

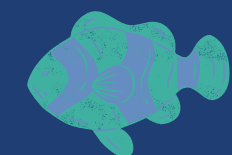
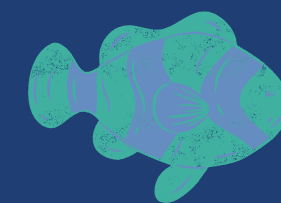


Exploring the Trade-offs methodology for MPA/Conservation design

Helena Calado e Débora Gutierrez



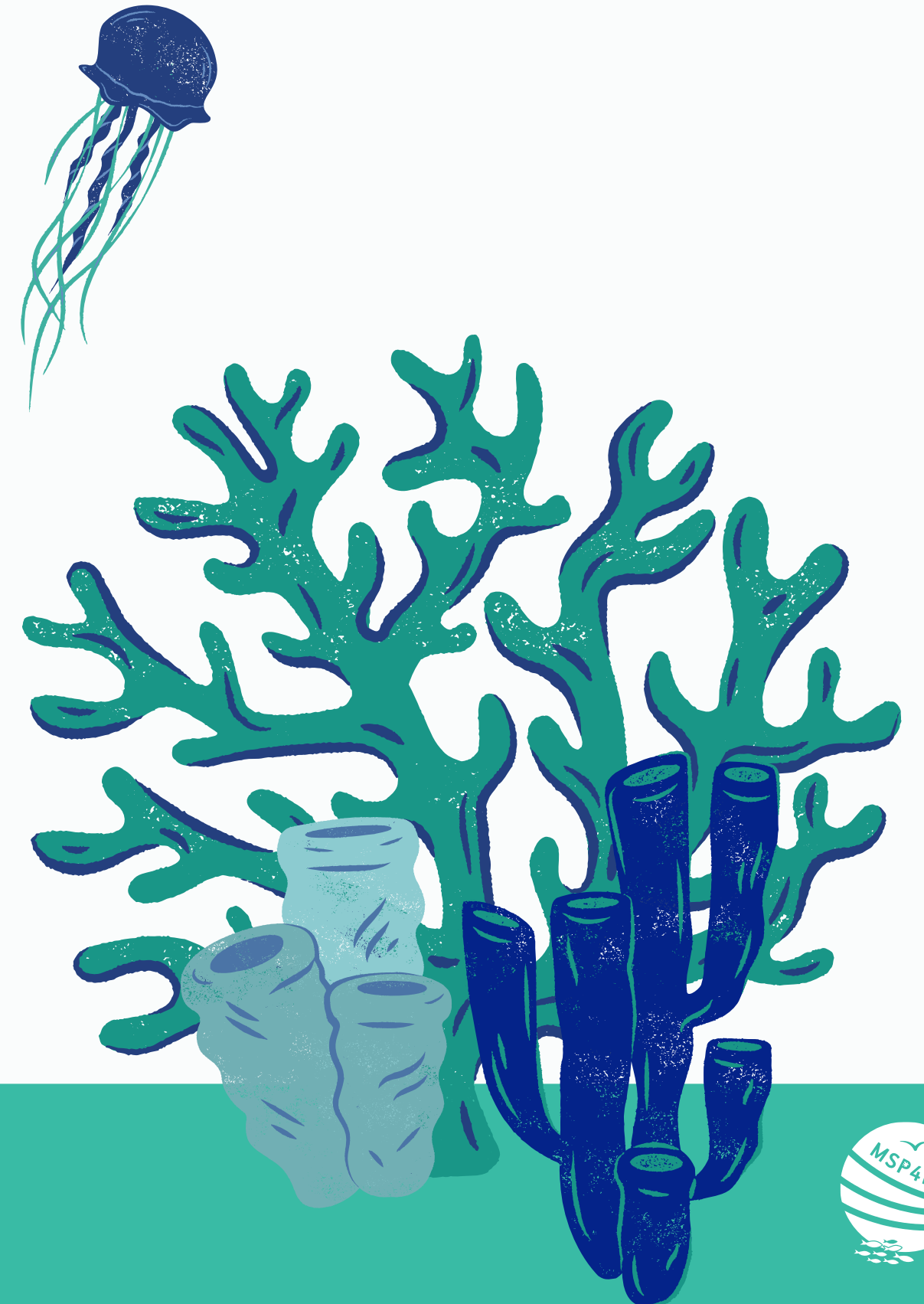
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Trade-offs definition:

~ Compromise or exchange between different objectives, interests, or uses of marine resources and space

~ Potential benefits and costs associated with different options, considering ecological, social and economic factors



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Different types of trade-offs between

Conservation and economic development

Definition: balance the need to protect marine ecosystems, maintaining ecological integrity while supporting economic activities such as fishing, shipping, and tourism

Example: designating marine protected areas (MPAs) can limit economic opportunities for fishing and tourism industries

Short-term and long-term benefits

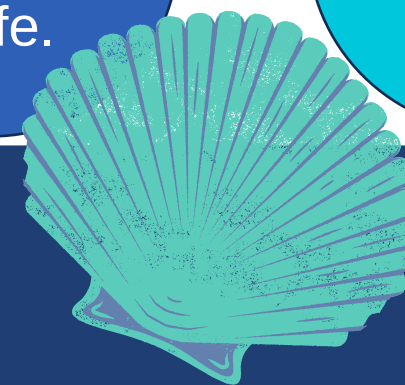
Definition: balance the immediate economic benefits of certain activities with the long-term benefits of protecting marine ecosystems.

Example: allowing oil and gas exploration and drilling can provide short-term economic benefits but can also have long-term negative impacts on the environment and marine life.

Exclusives uses and shared uses

Definition: when decisions about the allocation of marine space may involve trade-offs between exclusive use for a specific activity or multiple shared uses

Example: Requires considering different stakeholder interests for that area and balancing between various uses, like fishing, marine protected areas, recreational zones, shipping lanes, etc.





Different types of trade-offs between

Specific stakeholder interests

Definition: the various stakeholders may have different priorities and objectives compromises have to be made to take account of the various perspectives

Example: To advocate the interests of commercial fishermen, local communities, conservation organisations, researchers, maritime tour operators, and non-governmental organisations.

Local and global interests

Definition: While MSP can benefit local communities through economic development and job creation, it must also consider the impact of human activities on the global ocean ecosystem

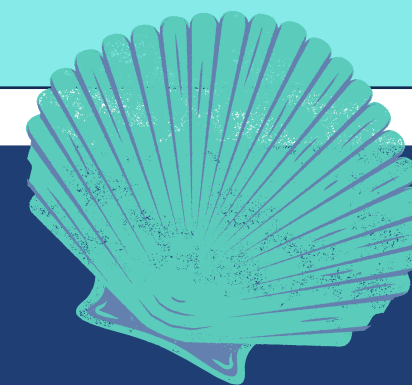
Example: overfishing in one region can negatively impact fish populations in other regions

SOCIO-ECONOMIC

SEASKETCH



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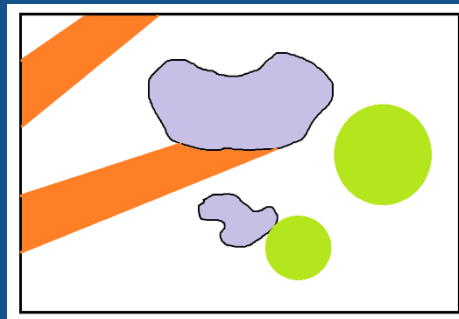
PARTICIPATORY DEVELOPMENT OF INTEGRATED TRADE-OFFS SCENARIOS

Trade-Offs



STEP 1

ES Mapping

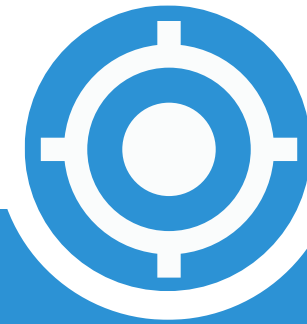


Ecosystems Services

Fishing Areas

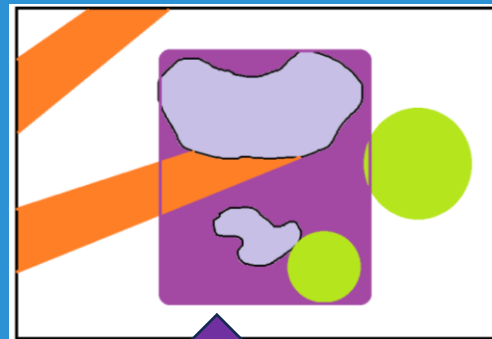
Marine Protected Areas

Diving Spots



STEP 2

Conservation Goals
(SMART)



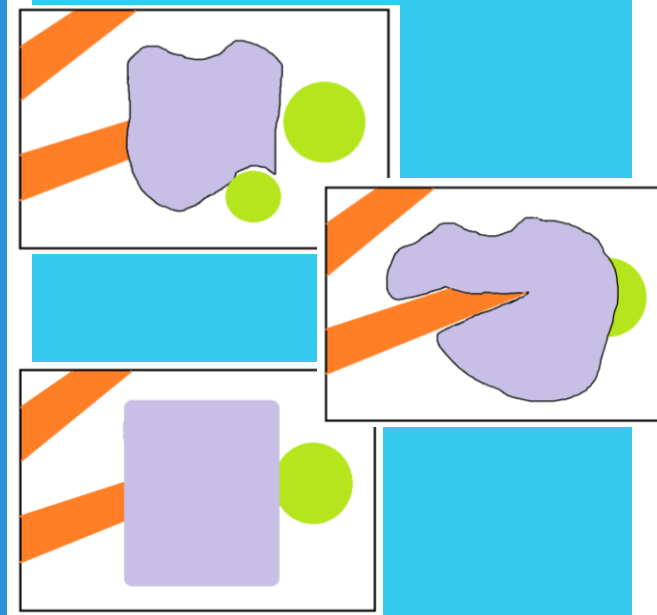
Ecological Criteria

Marine Vulnerable Ecosystems



STEP 3

MPAs Scenarios



STEP 4

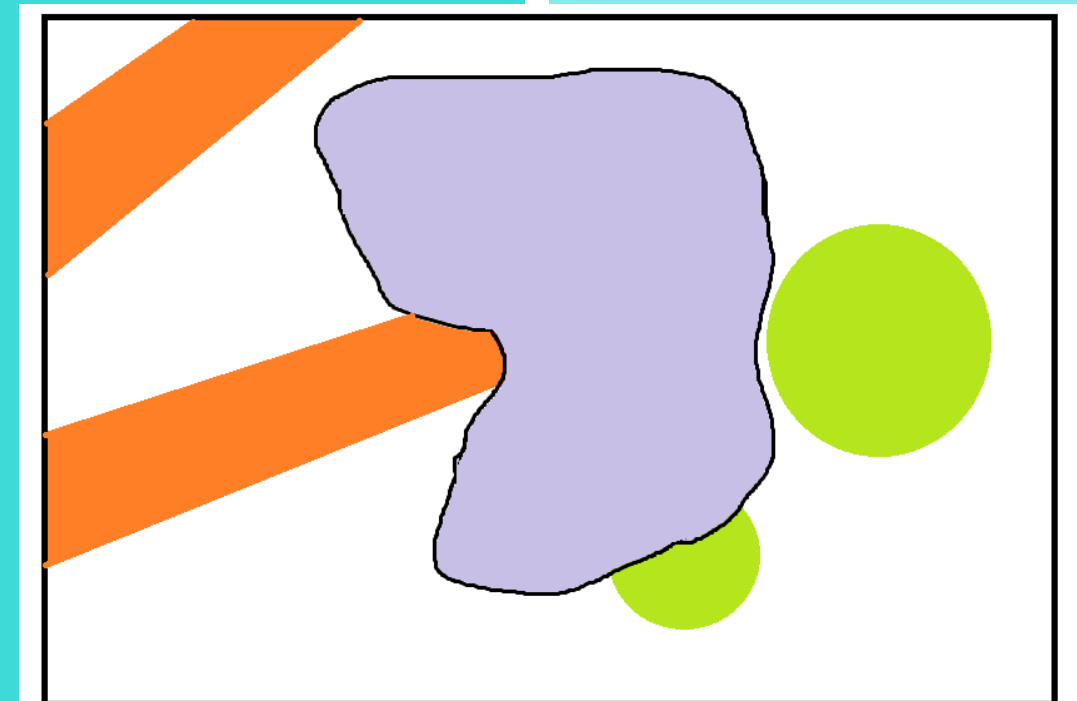
Trade-Offs

- Conservation Goals
 - 100%
 - 0%
 - 80%
- Ecosystem Services
 - 0%
 - 100%
 - 20%



STEP 5

Case Sites
Workshops
(Scenarios)



STEP 6

Final Reporting

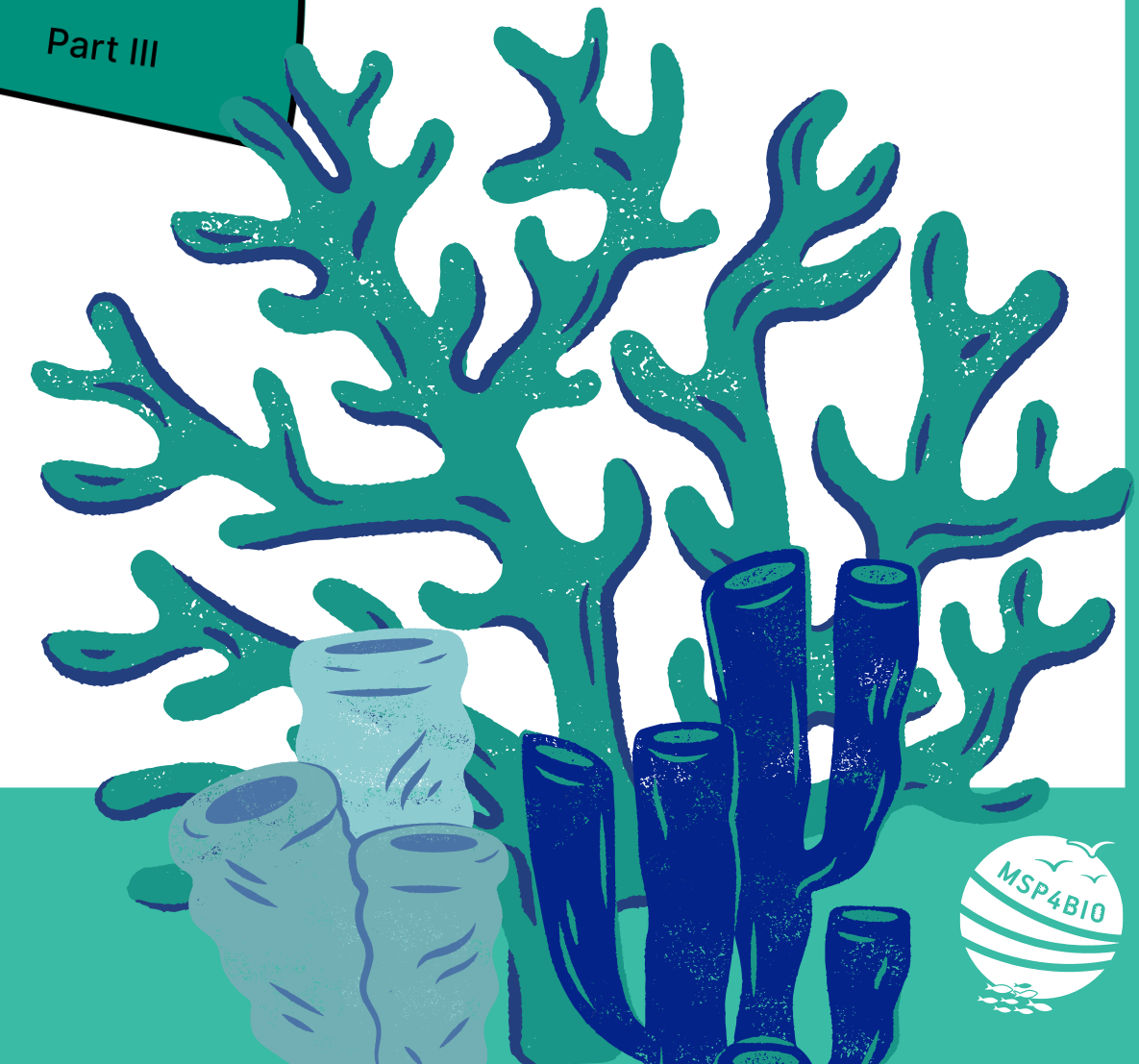
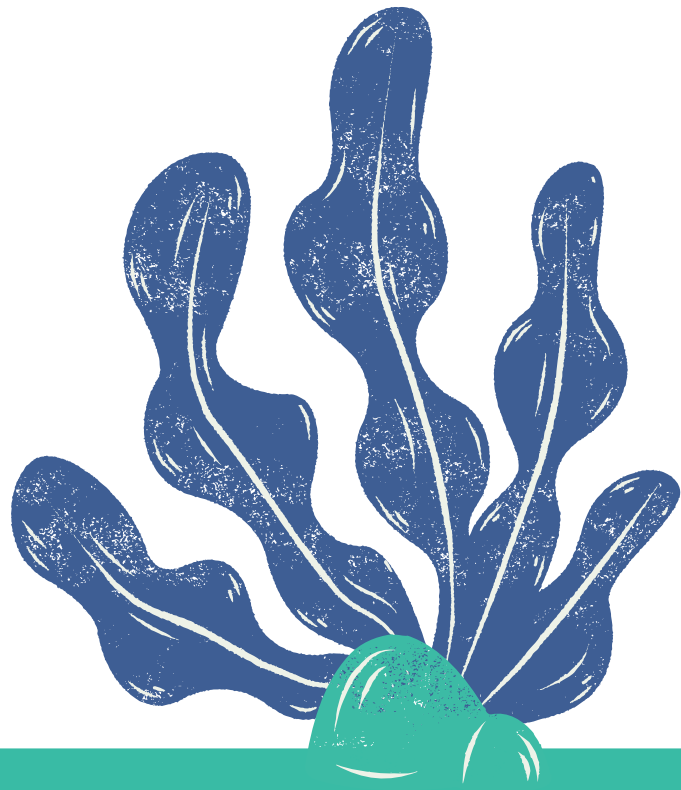
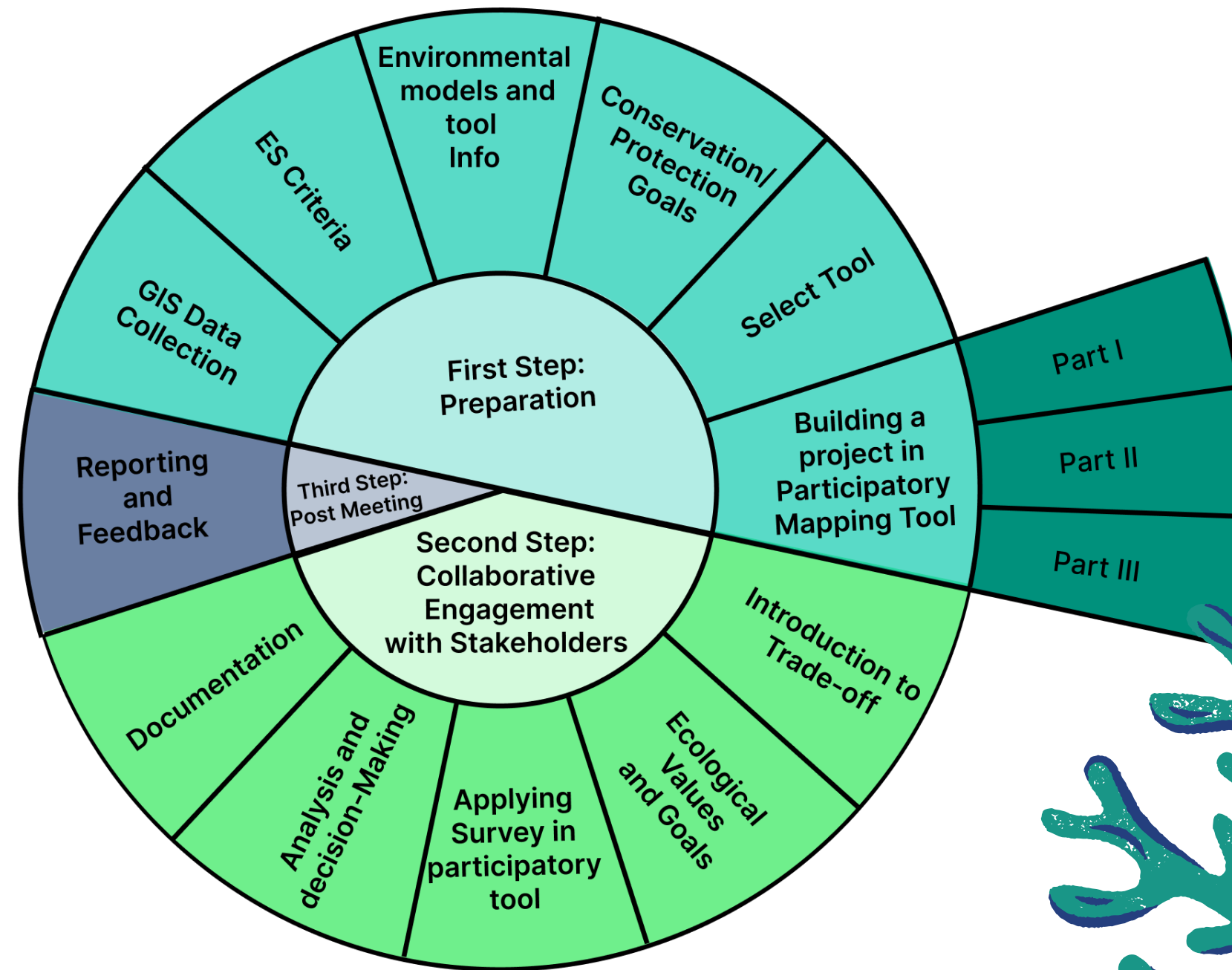
- CG → 80%
- ES → 20%



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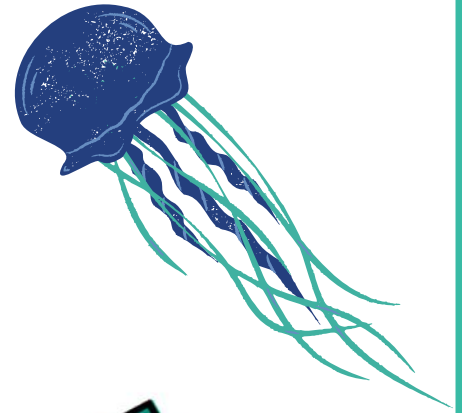
Trade-off methodology for MPA/Conservation design



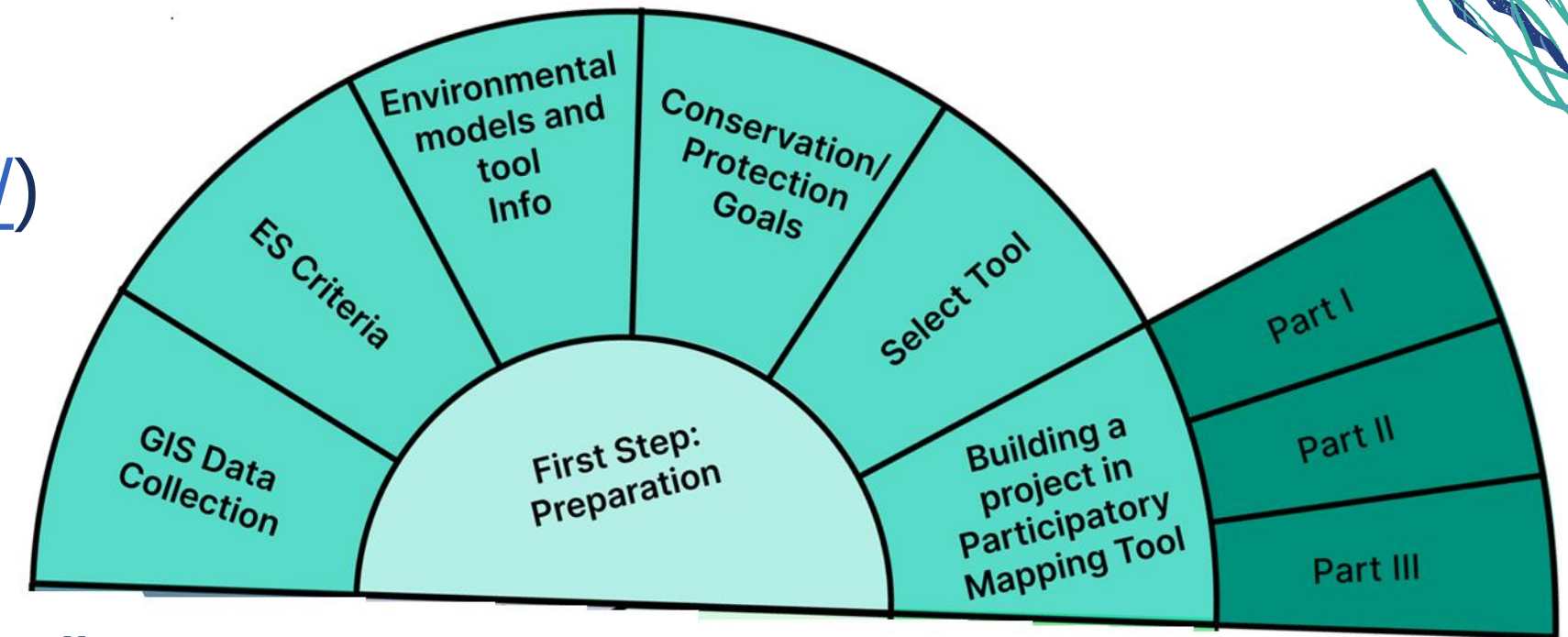
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Before COP



- ~ Prepare Data (<https://msp4bio.vliz.be/>)
- ~ List of Criteria/ Ecosystem Services
- ~ Select a Participatory Tool
- ~ Create a "participatory mapping survey"



1. "Participatory Mapping Survey" Part A – Data Collection and perception;

the goal is to collect information in spatial format about uses, conflict areas and possible valuation of areas for trade-offs.

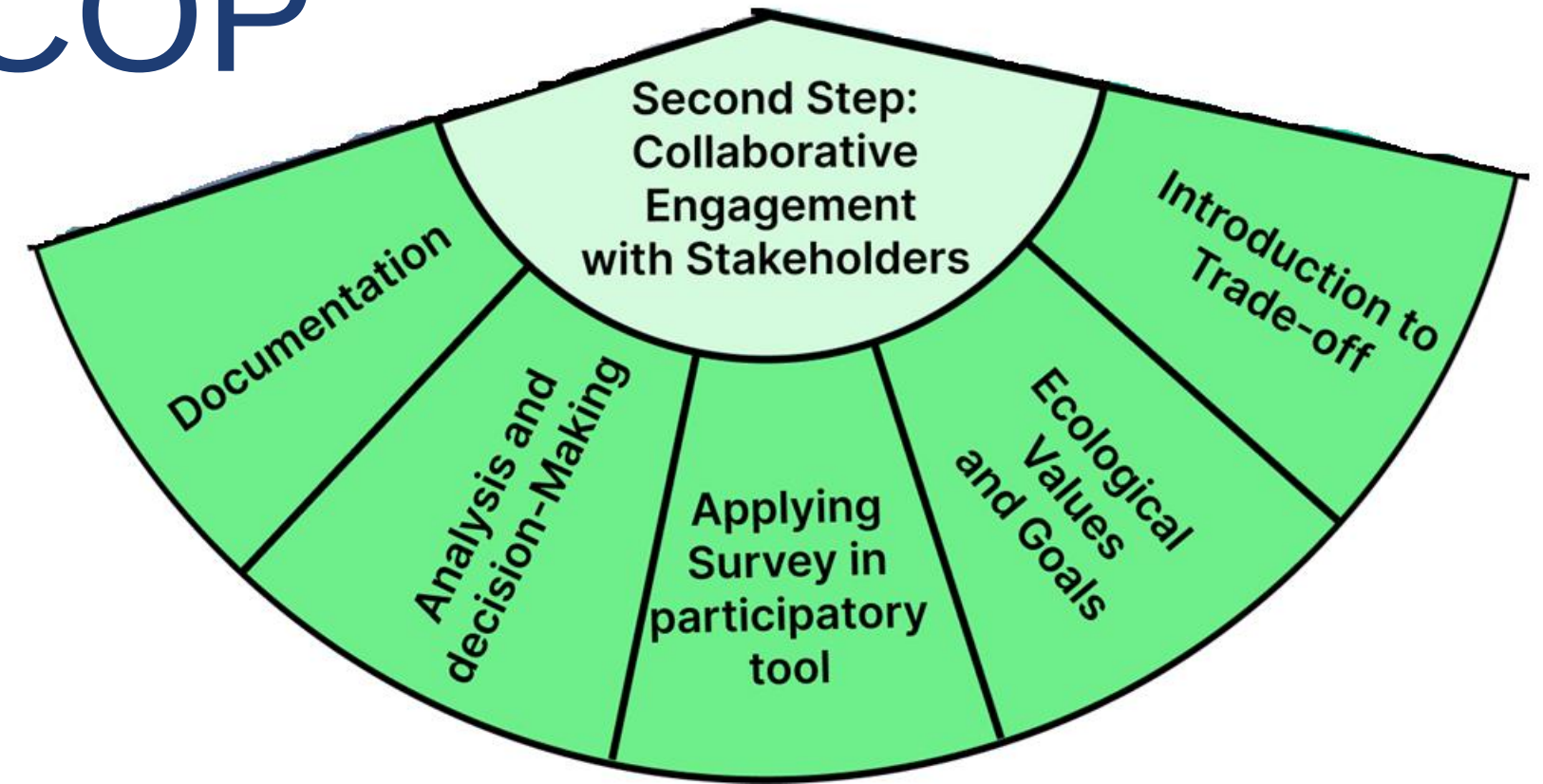
"Participatory Mapping Survey" Part B – Showcase the data analysis and validate;

Draw scenario examples based on the uses, conflicts and service criteria



During COP

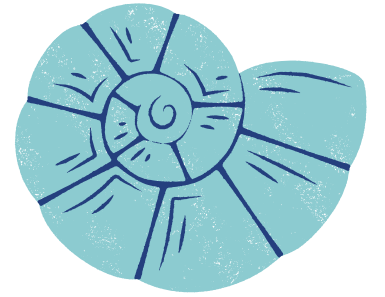
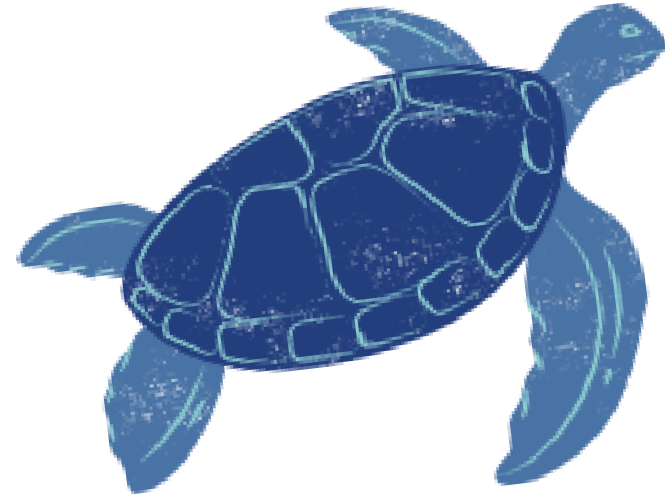
- ~ Introduction of Trade-off
- ~ Present issues to be discussed/ addressed at the meeting
- ~ Remind the criteria/ ecosystem services
- ~ Present the ecological values
- ~ Pass out the questionnaire (Part A) and Develop Scenarios mapping (Part B)
- ~ CoP Analyses and Scenarios
- ~ Vote decision
- ~ Write main points and photos
- ~ Download GIS information



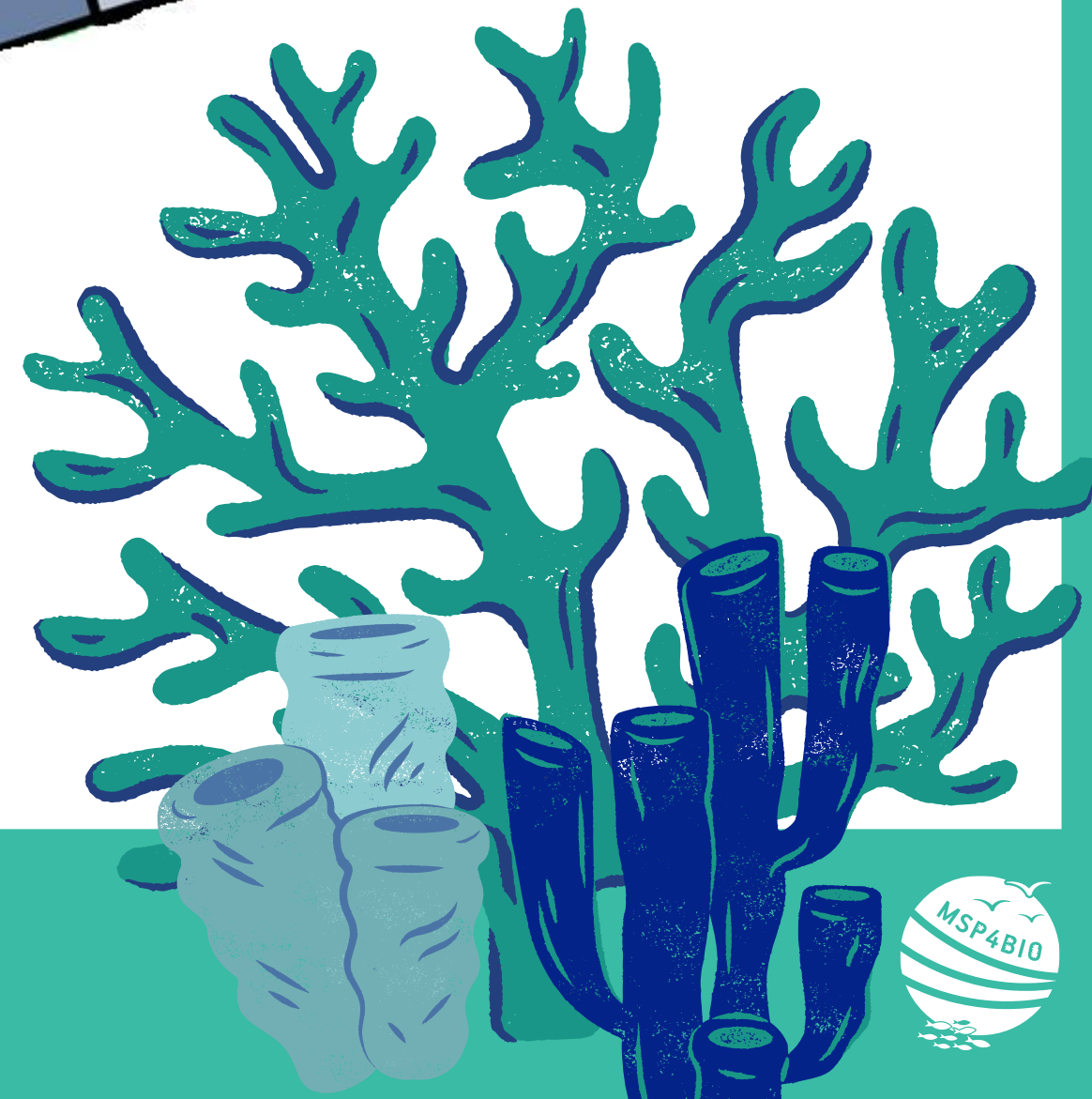
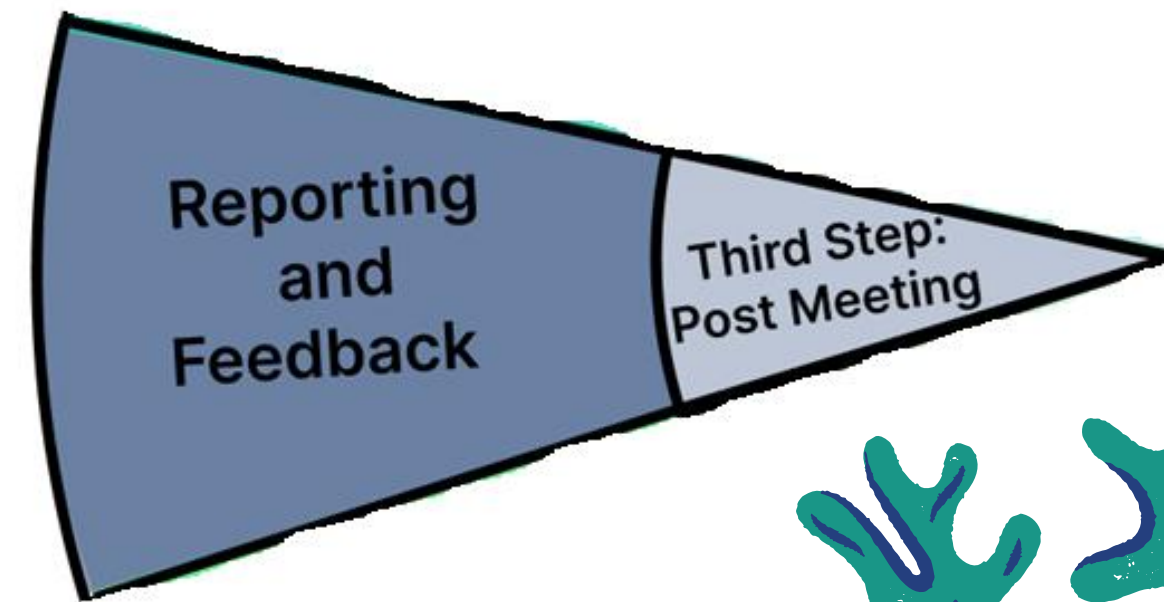
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After COP



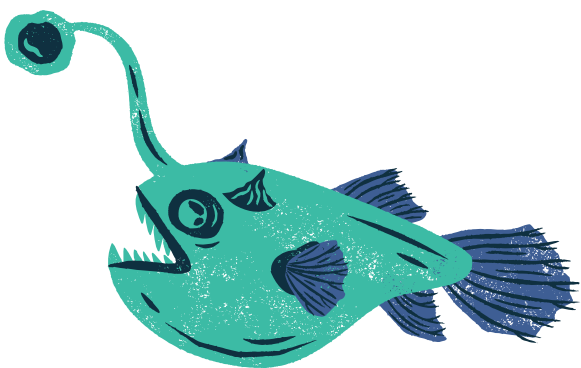
- ~ Download extra GIS information
- ~ Report the main decisions
- ~ Organise images and videos
- ~ Give a Feedback to Stakeholders



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Practical Tools and Frameworks



Trade-off in ecosystem services

Multi-Criteria Analysis (MCA).

The criteria overlay method overlays each criterion related to the ES. This method is based on Multi-Criteria Analysis (MCA). MCA is a method to structure and formalise decision-making processes. It allows ecological, economic and social criteria to be combined and is, therefore, well-suited to the context of ES (Fontana et al., 2013).

Selection of the three primary ES and the related criteria.

Choice of the indicators

Data availability

E.g., **Criteria 2:** Area is important for fishery activity.

ES: Pest and disease control
Controlling pests, invasive species and diseases

Selected Indicators	Unit	Data source
Species richness	No. of species	
Presence/absence/frequency of pests (e.g., algae blooms, foam, sea lice on farmed salmon)	No/ <u>km-2</u>	Species identification in marine areas invaded by <u>Rugulopteryx okamurae</u> ; Microalgae blooms
Distribution of alien species	No/ <u>km-2</u>	<u>Rugulopteryx okamurae</u> monitoring (alien species); Accumulation of pressures that may cause the introduction of alien species

Aggregated ecosystem service potential map

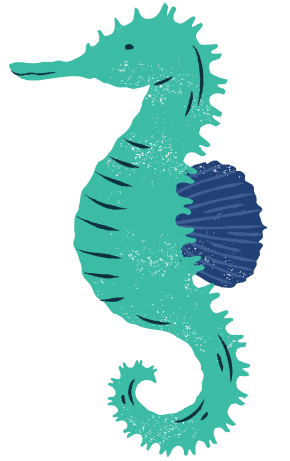


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Human Activities and Participatory Mapping

Portfolio of arguments



Trade-off between marine conservation and economic development

E.g., Impact assessment: Defining which human activity has the most direct impact and measuring the indirect impacts on marine habitats depends on good and reliable data on marine ecosystems (Deliverable 2.3, page 199).

Trade-off is between short-term and long-term benefits

E.g., allowing oil and gas exploration and drilling can provide short-term economic benefits, but can also have long-term negative impacts on the environment and marine life.

Trade-off between exclusive uses and shared uses

E.g., potential good practice associated with this MPA is the development of fishing gear restrictions for defined subzones within the MPA - in the process of being approved by the EU. (D2.3, page 173)

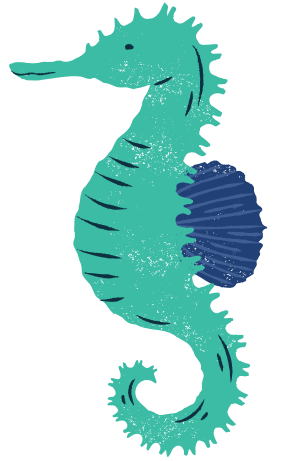


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Human Activities and Participatory Mapping

Portfolio of arguments



Trade-offs between local and global interests

E.g., Negotiation processes have understandably been longer when requiring collaboration amongst different countries, however the case studies shed light on how regular cooperation and communication amongst scientists from different authorities and countries, in addition to the involvement of key stakeholders such as fishermen, underpins the decision-making process of furthering conservation efforts.

(Deliverable 2.3 page 92)

The specific stakeholder interests

E.g., Balancing the rights of indigenous communities with commercial interests may involve recognising traditional fishing territories, co-management agreements, and ensuring that indigenous voices are heard in decision-making processes.



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Human Activities and Participatory Mapping



Tools

Mapbox

Mappeo

Maptionnaire

Sapelli

SeaSketch

Sketch Map Tool

Survey 123 for ArcGIS Online

Terrastories

Ushahidi

Invest*

The Reef*

Objectives/ Analytics	Coasts	Target Audience	Strengths	Challenges	System	Developer
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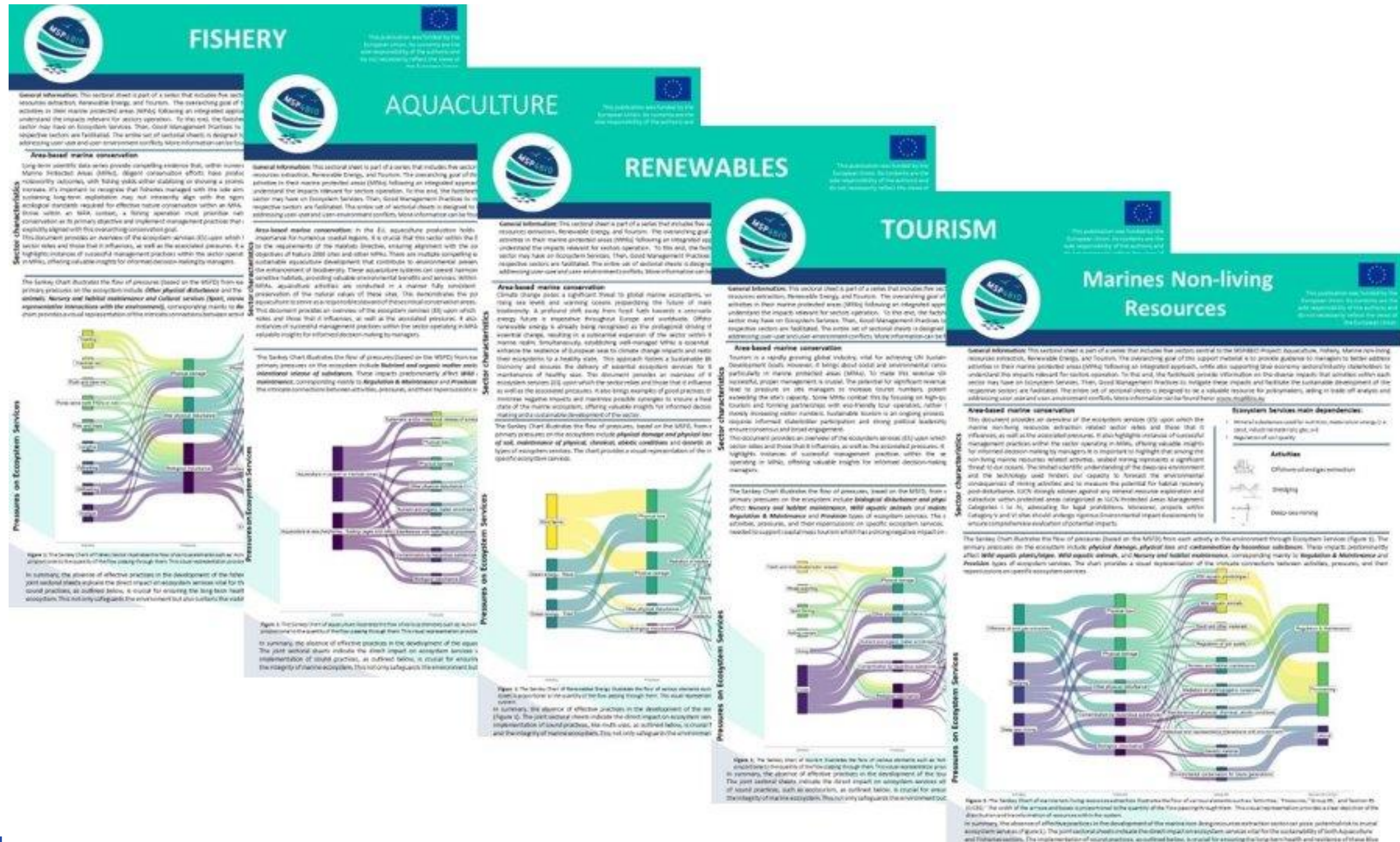
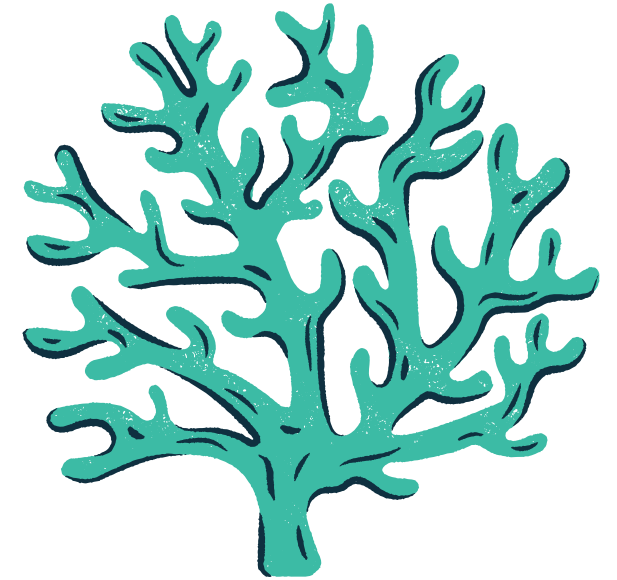
(adapted from Burnett et al., 2023)



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Human Activities and Participatory Mapping



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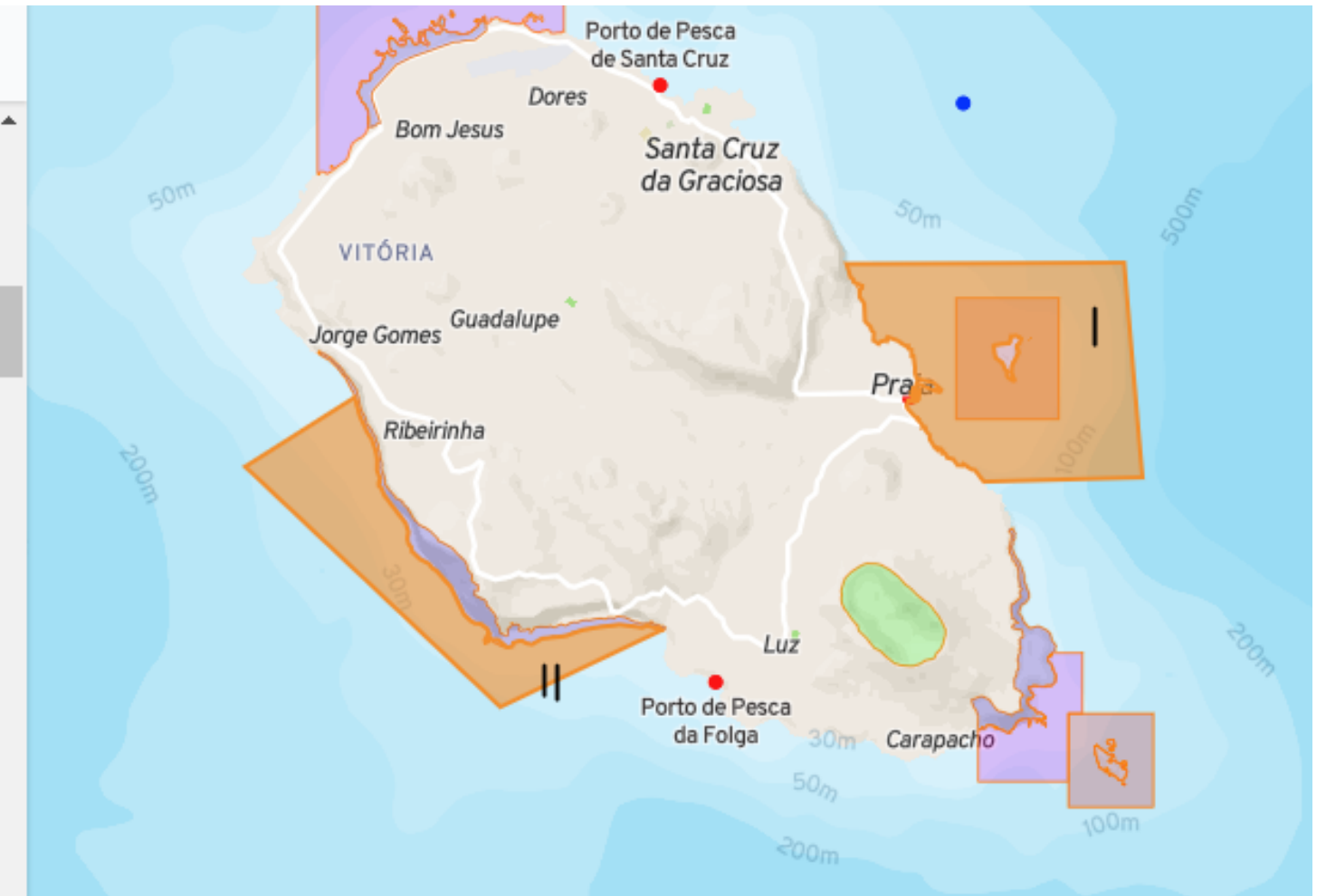


Graciosa Island Example

Scenario 2 - updated

this situation can be explained to fishermen in order to promote their engagement in this new protection area and even collaborate with them so they help with the monitorization and protection of this place. Since it is known that MPAs work as a nursery for new and important fish and thanks to the spillover effect - that occurs in the borders of the MPA - the quantity, quality and biomass of fish will increase, and so does the income for fishermen in that area.

- ☒ Natural Park expansion 1
- ☒ MPA da Graciosa II

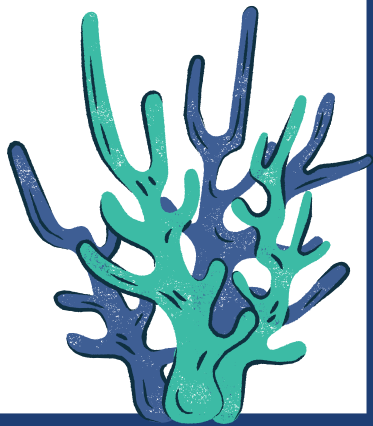
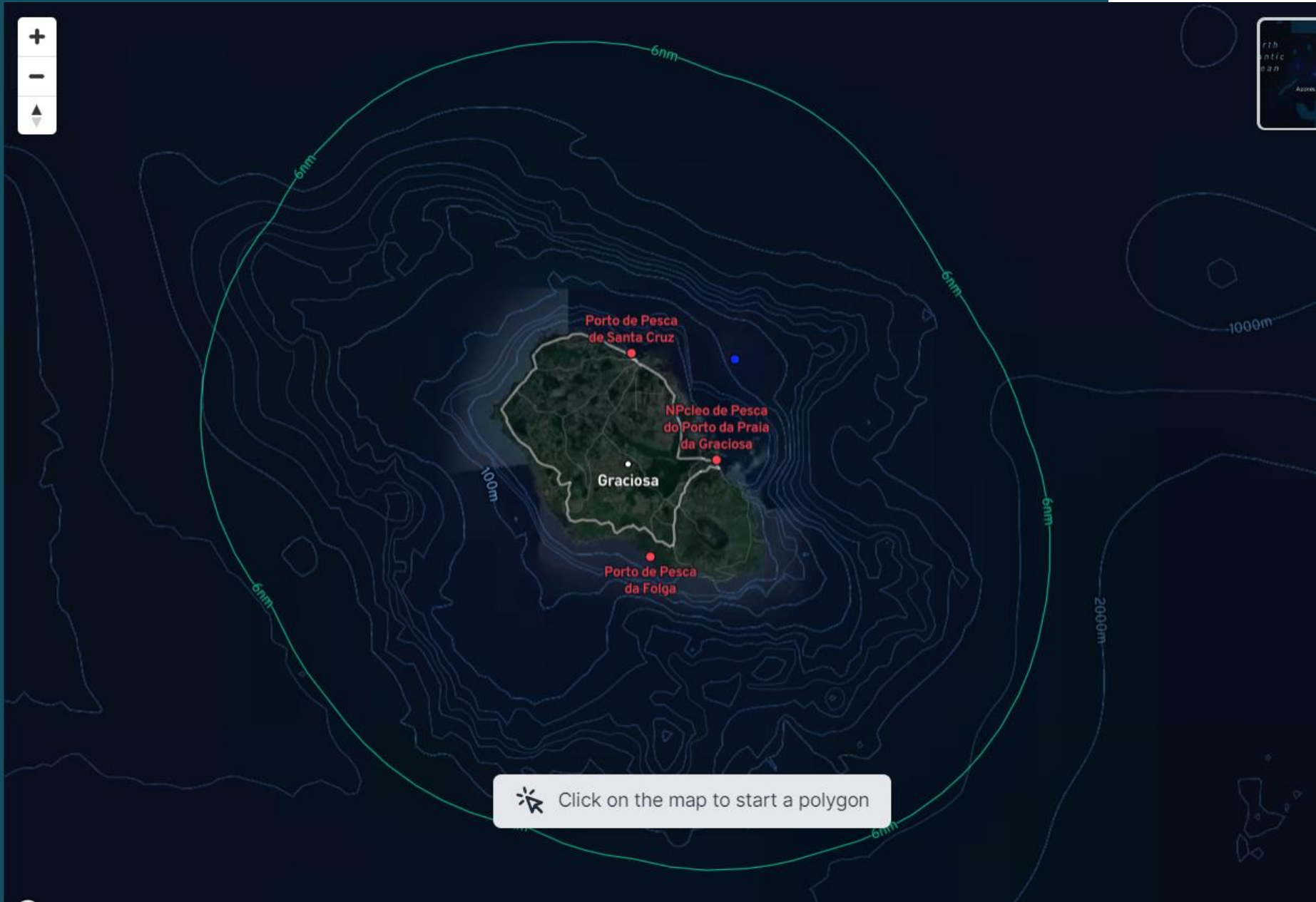
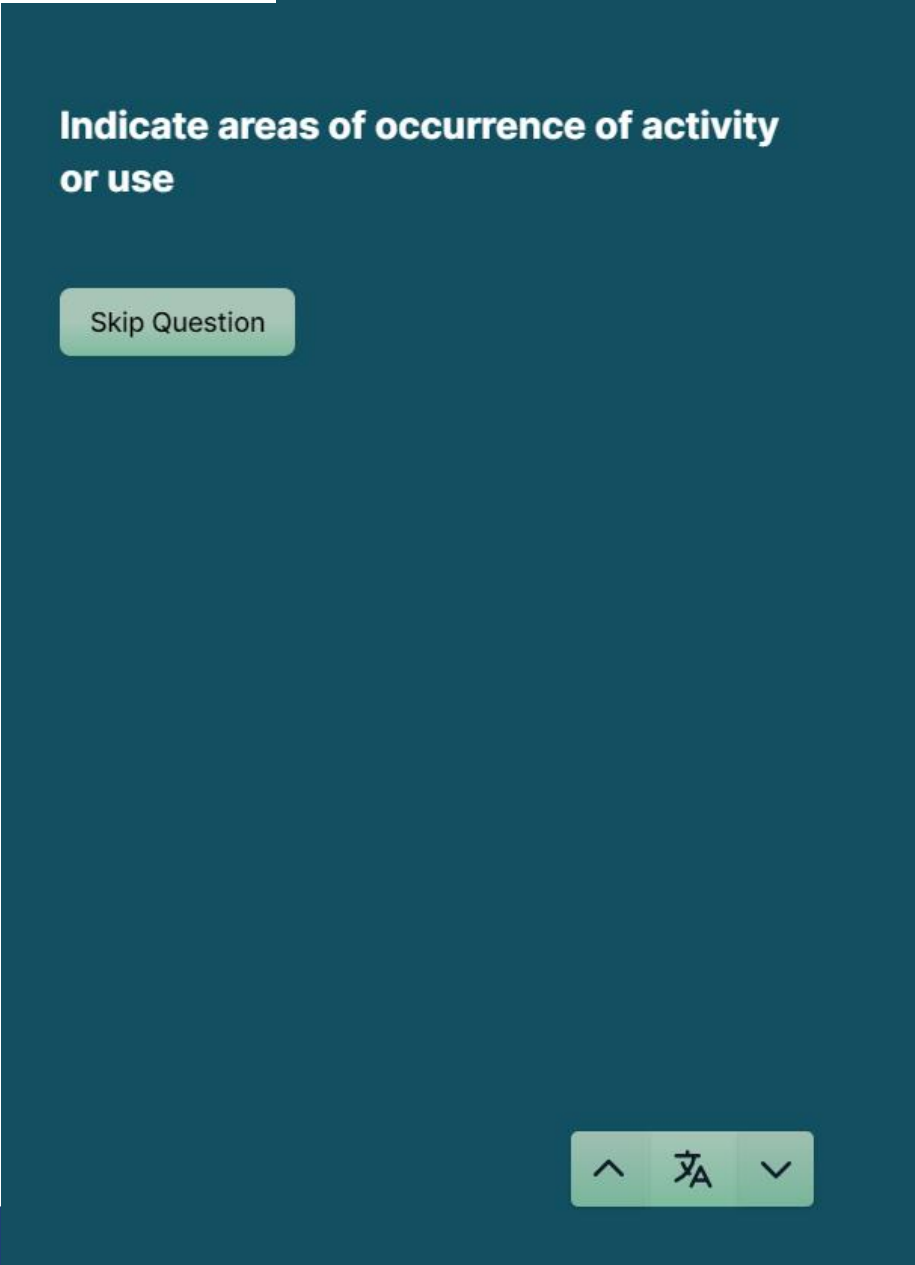
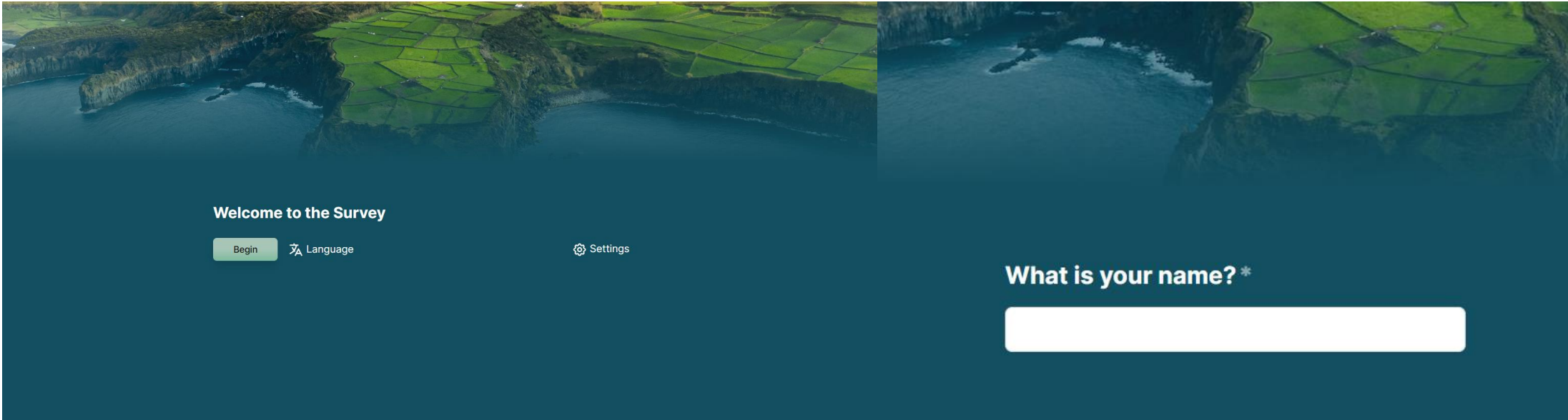


<https://www.seasketch.org/graciosa/app>



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What are the most important areas for the development of your activity/use? *



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Location Name *

Location 1

Justification for the chosen area

Cancel

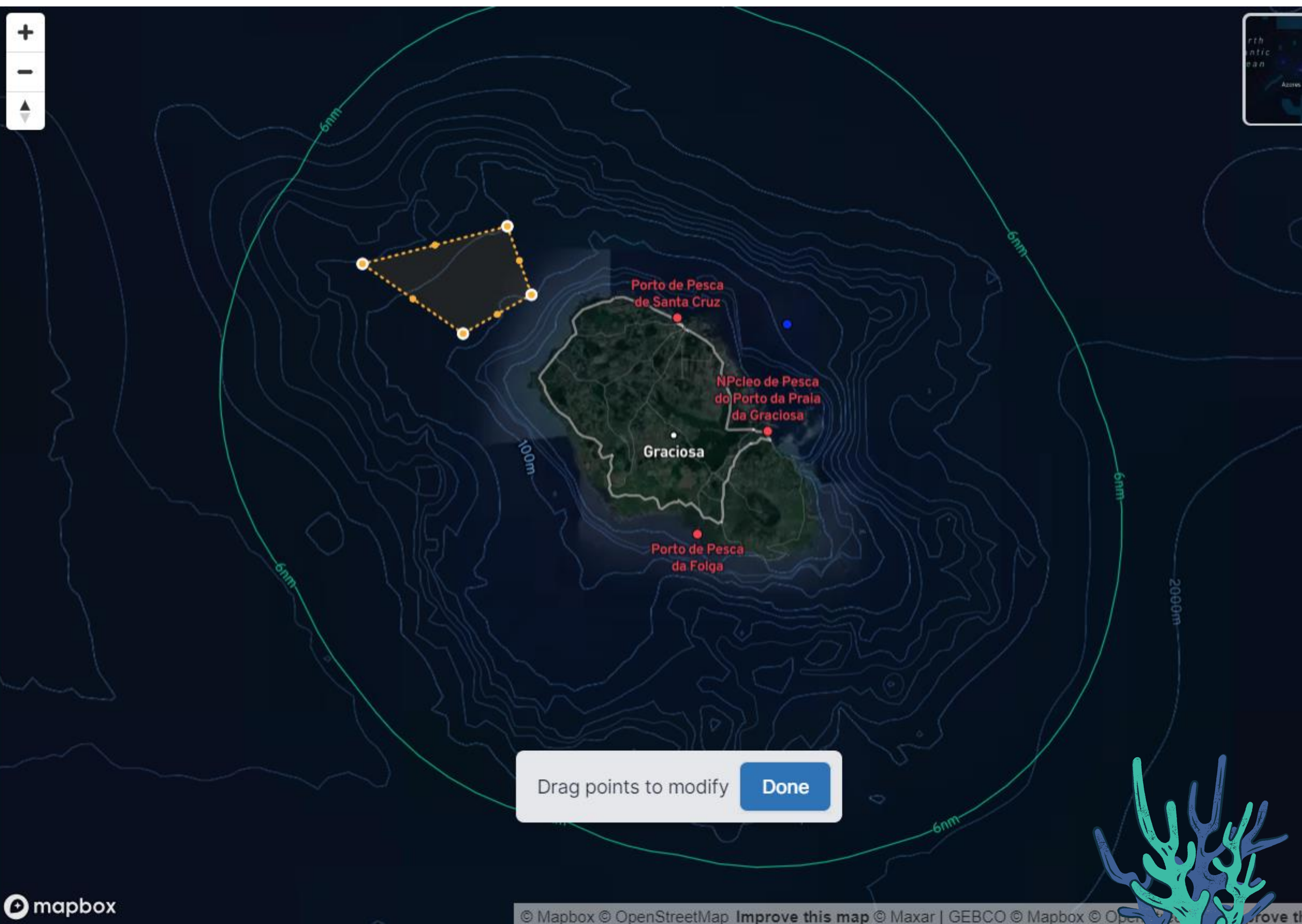
Save

Add as many areas as you need to represent the valuable areas for your activity, then adjust your relative priorities below.

Location 1

+ New Shape

Next Question



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What are the areas where there are more conflicts? *

Location Name *

Location 2

Justification for the chosen area

Cancel Save

Add as many areas as you need to represent areas of conflict, then adjust your relative priorities below.

Location 2

+ New Shape Next Question

^ A v



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Areas with potential for expansion or relocation of your activity *

Location Name *

Location 3

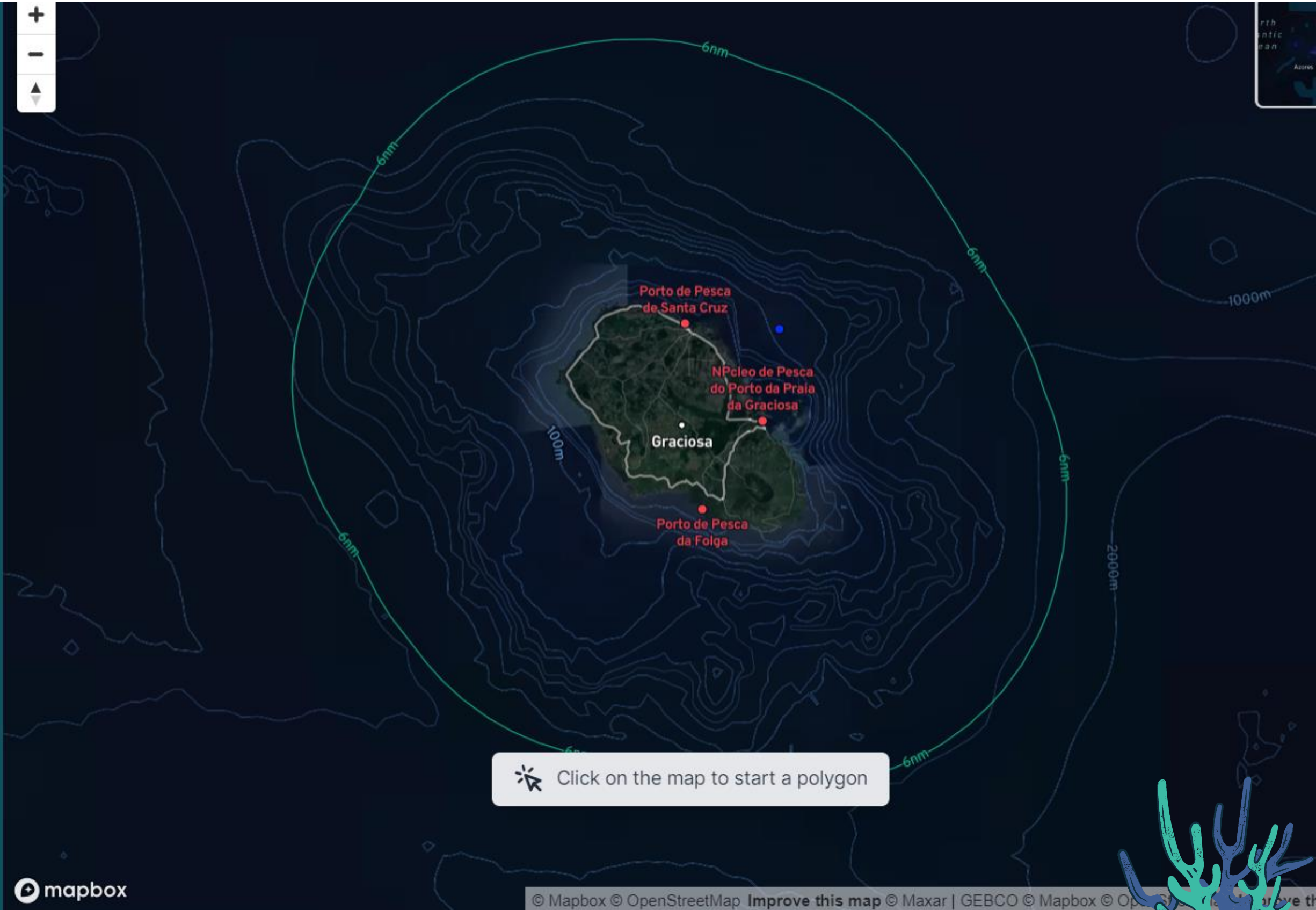
Justification for the chosen area

Cancel Save

Add as many areas as you need to represent potential areas for expansion or relocation of its activity, then adjust your relative priorities below.

Location 3

+ New Shape Next Question



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What are the priority areas for conservation? *

Location Name *

Location 4

Justification for the chosen area

Cancel

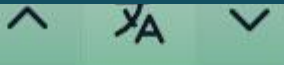
Save

Listed below are the shapes you have drawn. You can draw additional priority areas for conservation, or edit your previous submissions.

Location 4

+ New Shape

Next Question



mapbox

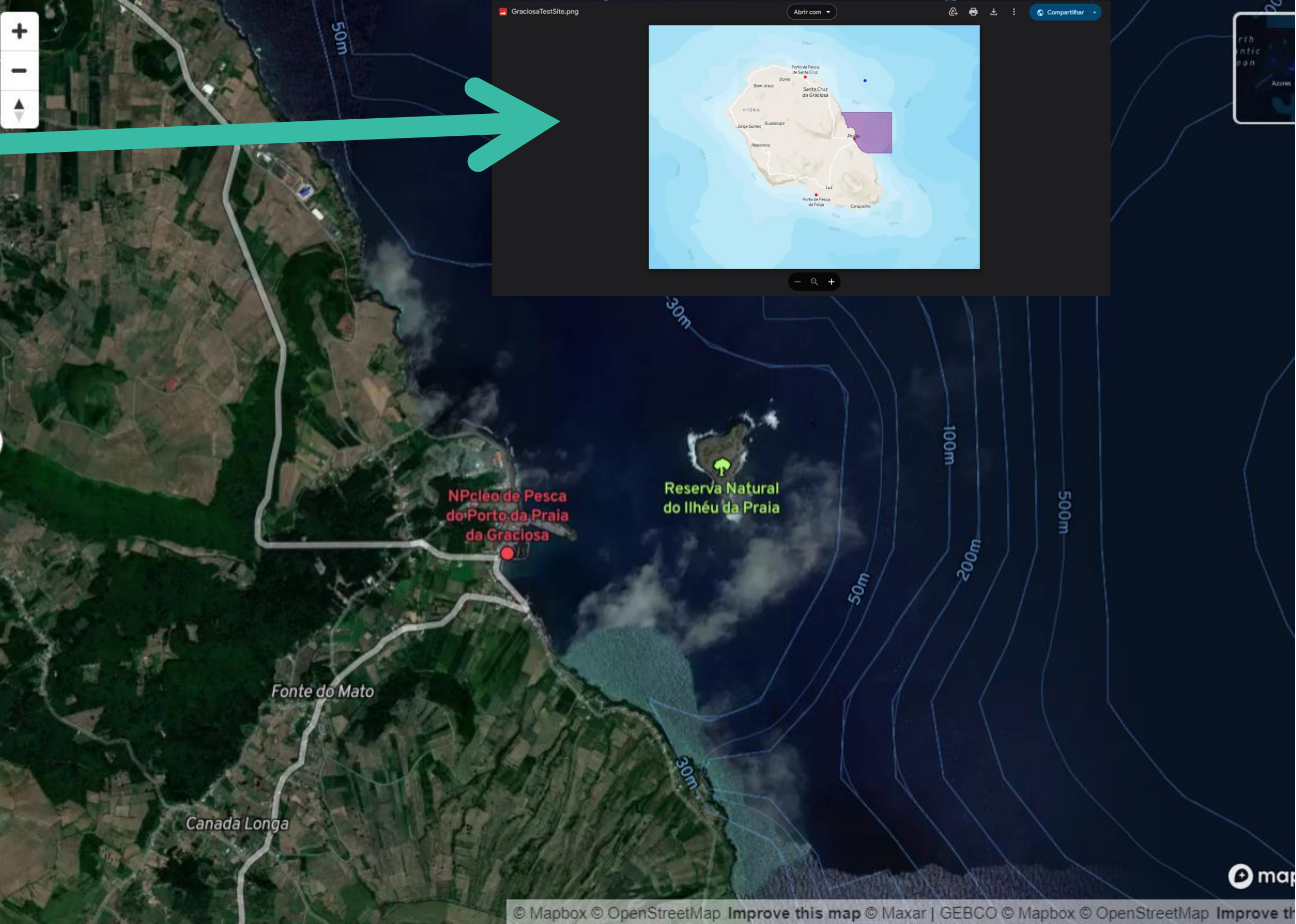


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How likely is this area to change with Climate Change?

See this map.

Skip Question



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What would be the Climate Change impact (-5 = negative impact; 5 = positive impact)? *

[See this map.](#)

-

0

+

Next

How does Climate Change affect the use of ecosystem services? *

[See this map.](#)

Permanent

Periodical

Ocasional

How can we prevent Climate Change in the area? *

[See this map.](#)

Reallocate area

Enlarge area

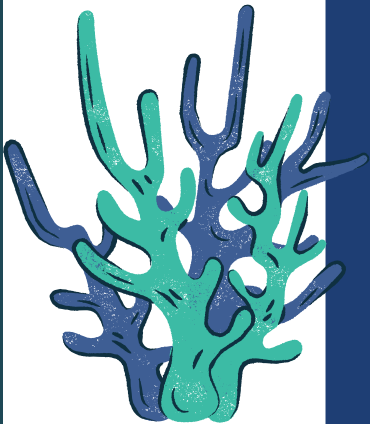
Reduce area

Submitting Your Response



Thank You for Responding

Submit Another Response

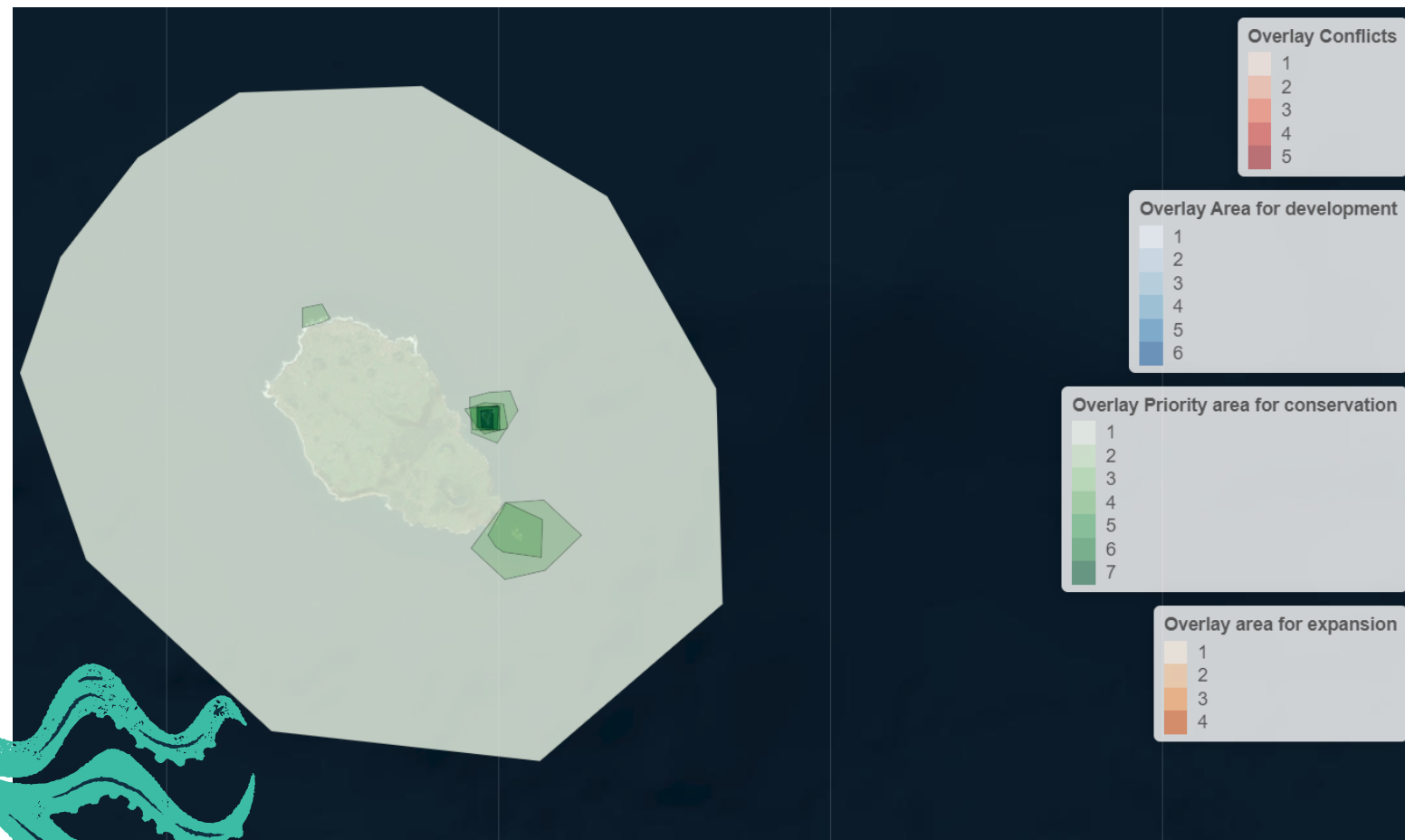


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Graciosa Island Example

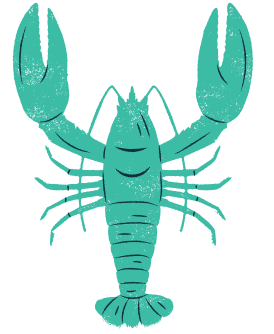
The main goal was to support the creation of a new protected area IUCN categorise VI. Also, map the conflicts, potential uses and Climate Change perceptions.



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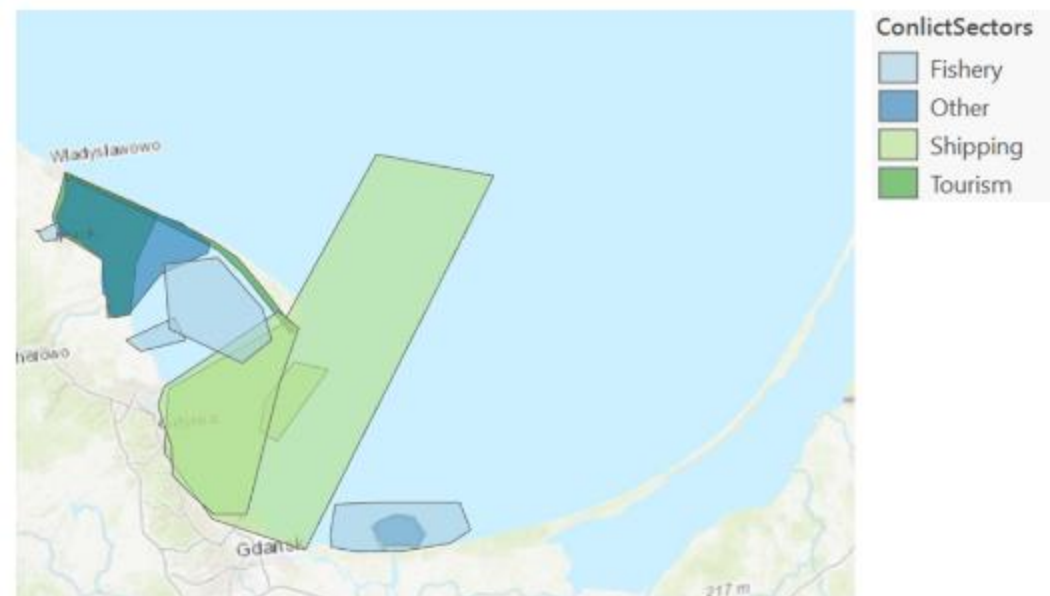


Baltic Sea Example

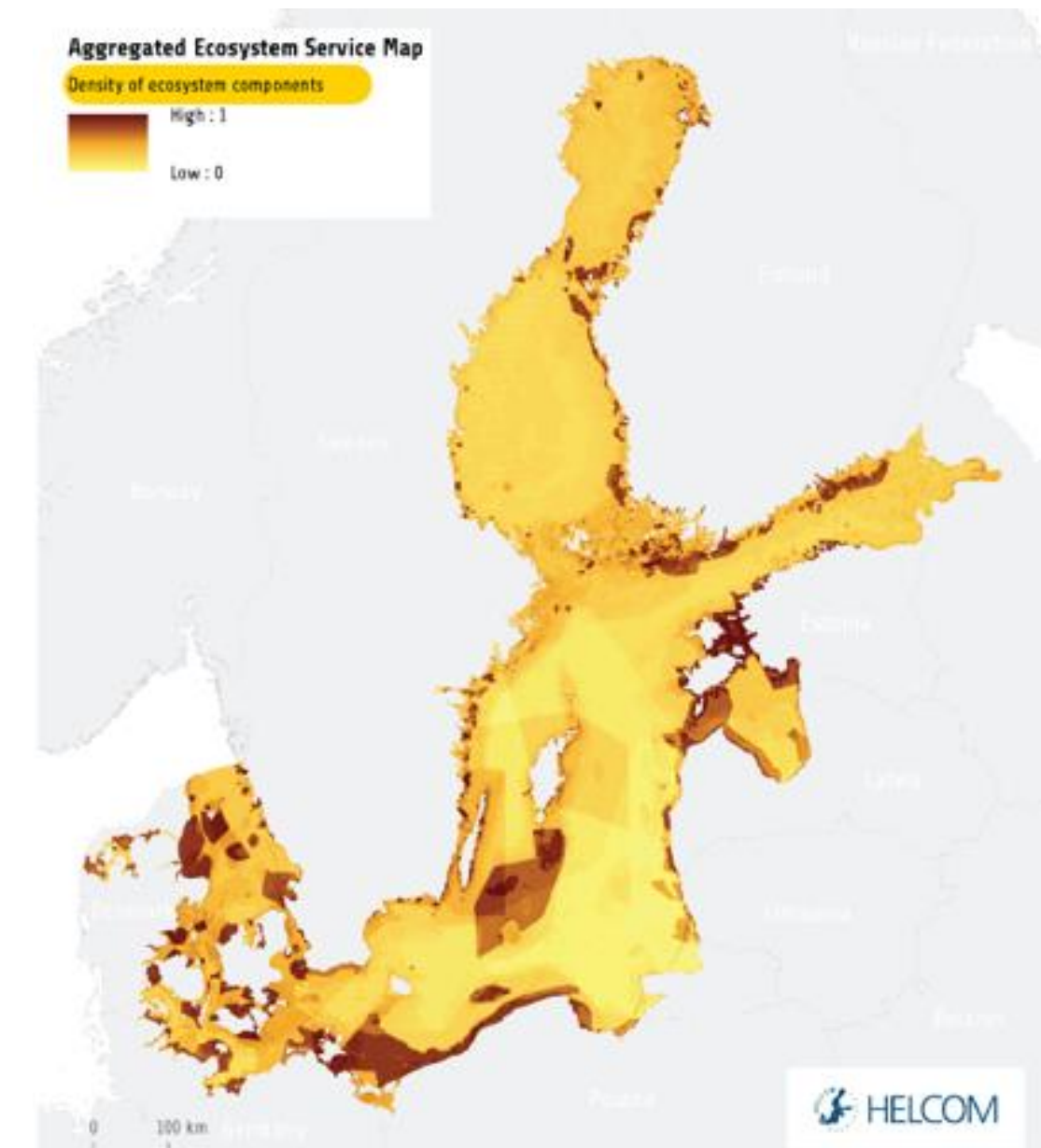


The primary goal for the test site was to **identify and analyse the main conflict areas** that may arise if we need to **expand marine protected areas** in response to sensitive habitats, ecological connectivity, or other valuable environmental assets. By assessing potential conflicts between human activities, such as fishing (bottom trawling and coastal fishery), shipping, and marine protection, we aim to inform sustainable decision-making and promote the conservation of marine ecosystems in Gdansk Bay.

Main outcomes from participatory mapping activity by SeaSketch:



2) Proposed MPA: Seagull Sandbank (Mewia Łacha)



<https://msp4bio.eu/gdansk-bay/>

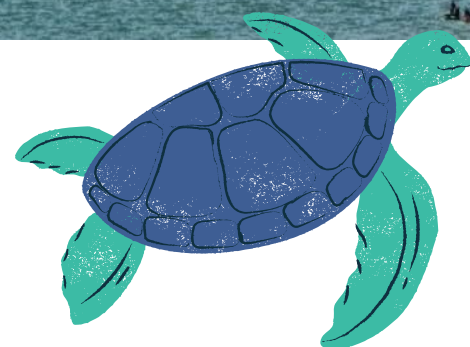


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The Marine Protected Area (MPA) "Fondos marinos de la Bahía de Cádiz" is a nominal designation without effective implementation (paper park). Consequently, the objectives we have for the area are more strategic, focused on establishing a framework, rather than operational. These strategic goals include:

- a. **Placing the MPA on the political agenda** or, at the very least, on the agenda of territorial actors.
- b. **Gathering information** about the marine area of the Bay of Cádiz, including uses and activities, their locations, areas of significance for various sectors, as well as areas of conflict.
- c. Resolving (or try to resolve) the main conflicts identified and **proposing measures or lines of action (for addressing tradeoffs)**.



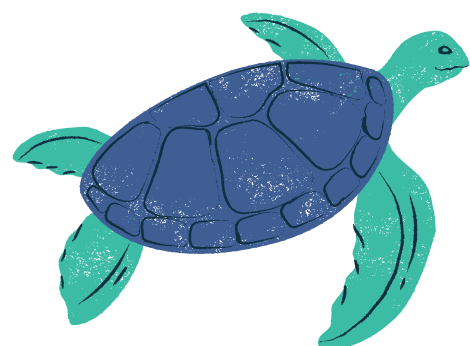
<https://msp4bio.eu/bay-of-cadiz/>



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The Belgian part of the North Sea is a busy sea space, where a stronger protection of ecological features is necessary to increase their resilience for future environmental changes. To enable Belgium to contribute to the target of 10% strictly protected areas in European Seas, in line with the EU Biodiversity Strategy, the 4Sea coalition is proposing the allocation of a marine reserve in the next version of the MSP. Two trade-offs were performed one associated with the **marine reserve proposal to protect benthic features** and one about **pelagic considerations**.



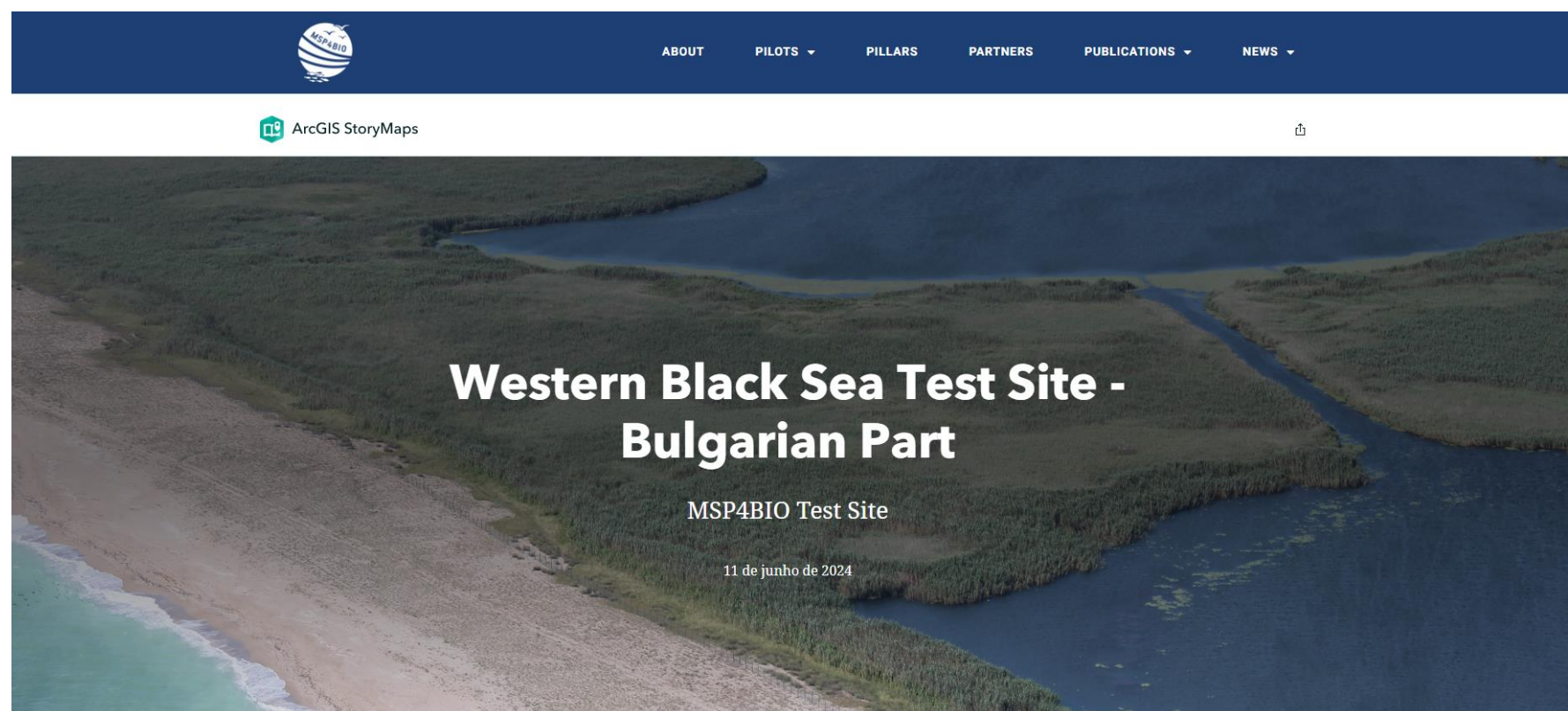
<https://msp4bio.eu/belgian-part-of-the-north-sea/>



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<https://msp4bio.eu/western-black-sea-test-site-bulgaria/>



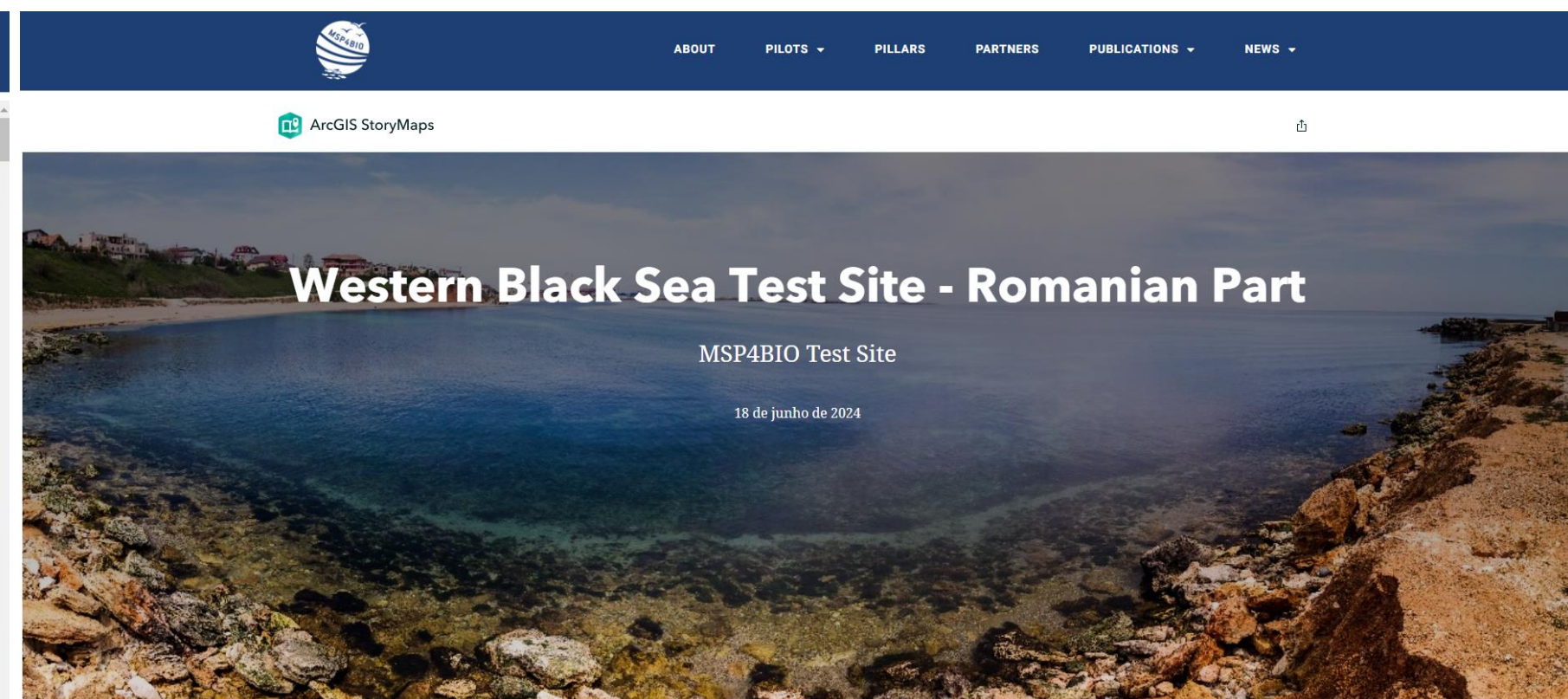
The main goal of the trade-offs is to support the reflexion on the **enlargement of the cross-border protected areas** (subject to national legislation – protected area and under Natura 2000 – Habitats and Birds Directives).

Environmental components concerned: Mobile species (marine mammals and fishes); Marine vulnerable ecosystems; Coastal habitats.

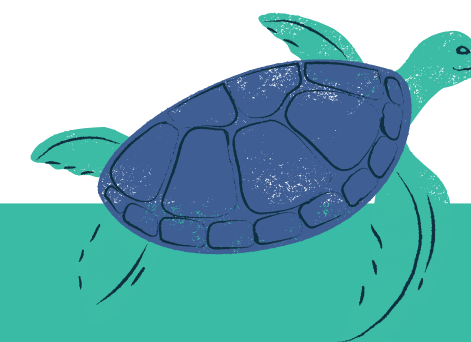
The main maritime uses concerned: maritime traffic; fishery, offshore wind parks (the area has the highest potential for offshore wind installations in the BG Black Sea zone), other coastal activities such as coastal tourism, scuba diving, kayaking, marine aquaculture, etc.

Ecosystem services concerned: Regulation/Maintenance (lifecycle maintenance habitat and gene pool protection (marine mammals); Provisional (Wild animals, both terrestrial and aquatic) for nutrition, materials or energy.

<https://msp4bio.eu/western-black-sea-test-site-romania/>

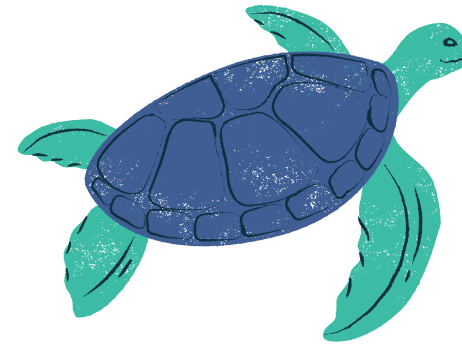


To **identify the conflicts and synergies** between the various utilities and activities in marine space in the pilot site- To determine the **stakeholders' perception of climate changes** and how they should adapt to them- To identify areas where marine habitats very high ecological and conservation value can be protected and how the **establishment of "strict protection"** (without any human activities) can interfere with current uses and activities.- To identify where/and if it would be convenient to create a **transboundary marine protected area for marine mammals**- To evaluate whether the **development of Blue economy activities** (aquaculture/offshore windfarms, tourism) can create conflicts with current uses



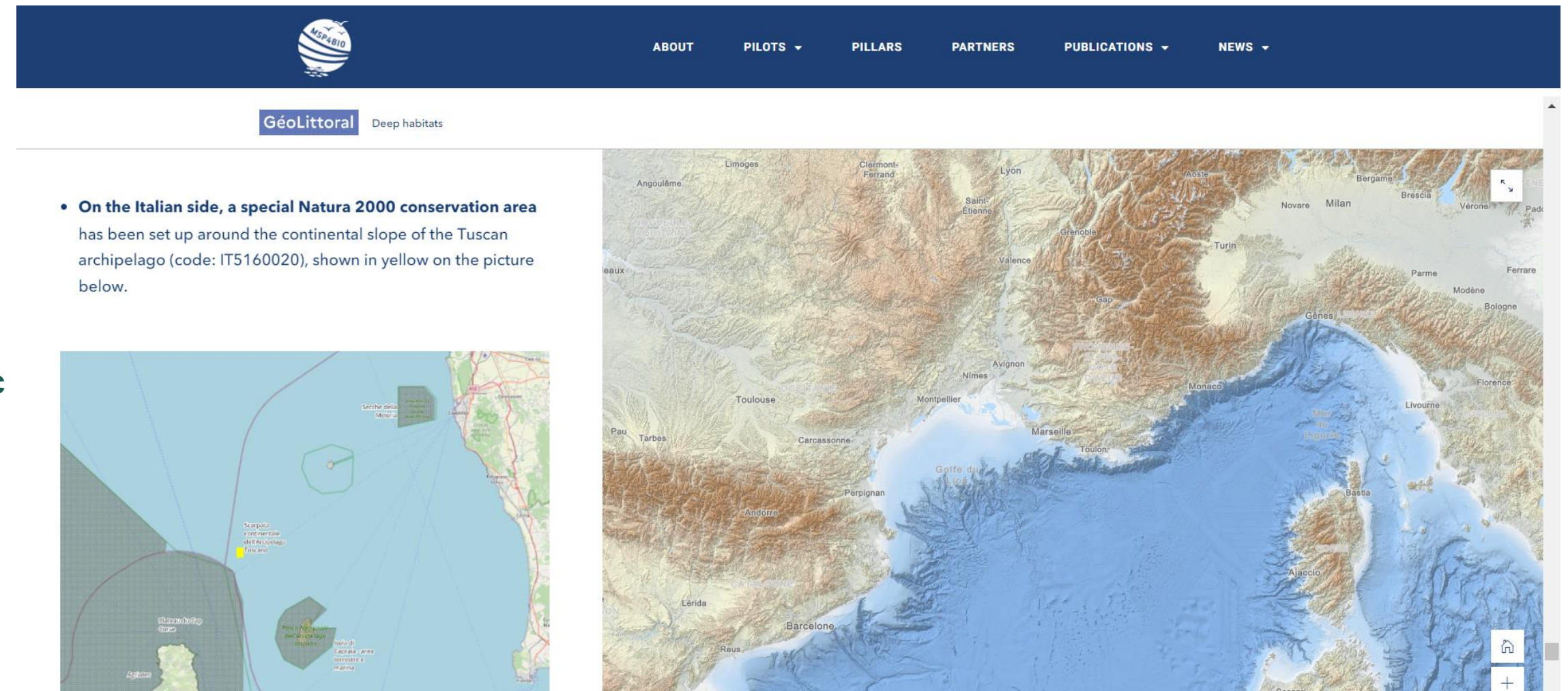
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West-Med

The trade-offs exercise allowed to **frame the approach of SPA design for marine mammals**. The approach that was proposed during the exercise is to use a biocentric process which aims at targeting species conservation relying on identified IMMAs as a starting point for the reflection. This will be done by identifying main threats and pressures. In particular, the **attention is on canyons as they are areas important both for marine mammals and deep ecosystems**. For those habitats, we will try to understand what are the main threats and pressures on conservation objectives before proposing adequate measures to ensure conservation targets. We will thus try to 1) **analyse how the ecosystem service 'Lifecycle maintenance, habitat and gene pool protection' interacts with maritime traffic** which is the main maritime activity having negative impacts on this ecosystem service 2) **propose measures for trade-off between environmental protection and maritime activity relying notably on all existing tools** (existing MPAs, N2000 network, PSSA, Pelagos Sanctuary), knowing that strong protection of marine mammals raises a lot of questions as it is something which has not been implemented so far across the globe (size of area, type of measures to be labelled as SPA, etc.)



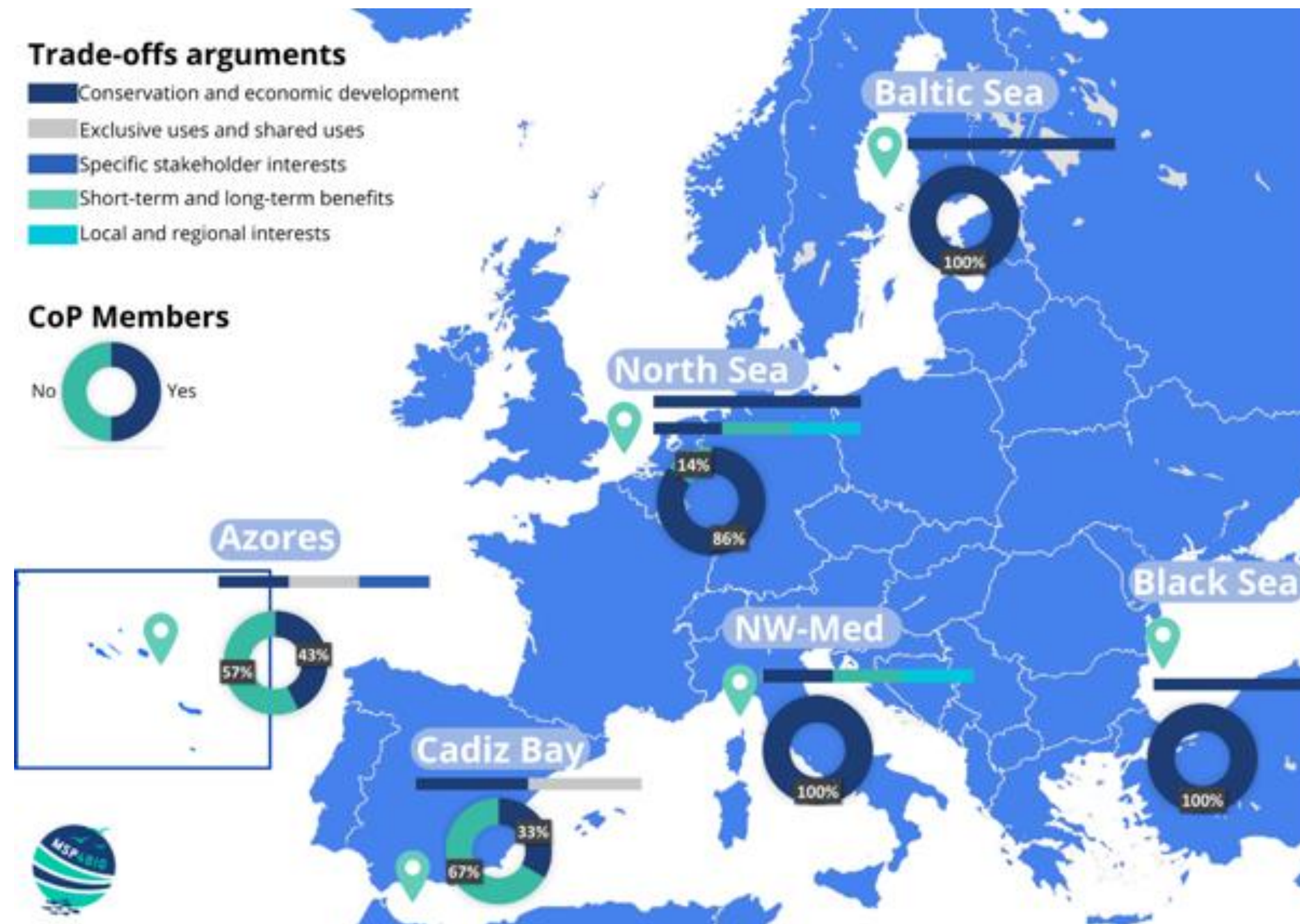
<https://msp4bio.eu/north-western-mediterranean/>



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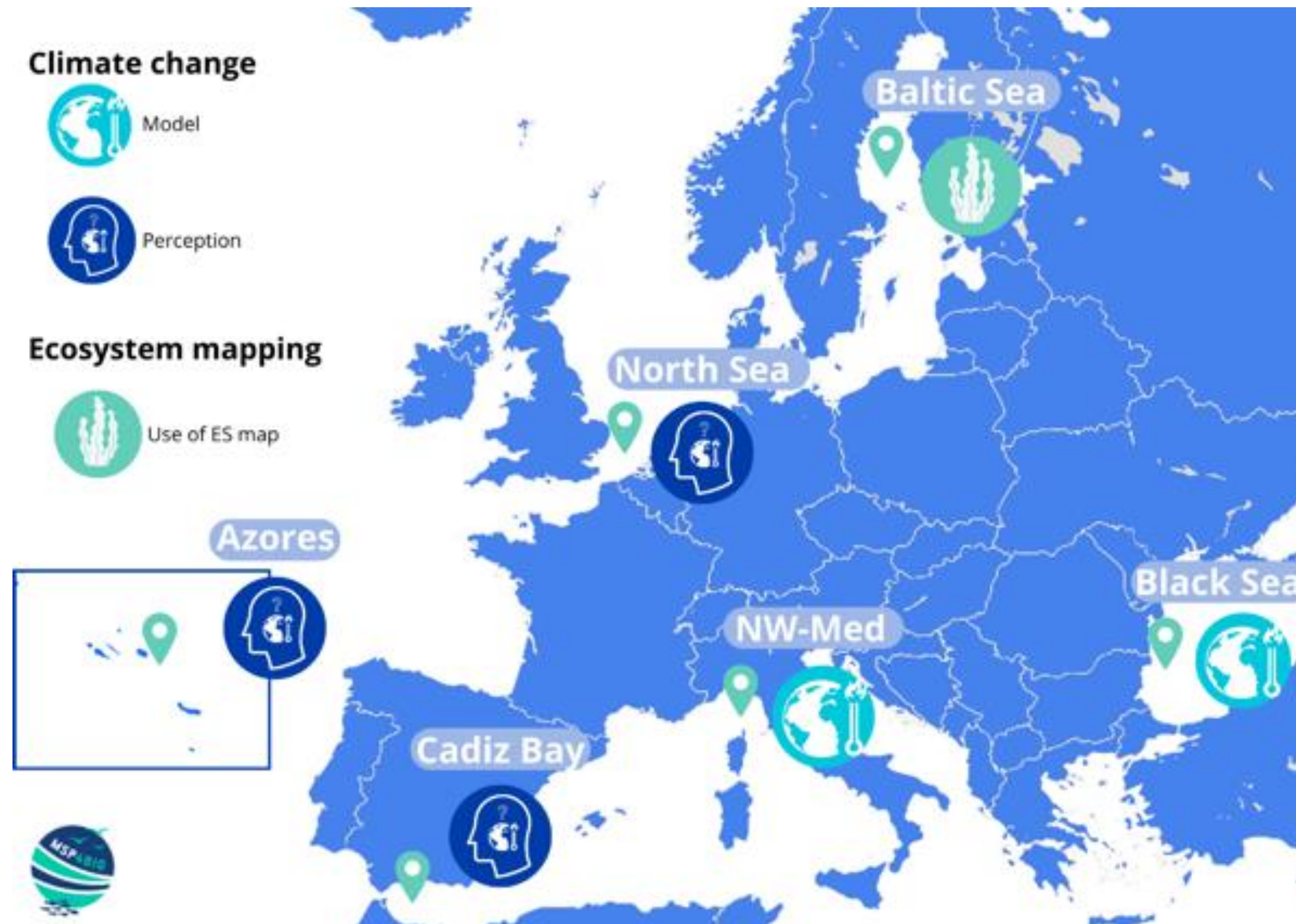
MSP4Bio Results



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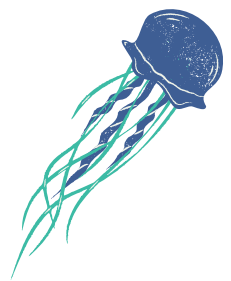


MSP4Bio Results



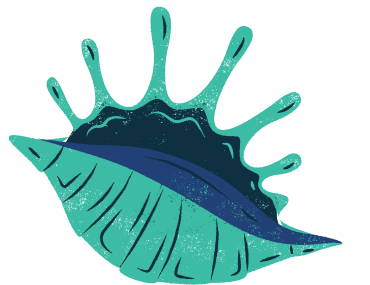
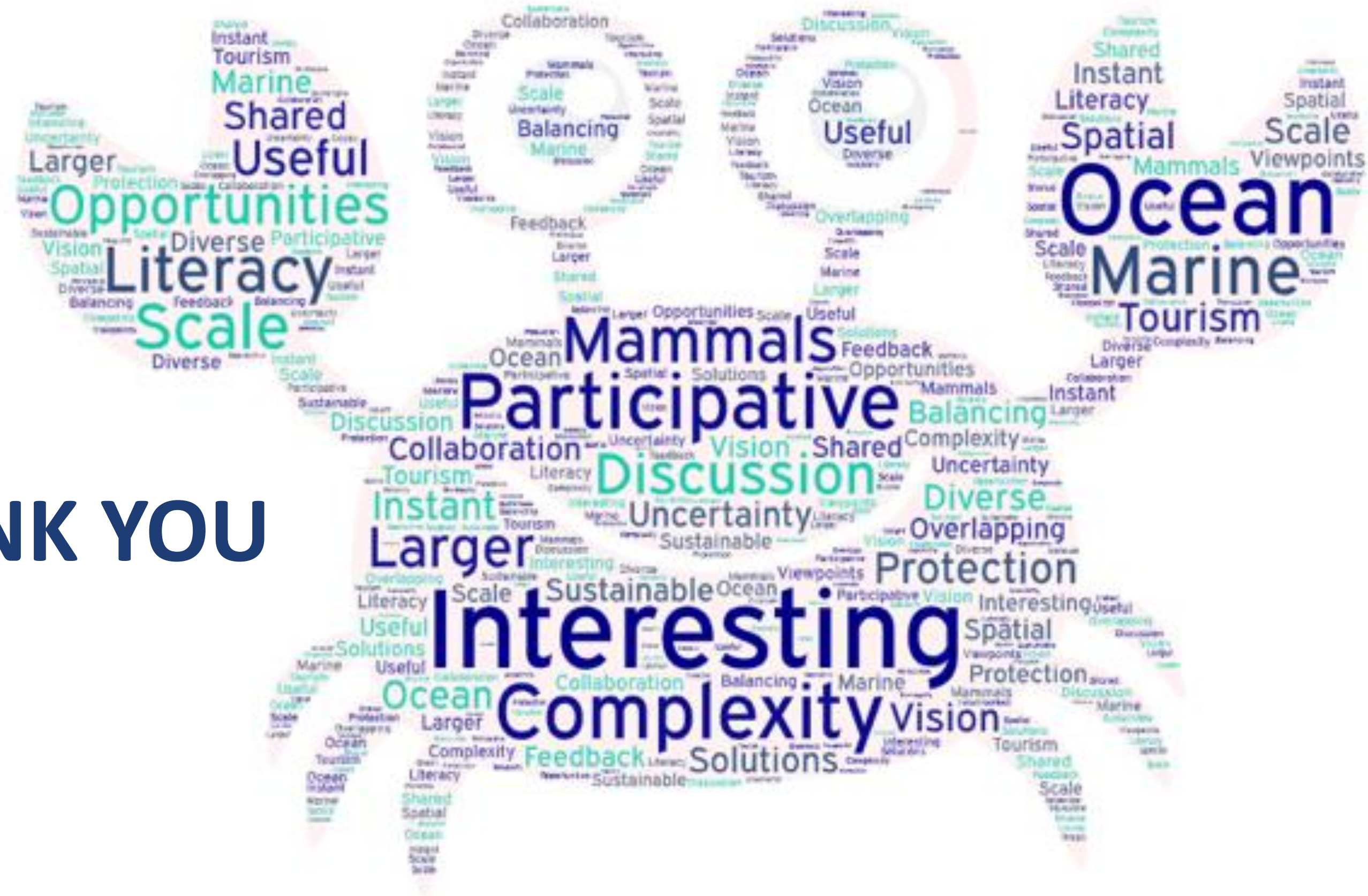
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Stage	Recommendations from MSP4BIO trade-off exercises
 Early Decisions	Before beginning the process, examine the past initiatives. This is important to avoid past mistakes and highlight the best practices for better results. Furthermore, the socio-cultural and jurisdictional challenges must also be examined. Starting with simpler issues that fall within the existing framework, can set oneself up for success. This approach allows for identifying opportunity areas that can be quickly and efficiently capitalised on. It is crucial to carefully choose the stakeholder engagement format more appropriate to context. For e.g. workshops, working Groups, NGOs (as not all regions may find CoP format suitable). Finding the right tool to use for participatory mapping is essential before starting the process. SeaSketch proved to be valuable for participatory mapping, but other tools are available. Comprehensive reporting is essential to communicate results effectively. More resources are needed to produce comprehensive reports. SeaSketch is good for data collection or smaller scales, as it may not be suitable for exploring larger areas. Before the process, basemaps must be prepared for participatory mapping. Despite its complexity, simplifying the preparation of basemaps on Mapbox is recommended. Exploring alternative software like MSP Challenge for discussing trade-offs in specific test sites. The visualisation of results is important, thinking of a two-day format for CoP interactions could help improve this visualisation. Before organising the workshops, it should be noted that in-person workshops are preferred for better engagement and discussion of opportunities in some cases.
Acceptable and Negotiable Aspects	Illegal activities are also part of the negotiable aspects, but as it is difficult to have data about them, intensifying surveillance in sensitive zones could indirectly deter illegal activities. Thinking about the future of military zones helps to avoid future complications and conflicts. The support of a new MPA by the stakeholders with some conditions, therefore negotiations should happen between the stakeholders. Participatory monitoring should be suggested. The uncertainties are inherent to complex socio-ecological systems, so accepting them and addressing multiple scenarios while explaining them could be useful in defining the acceptable and negotiable aspects. Having crowded onshore areas and MPAs could be a source of conflict, as the two are incompatible. Exploring opportunities for compatibility is therefore needed.
Decision-making process support	To support the decision-making process, improving policy coherence between the MSFD and MSP Directives for better MPA integration is needed. As one of the challenges of MSP is the lack or the gap in the data, conducting offshore studies on marine mammals, implementing automated detection, and tracking their food chains should be useful to complete these data to support the decision-making process with more arguments. One of the biggest uncertainties in MSP is Climate change, and therefore Climate Change scenarios are still challenging to address, their comprehension should be expanded. Visualising all preliminary layers during participatory mapping allows us to understand the workshop results quickly and easily and, therefore, to support the decision-making process with more arguments.



THANK YOU



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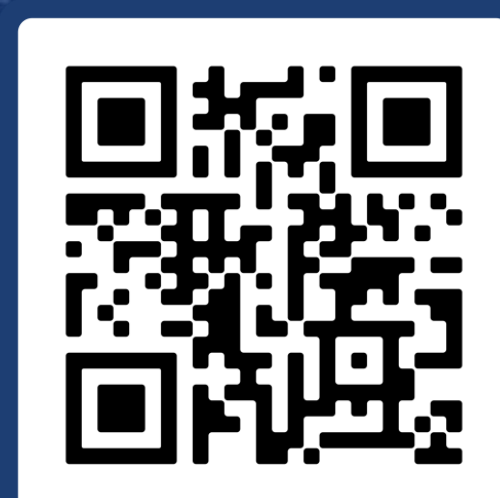




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