Sensitivity to	Edge effects	Costs	??
Requires	Priority weights	Conservation targets	??

- **Zonation:** Considered a **reverse** step-wise heuristic because its meta-algorithm starts from the full landscape and iteratively removes those cells whose loss causes the smallest marginal loss in the overall conservation value
- **Marxan:** uses stochastic optimisation routines (spatially explicit simulated annealing) to generate spatial reserve systems that achieve particular biodiversity representation goals with reasonable optimality.

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He who hesitates is lost: Why conservation in the Mediterranean Sea is necessary and possible now

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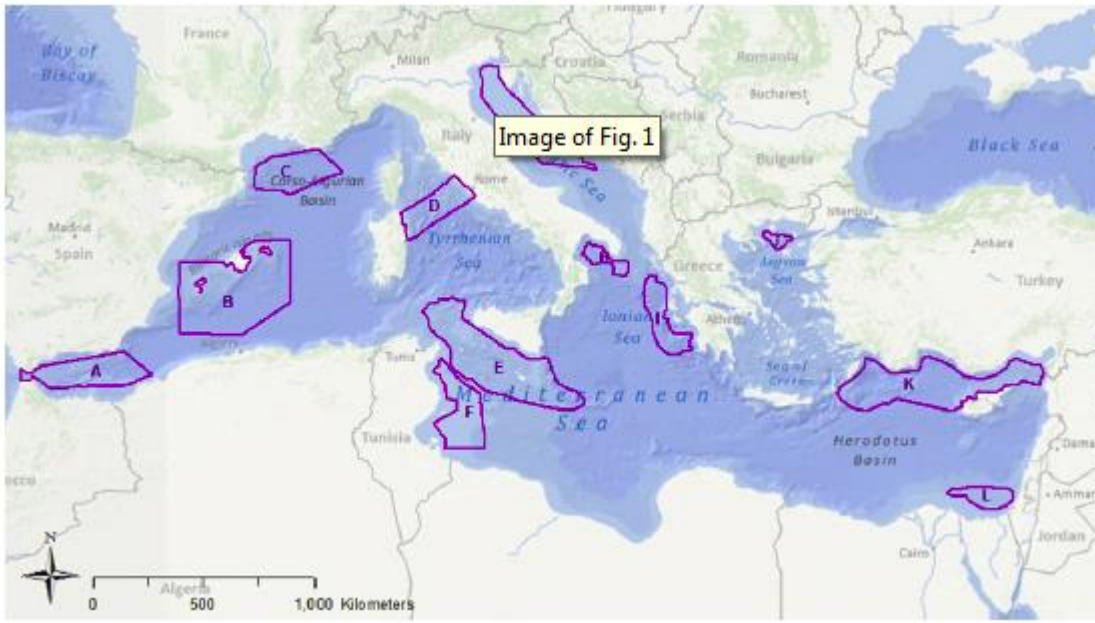

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ABSTRACT

Although significant advance
nean Sea have been made, r
Biological Diversity (and the
Particularly, these targets r
network of marine protected
many efforts to gather spatial
initiatives that identify sensi
paper, we briefly review exis
Mediterranean to recognise t
tools. We then propose a mo
the eleven ecologically and b
for moving conservation for
tenets of professional urban/
specific examples, despite some conventional wisdom, there is enough information on the Mediterranean Sea to move forward with ecosystem-based marine spatial management for conservation purposes using the EBSAs as a starting point - and the time is right to do so.

Thank you for listening….

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