# Setting conservation priorities: the solutions from CoCoNet

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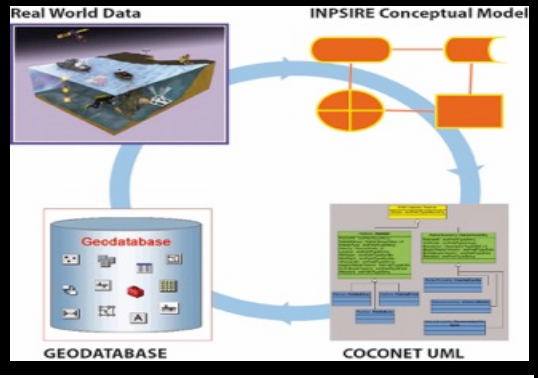
# COCONET:

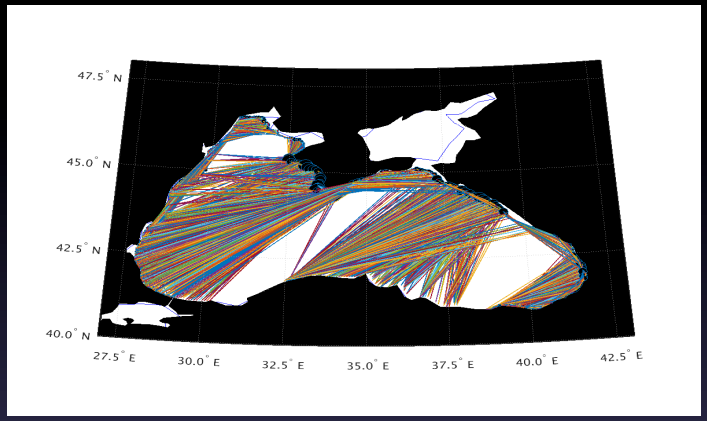
## Towards COast to Coast NETworks of marine protected areas (from the shore to the high and deep sea), coupled with sea-based wind energy potential

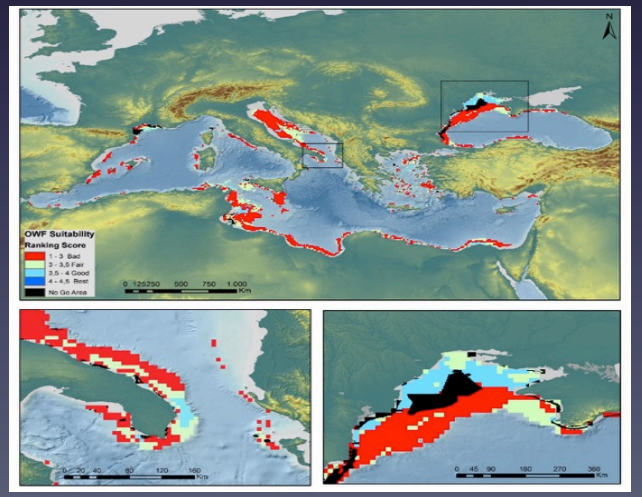
- A Project of the 7th Framework Programme

# HOW: 11 wps

- Habitat mapping: state of knowledge, data integration and scenarios of protection
- Species assemblages, dispersal and connectivity
- Scenarios of environmental change (natural and human induced): Role and response of the MPAs
- Offshore wind farms and marine protected areas
- MPA Socio-Economic Issues, Management and Legislation
- Information Dissemination and Outreach Training and capacity building
- Data Management and synthesis
- Pilot Projects: Black Sea Pilot Project / Mediterranean Sea Pilot Project



# The CoCoNet Guidelines

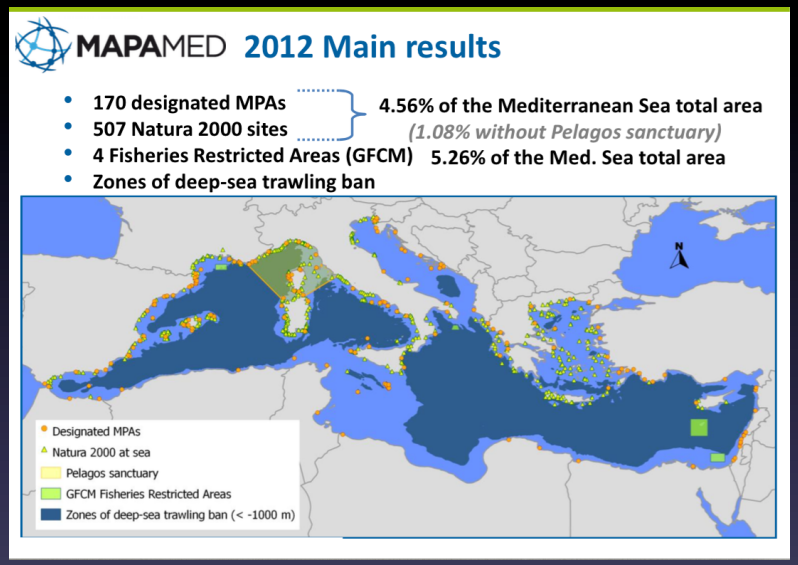
**Main authors:**

**Ferdinando Boero, Simonetta Fraschetti, Serge Planes, Aurore Chassanite, Enrique McPherson, Antoni Garcia-Rubies, Bella Galil, Paul Goriup, Stephen Beal, Takvor Soukissian, Federica Foglini**
**and the CoCoNet Consortium**

# General Principles

- **Increase the geographical coverage of protection**, establishing new arrays of MPAs (and then Networks of MPAs) in the southern and eastern parts of the Mediterranean Sea, and also in the whole Black Sea (most MPAs are concentrated in the north-central Mediterranean Sea)

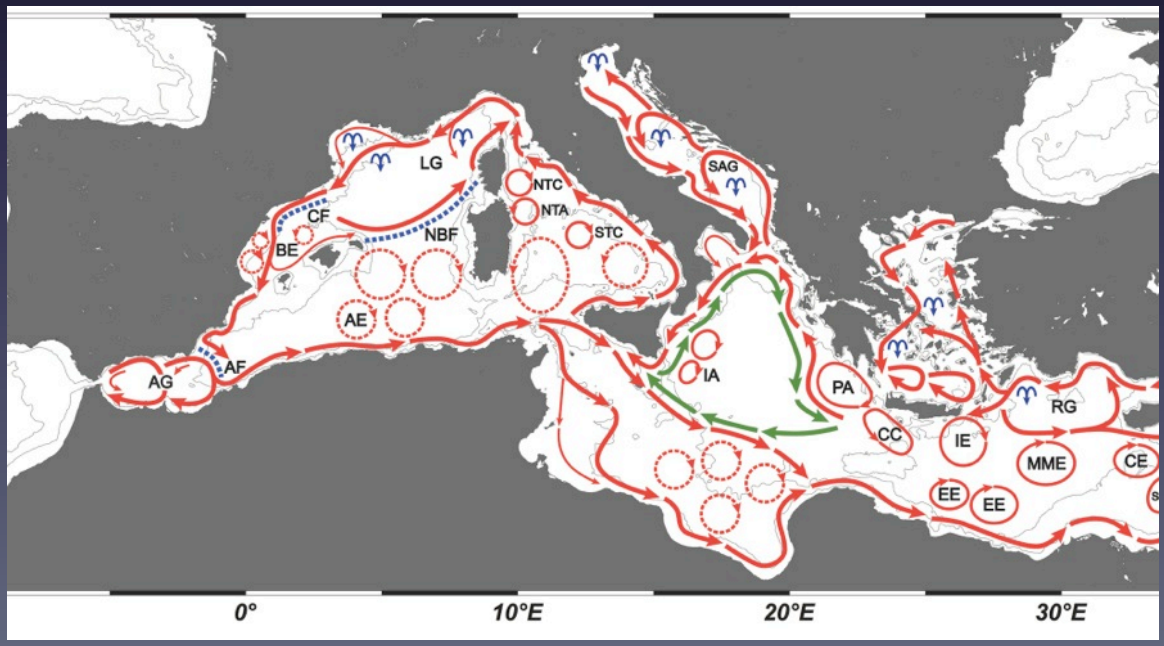
- **Consider conservation units as volumes**, and not surfaces only (i.e. areas), because they include the water column, the most widespread environment of the planet. This brings the high seas and the deep sea into the focus of conservation through networks of MPAs



# General Principles

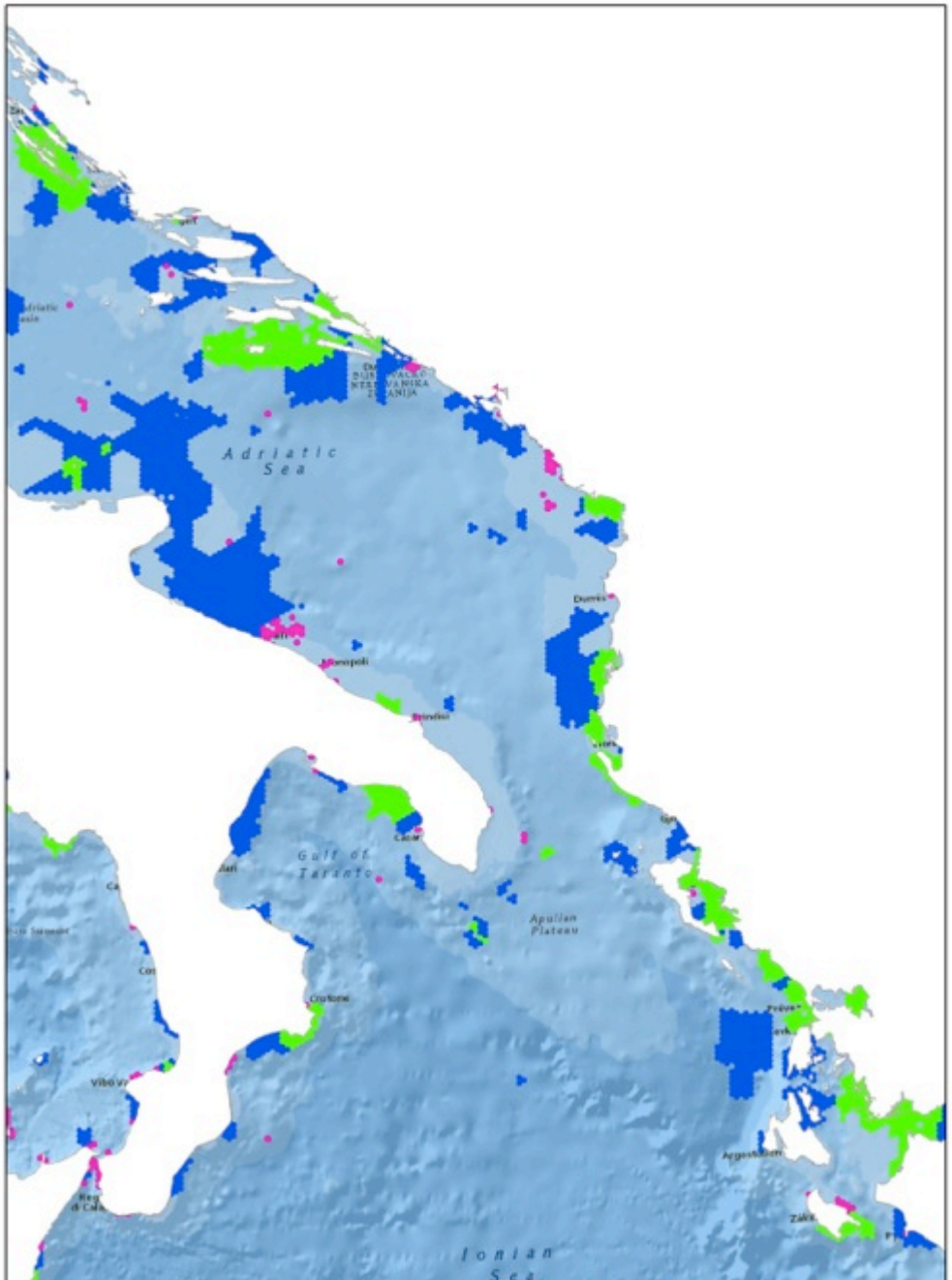
- **Identify ecologically sound units of protection and management**. Our results led to the concept of **Cells of Ecosystem Functioning**, defined by physical processes that allow for a biodiversity expression sustained and sustaining specific ecosystem functions that are consistent within a geographical area

CEFs are not isolated from each other, but connections within their volume are higher than outside in nearby volumes of water (including also the sea bottom and the coast). The CEFs are true biogeographic functioning units.



- **Embed networks of MPAs in the CEFs and combine climatic-oceanographic processes with biodiversity and ecosystem functioning**, including connectivity, producing a multi-layered, holistic conceptual space that will be instrumental for future management and protection of networks of MPAs and of the marine spaces in general

- **Promote free access to data,** especially those deriving from EU projects, through institutional databases sustained under rules and protocols endorsed by EU

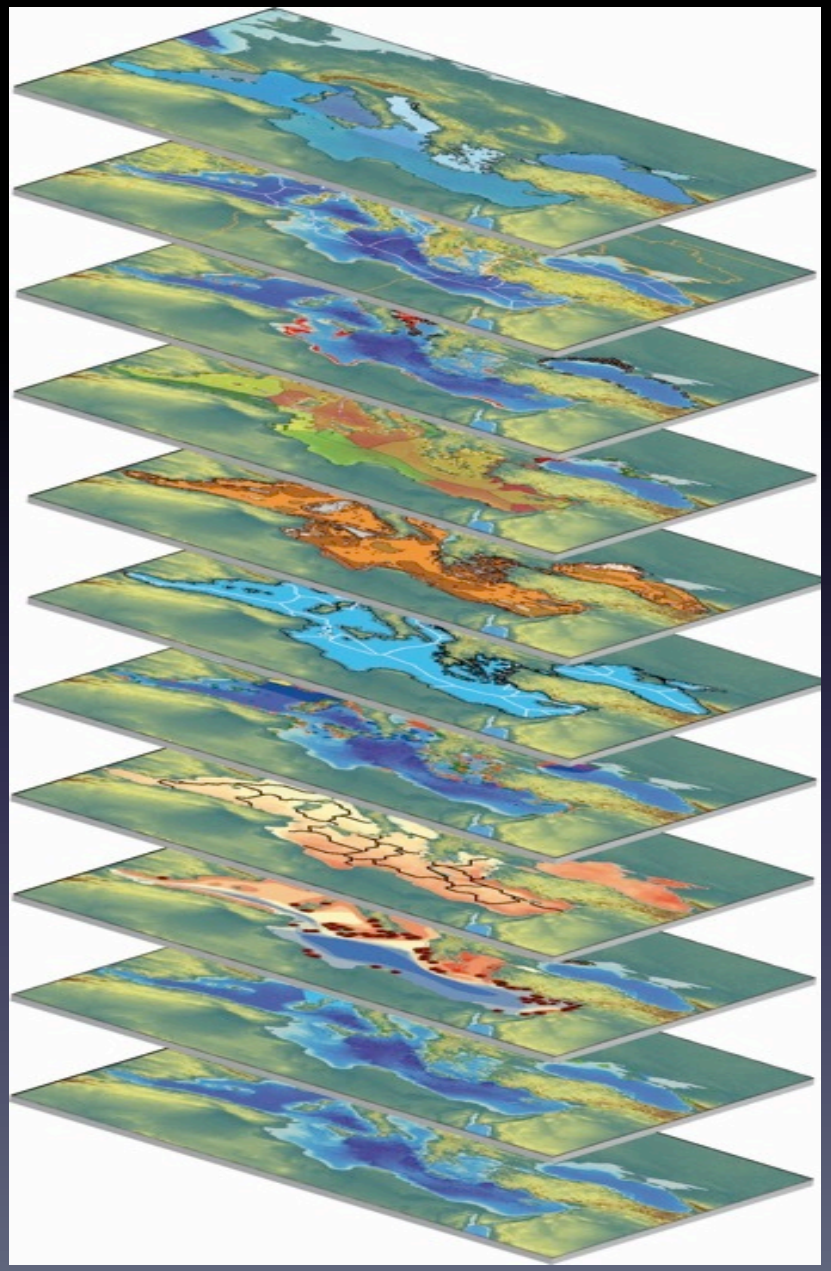


# Distribution of biodiversity at habitat level: the baseline

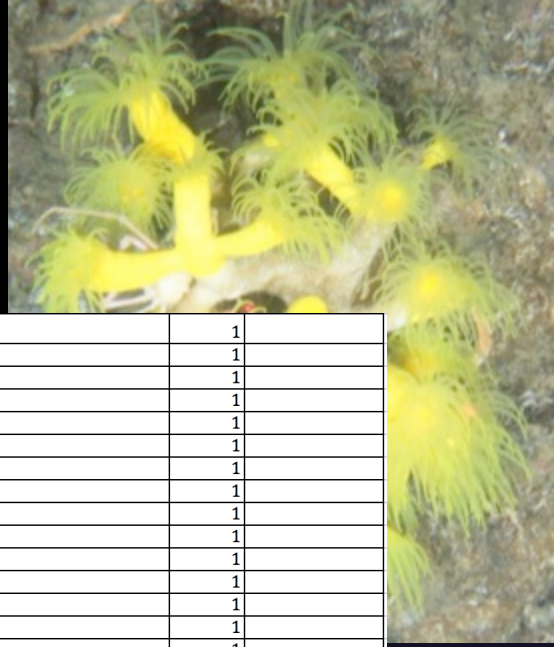
1. Which are the habitats in the Mediterranean and in the Black Seas?

2. How much we know about the distribution of critical habitats - threats to inform /support future analyses?

3. Is it possible to further improve previous attempts to set conservation priorities using GIS based spatial tools using this updated information?



# The habitat inventory



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| | | | | | |
|---|---|---|---|---|---|
| 725 | 04 | 1 | **Bathyal zone** | 1 | |
| 726 | 0401 | 2 | **Bathyal rocks and other hard substrates** | 1 | |
| 727 | 040101 | 3 | **Bathyal rocks** | 1 | |
| 728 | | 4 | Bathyal rocks with Anthozoa | 1 | |
| 729 | | 5 | Bathyal rocks with Alcyonacea | 1 | |
| 730 | | 6 | Bathyal rocks with *Corallium rubrum* | 1 | |
| 731 | | 6 | Bathyal rocks with *Acanthogorgia hirsuta* | 1 | |
| 732 | | 6 | Bathyal rock with *Muriceides lepida* and/or *Bebryce mollis* and/or *Villogorgia brevicoides* | 1 | |
| 733 | | 6 | Bathyal rock with *Viminella flagellum* and/or *Callogorgia verticillata* | 1 | |
| 734 | | 6 | Bathyal rock with *Paramuricea macrospina* | 1 | |
| 735 | | 5 | Bathyal rocks with Antipatharia | 1 | |
| 736 | | 6 | Bathyal rocks with *Leiopathes glaberrima* and/or *Antipathes dichotoma* | 1 | |
| 737 | | 6 | Bathyal rocks with *Caryophyllia calveri* | 1 | |
| 738 | | 5 | Bathyal rocks with Scleractinia | 1 | |
| 739 | | 6 | Bathyal rocks with *Dendrophyllia cornigera* | 1 | |
| 740 | | 6 | Bathyal rocks with *Madrepora oculata* and/or *Lophelia pertusa* | 1 | |
| 741 | | 6 | Bathyal rocks with *Desmophyllium dianthus* | 1 | |
| 742 | | 5 | Bathyal rocks with Scleractinia and Alcyonacea | 1 | |
| 743 | | 6 | Bathyal rocks with *Madrepora oculata* and/or *Lophelia pertusa* and *Corallium rubrum* | 1 | |
| 744 | | 5 | Bathyal rocks with Scleractinia and Tetractinellida | 1 | |
| 745 | | 6 | Bathyal rocks with *Madrepora oculata* and/or *Lophelia pertusa* and/or *Desmophyllum dianthus* with *Pachastrella monilifera* and/or *Poecillastra compressa* | 1 | |
| 746 | | 4 | Bathyal rocks with Demospongiae | 1 | |
| 747 | | 5 | Bathyal rocks with Tetractinellida | 1 | |
| 748 | | 5 | Bathyal rocks with Geodiidae | 1 | |
| 749 | | | | | |
| 750 | | | | | |
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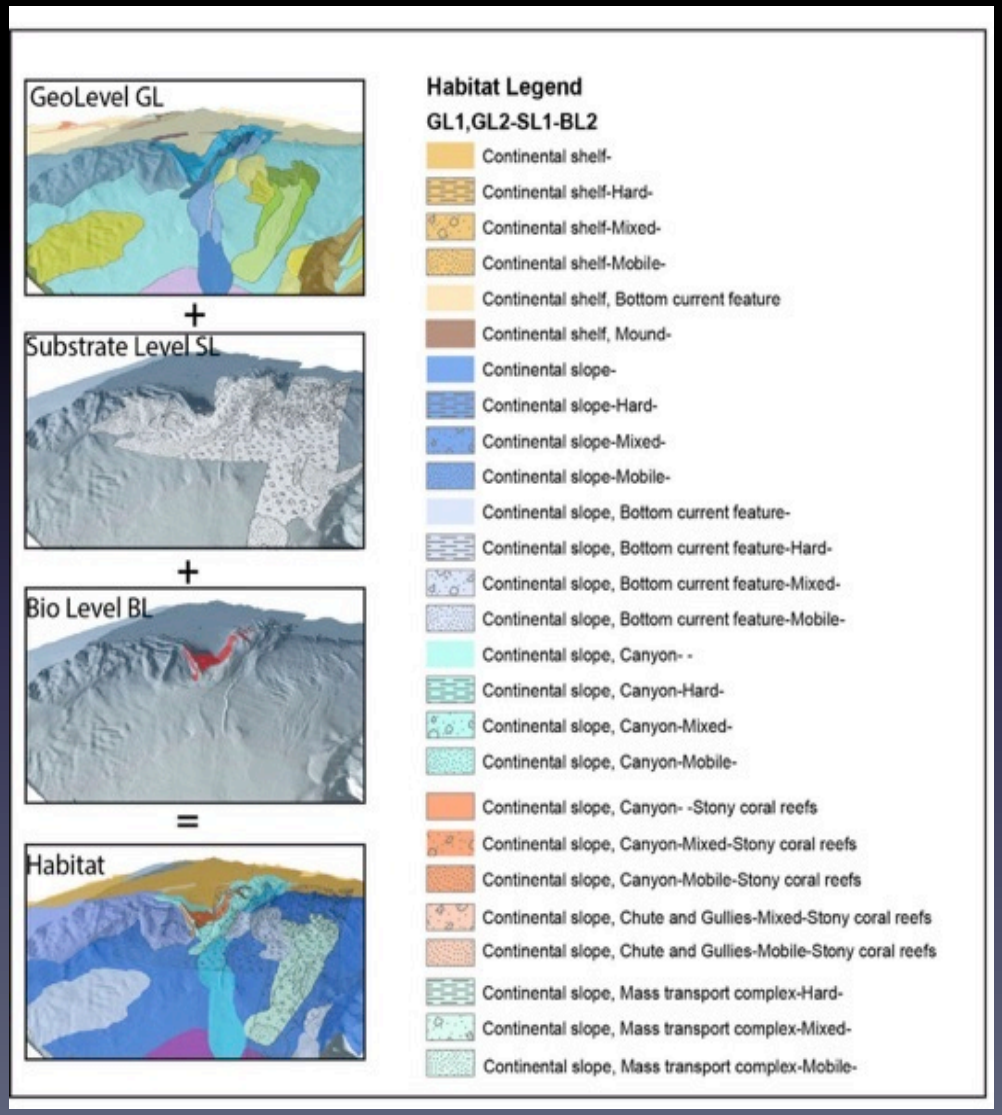
| | | | | | |
|---|---|---|---|---|---|
| 147 | 03 | 1 | **Infralittoral and circalittoral zone** | 1 | |
| 148 | 0301 | 2 | **Infralittoral rocks and other hard substrates** | 1 | |
| 149 | 030101 | 3 | High energy shallow infralittoral rock | 1 | |
| 150 | 03010105 | 4 | Highly exposed to moderately exposed infralittoral rock or cobbles with dense cover of corallines | 1 | |
| 151 | 03010113 | 4 | Exposed infralittoral rock with *Gelidium* spp. | 1 | 1 |
| 152 | 03010114 | 4 | Exposed infralittoral rock with encrusting algae | 1 | |
| 153 | 03010115 | 4 | Exposed to moderately exposed infralittoral rock with *Arbacia lixula* | 1 | |
| 154 | | 4 | Exposed infralittoral rock with encrusting corallines algae, sea urchins, *Chondrilla nucula, Balanophyllia europea* | 1 | |
| 155 | | 4 | Exposed infralittoral rock with Erythraean aliens | 1 | |
| 156 | 03010117 | 4 | Highly exposed upper infralittoral rock with fucales | 1 | |
| 157 | 0301011701 | 5 | Highly exposed upper infralittoral rock with *Cystoseira* spp. | 1 | 1 |
| 158 | | 5 | Highly exposed upper infralittoral rock with *Cystoseira crinita + Cystoseira barbata – Cladostephus spongiosus – Corallina elongata* | | 1 |
| 159 | | 5 | Highly exposed upper infralittoral rock with *Cystoseira crinita + Dictyota fasciola* | | 1 |
| 160 | | 5 | Highly exposed upper infralittoral rock with *Cystoseira crinita + Cystoseira barbata – Polysiphonia subulifera + Ulva rigida* | | 1 |
| 161 | | 5 | Highly exposed upper infralittoral rocks with *Cystoseira crinita f. bosphorica Kalug. et Zin. (=C. bosphorica Sauv.)* | | |
| 162 | | 5 | Highly exposed upper infralittoral rock with *Lophosiphonia obscura* | | 1 |
| 163 | | 5 | Highly exposed upper infralittoral rock with *Ceramium ciliatum + Lophosiphonia obscura + Padina pavonica* | | 1 |
| 164 | | 5 | Highly exposed upper infralittoral rock with *Grateloupia dichotoma* | | 1 |
| 165 | | 5 | Highly exposed upper infralittoral rock with *Dilophus fasciola f. repens + Polysiphonia opaca + Ceramium ciliatum + Enteromorpha compressa* | | 1 |
| 166 | | 5 | Highly exposed upper infralittoral rock with *Dictyota fasciola + Lophosiphonia obscura + Ceramium ciliatum* | | 1 |
| 167 | | 5 | Highly exposed upper infralittoral rock with *Ulva intestinalis* | | 1 |
| 168 | | 5 | Highly exposed upper infralittoral rock with *Ulva linza + Polysiphonia opaca* | | 1 |
| 169 | 0301011702 | 5 | Exposed upper infralittoral rock with *Sargassum* spp. | 1 | |
| 170 | | 4 | Infralittoral rock with *Mytilus galloprovincialis* and *Mytilaster lineatus* | | 1 |

# A new scheme for habitat mapping

CoCoNet attempts to establish an integrated approach on the definition of habitats

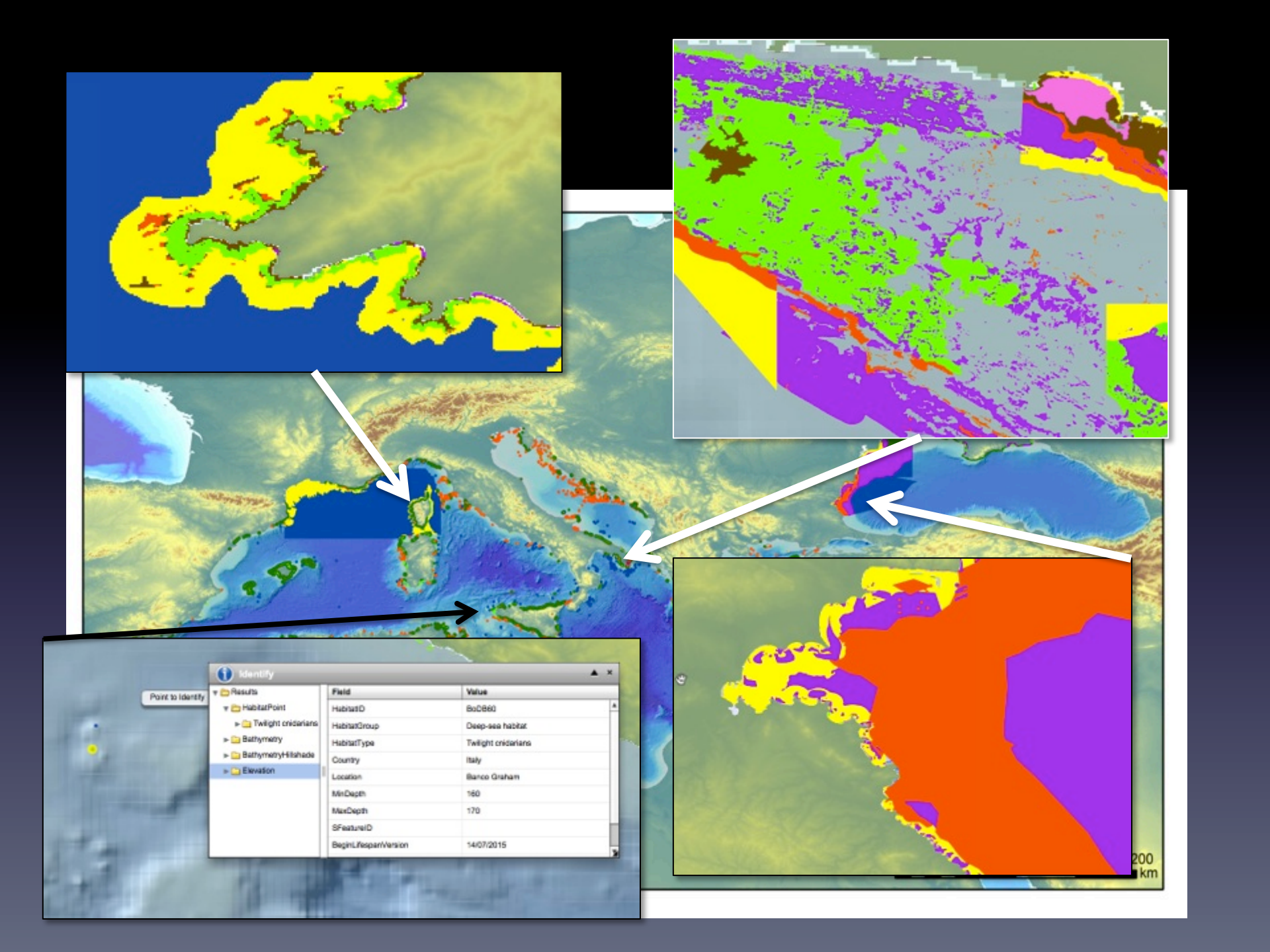
This scheme combines multi-scale geological and biological data organized into three levels (Geomorphological, Substrate and Biological), divided into several hierarchical sublevels

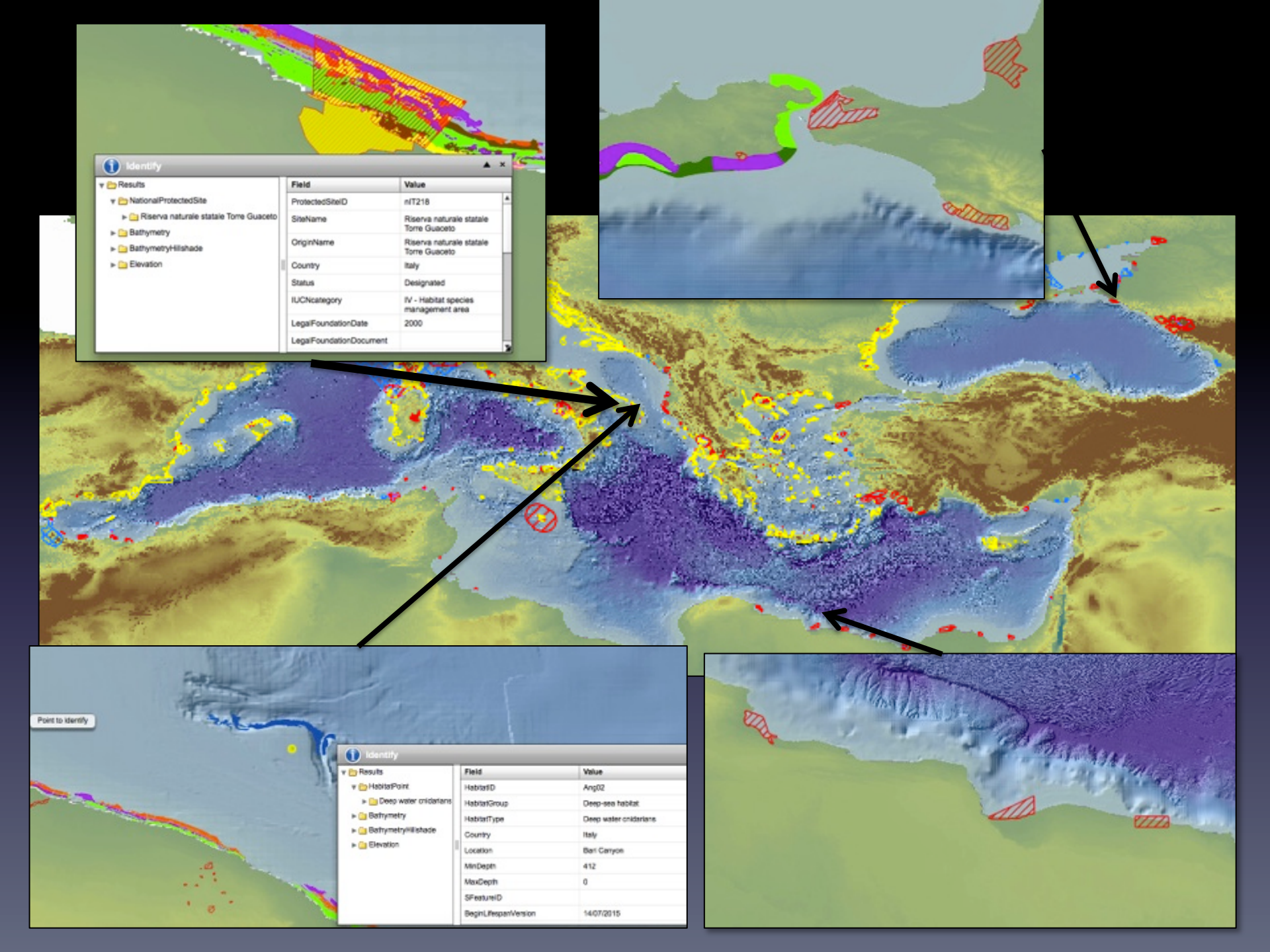
The Habitat layer is the sum of these levels leading to maps with several possibilities of level combination



# How much we know about the distribution of critical habitats?

| Habitats | Points | Polygons | Lines | Total |
|---|---|---|---|---|
| Barrens | 0 | 8 | 0 | 8 |
| Biogenic habitats | 895 | 1144 | 30 | 2069 |
| Canopies | 18931 | 7 | 12772 | 31710 |
| Deep-sea habitats | 475 | 11024 | 0 | 11499 |
| Mosaic | 14 | 356 | 0 | 370 |
| Rocky subtidal | 0 | 4061 | 0 | 4061 |
| Seagrasses | 0 | 24047 | 0 | 24047 |
| Sublitoral sediment | 0 | 15821 | 0 | 15821 |
| Total number of occurrences | | | | 89585 |


Point to Identify
Identify
Results
HabitatPoint
Twilight cnidarians
Bathymetry
BathymetryHillshade
Elevation
Field
Value
HabitatID
BoDB60
HabitatGroup
Deep-sea habitat
HabitatType
Twilight cnidarians
Country
Italy
Location
Banco Graham
MinDepth
160
MaxDepth
170
SFeatureID
BeginLifespanVersion
14/07/2015
200
km


Identify
Results
NationalProtectedSite
Riserva naturale statale Torre Guaceto
Bathymetry
BathymetryHillshade
Elevation
Field
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SiteName
Riserva naturale statale Torre Guaceto
OriginName
Riserva naturale statale Torre Guaceto
Country
Italy
Status
Designated
IUCNcategory
IV - Habitat species management area
LegalFoundationDate
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Point to identify
Identify
Results
HabitatPoint
Deep water cnidarians
Bathymetry
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Deep water cnidarians
Country
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MaxDepth
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BeginLifespanVersion
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# Guidelines

- Improve the knowledge about t
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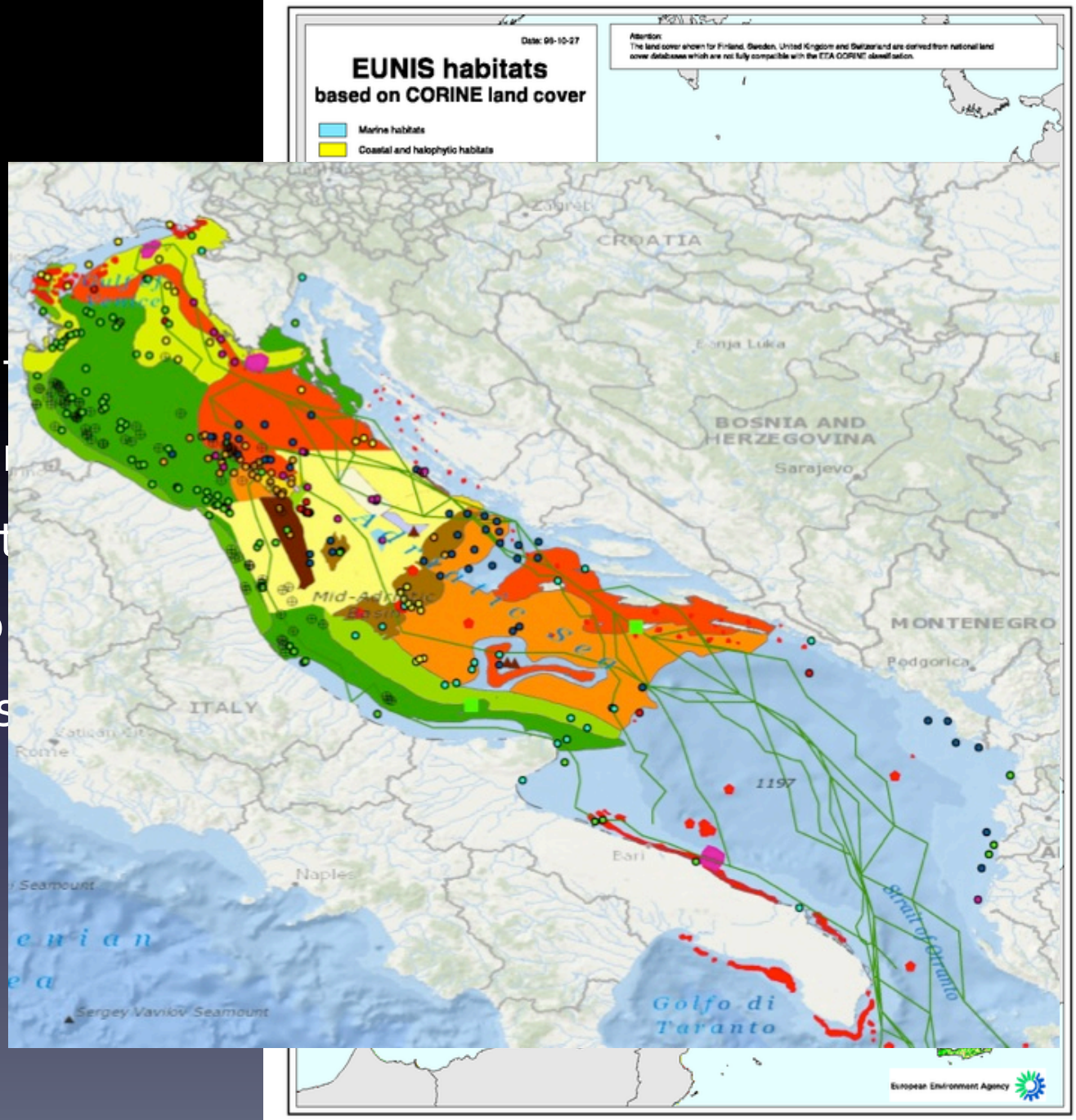
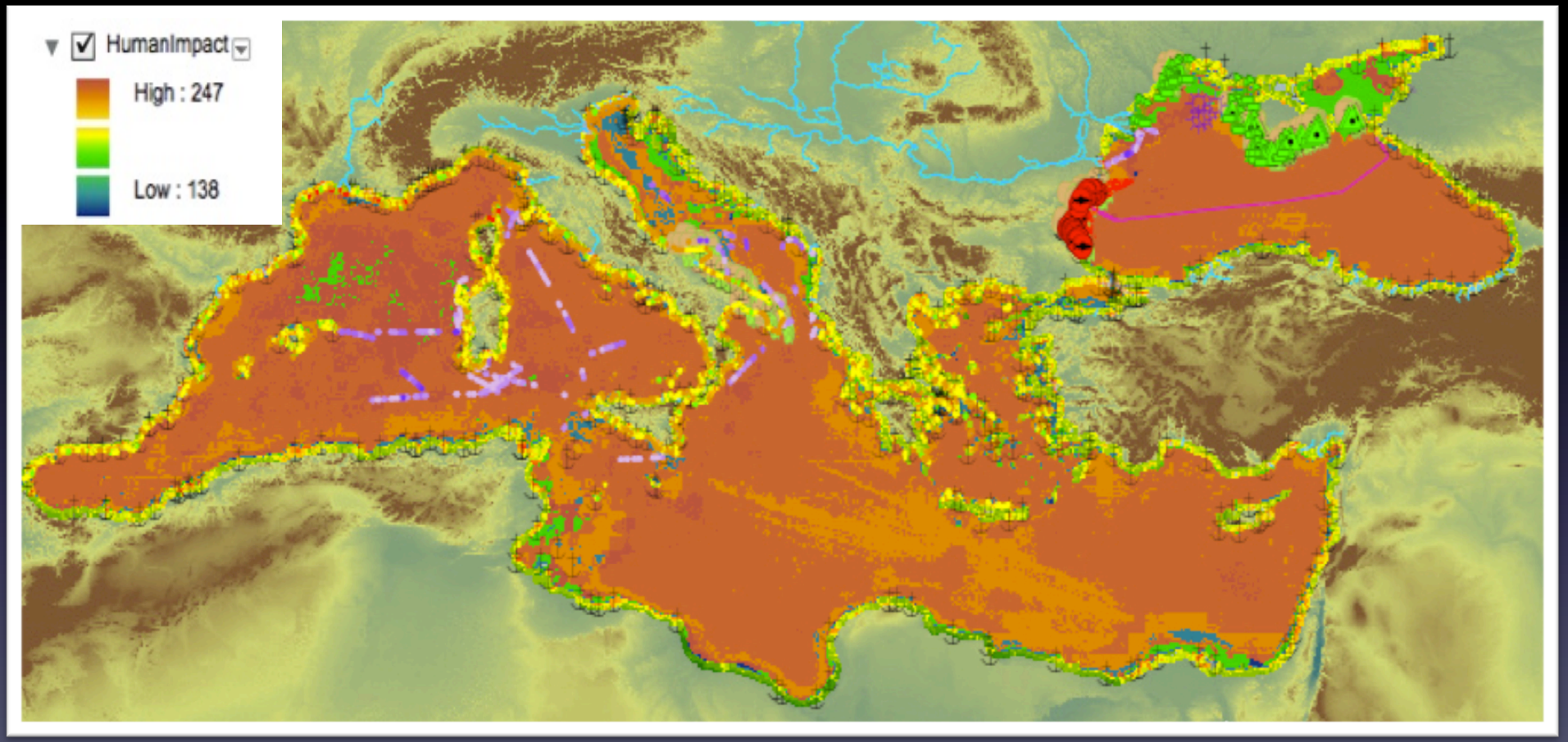
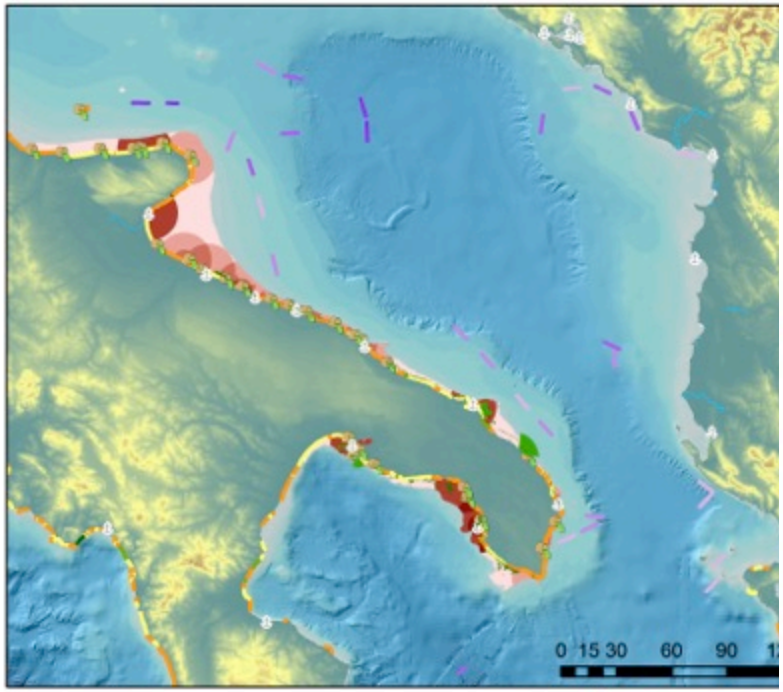
  habitats to attain t
  quality reached fo
  terrestrial systems
  (i.e. Corine land
  cover)

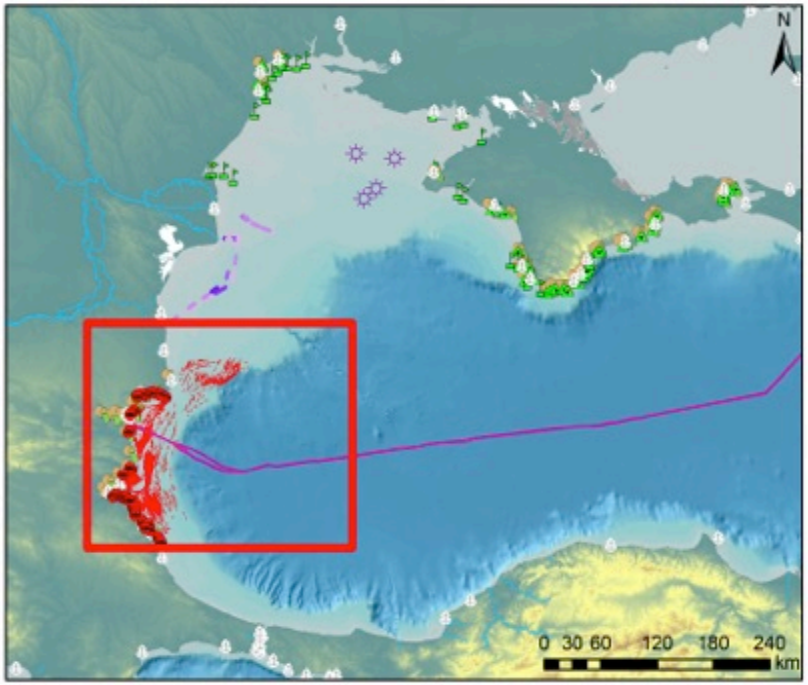


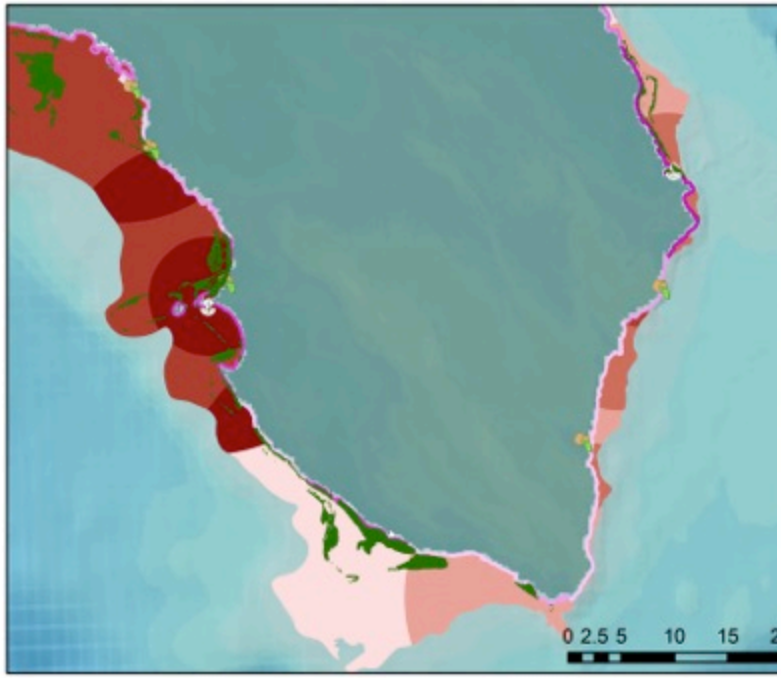
# Threats

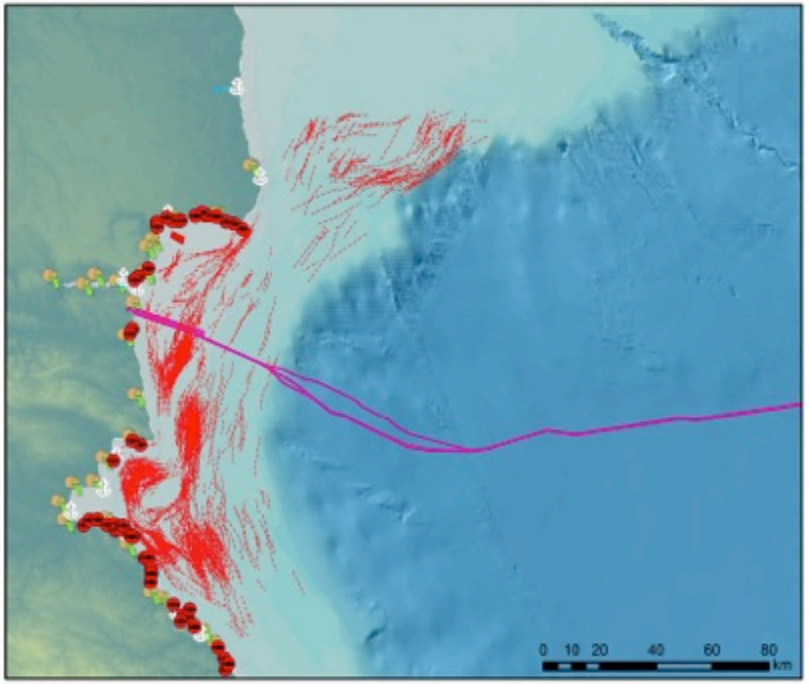



Move beyond the traditional single-threat approach, identifying key threats to different components of biodiversity and allowing site prioritization for different uses.




**MarineMacroPollution**

**Marine litter density**

- 0 - 9
- 9 - 29
- 29 - 61
- 61 - 114
- 114 - 162
- Fishing
- Aquaculture
- FishingRoute
- Port
- Anchorage
- Discharge
- Outfall
- ExplorationExtractionOfOilGas
- UtilityAndServiceLine
- WaterCourse

- Fishing
- Aquaculture
- FishingRoute
- Port
- WaterCourse
- UtilityAndServiceLine
- Discharge

# Guidelines (1)

- **Improve knowledge about the distribution and intensity of specific threats** such as fishery and bioinvasions
- **Prioritize and monitor areas highly exposed to present/future human pressures,** including the consideration of critically dynamic changes (e.g. hot spots of thermal anomalies, invasions by non indigenous species)
- **Base large-scale approaches on fine scale spatial data** and develop shared methodologies and strategies for the management of potential impacts and consequent changes.
- **Link threat mapping with specific actions** identified on the base of successful case of recovery to make better conservation/management decisions.

# Guidelines (2)

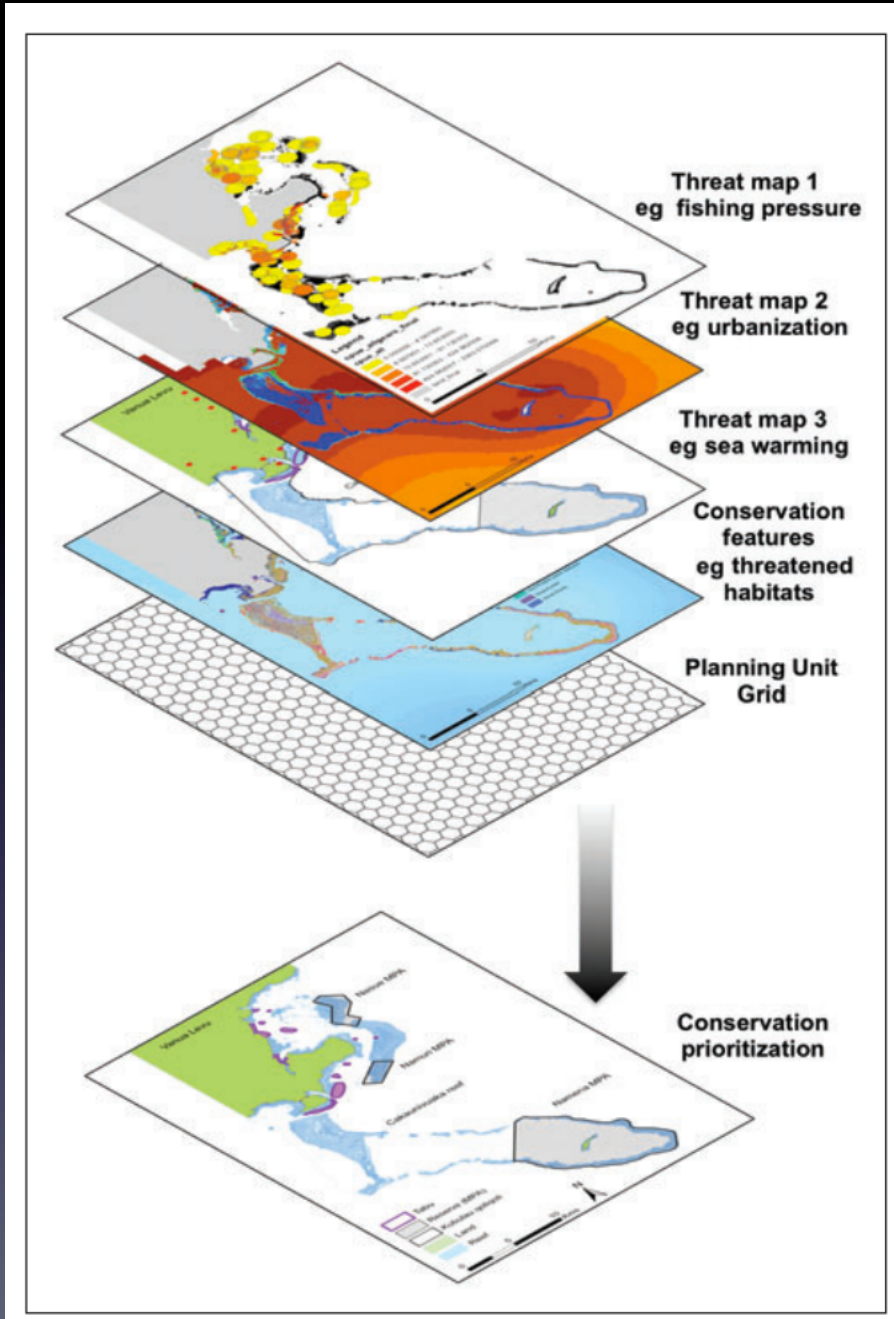
- **Develop novel tools and strategies to move beyond the traditional single- threat approach to assess the response of ecosystems to multiple stressors** (present and future), identifying key threats to different components of biodiversity and allowing site prioritization for different uses

- **Evaluate early warning indicators** to alert of approaching changes in marine habitats, in parallel with the evaluation of biodiversity monitoring methods and ecological thresholds

# New conservation/ management scenarios

Few past attempts to improve Med and BS scenarios of protection invariably stressing the need of passing from single MPAs to networks

Fine scale resolution data on habitat distribution, costs associated with management/ conservation initiatives, and potential threats have to be integrated to support the use of spatial tools such as Marxan




**MARXAN** is a software delivering decision support for reserve system design. MARXAN finds reasonably efficient solutions to the problem of selecting a system of spatially cohesive sites that meet a suite of biodiversity targets. Given reasonably uniform data on species, habitats and/or other relevant biodiversity features and surrogates for a number of planning units MARXAN minimizes the cost while meeting user-defined targets.

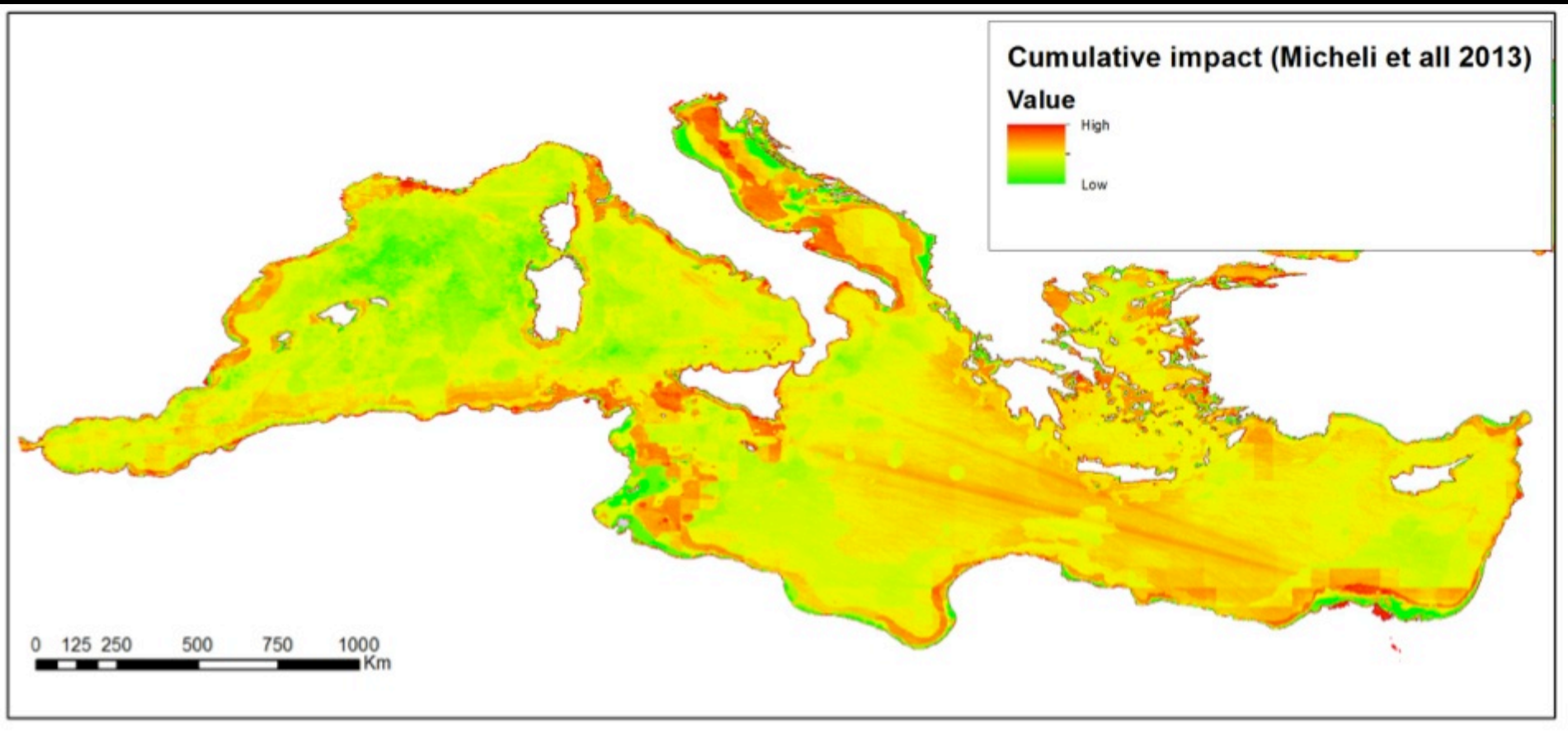
## Study Area

- **Planning Units**
  - Form
  - Size
- **Conservation Features**
  - Type
  - Target
- **Cost**
  - Management Cost

# Conservation Features

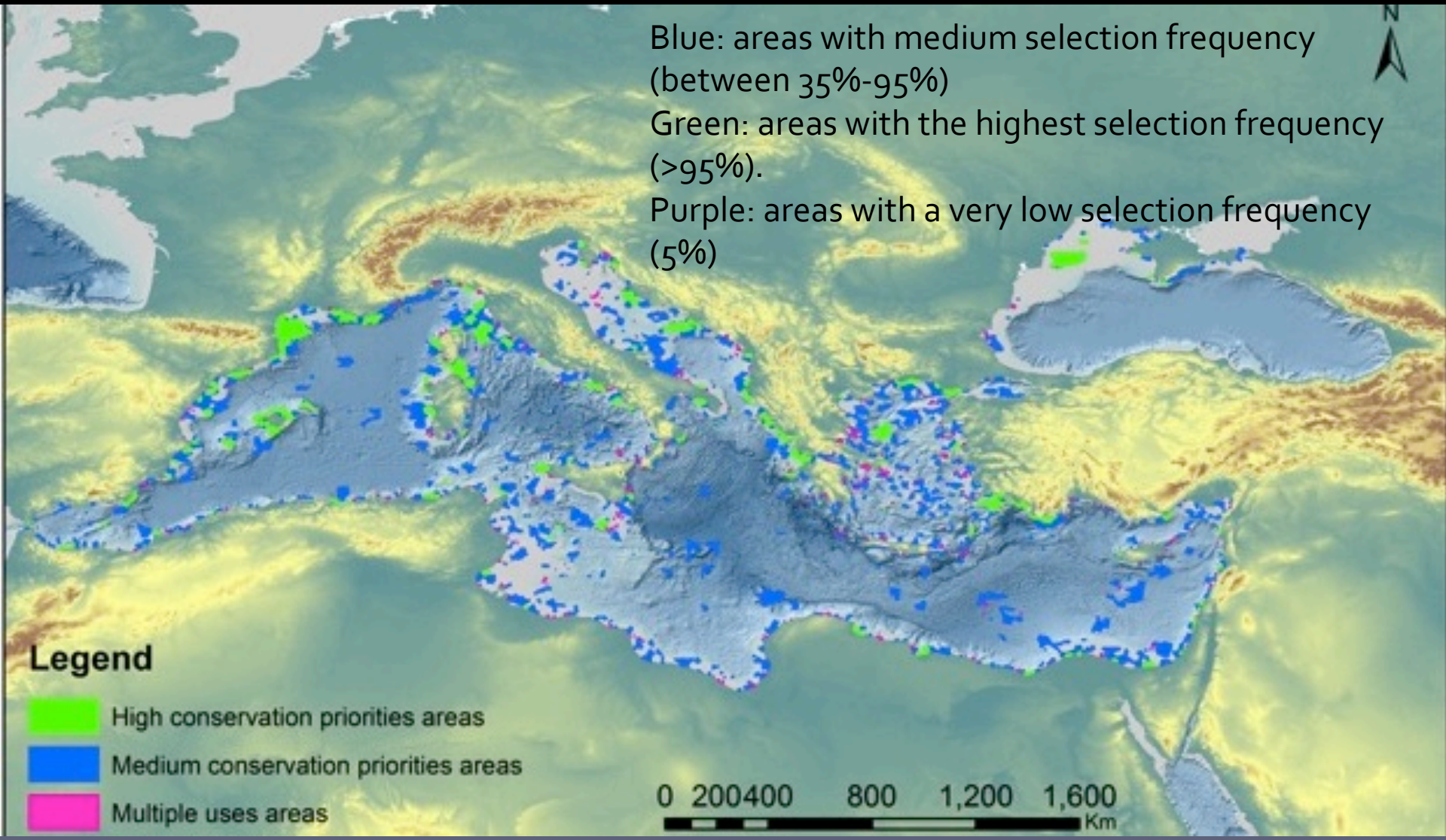

| FEATURES | CONSERVATION TARGET |
|---|---|
| Seagrasses | 60% |
| Biogenic Habitats | 60% |
| Canopies | 60% |
| Deep-Sea Habitats | 30% |
| Spawning / nursery habitats | 30% |

# Costs




Cumulative impact layer as a surrogate of management costs
Presence of protection measure decreases the cost (e.g. MPAs, Natura 2000 site distribution)

# Habitats, Threats and Costs



# Guidelines

- Use the conclusions reached by CoCoNet to inform a process of **Maritime Spatial Planning** across the Mediterranean and the Black Seas, considering activities that are expected to increase in the future (e.g. aquaculture, maritime traffic, seabed mining).
- **Incorporate dynamic aspects (connectivity, climate change, spread of invasive species, trophic interactions**) into spatial prioritization tools.