Work package 5: Operationalisation and participation in test sites

D5.2: Test Sites Methodology Including the Participation Strategy

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ABSTRACT	This deliverable presents the findings of Task 5.2 (T5.2) within the MSP4BIO project. The primary objective is to streamline the

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	adjustment process of the Ecosystem Service Enhancement (ESE) management framework, which provides guidance on enhancing the protection and restoration of marine ecosystems and biodiversity while integrating with Maritime Spatial Planning (MSP). The report focuses on tailoring the framework to the unique characteristics of the MSP4BIO test sites. It concludes with key insights essential for effectively validating the ESE management framework.
KEYWORDS	test sites, ESE Framework adjustment, participation
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2.0	31.08.2024	Revised version: modified after comments from the revisors
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Acronyms

CoP	community of practice
ESE	framework providing systematic guidance how to enhance protection and restoration of marine ecosystems and biodiversity and their integration with MSP
MPA	Marine Protected Area
MSFD	Marine Strategy Framework Directive
MSP	Maritime Spatial Planning
NGO	Non-Governmental Organisation
OECM	Other Effective Area-based Conservation Measure
PNI	Island Natural Park
PSSA	Particularly Sensitive Sea Area
SAC	Special Area of Conservation
SEA	Strategic Environmental Assessment
SPA	Special Protection Area
VME	Vulnerable Marine Ecosystems
WFD	Water Framework Directive
WP	Work Package

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Executive Summary

This report encapsulates the outcomes of Task 5.2 (T5.2) within the MSP4BIO project, funded by the European Union's Horizon Europe Research and Innovation program. The primary objective of this deliverable is to prepare testing of the Ecological-Socio-Economic (ESE) management framework to suit the distinct requirements of the MSP4BIO test sites, aimed at improving Science-Based Maritime Spatial Planning (MSP) to safeguard and restore biodiversity within EU seas and oceans.

The ESE management framework, a pivotal product of MSP4BIO, offers systematic guidance for enhancing the protection and restoration of marine ecosystems and biodiversity, integrated with MSP. The project encompasses six diverse test sites: Western Black Sea, Baltic Sea, Gulf of Cadiz, North Western Mediterranean, Azores, and the Belgian part of the North Sea. While the overarching goal across all sites is to bolster nature conservation efforts, each site has unique focal points and challenges.

The deliverable outlines the starting point and methodology for adjusting the ESE Framework project-wide and at each test site individually. It emphasizes supporting test site leads in preparing for ESE validation with Communities of Practice (CoPs). Comprising three parts, the report introduces the ESE Framework, presents a general methodology for participatory testing, and examines the site-specific circumstances and factors for each test site(incorporating policy ambitions, available knowledge, and maturity of the MSP processes) and their impact on the testing methodology for each test site.

Through participatory processes facilitated by CoPs, stakeholders' voices are integrated into decision-making, ensuring the framework's adaptability to local needs. The report underscores the need for continued dialogue post-T5.2 to deepen understanding and maintain momentum. Flexibility emerged as crucial, especially in accommodating policy-relevant elements, demonstrated in particular in the Cadiz Bay and Baltic Sea cases.

The report concludes by highlighting the MSP4BIO approach's validity and the ESE Framework's flexibility in addressing local needs across diverse EU sea basins. It advocates for facilitator services to aid in the framework's application beyond the test sites, ensuring effective transferability and scaling up. The proposed common methodology sets the stage for cross-site analysis and the identification of transferability barriers, laying the groundwork for future MSP initiatives.

Overall, the report underscores the importance of stakeholder engagement, flexibility, and continued dialogue in tailoring the ESE Framework to diverse marine environments, fostering effective biodiversity conservation within MSP.

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Introduction

The main aim of this deliverable is adjusting the ESE management framework to fit the specificities of the MSP4BIO test sites. ESE management framework (see chapter below) is a key product of the project MSP4BIO (improved Science-Based Maritime Spatial Planning to Safeguard and Restore Biodiversity in a coherent European MPA network), financed by the European Union's Horizon Europe Research and Innovation programme. This framework provides systematic guidance how to enhance protection and restoration of marine ecosystems and biodiversity and their integration with MSP.

The ESE will be in each test site outlined in this deliverable. The objective of the application, its results and the overall ESE approach, structure and guidance are defined and validated through a participatory process at test site level. In this context, the participatory strategy is intended as a tool for executing specific tasks, namely facilitating the implementation of the ESE once it is prepared for application at the test sites. Therefore, the focus of Deliverable 5.2 is on proposing the steps and content of the participatory strategy that could assist in this particular task, while the broader stakeholder engagement of the project is analysed in D5.1 (detailed methodological description and factual data on CoPs) and will be further elaborated and evaluated in D5.5.

There are six test sites in the project that are used for validation of the ESE: Western Black Sea, Baltic Sea, Gulf of Cadiz, North Western Mediterranean, Azores, Belgian part of the North Sea. It has been demonstrated in the previous stages of the project development that the test sites are diverse, and they have different needs in relation to strengthening environmental protection while at the same time considering socio-economic impacts of conservation measures and taking advantage of ongoing MSP processes. Although general aims and objectives of all test sites in terms of strengthening (or improving the quality of) nature conservation are similar, each test site has a different focus. The NW-MED test site focuses on enhancement of strictly protected areas and mobile species and the national and cross border coherence between MPAs. The Gulf of Cadiz test site pays attention to policy design, management and implementation as well as the attitudes towards conservation of the local population. For the Belgian part of the North Sea test site key concerns are related to pelagic habitats. Key ambitions of the Western Black Sea test site are: MPA extension, cross-border coherence between MPAs (MPA connectivity) and alignment between MSP and MPA processes. The Azores - Graciosa Island – Portugal test site also focuses on alignment between MSP and MPA processes, but key challenges are related to closing knowledge gaps and helping to improve stakeholder participation. The Baltic Sea test site is investigating spatial solutions related to climate change (CC) (e.g. refugia), and its (i.e. CC) impact on nature conservation.

Due to the particularities of each test site, different ESE elements will be tested in different sites but following common methodology for adjustment offered by D5.2. Moreover, the diversity of the needs described above resulted in the requirement to bring not only the ESE Framework itself to the testing stage but also combine ESE with policy considerations (developed in WP6) and knowledge gaps or availability of data (developed in WP2) and put such a combined set-up

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under testing scrutiny. The key task of T 5.2. is to prepare validation of different elements of ESE at each test site. Thus, there are two key elements constituting the adjustment phase: (i) combination of ESE with relevant products of other WPs and (ii) selection of test-specific ESE (and other) elements for testing in each test-site.

The deliverable presents the starting point and adopts methodology for ESE Framework adjustment at the level of the entire project and for each test site separately. Key ambition is to help test site leads in their preparation of the validation of ESE with CoPs.

The deliverable is composed of three parts. The first one presents an introduction, explaining the essence of the current report and a short description of the ESE Framework.

The second one presents the general methodology, including the participatory strategy for the testing phase at the project level. It builds on the existing stakeholder process in each test site that has been explained and described in D5.1 (Withouck et al. 2023a). In D5.2we indicate the steps that must be taken by all test sites in order to start validation of the ESE Framework. It takes the form of a checklist composed of questions that should be answered and circumstances (external factors) that influence the way in which validation can be run and therefore condition the validation process. It forms the basis for elaboration of individual plans for the participatory process by the test site leaders before the validation workshop.

The third part is test sites' specific. It is based on commonly agreed theoretical template attached in Annex 1. It presents the aforesaid circumstances/factors for each test site separately such as policy ambition, available knowledge, key gaps analysis (all identified in Task5.1, see D5.1 - Withouck et al. 2023a), feedback captured in CoPs interactions, and the MSP planning and MPAs management processes conducted in each test site. Moreover, it highlights key elements of the MPAs and MSP processes, i.e. different stages of MSP from inception to monitoring & evaluation and review, in order to provide guidance for biodiversity integration at different levels and stages. On that basis, concrete focus of testing is proposed including the testing of the ESE Framework as well as other elements based on their relation to the guiding questions developed by the CoPs of each test site (showing key problems and ambitions and serving as a basis for ESE development) of each test site. This part is based on inputs from previous deliverable (Withouck et al. 2023a) and outcomes of the workshops organised under T5.2 for each test site which aimed to bring together ESE and WP6 developers with the test site leaders and initiate dialogue between them. These meetings have resulted in proposed – in the deliverable – adjustments to the ESE Framework and to the combination of ESE elements to be used for testing, including specific decision support tools (DSTs) that should be tested in each test-site. Moreover, the discussions also served as a starting point for reflections whether the existing stakeholder processes in each test site (as described in D5.1) need adjustment or extension in order to proper validate ESE.

In the concluding part of the deliverable the most important lessons learned from the adjusting process are summarised and a joint criterion for the ESE (and other elements) implementation is proposed as a basis for the transferability analysis.

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ESE - Ecological-Socio-Economic management framework

The Ecological-Socio-Economic management framework (ESE) is a tool-based step-by-step guidance for enhancing protection and restoration of marine ecosystems and biodiversity and integration with MSP.

As such the ESE Framework is still under development. From a practical point of view, the ESE final version (available at the end of the project) will be operationalized through the realization of an interactive application / module where the end-users (e.g. MPA / MSP managers and stakeholders) will be guided to the identification of information, data, and practical tools for supporting their decisions.

The main elements of the ESE Framework are illustrated in Figure 1. The entry point to the framework will be management (guiding) questions to be identified at site level. Based on the type of question, the user will be able to navigate through the solutions offered by the different ESE modules and other components of the project (outputs from WP2 and WP6). Practices (= operative instructions) will be prepared to guide users to address their questions by applying ecological and socio-economic criteria and tools. Policy solutions from WP6 will be included in ESE too. The ESE Framework will also provide the user with links to catalogues (= lists) of measures (= good practices) dealing with mainstreaming marine protection in maritime sectors and MSP.

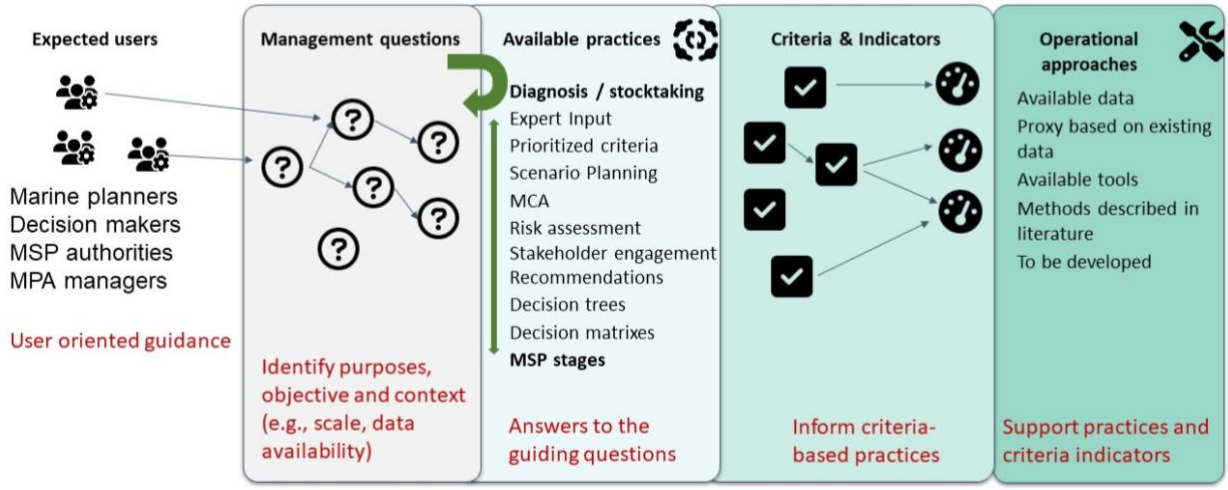

Figure 1 Guiding elements of the ESE management framework, own elaboration.

As showcased in Figure 2, the ESE Framework will support users across all main MSP stages. A selection of management questions, in particular comprehensive ones, formulated in such a way to address prioritisation of protection in MSP, integrating social economic and environmental considerations, will be included in the framework.

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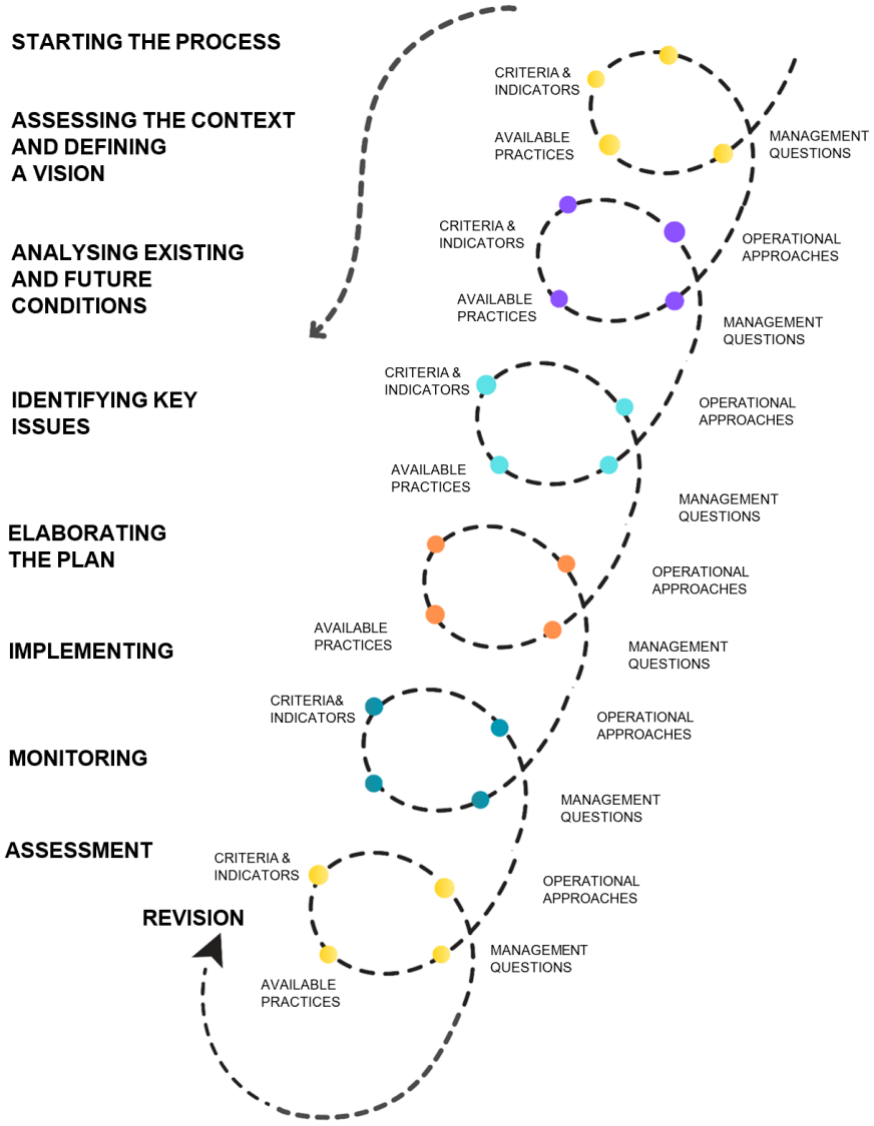

Figure 2 Utilization of the ESE Framework along the MSP steps, own elaboration

Overall, the ESE Frameworkwas intended to integrate and combine the following sub-modules (as illustrated in Figure 3):

- ESE1 - the ecological Toolkit for systemic consideration of biodiversity;
- ESE2 - criteria for representing the social and economic dimension of marine protected areas (MPAs);
- ESE3 - guidelines for strategic and spatial measures to promote nature-inclusive operations within blue economy sectors;
- ESE4 – trade-off method for protection and restoration in MSP.

However, in the course of the ESE development it was decided (MSP4BIO General Assembly held on 6-7 November in Split)to integrate ESE 4 on Trade-offs method for protection and restoration in MSP into ESE 3 and therefore that the ESE Framework would consist of three instead of originally planned four modules.

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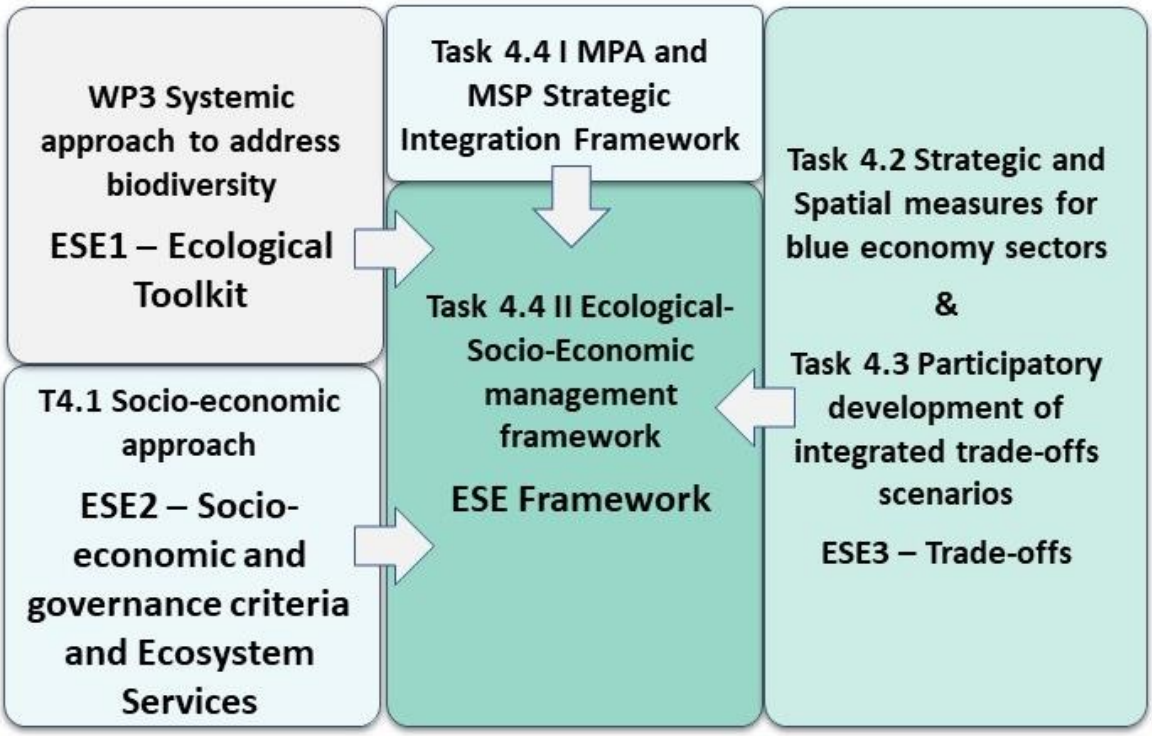

Figure 3 ESE modules and their integration in the ESE Framework, own elaboration

The elements presented at Fig. 3 have been detailed in the project deliverables:

- D3.4 Ecological toolkit for MPAs prioritization and networking - ESE 1
- D4.1 Criteria for the representation of the social and economic dimension of MPAs - ESE2 (Pegorelli et al. 2023)
- D4.2 Guideline for the strategic and spatial measures for the nature-inclusive operation of blue economy sec tors - ESE3 (Pegorelli et al. 2024)
- D4.3 Trade-offs method for protection and restoration in MSP - ESE3(Gutierrez et al 2024)

These deliverables have already been finalized. The entire framework will be presented in D4.4 (under preparation).T 5.2 served testing the concept and the initial structure of the ESE Framework and adjusting it to the needs of the test sites. Testing was done with active participation of the ESE developers (authors of aforesaid deliverables) that help test sites to understand, operationalise and make full advantage of the concept. If necessary, coaching will be continued after formally completing T 5.2. Based on this experience, some measures will be proposed to facilitate ESE implementation outside MSP4Bio project. These measures will be elaborated in detail in D5.4. Their preliminary list is part of his deliverable.

2.1 ESE1: Ecological toolkit (ESE 1) for MPAs prioritization and networking

ESE1, also named Ecological toolkit, supports improvement of MPA decision-making processes,such as prioritizing areas for conservation, considering and incorporating

connectivity processes in decision making, and assessing the impacts of human activities on marine ecosystems under current and future scenarios. The toolkit consists of an inventory of solutions to guide decision-makers through the complex pathways of MPA prioritization and networking.

To support decision making, the ESE1 incorporates a set of improved ecological and climate-related criteria derived from systematic reviews and desktop analyses. These criteria aim to inform decision making related to the above-mentioned processes such as prioritising areas for conservation or incorporating connectivity considerations in planning.

Through ESE1, criteria focusing on structural aspects (as collected and systematized in D2.2 (Withouck et al. 2023 b)) as well as on functional aspects (as presented and organized in D3.1 (Bongiorniet al. 2023a) and D3.2 (Bongiorniet al. 2023b), across different levels of biological organization (from individuals to ecosystem) are provided. Functional criteria are aggregated into four broad categories: biological traits, functional diversity, trophic ecology, food web functioning and connectivity. This aggregation will help identification of the most suitable ones, according to the management question of the site.

ESE1 also includes guidance for considering climate change scenarios in protection and prioritization strategies for MPA development (Cambra et al. 2024). Such guidance builds on a selection of relevant ecological criteria and takes the user through
the vulnerability assessment steps necessary for the prioritization of conservation measures in MPAs. The suggested methodologies provide interested stakeholders with the elements to define climate-proof conservation scenarios.

Finally, as well as support with prioritizing conservation measures, ESE1 also provides science-based ecological and environmental tools to prioritize conservation areas. By combining ecological data and relevant information from existing Copernicus services and hydrodynamic models, this module substantially improves existing DSTs to address ecological and environmental processes at both local and regional scales, and the diverse pressures to which marine ecosystems are subjected, including those arising from climate change. The Ecological toolkit includes the following spatially explicit Decision Support Tools: Dispersion and Connectivity Modelling Tools, Cumulative Effect Assessment tools (Tools4MSP, PlanWise4Blue, HELCOM SPIA Tool), Climate Change Impact Assessment Tools, and Prioritization Tools.

2.2 ESE2: Criteria for the representation of the social and economic dimension of MPAs

ESE2 provides socio-economic and governance criteria to support the prioritization of proposals for new Marine Protected Areas, revised MPA boundaries, reallocations, and more. Collectively, these criteria provide a framework considering the MSP process and ensuring a comprehensive approach to decision-making. The list of socio-economic criteria and governance were elaborated by UCA Team and validated with test sites leaders. The CoP (stakeholders) were consulted in the next faze to rank the criteria with ecosystems services (Pegorelli et al. 2023).

Regarding governance criteria, ESE2 is based on a common regulatory framework at the EU level which leads to a homogenization in prioritizing them across different sites. These criteria are generic and strategic for any MSP process, as well as for the designation or management of an MPA. This part of ESE2 presents, among the steps of an MSP process, the implementation of strategic planning, as well as the need for adaptive management through monitoring and feedback. Regarding the socio-economic criteria, these are expected to vary in relevance for the different sites. The relevance of socio-economic criteria depends on site-specific aspects such as national and local objectives, and the ecosystem under protection.

ESE2 also provides links between socio-economic criteria and ecosystem services. It was ranked by all test sites in the 2nd CoP interaction. This component is of particular importance to be used in stakeholder consultation at site level, when comparing alternative scenarios for MPAs, within and outside of MSP processes.

2.3 ESE3 – Trade-offs method for protections and restoration in MSP, including guidelines for strategic and spatial measures for the nature-inclusive operations within blue economy sectors.

ESE3 provides a guideline for the participatory creation of integrated trade-off scenarios. Scenario-building to explore trade-offs can help to improve the management of marine spaces and safeguard ecosystem services.

These scenarios aim to assess and negotiate the consequences of diverse actions and strategies regarding the spatial and strategic management of marine areas. The key element of the approach is to understand how various human activities can influence and are influenced by the ecosystem's services and find potential ways for negotiating solutions. The outcomes, particularly the trade-off scenario guidelines, can be integrated into practical tools and frameworks, aiding decision-making processes related to marine resource management (Gutierrez et al., 2024).

Effective management of trade-offs involves stakeholder engagement, scientific analysis, and the utilisation of decision-support tools (DST) to pinpoint optimal solutions that minimise negative impacts while maximising overall benefits. Trade-offs manifest in close association with specific goals, interests, and activities. Various types of trade-offs can be categorised: trade-off between conservation and economic development objectives; trade-off between short-term and long-term benefits; trade-off between exclusive uses and shared uses; trade-off between specific stakeholder interests; trade-offs between local and regional interests.

Complementary and as supporting material to the trade-off methods, ESE3 provides a non-exhaustive list of effective management practices tailored to some key maritime sectors: fishery, tourism, aquaculture, marine non-living resource extraction, renewable energy. This list aims to inform the activity of sectors inside and/or near MPs, providing knowledge base to understand interactions and possible impacts, as well as examples of good management practices for uptake by some key sectors operating within or in the vicinity of MPAs.

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The practices showcase actions that embody a balanced and sustainable approach to the blue economy and may serve as a guide to fostering responsible and sustainable practices that support both economic interests and environmental conservation. For each sector a factsheet is provided, including crucial information such as essential sector characteristics, a detailed list of sector-specific activities, a Sankey diagram to visualize sectors, pressures, and impacted ecosystem services hierarchically, and brief insights into exemplary management practices.

This content also links to the ecosystem services that can be impacted by the activities of the sectors. Consequently, this module allows to understand how these activities could affect the achievement of socio-economic criteria identified as priorities (ESE 2).

Finally, these practices support managers in achieving better outcomes in addressing trade-offs while also supporting blue economy sectors/industry stakeholders to understand the impacts relevant of sectors' operation.

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3. General methodology, including participatory strategy for the ESE Framework testing phase

One of the T5.2 objectives was to recognise and elaborate on the steps that should be taken by all test sites to adopt/validate the ESE Framework within the MSP4BIOframework. In the end, it takes a form of the checklist composed of questions that should be answered by the test site Leaders during the process and circumstances (external factors) that influence the way in which validation can be carried out.

The participatory strategy, which in this case might be called “methodology for ESE adjustment” should incorporate participatory aspects, signifying the involvement of stakeholders, individuals, and communities in decision-making and problem-solving processes. Furthermore, the idea behind a participatory process is to ensure that the voices of those involved are heard and their perspectives are considered.

In the MSP4BIO project, participation is ensured through the creation and facilitation of Communities of Practice (CoPs) at each test site level. This process is described in detail in Deliverable 5.1. As indicated in D5.1, each CoP varies in terms of participant composition, backgrounds, roles, and responsibilities. While D5.1 serves as a foundation, the validation of the ESE requires consideration of the specific characteristics and nature of the test sites when engaging stakeholders in this task. This has been done under T5.2. At the end, based on the created strategy – for each of the test sites an individual indications and steps on how to adjust ESE Framework to the test sites specificity have been elaborated, including steps designated jointly by the test site leaders and ESE Framework developers. This strategy capitalizes on the existing stakeholder processes at each site. In some cases, the extension of the existing CoPs might be necessary, if the ESE validation (specific ESE elements chosen for validation) requires additional expertise not present in the current setup. Therefore, CoP interactions are utilized to facilitate the developments of MSP4BIO and to validate the initial draft of the general ESE Framework.

The strategy identified (presented below) focuses on the proper implementation of the ESE Framework within the MSP4BIO framework, including time frames. However, towards the end, some actions extending beyond the project's lifetime have been outlined.

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1 STOCK-TAKING – crucial at the initial stage

performed

What should be considered:

- Availability of information;
- Mismatches between analysis, lack of clear conclusions;
- Key gaps;
- Current state but also future situation;
- Use your CoP knowledge and expertise, discuss with them the gaps and future aspects.

Feedback loop

- If data is missing → ask WP2 whether data is available;
- If clear conclusions cannot be taken→ ask experts which analysis should be followed;
- If data on future state are not available → ask WP3 for dynamism of the ecosystem.

2 SELECTING - key issues and actions for test site

performed

What should be considered:

- Discuss with your CoP the key issues, use their tacit knowledge, their interests, recognised conflicts and needs for actions;
- Existence of an administrative framework to take actions.

Feedback loop

- If frame is not existing → go to WP6;
- If your test site CoP is unable to make priorities → use other ways of doing that (e.g. expert knowledge of test site leaders) or consider engaging wider group by organising workshops.

3 Analysing ESE - criteria, indicators, practices

in the course

What should be considered:

- ESE offer should be ready at this point, as a crucial precondition;
- Tacit knowledge and skills of ESE developers;
- Priorities of each test site;
- Inform your CoP and present the ESE potential, its added value as a new tool to support the decision-making process.

Feedback loop

- If ESE offer is not suitable:

→ ask ESE developers for more tailored support or

→ rethink test site priorities or

→ narrow down the testing ambitions to available ESE contribution;

- If policy tools and good practices should complement ESE →start dialogue with WP6.

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4 Selecting ESE criteria, indicators, practices (tools and guidelines) for testing

in the course

What should be considered:

- Availability of necessary data and information relevant for selected tools;
- Availability of skills among test site leaders to apply selected ESE elements;
- List of boundaries spanning objects necessary to trigger validation workshop;
- Availability of knowledge and active participation of stakeholders;
- Capacity of existing CoP to handle validation;
- You may also select other project results like the WP6 recognised practices.

Feedback loop:

- If data and information is missing → ask WP2 whether data is available;
- If skills among test site leaders are insufficient → make ad hoc meetings with ESE (or/and WP6) developers to acquire them;
- If you are unable to produce boundary spanning objects → ask other partners (with GIS facilities) for help;
- If your CoP has insufficient capacity to participate in testing (lack of some important stakeholders, lack of skills and expertise) → consider inviting additional persons to the validation phase;
- If you encounter key problems jeopardizing validation phase →please reconsider the selection of ESE (or WP6) elements for testing.

5 PILOTING testing

to be done

What should be considered:

- Producing necessary boundary spanning objects creating fundamentals of discussion based onthe application of ESE (or WP6) criteria, indicators, practices (tools and guidelines);
- Inform your CoP on the commencement of ESE testing.

Feedback loop

- If boundary spanning objects are dubious → please ask ESE (or WP6) developers for help or verification;
- If boundary spanning objects will not inform validation phase →please contact Task 5.3 leaders to come together to the previous phase.

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Engaging stakeholders (for the validation workshop)

What should be considered:

- Right pool of stakeholders to start validation. Consider wider group than your CoP, address other decision-makers, scientists, maritime spatial planners, environmental administrations, etc - prepare the stakeholders list in advance;
- Willingness of stakeholders to participate;
- Agreed and active methods of engagement of stakeholders;
- Translate complicated scientific boundary objects into a simpler format which is easier to grasp by the stakeholders (graphical tools).

Feedback loop

- Make sure that you have experts/ people engaged in each testing element (analyse existing CoP composition);
- If gaps are detected → try to fill them by extending CoP;
- Make sure that stakeholders are committed (think about how to advertise ESE products and engage them in pre-testing activities);
- Tailor your engagement strategy to the needs of stakeholders' ability to participate and consider materials;
- Inform stakeholders about questions to be discussed in advance;
- Allow stakeholders to bring other stakeholders to the validation workshop (snowball method);
- Consider dividing stakeholders into smaller subgroups with clear tasks;
- Consider building collaborative partnership strategies in the context of MSP and MPAs integration.

6 **Validating** workshop

To be done

What should be considered:

- Clarity of the product for the validation workshop;
- Future commitments.

Feedback loop

- Make sure that the feedback from the validation workshop is summarised and transferred to the ESE developers;
- Try to organise the validation workshop back-to-back with an existing decision-making process.

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Beyond the project level

- Identify the decision-making processes in your test site area and beyond (on national and regional level), update the analyses already done at the project level.
- Establish connections with people involved in these processes, if they are not already involved in CoP works, share information about the ESE modules with them, show the new knowledge, new tools, new sets of indicators and criteria.
- Communicate the ESE modules/results appropriately – analyse who would be interested in which tool.
- Create clear recommendations to policy level.
- Create recommendations to maritime spatial planners.
- Be proactive – propose your input to people involved in decision-making processes.
- In case of cross-border test-sites, show the common picture for the whole area, show added-value of cross-border solutions included in the ESE modules.

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4. Adjusting the ESE management framework to fit the specificities of the test sites

4.1. The Azores Graciosa Island – Portugal test site

4.1.1. Test site key characteristics

The Azores is an autonomous region of Portugal located in the north Atlantic and composed of nine islands and a rich diversity of habitats. Graciosa Island (Portuguese: *Ilha Graciosa*), also referred to as the White Island, is a volcanic Atlantic Island in the Azores archipelago located around 1630km from the Portugal mainland (Withouck et. al., 2023a).

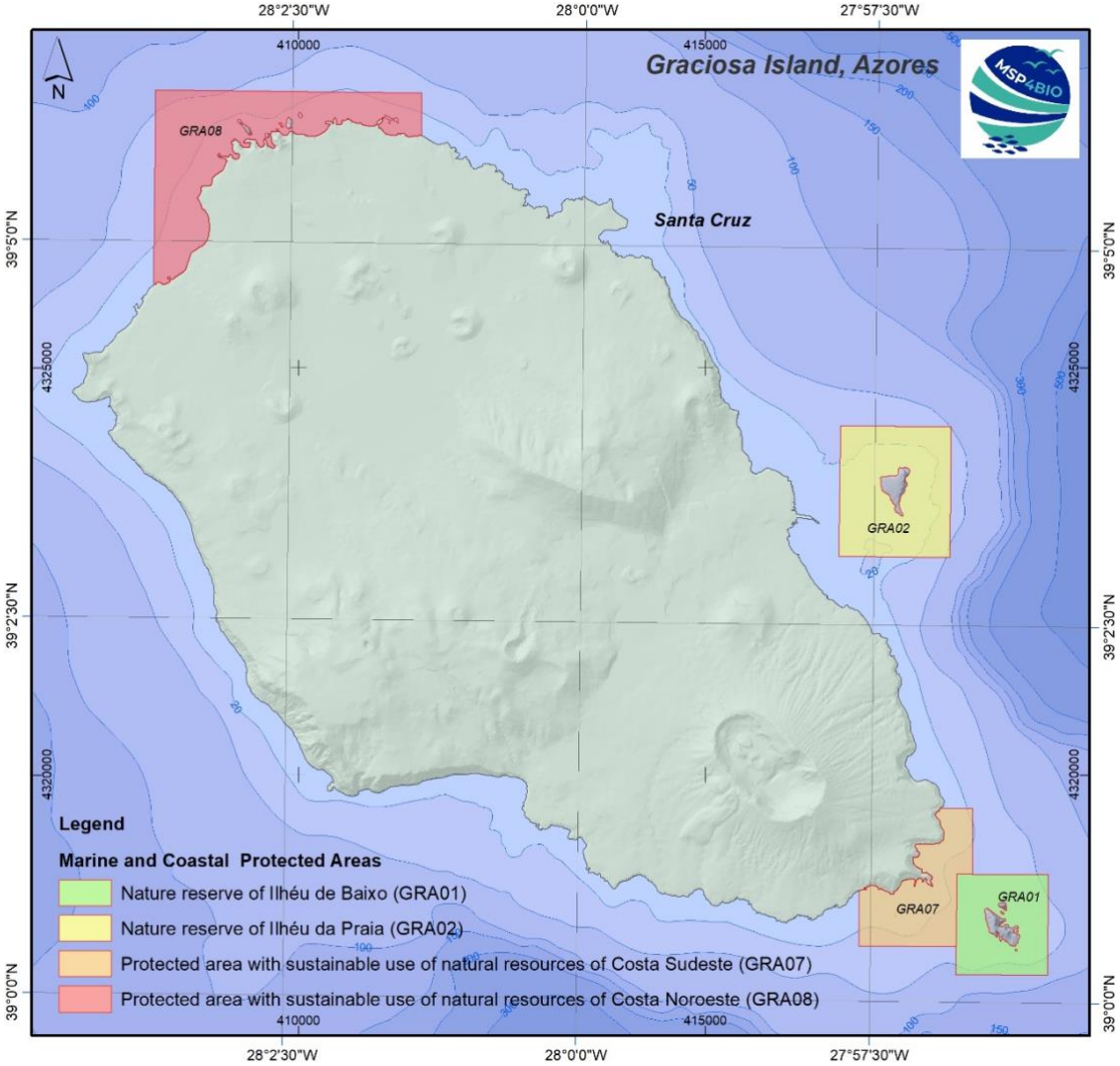

Figure 4 The location of the Azores Graciosa Island – Portugal test site. Source. Withouck et. al. 2023a.

The island has an area of 60.65 km^2, a length of 10 km and a width of 7 km. Its landscape is dominated by a 1.6-km-wide central caldera (the *Caldeira*) located in the southeast. Population is above 4 thousand inhabitants. Coastal waters surrounding the island cover 971,582 km^2 (EEZ and extended continental shelf).

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The most important blue economy sectors are fisheries and tourism. The key characteristics of the test site are the following:

- Rich habitat diversity – knowledge gaps in offshore and coastal areas;
- Need for strategies to enlarge MPA network in coastal areas and for "fully protected areas";
- No Regional MSP approved so far (MSP plan is under public consultation).

4.1.2. Main focus and objectives of the test site

So far, conservation planning has not been systematic, partially due to a lack of a time series of data. No management plans are available for the marine component of protected areas, and management plans in place need better defined conservation objectives. There is a need for more continuous and robust monitoring and surveillance, as well as consistent indicators used for the monitoring. MSP is not integrated with MPA design and management processes due to inconsistent timing.

4.1.3. Key local issues and challenges to be solved with support of the MSP4BIO ESE Framework[1]

The following issues were highlighted as important challenges in the test site:

Topic	Description
Deficiencies in the current status of the MPA management	MPAs are in place, but new areas can be needed, and the delimitation of the existing ones might be revised on the basis of more systematic data collection. There are problems with systematic monitoring of MPAs due to financial constraints and limited human resources.
Coherence between area designations, MSP and other environmental legislation such as MSFD	MSP still needs to be approved for the autonomous region of the Azores. A key problem is insufficient coordination between MSP and MPA preparatory activities that are executed as parallel and poorly integrated processes. Both of them should pay attention to MSFD but this remains a formal requirement.
The integration of social and economic aspects in MPAs	The socio-economic aspects are not properly integrated into MPAs management plans. Only recently, some studies of uses have been carried out, but still important

1. Enite chapter is based on direct or slightly changed citations from D.5.1 (Withouck et. al., 2023a)2. Enite chapter is based on direct or slightly changed citations from D.5.1 (Withouck et. al., 2023a)[3]Enite chapter is based on direct or slightly changed citations from D.5.1(Withouck et. al., 2023a)[4]Entire chapter is based on direct or slightly changed citations from D.5.1 (Withouck et. al., 2023a)

	background information is missing (i.e. economic data on fishing efforts or information on socio-economic management goals of the MPAs). Management, as a rule pay insufficient attention to socio-economic cumulative impacts on MPAs.
Stakeholder confidence in MPA and MSP processes	Stakeholder engagement is secured mainly through public consultation and workshops, but the feedback received is unsatisfactory. Such engagement should be deepened through capacity building measures, stakeholders' education, enhancement of ocean literacy, and better communication with stakeholders. Stakeholder management is much better under MSP than it was in the processes of delineating MPAs.

Source: based on Withouck et. al., 2023a

4.1.4. Community of Practice (CoP) involvement.

Out of the originally envisaged 13 stakeholders' representatives, 11 persons agreed to participate in the Graciosa (Azores) CoP. They came from various levels of public administration (regional and local) and business sectors, mainly fishery and tourism (sailing and diving). They were expected to form an important reference group for the MSP4BIO project in the Graciosa. The experience with CoP in Graciosa is very challenging. Key problems were related to distance among islands and the high costs of travelling that somehow hampered willingness of CoP members to participate in face-to-face meetings. Since some stakeholders are not computer-lettered and do not have easy access to the internet, the best format to develop the meetings is in a hybrid format. It is important to keep the stakeholder engagement by email and also constantly confirm by phone. As a result, in the course of the first CoP meeting, only 7 answers were received (including online meetings or phone interviews), and in the second one the 3feedback were generated (2 persons in the online meeting and 1 sent later by email after some phone clarification). The 3rdCoP interaction was held in a hybrid format, with 5 persons in-person plus 2 online.

4.1.5. Stage of the MSP plan and the MPA designation process

The MSP process in Portugal is subdivided into three regions: mainland, Madeira and Azores. The maritime spatial plan for the Autonomous Region of the Azores is currently in the approval phase, and after this legal procedure, a Public Consultation will follow partially thanks to the OR project. The online portal is already in place.

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In terms of marine conservation, as well as Coastal Marine Protected Areas, the Azores Marine Park has been established, which integrates the 9 different Islands Parks. The Graciosa Natural Park was created in 2008 by the Regional Government. It establishes the protection and conservation regime of the natural resources and values present therein, compatible with the sustainable use of the territory and in articulation with the territorial management instruments and applicable legal regime. The creation of the Natural Park led to the classification of its protected areas (marine and terrestrial). The marine and coastal protected areas consist of the *Ilhéu de Baixo* Natural Reserve (0.10 km^2 of terrestrial area and 1.29 km^2 of marine area, located about 700m from the coast: SPA, SAC, IBA), *Ilhéu da Praia* Natural Reserve (2.09 km^2 of marine area and about 0.1 km^2 of land area that constitute the islet and is located 1.3 km from the coastline: SPA, IBA), Southeast Coastal Resource Management Protected Area (marine area 2.83 km^2: IBA). and the Northwest Coast Protected Resource Management Area (marine area 1.36 km^2: SAC, SPA, IBA) – seeFigure 4.

The ESE will be launched at a helpful moment once the Azorean MSP are not still approved by the government and can support the MSP implementation. Also, with the review process of the MPAs, the ESE can foster new experiences and good practices to open the possibility of building possible management plans.

4.1.6. ESE expected results.

The key guiding questions highlighting the main concerns/needs of the test site that can be addressed through the usage of the ESE Framework are following:

1. methods for clarification of the procedures for Portuguese MSP Plans to integrate newly classified MPAs;
2. better inclusion of the evaluations of stakeholders' satisfaction level (e.g., alignment expectations) in the MSP/MPA Processes? methods for evaluating cumulative impacts/trade-offs in MSP and MPAs;
3. monitoring approach to evaluate conservation measures for extensive MPA Networks, especially offshore ones;
4. improving the integration of socio-economic objectives in the evaluation and re-drawing of the current MPA network and new drawing MPAs.

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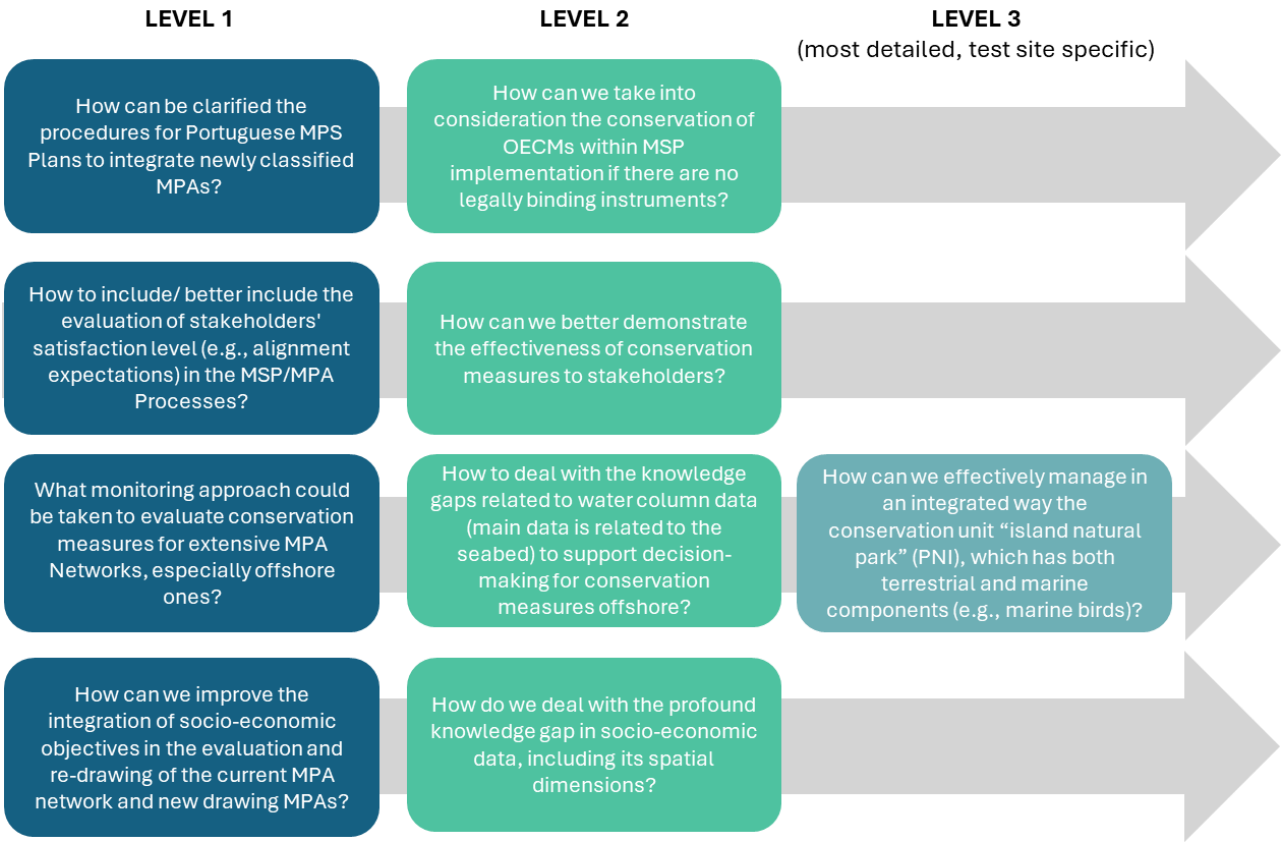

Figure 5Azores Graciosa Island Test Site Guiding Questions for ESE Framework, own elaboration.

So, the key ambitions of the test site are to inform, through the ESE Framework, the alignment of MPA and MSP processes, and the consolidation of the MPA design and management activities.

For several key issues (above listed guiding questions) – more detailed investigations and discussions were undertaken by the test site.

For the first issue/ guiding question or dilemma (on the alignment of MPAs and MSP), considerations are related to the integration of the conservation of other effective area-based conservation measures (OECMs) within MSP implementation if there are no legally binding instruments to do that.

For the second issue/ guiding question or dilemma (taking into account the stakeholder´s satisfaction), considerations are related to better demonstrating the effectiveness of conservation measures to stakeholders.

For the third issue/ guiding question or dilemma (on monitoring), considerations are related to the ways of coping with the knowledge gaps related to water column data (the majority of data is related to the seabed) to support decision-making for conservation measures offshore. Even the more detailed concern that specifies and deepens the one listed above is related to the methods for effectively managing in an integrated way the conservation unit "island natural park" (PNI), which has both terrestrial and marine components (e.g., marine birds).

For the fourth issue/guiding question (on integration of socio-economic objectives), key concerns are related to the ways of coping with the profound knowledge gap in socio-economic data, including its spatial dimensions.

So, the ESE Framework might help in closing knowledge gaps, helping in improving stakeholders' participation and alignment between MSP and MPAs processes (conservation measures and MSP designations).

4.1.7. ESE expected impacts.

An expected ESE impact should be a better alignment of MSP with the nature protection processes and initiatives. It is expected that ESE will help in guiding or informing the MPAs extension, will help to attract stakeholders to both processes and will make MSP more proactive in the MPA processes (or better prepared to become more proactive). MPA processes will become more comprehensive i.e. open to socio-economic concerns and not limited to the ecological ones and with better land-sea alignment. The key issue is in closing existing knowledge gaps, and ESE might be instrumental to this end. ESE might strengthen the integration of MPAs into the MSP plan and process, also by improving and aligning stakeholder engagement in both processes. So far, they are separate administrative efforts. There is a need for advice on how to operationally and better integrate MPA designations into MSP. As an ultimate impact, one can expect improvements in the fragmented governance related to marine issues leading to better policy integration and dialogue.

In summary, the following impacts of the ESE application are expected:

- facilitating enlarging the Azores Marine Protected Areas Network to 30%of the Azores EEZ while 15 % is to be fully protected;
- the process for the offshore is now well set but coastal MPAs (as Graciosa case) are still in waiting;
- ensuring coherence/integration of MPAs with MSP;
- building capacity and regaining confidence from stakeholders for MPAs implementation.

4.1.8. ESE elements to be tested.

The meeting between ESE Framework developers and the test site leaders resulted in agreement upon the range and testing scope of implementation. The focus of testing should be on the alignment of MPAs and MSP processes, while improving data availability and stakeholders' engagement.

The scope of testing might require different products of the MSP4BIO according to each ESE element. In the Azores test site, the following can be tested/used:

a) availability of data (WP2 –water column data i.e. distribution and trends of pelagic species, and socio-economic data) for addressing/informing work on guiding question no. 3;

b) ecological models developed by WP3 (ESE 1 module) tracing mobility of mobile species for addressing/informing work on guiding question no. 3;

c) feasibility analysis to assess the robustness of the assessment and data/information/knowledge availability discussed in the D3.3 guidance (ESE 1 module) for addressing/informing work on guiding question no. 3;

d) CC guidelines (ESE 1 module) for better estimating the potential conservation benefits of OECMs and supporting the integration of CC consideration in MPA network design; for addressing/informing work on guiding question no. 1 and 2;

e) Trade-Off Guidelines (ESE 3 module) for addressing/informing work on guiding questions no. 2,3,4 (e.g. spatial participatory mapping surveys to receive inputs and data);

f) WP6 solutions to understand how to better integrate MSP/MPA for addressing/informing work on guiding question no.1.

For more details on the scope of testing, please see the chapter below on adjusting the ESE Framework.

4.1.9. Risks and challenges.

Key risks and challenges are related to the location of the test side (middle of the Atlantic Ocean), which might mean limited availability of data and high costs of their acquisition. Another issue is related to limited human capital in the islands, large distances between islands hamper contact between people and their engagement in management processes. This can be illustrated by the problems with carrying out CoP work.

4.1.10. Towards adjusting ESE Framework.

The following procedure was agreed:

a) Test site leaders will add to the guiding question more contextual information in terms of available information and knowledge related to the issues raised in these questions.

b) 5.2. leaders will also add contextual information available from other deliverables.

c) ESE Framework developers will reflect on existing guiding questions (level 2 and level 3 questions) and come back to the test site leaders with proposals for their reformulation in order to acquire better insight into the problem that should be tested.

d) If necessary meeting on demand will be organised in February between test site leaders and ESE Framework developers, in case some issues need further clarification.

e) Having context information on issues related to guiding questions, ESE Framework developers will link them to the tools and criteria developed by ESE. This will be done in the working Excel sheet in SharePoint.

f) Azores test site leaders will verify proposals in the Excel sheet with regard to the ESE elements for their testing.

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Results of the discussion so far and established connections between the test site guiding questions and ESE Framework modules are presented below.

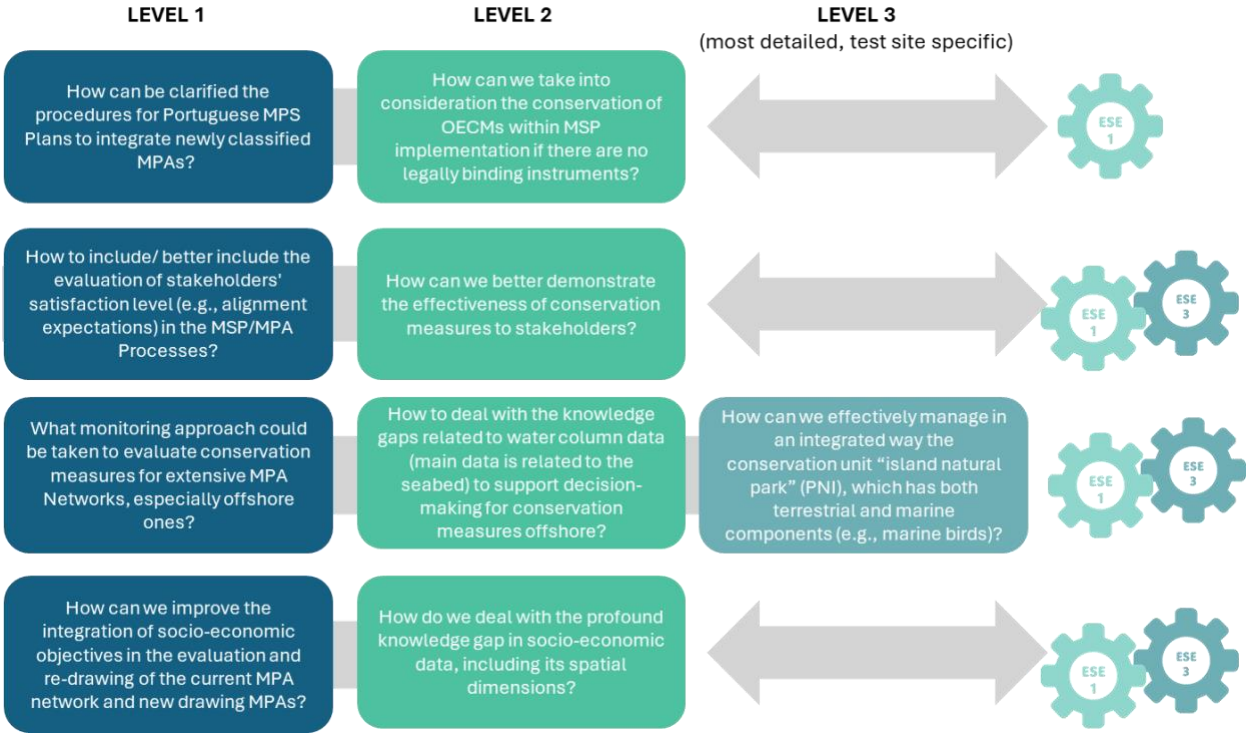

Figure 6Azores Graciosa Island Test Site Guiding Questions for ESE Framework and recognized connections, own elaboration.

Based on the general participatory strategy described in detail in the 3rd chapter of the report, below you will find the strategy steps including Azores Graciosa Island test site specific recommendations, suggestions and solutions. The steps encompass the whole project's lifetime.

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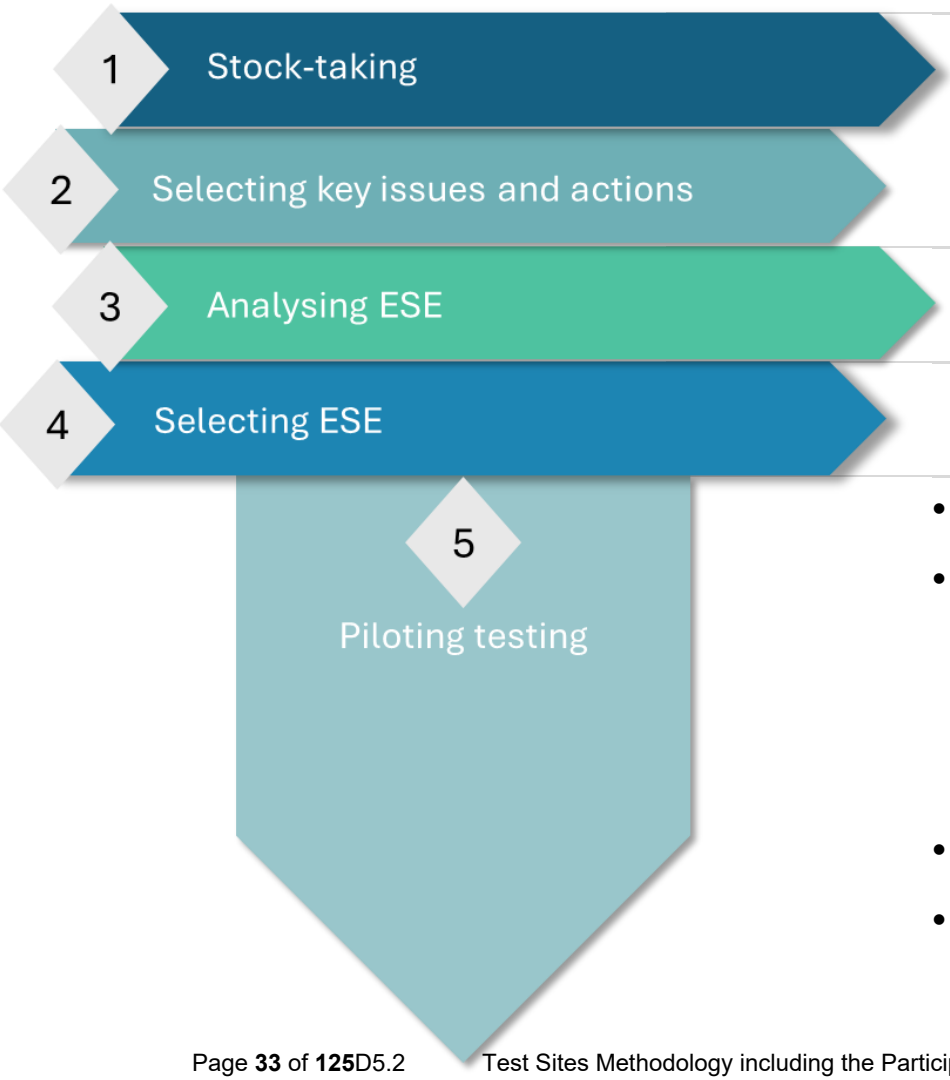
Steps how to adjust ESE Framework to Azores Graciosa Island test site specificity



	Actions&results	Status
1 Stock-taking	Test sites characteristics, main focus&objectives. Main management questions/issues of the Azores Graciosa Island test site have been formulated – described in Del. 5.1.	performed
2 Selecting key issues and actions		
3 Analysing ESE	ESE elements have been discussed and expected results & impacts for the test – site have been recognised; ESE guiding questions are ready.	performed
4 Selecting ESE	ESE elements to be tested have been recognised - focus on ESE 1 and ESE 3 (depending on the question), continue dialogue with ESE developers.	in the course
5 Piloting testing	• Perform testing when ESE Framework will be elaborated, inform your CoP about the testing, if possible, include them in the task; • f data is needed –check the WP2 products. Some data on the distribution and trends of pelagic species is available from GBIF, OBIS etc, as well as some Azores-specific data e.g. from the Azores Fisheries Observation Programme https://www.vliz.be/en/imis?dasid=2821&ext=1&module=dataset data related to the water column is available from Copernicus; Some data on fisheries (landings, fleet etc.) and shipping is available at EMODnet - human activities, also SIGMAR-Acores geoportalhttps://sigmar.dram.azores.gov.pt/#/viewer/openlayers/geoportal • check WP6 solutions to understand how to better integrate MSP/MPA for addressing/informing work on guiding question no.1; • consider the guidance provided by ESE developers for each guiding question (next page).	draft ESE Framework will be ready in May 2024 (WP4)

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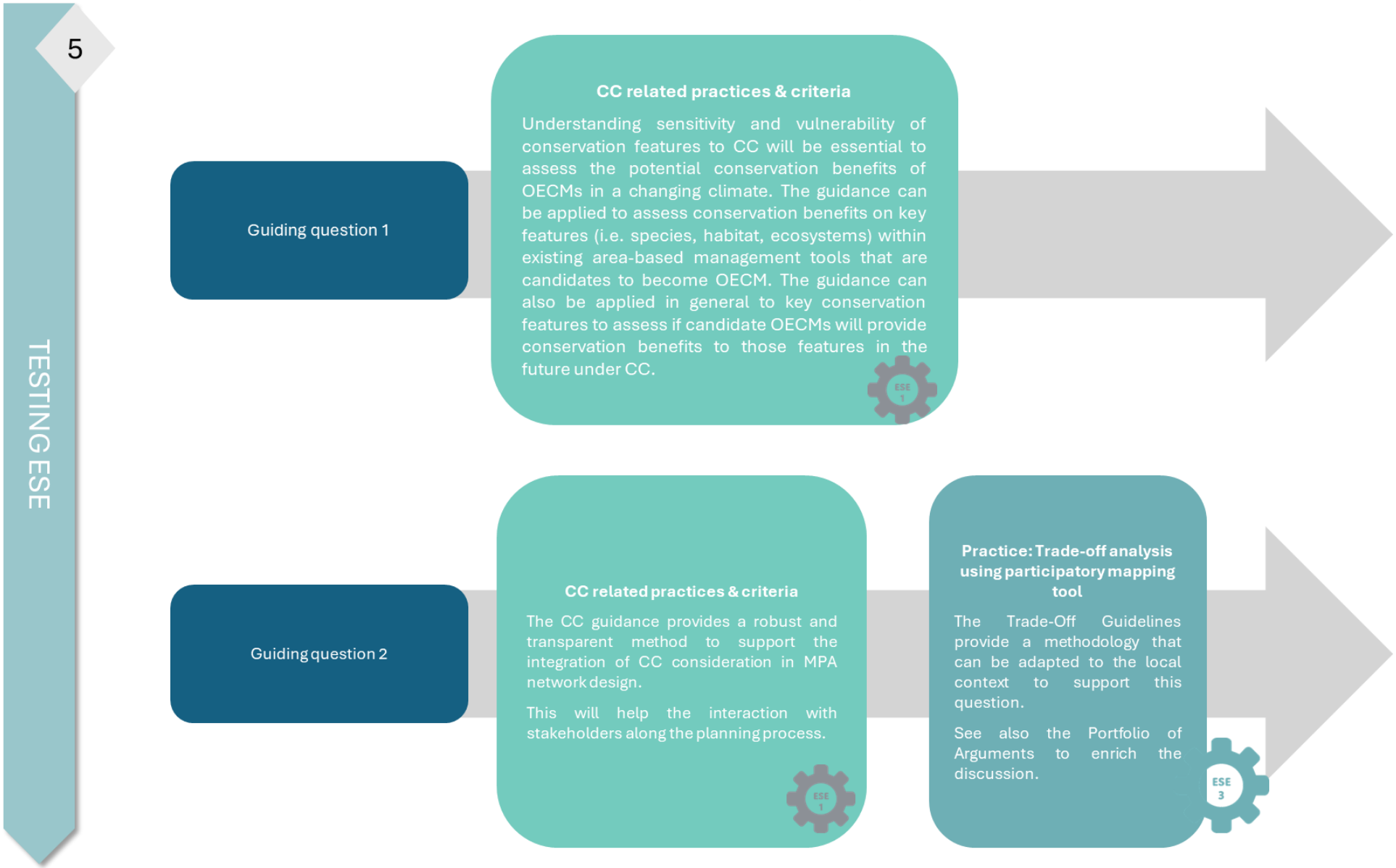

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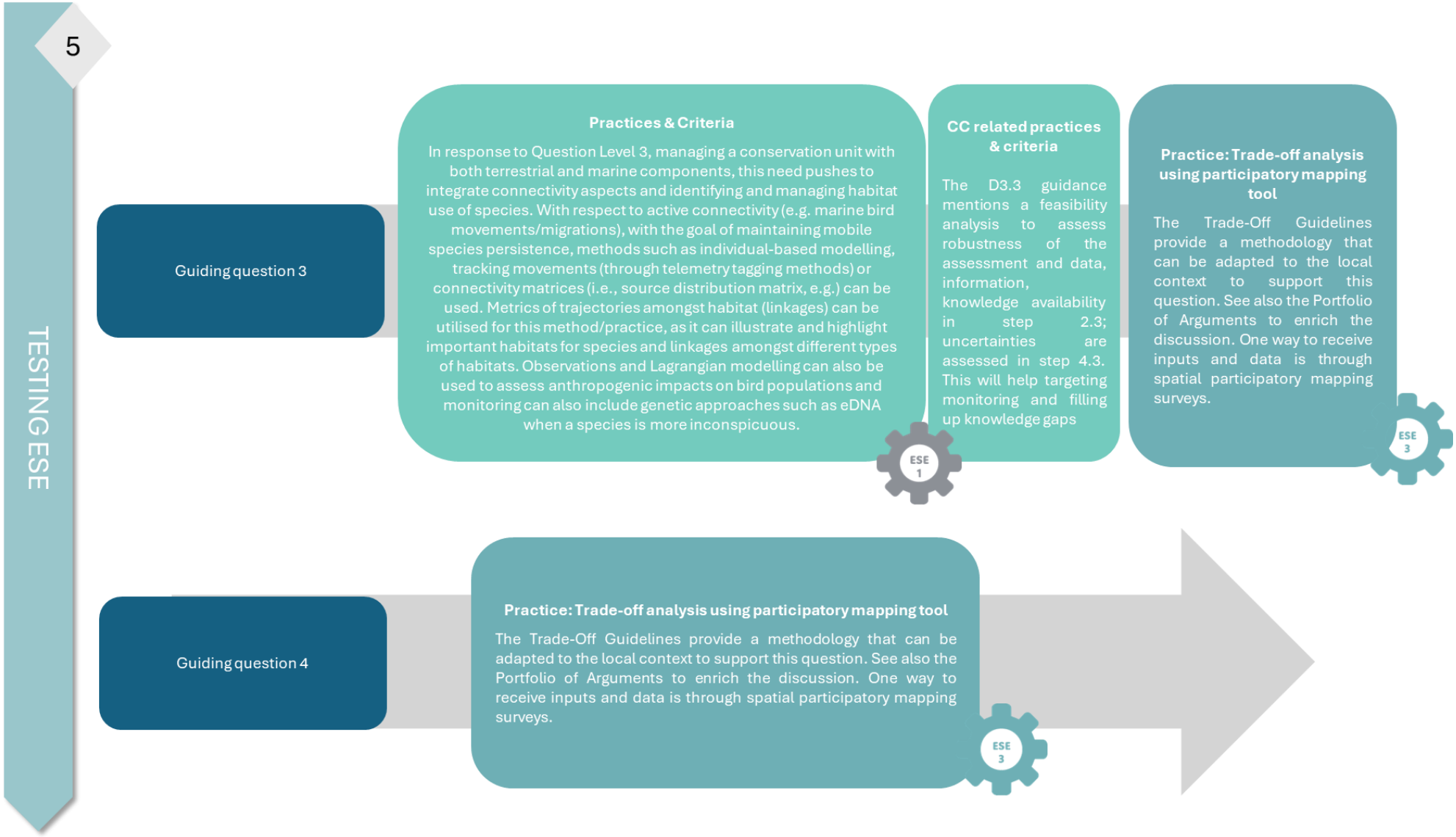

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	Actions&results	Status
1 Stock-taking	Test sites characteristics, main focus&objectives. Main management questions/issues of the Azores Graciosa Island test site have been formulated – described in Del. 5.1.	performed
2 Selecting key issues and actions		
3 Analysing ESE	ESE elements have been discussed andexpected results & impacts for the test – site have been recognised; ESE guiding questions are ready.	performed
4 Selecting ESE	ESE elements to be tested have been recognised - focus on ESE 1 and ESE 3 (depending on question), continue dialogue with ESE developers.	in the course
5 Piloting testing – since may 2024	perform testing when ESE Framework will be elaborated, inform your CoP about the testing, if possible, include them in the task.	from May 2024 (WP4)
6 Validating workshop	Try to align with the still undergoing Azorean MSP process, as providing new knowledge to the process. Try to align with the review process of the MPAs - foster new experiences and good practices to open the possibility of building possible management plans. Approach right pool of stakeholders to start validation. Consider a wider group than your CoP, address other decision-makers.	future

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4.2. The Baltic Sea Test Site

4.2.1. Test site key characteristics

The Baltic Sea, a semi-enclosed inland sea located in Northern Europe, serves as a transboundary sea basin. The sea area is 377,000 km² and stretches from 53°N to 66°N latitude and from 10°E to 30°E longitude. Its clear separation from the open ocean restricts water movement through the Danish Straits. Eight EU coastal countries share the Baltic coast (i.e., Germany, Denmark, Sweden. Finland, Estonia, Latvia, Lithuania and Poland) with Russia. The Baltic is one of the most brackish bodies of water in the world, receiving both ocean and river influx water. The average salinity of the Baltic Sea is around 7%. The Baltic Sea's ecosystem is particularly sensitive, responding quickly to external influences and pressures. Natural occurrences, such as environmental factor fluctuations, and anthropogenic effects, such as fisheries, pollution, or industrialization impact the sea measurably. The Baltic Sea features a fragile ecosystem under multiple human-induced environmental pressures, both on land and at sea. There is not a wide variety of sea life in the Baltic Sea in comparison with the sea basins located more to the south. It is possible to find algae, but flowering plants are less common. Fish are the dominant animal species, such as herring, cod, sprat, flounder, mackerel, flatfish, salmon and eel, but their population has drastically diminished recently. Occasionally large marine mammals can be found – porpoises and seals, which are under protection. The most common birds are terns, gulls and mute swans. There are also jellyfish, annelids (worms), small shellfish and crustaceans. The ecological status of the Baltic Sea waters is unsatisfactory. Influx of town and industrial sewage, as well as artificial fertilisers and pesticides washed out from fields results in eutrophication of marine waters. There are also accidents that result in fuel or other liquids leaking into the water since the Baltic Sea is one of the busiest sea basins in the world in terms of sea traffic. There are many wrecks and remnants of the Second World War that remain on the seabed. Key economic sectors are fisheries, aquaculture, tourism, renewables and mineral extraction. Conservation efforts are coordinated by the Helsinki Commission (international convention) since 1974.

Local test site: Gdansk Bay

Given the Baltic Sea's limitations as a regional test site for specific local applications, Task 4.3 to explore trade-offs was effectively executed using the SeaSketch tool at our local test site in Gdansk Bay, Poland. The expected outcomes from the local ESE Framework can be applied at the Gdansk Bay test site.

Gdansk Bay, located in the southern Baltic Sea, is highlighted as an ecologically diverse area that supports a wide range of marine species and human activities such as fishing, shipping, and recreation. The task focus was on identifying and analysing potential conflicts arising from the proposed expansion of Marine Protected Areas (MPAs) to protect sensitive habitats, ensure ecological connectivity, and preserve valuable environmental assets. The potential conflicts with tourism, bottom trawling, coastal fishery, and shipping are outlined as areas of concern.

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Figure 7 The location of the Baltic Sea test site. Source: WorldAtlas

The key characteristics of the test site are following:

- Transboundary sea basin;
- Ecosystem under multiple human-induced pressures;
- Need for more designated MPAs to achieve the regional goals;
- Need for coordinated plans for human activities.

4.2.2. Main focus and objectives of the test site.

The current status of Marine Protected Areas (MPAs) varies among the Baltic countries. Most countries agree that the criteria and data informing MPA designations are appropriate, yet some suggest there is potential for improvement. There is a general agreement among all Baltic countries that the effects of climate

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change on the marine environment must be considered when designing MPAs. Additionally, the use of new data and the continuation of work on MPAs are seen as important to ensure that these protected areas effectively protect marine biodiversity and habitats. The current protection provided by the MPA network needs improvement in order to effectively protect the marine environment and meet the conservation goals set by the EU Biodiversity Strategy 2030. There is a need to enrich the Baltic MPA designation process with considerations related to climate change. The MPA network must be dynamic i.e. in line with the current but also future needs.

4.2.3. Key local issues and challenges to be solved with support of the MSP4BIO ESE Framework[2]

The following issues were highlighted as important challenges in the test site by the stakeholders from Estonia, Latvia, Sweden and Finland:

Topic	Description
Deficiencies in the current status of the MPA management	Criteria used for the identification of MPAs differs among Baltic countries. Key deficiencies in this regard are related to handling connectivity between MPAs and climate change impacts on MPAs. Current MPAs network is not fulfilling Baltic conservation ambitions. Key problems are related to gaps in terms of restrictions on human activities, insufficient control and assessment, and lack of resources hampering implementation.
Coherence between area designations, MSP and other environmental legislation such as MSFD	The coherence between MPAs designations and the (transboundary) MSP process and related governance frameworks such as MSFD is far from being optimal. Data are missing for some conservation targets, and this jeopardise inclusion of ecological concerns into MSP. Integration of MSP with other environmental policies such as MSFD or WFD implementation requires improvements and further consideration in order to enhance protection of marine environment while balancing economic and social interests.

2. Enite chapter is based on direct or slightly changed citations from D.5.1 (Withouck et. al., 2023a)[3]Enite chapter is based on direct or slightly changed citations from D.5.1(Withouck et. al., 2023a)[4]Entire chapter is based on direct or slightly changed citations from D.5.1 (Withouck et. al., 2023a)

The integration of social and economic aspects in MPAs	Improving the co-existence between different activities and better understanding of multiple pressures and impacts are among the most important management issues related to the Baltic MPAs. There is a need of more intensive highlighting interlinkages between pressure-state-impacts and positive long-term outcomes of MPAs and nature protection.
Stakeholder confidence in MPA and MSP processes	Baltic Sea region countries pay due attention to proper stakeholder engagement, but results are mixed. Key barriers in this respect are related to limited time for running of MSP or MPA designation processes, seasonal changes, conflicting interests, irregular communication, and a lack of communication and transparency.

Source: based on Withouck et. al., 2023a

4.2.4. Community of Practice (CoP) involvement.

Out of originally envisaged 73 stakeholder representatives, 7 persons actively participated in the second Baltic CoP interaction. Furthermore, 8 additional local CoP membersfrom the Gdansk Bay took part in task 4.3 for trade-off exercise. CoP members came from various levels of public administration (regional and local). Initially the representation of three most important transnational bodies responsible for MSP and MPAs management in the Baltic Sea was envisaged to staff the CoP activities. These three bodies are the following:

- HELCOM Working Group on Biodiversity, Protection and Restoration (WG BioDiv);
- HELCOM-VASAB MSP Working Group;
- MPA Managers Network – MANET.

Through the interactions within the Community of Practice, the Baltic Sea test site was able to pinpoint the primary concerns and deficiencies concerning the integration of Marine Spatial Planning (MSP) and Marine Protected Areas (MPA) within the Baltic Sea region, as part of Task 5.1. Feedback from CoP members underscored the significance of incorporating socio-economic and governance indicators, alongside ecosystem services and the management of trade-offs, as part of WP4. The organization of several online workshops facilitated the engagement of diverse stakeholders, streamlining collaboration. However, a notable challenge encountered during these interactions was the uniform application of the MSP4BIO framework tasks across the region. The Baltic Sea's diverse multinational context

introduced complexities in implementing localized tasks, such as trade-off management, due to the differences in national policies and priorities.

4.2.5. Stage of the MSP plan and the MPA designation process.

Baltic Sea test site: MSP context

The Baltic Sea countries have recognised the need for coordinated spatial planning to address the complex challenges facing the region, given its fragile ecosystem and multiple environmental pressures. National and cross-border Marine Spatial Planning (MSP) frameworks have been actively developed and implemented in these countries. In fact, almost all Baltic Sea countries have either implemented or are in the process of implementing their maritime spatial plans. Collaborative efforts through regional initiatives and organisations like the Helsinki Commission (HELCOM) and VASAB (Vision and Strategies Around the Baltic Sea) have been instrumental in establishing common goals, sharing best practices, and ensuring the harmonisation of MSP approaches.

Baltic Sea test site: Marine protection context

To address the biodiversity targets outlined in the Baltic Sea Action Plan (BSAP) and the regional MSP Roadmap 2021-2030, efforts have been made to designate HELCOM MPAs (Marine Protected Areas) and Natura 2000 areas. While some progress has been achieved in this regard, additional areas need to be designated to reach the regional goal. This necessitates coordinated planning of human activities using an ecosystem-based approach across all riparian countries in the region. The aim is to minimise environmental pressures while simultaneously promoting economic growth and sustainability.

MPAs in the Baltic are traditionally established to protect a subset of species, habitats or, more rarely, ecosystem processes under the Birds and Habitats Directives, regional conventions, or national law. Spatial protection of the Baltic Sea is characterised by several protection schemes overlapping in one geographical location (see figure below). Natura 2000 areas in the Baltic Sea have often been designated as HELCOM MPAs, and some smaller Natura 2000 areas have been merged under one large HELCOM MPA. Overlapping Natura 2000 areas and HELCOM MPAs often have different shapes as the Natura 2000 areas may also include inland areas, while the HELCOM MPAs are restricted to the coastal zone and marine area. In addition, the HELCOM MPA network also includes Russian waters in the Baltic Sea, while the Natura 2000 network is restricted to marine areas under EU jurisdiction. Discounting MPAs designated by the Russian Federation, all but two of the 188 HELCOM MPAs include significant Natura 2000 components.

The location of protected areas in the Baltic Sea, known as HELCOM MPAs, is determined based on a clear and transparent scientific rationale with the objective of safeguarding valuable marine and coastal habitats in the region. These protected areas vary in size and type, forming an ecologically coherent network that is effectively managed to ensure their conservation. Currently, there are 188 designated HELCOM MPAs, covering approximately 16.5% of the Baltic Sea as of

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December 2022. The region demonstrates a high level of ambition with commitments under the BSAP, HELCOM Recommendations, and ongoing efforts to implement the EU Biodiversity Strategy 2030, indicating an expected significant increase in spatial coverage in the future.

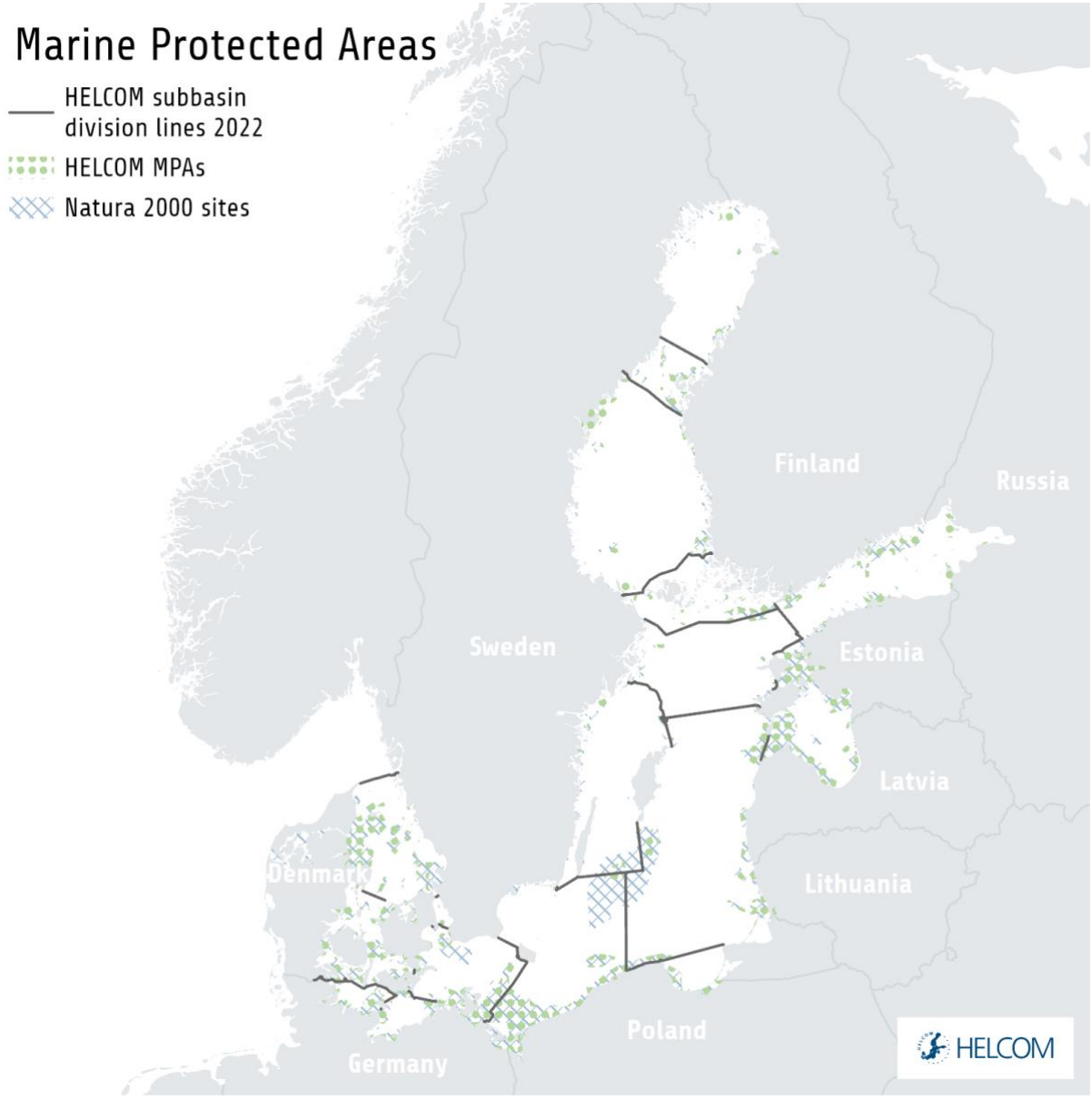

Figure 8Distribution and spatial coverage of marine protected areas in the Baltic Sea, including both HELCOM MPAs and Natura 2000 areas. (Withouck et al. 2023a).

The ESE Framework can enhance MSP-MPA integration and adaptation in the Baltic Sea by addressing key necessities. It might support Baltic Sea countries by offering innovative methods and tools for climate adaptation, effective MPA monitoring strategies, and the integration of MPA policies within the marine spatial plans. Moreover, ESE can aid in balancing economic and environmental priorities by trade-off exercises. By adopting ESE elements, responsible authorities can advance their work.

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4.2.6. ESE expected results.

The key guiding questions highlighting the main concerns/needs of the test site that can be addressed through the usage of the ESE Framework are the following:

1. Methods, tools and approaches for adapting to climate change within Baltic marine protected areas (MPAs);
2. Effective monitoring strategies for Baltic MPAs;
3. Methods, tools and approaches facilitating MPAs' policies intersection with marine spatial planning (MSP) and planners, i.e. integration of MSP and MPA processes;
4. Methods, tools and approaches facilitating balancing economic interests with the need for environmental protection within Baltic MPAs(e.g., trade-off exercise).

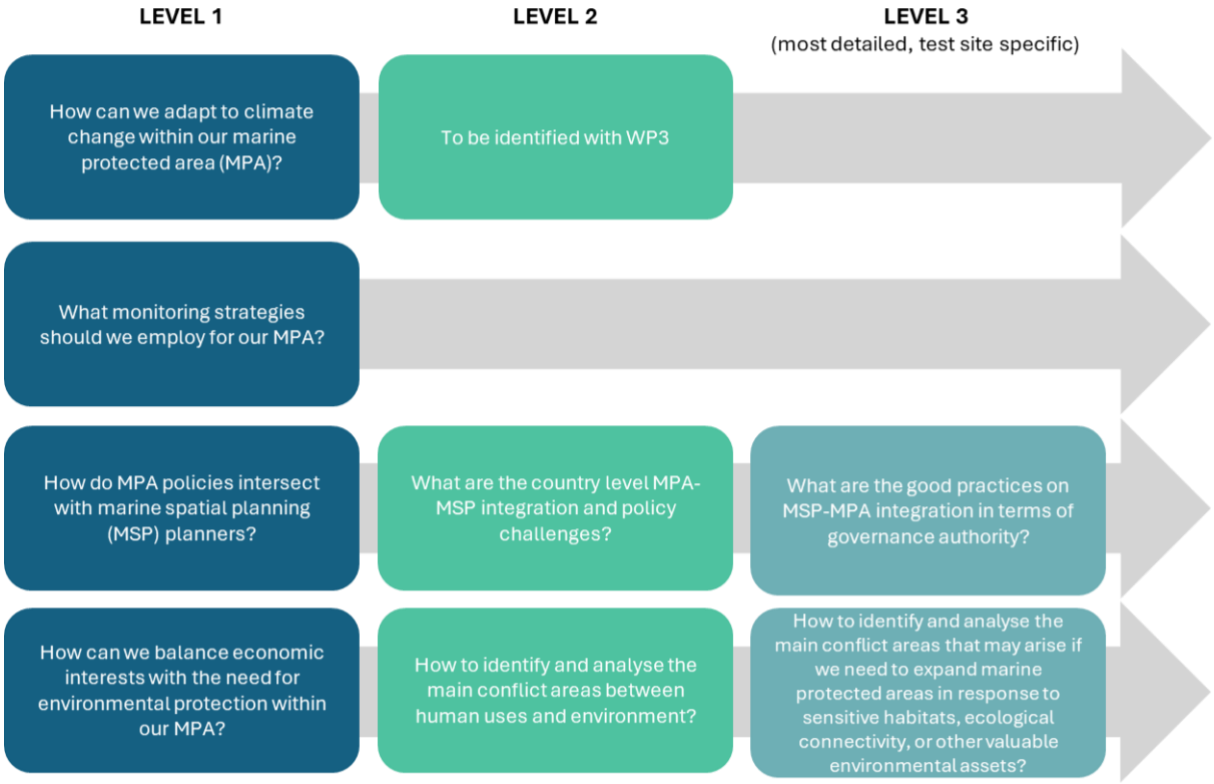

Figure 9Baltic Sea test site Guiding Questions for ESE Framework, own elaboration.

The primary ambitions of the test site are cantered on utilizing the ESE Framework to align MPA with MSP processes and to consolidate MPA management activities, especially concerning climate change adaptation. To address several key issues outlined in the guiding questions, the test site has undertaken detailed investigations and discussions.

For the third guiding question concerning the integration of MPAs and MSP, the focus is on identifying challenges and policy issues at the country level related to MPA-MSP integration. Additionally, a more detailed aspect of this issue involves

pinpointing best practices in MSP-MPA integration, particularly in terms of governance authority.

For the fourth guiding question, which addresses the integration of socio-economic objectives, the primary focus is on identifying and analysing the main conflicts between human activities and the environment. A further detailed exploration of this issue involves identifying and examining the specific conflicts that emerge from expanding marine protected areas to protect sensitive habitats, ensure ecological connectivity, or safeguard other valuable environmental assets. In general, ESE Framework might help in improving alignment between MSP and MPAs processes and MPA management to take into consideration consequences of the climate change and increased intensity of the use of the marine areas of the Baltic Sea for economic purposes.

4.2.7. ESE expected impacts.

An expected ESE impact should be on better understanding the impact of climate change. This might help in aligning MSP with the nature protection processes and initiatives. It is expected that ESE will help in guiding or informing the MPAs management in order to take into consideration the consequences of the climate change. MPA processes will become more comprehensive i.e. open to climate change but also to understanding consequences of the increased economic pleasures (mainly windmills development).ESE might also help to monitor MPA development strategies in entire sea basin.

In summary the following impacts of ESE application are expected:

- Enhanced comprehension of climate change impacts, facilitating the integration of MSP with nature protection efforts and initiatives. Improved guidance for MPA management, emphasizing the importance of considering climate change consequences in decision-making processes.
- The ability to monitor and assess MPA development strategies across the entire sea basin, ensuring cohesive and effective conservation efforts.
- A more holistic approach to MSP− MPA processes, considering the effects stemming from increased economic activities, particularly the development of wind farms.

4.2.8. ESE elements to be tested

As the result of the meeting between ESE Framework developers and the test-site leaders the testing scope and range was agreed. The focus of testing should be on climate change (guiding question no 1) combined with MPAs monitoring (guiding question no. 2), whereas other guiding questions can be included if feasible. The Baltic test site presents a unique marine ecosystem ideally suited for climate change studies due to its significant size and distinct oceanographic characteristics as a semi-enclosed inland sea. These features might allow for the detailed tracing of climate change impacts, potentially yielding results that could significantly diverge from findings in other EU sea basins, making its analysis particularly valuable and intriguing.

The formulated above scope of testing might require different products of the MSP4BIO. In the Baltic test site, the following can be tested/used:

a) Availability of new data can help in addressing guiding question no. 1 (WP2 can highlight data availability on human activities, climate data and projections);

b) Ecological models developed by WP 3 (ESE 1 module) can help in addressing monitoring for Baltic MPAs (guiding question no. 2) in particular by identifying the threats (whether anthropogenic or other) to species / habitats / ecosystems and in addressing guiding question no. 1(the same but with the respect to climate change and habitats' suitability);

c) Spatial participatory mapping surveys might help in working on guiding question no.4;

d) Task 2.3 results might help in addressing guiding question no. 2.

MOREOVER,

e) Trade-Off Guidelines (ESE 3 module) might help in addressing/informing work on guiding question no. 4;

f) Task 4.3 results might help in addressing guiding question no. 4;

g) WP 6 results might help in for addressing guiding question no. 3.

For more details on the scope of testing, please see the chapter below on adjusting ESE Framework.

4.2.9. Risks and challenges

Key risks and challenges are related to the nature of the test site that is composed of several independent countries running its own policies with respect to MSP and MPAs. So even if the countries strive to implement joint EU Directives (rules, targets and ambition) the practical application and actual outcome in terms of Baltic Sea ecosystem protection might vary.

4.2.10. Towards adjusting ESE Framework

The following procedure was agreed:

a) The Baltic test site leaders will work more intensively on climate change models (additional meeting in February) to clarify linkages between guiding questions of the Baltic test site and ESE products on climate change. Baltic test site leaders will provide all available data related to climate change in the Baltic Sea in order to help the ESE1 developers in adjusting their models to the Baltic needs and circumstances.

b) ESE Framework developers will reflect on existing guiding questions no. 2 and 4 (level 2 and level 3 questions) and come back to the test site leaders with proposal of their reformulation in order to acquire better insight into the problem that should be tested.

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c) Having context information on issues related to guiding questions 2 and 4 ESE Framework developers will link them the tools and criteria developed by ESE. This will be done in the working Excel sheet in the SharePoint.

d) Question no.3 will be linked to the WP 6 results by the Baltic tests site leaders themselves.

e) Baltic Sea test site leaders will verify proposals in the Excel sheet with regard to the ESE elements for their testing.

Results of the discussion so far and established connections between the test site guiding questions and ESE Framework modules are presented below.

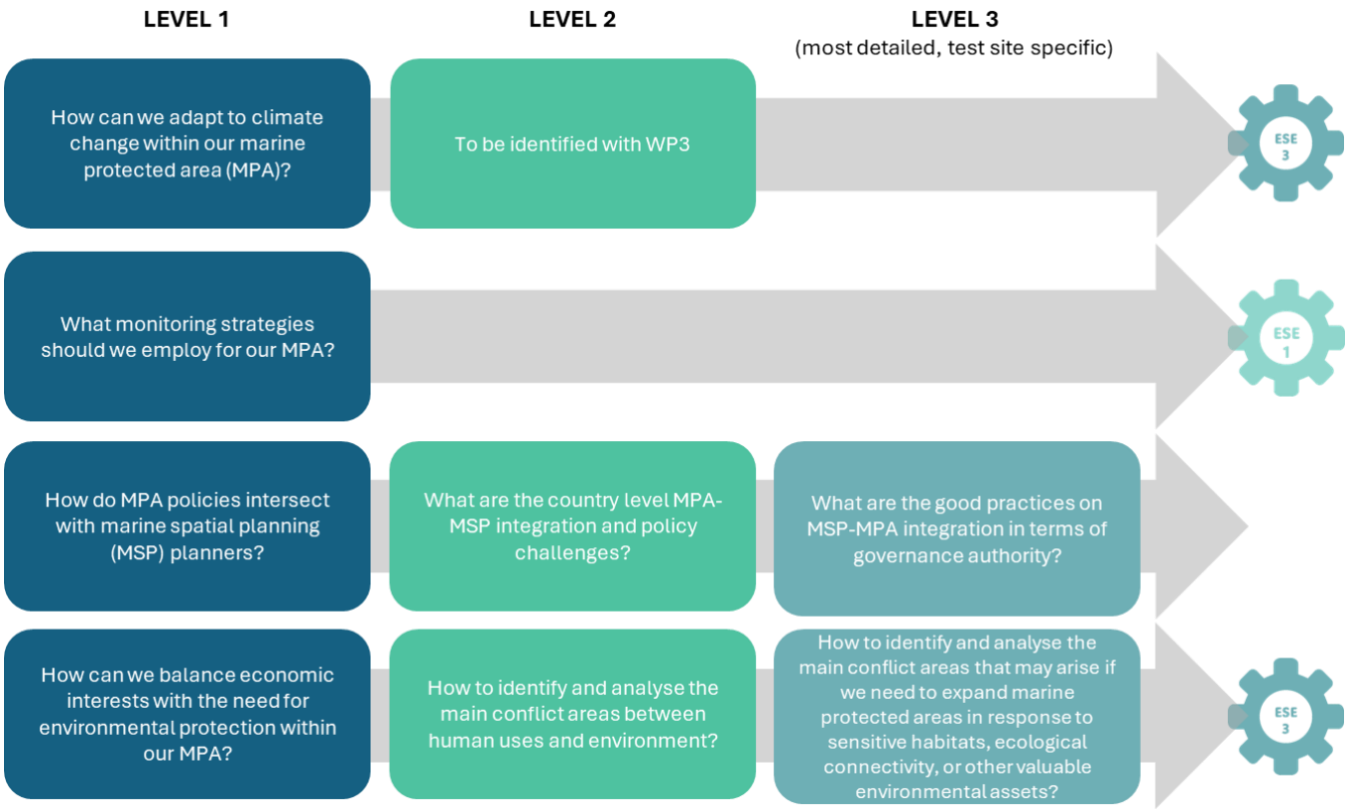

Figure 10 Baltic Sea Test Site Guiding Questions for ESE Framework and recognized connections, own elaboration.

Based on the general participatory strategy described in detail in the 3rd chapter of the report, below you will find the strategy steps including Baltic Sea test site specific recommendations, suggestions and solutions. The steps encompass the whole project lifetime.

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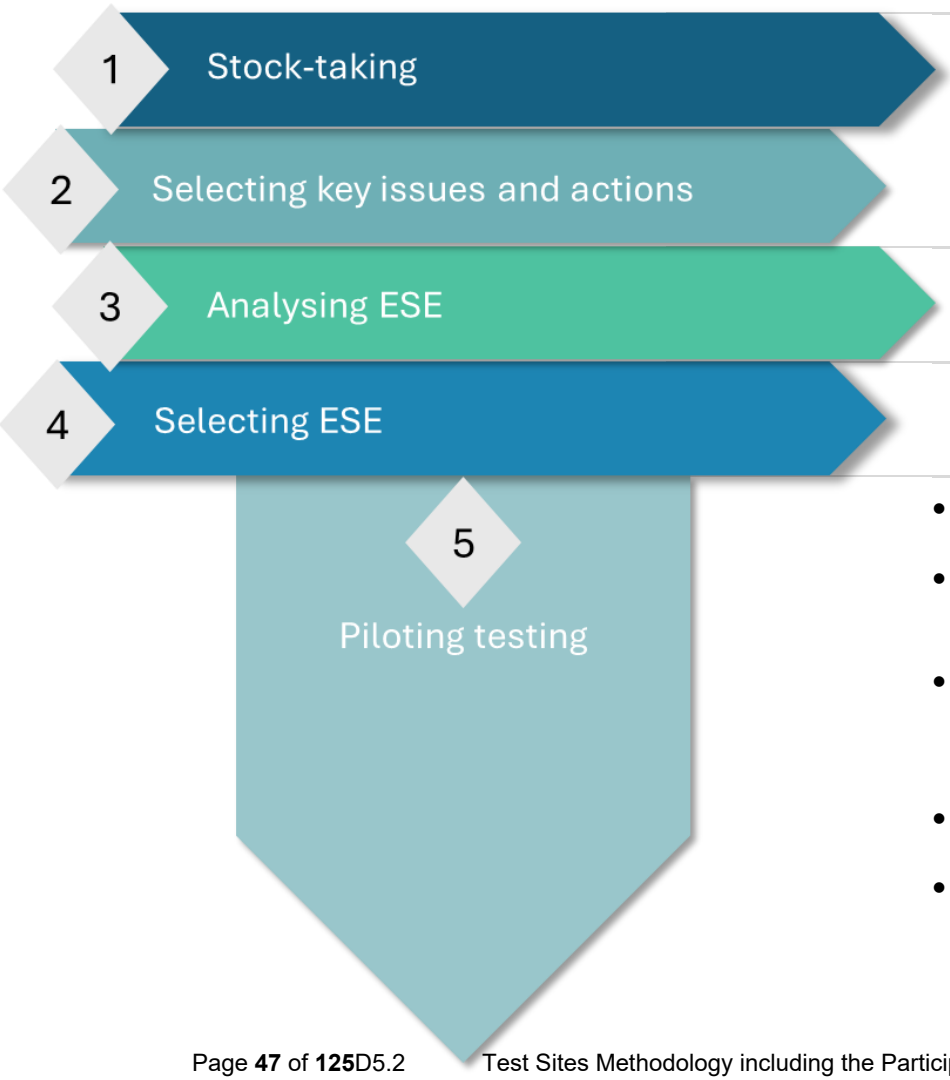
Steps how to adjust ESE Framework to Baltic Sea test site specificity



	Actions&results	Status
1 Stock-taking	Test sites characteristics, main focus&objectives. Main management questions/issues of the Baltic Sea test site have been formulated – described in Del. 5.1.	performed
2 Selecting key issues and actions		
3 Analysing ESE	ESE elements have been discussed and expected results & impacts for the test – site have been recognised; ESE guiding questions are ready.	performed
4 Selecting ESE	ESE elements to be tested have been recognised - focus on ESE 1 and ESE 3 (depending on question), continue dialogue with ESE developers.	in the course
5 Piloting testing	• Perform testing when ESE Framework will be elaborated, inform your CoP about the testing, if possible, include them in the task; • if data needed –for climate data and projections, see ESGF portal, Bio-ORACLE, and Copernicus. EMODnet Biology Thermal Traits and GlobTherm have species thermal tolerance/affinity data; • Human activities spatial data available from EMODnet Human Activities, HELCOM Map and Data Service, and Global Fishing Watch (for fishing). MPA data are available from HELCOM's MPA database; for data on Polish Maritime Areas check https://sipam.gov.pl/ • check WP6 solutions to understand how to better integrate MSP/MPA for addressing/informing work on guiding question no; • consider the guidance provided by ESE developers for each guiding question (next page).	draft ESE Framework will be ready in May 2024 (WP4)

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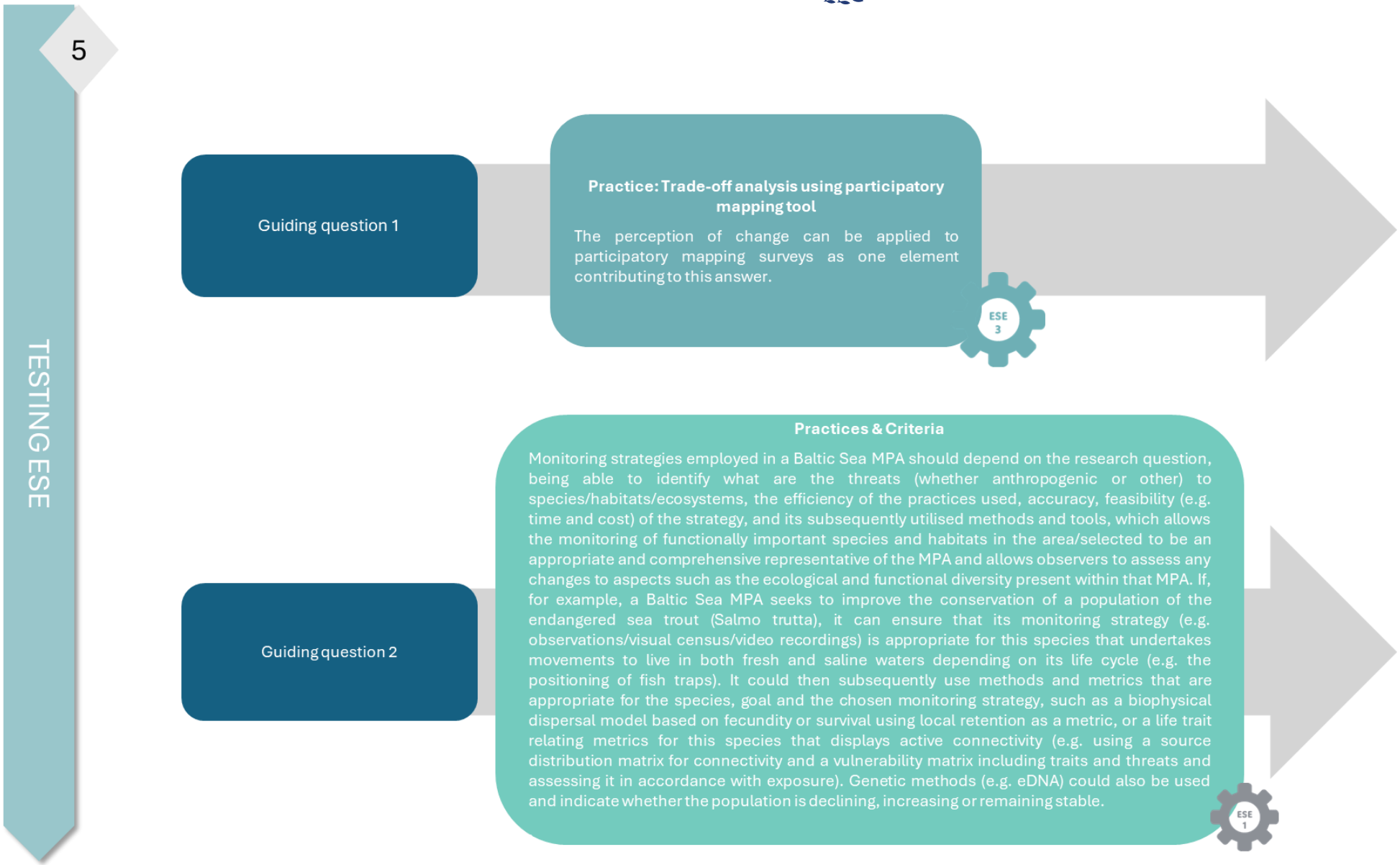

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Actions&results	Status
Try to align with the undergoing Baltic countries' MSP revision processes. Involve the BSR Helcom-VASAB WG on MSP. Approach right pool of stakeholders to start validation. Consider wider group than your CoP, address other decision-makers.	future

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4.3. The Belgian Part of the North Sea test site

4.3.1. Test site key characteristics

The Belgian part of the North Sea (BPNS) is found in the Southern Bight of the North Sea and borders the Exclusive Economic Zone (EEZ) of France, the Netherlands and the UK. The test site covers 3,447 km^2 (the entire Belgian EEZ). Leading blue economy sectors are fisheries, aquaculture, tourism, renewables and mineral extraction. Currently, 36.5% of the BPNS is designated as protected, through five Natura 2000 Marine Protected Areas (3 SPAs and 2 SACs), one marine reserve and a Ramsar site (Figure 11).

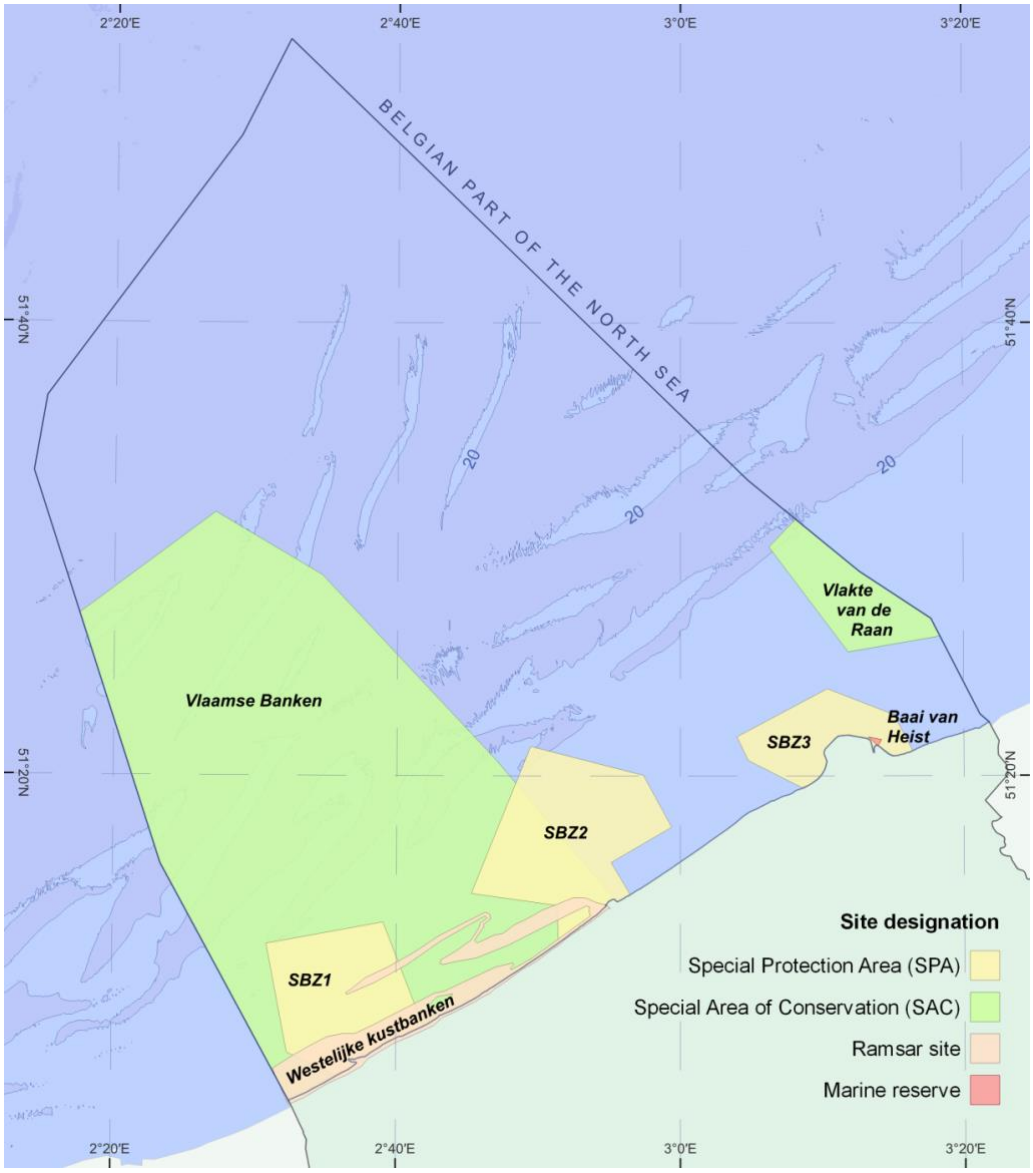

Figure 11 Overview of the protected areas in the Belgian part of the North Sea(source:Withouck et al. 2023a).

The key characteristics of the test site are:

- Well-studied and monitored sea area with a second revision cycle of the MSP currently ongoing;
- The present conservation status of benthic habitats is unsatisfactory;
- Lack of conservation objectives and management related to pelagic habitats;
- New management plans include measures for nature restoration (e.g. oyster reefs);
- There are no official fine-scale geographical biodiversity assessments units.

4.3.2. Main focus and objectives of the test site.

Belgian MPAs remain “paper parks” where effective management is still lacking. Within these designated protected areas, there is still a significant overlap with human activities that can impact the local biodiversity and ecosystem functioning. Especially for benthic habitats, the conservation status is currently unsatisfactory. In the context of an ecosystem-based management, there is an urgent need to develop a spatial strategy for pelagic biodiversity conservation in Belgium. The effects of climate change on ecological criteria are not explicitly taken into account yet, mainly because the effects are not sufficiently known to anticipate the potential impact on the area. The test site challenges can be summarised as follows:

- Majority of MPAs is biased towards benthic features;
- Pelagic biodiversity is not included in prioritization as utility of pelagic protected areas is contentious (dynamic variability).;
- Important barriers for implementation of pelagic MPAs:
  a) physical and biological complexity;
  b) design challenges;
  c) enforcement challenges;
  d) governance challenges;
- Lack of data, methods, and tools available especially for pelagic management.

4.3.3. Key local issues and challenges to be solved with support of the MSP4BIO ESE Framework[3]

Key local issues and challenges concerning MSP and MPAs in the BPNS were outlined in the gap analysis and reported in D5.1 (Withouck et al. 2023a).

[3]Enite chapter is based on direct or slightly changed citations from D.5.1(Withouck et. al., 2023a)[4]Entire chapter is based on direct or slightly changed citations from D.5.1 (Withouck et. al., 2023a)

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Topic	Description
Deficiencies in the current status of the MPA management	MPAs are in place, but measures are very limited, and the status of benthic habitats is unsatisfactory
Coherence between area designations, MSP and other environmental legislation such as MSFD	There is an overarching programme of measures for MSFD and the Natura 2000 sites, indicating the two processes are well aligned. As well as that, good environmental status as defined under the MSFD is a core principle of the MSP, which also explicitly mentions the Natura sites. Transboundary coherence is tricky due to the differing nature of MSP processes across borders (e.g. with France)
The integration of social and economic aspects in MPAs	Lack of attention for the social acceptance of measures, which can be encouraged with societal awareness and education. A lack of attention for positive impacts in the framework of environmental permitting was also highlighted
Stakeholder confidence in MPA and MSP processes	Expertise built up whilst developing the first two MSPs has led to a good cooperation and mutual understanding between different actors in the process

Source: based on Withouck et. al., 2023a

4.3.4. Community of Practice (CoP) involvement.

The current CoP in Belgium is composed of 17 stakeholder representatives from seven organisations/authorities (government, NGO, academia and business sector (Blue Cluster)). The largest groups represent research (seven persons from three organisations) and government (seven persons from two governmental bodies). The experience with CoP in Belgium has been positive, although some challenges were noted (e.g. environmental consultancy dropping out due to time constraints). The CoP has been engaged with through a combination of face-to-face meetings, phone calls and by providing digital input. 13 individuals actively participated in the first CoP interaction intended to collect test site gaps (seven organisations were represented), and in the second interaction intended to collect feedback on the use of socio-economic criteria for the MPA process, five CoP members provided feedback (representing four organisations).

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4.3.5. Stage of the MSP plan and the MPA designation process

The present MSP is currently in a revision process running from April 2023 to March 2026, so proposals of marine reserves are being prepared to be incorporated into the next cycle of MSP which will be in place from March 2026 onwards. Spatial decision support was used, and the ESE Framework could be helpful to scientifically underpin this decision support, e.g. by carrying out the mapping exercise in a systematic way, to compare the suitable options that arise with the options that have now been proposed. For MPA monitoring and management, ESE tools that provide decision support on how to take into account climate change could be useful. Another knowledge gap that was suggested as a focus was to investigate how nature restoration plans can be included in marine spatial planning.

4.3.6. ESE expected results

The key guiding questions highlighting the main concerns/needs of the test site that can be addressed through the usage of the ESE Framework are the following:

1) How can we meet the 10% strictly protected target?
    a) Which spatial measures are available to meet the 10% strictly protected target?
    b) How can we prioritise a location for the designation of a marine reserve?
    c) Should pressures surrounding the location also be considered?
2) How can we improve the protection of pelagic habitats?
    a) Can we prioritise areas for protecting pelagic biodiversity?
    b) What tools can we use to implement spatial protection of pelagic habitats?
3) How do we prioritise space use within a multi-use MPA, which could consist of nature protection, nature restoration, aquaculture, renewable energy generation, sand and gravel extraction, fishing or dredging?
    a) How could we use an MPA as a living lab to answer this guiding question?
4) Can we determine suitable locations for the restoration/construction of oyster reefs?
5) How do we take into account climate change in the context of each of these questions?

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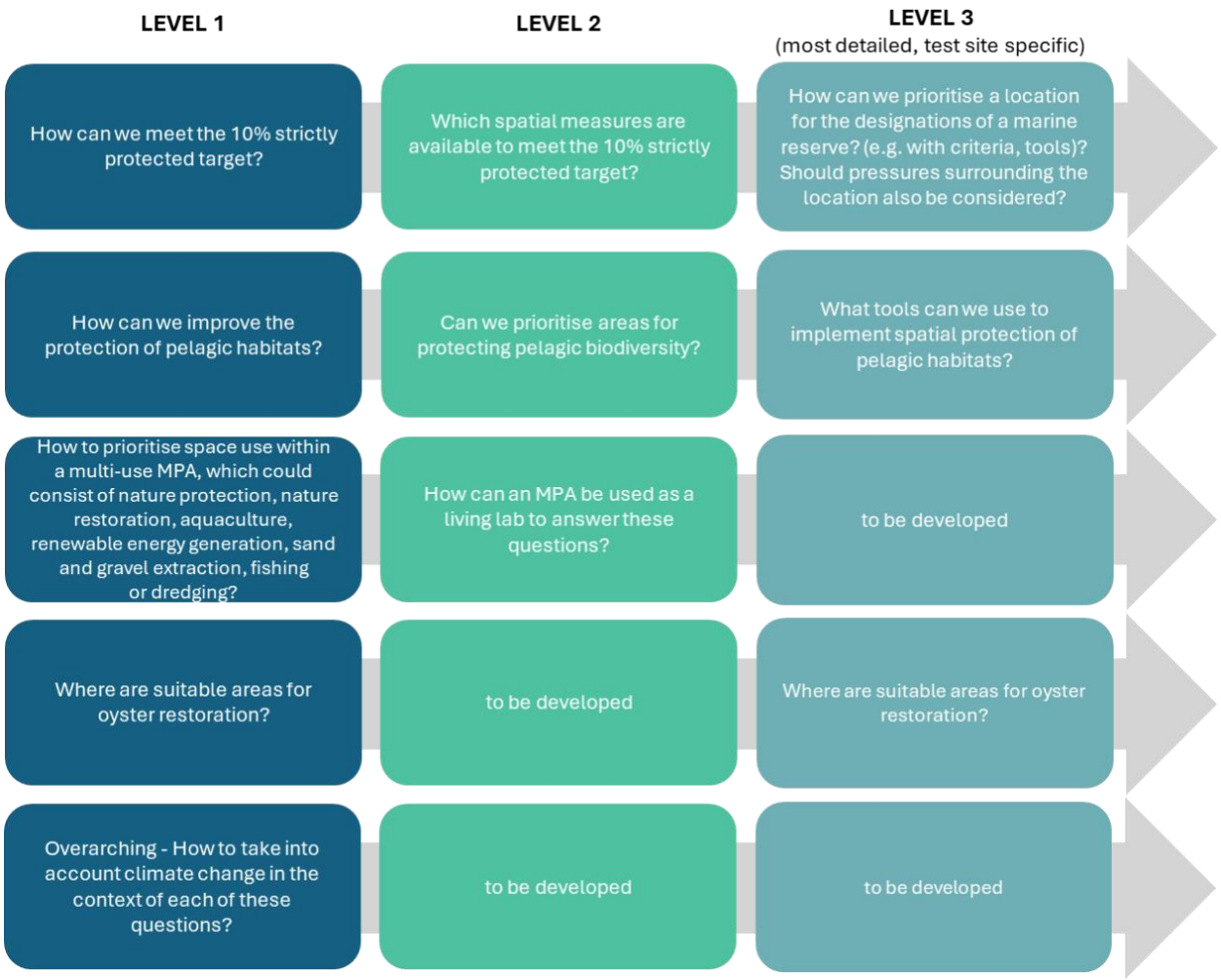

Figure 12 Belgian part of the North Sea Test Site Guiding Questions for ESE Framework, own elaboration.

Through the ESE Framework, the key ambitions of the test site are to promote and support the conservation and restoration of the pelagic habitats and restoration of oyster reefs while taking into consideration climate change.

For the first guiding question several possible locations have already been selected for MPA nomination based on a number of ecological criteria/considerations, which included both spatial measures as well as environmental features. To narrow down the selection to achieve the 10% strictly protected target, key areas for conservation identified now could be looked at under future climate change scenarios and further inform the selection decision.

To prioritise areas for the protection of pelagic habitats, fish spawning and nursing grounds could be identified, and an assessment of pelagic biodiversity can be made using plankton indicators (MSFD, OSPAR) applied on fine-scale geographical assessment units. Combining both approaches could reveal priority pelagic habitats for conservation. In terms of climate change, knowledge related to the future distribution of target species, future upwelling events, traits, and sensitivity of key species should be taken in consideration.

Criteria, methods and tools to answer guiding questions three and four are still being advised. Additionally, the guiding questions themselves need more development.

Overall, the ESE Framework will contribute to finding the right methods and tools for the possible implementation of pelagic habitat conservation and restoration of oysters while meeting the EU protection targets. The outcome of these efforts could then provide input for the current evaluation of the existing MSP plan in Belgium and towards the preparation of the next, i.e. third generation, version of the MSP plan.

4.3.7. ESE expected impacts

An expected ESE impact should be on better aligning MSP with the nature protection processes and initiatives. It is expected that ESE will help in guiding and informing the protection of the pelagic marine environment. In the long run this might help to close important conservation gaps related to insufficient consideration of transboundary impacts, transboundary connectivity of pelagic species, and impacts of human activities on pelagic species. In summary the following impacts are expected:

- Identification of priority areas for protection of pelagic systems:
  - Highly variable areas submitted to pressures;
  - Identifying spawning and nursery grounds for pelagic fish;
  - Plankton biodiversity assessment using OSPAR indicators;
- Inform revision of national MSP.

4.3.8. ESE elements to be tested

As the result of the meeting between ESE Framework developers and the test-site leaders the testing scope and range was agreed. The focus of testing should be on pelagic habitats.

The formulated above scope of testing related to pelagic habitats might require multiple products of the MSP4BIO. In the Belgium test site, the following can be tested/used:

a) Availability of data (WP2 can help look for data at the required resolution and help facilitate a data flow to the ESE Framework);

b) Criteria lists, taxa lists, indicator and habitat lists, for protecting pelagic species can be tested (deliverable D2.2; ESE 1 module);

c) Portfolio of Improved Ecological Criteria can provide some guidance towards the prioritisation of pelagic habitats taking into consideration the theme of connectivity, such as pelagic larval duration and species' migration routes (deliverable D3.2 ESE 1 module);

d) Extraction guideline for the systematic review in its aspects related to pelagic habitats (deliverable D3.2 ESE 1 module);

e) CC guidelines (ESE 1 module) for selection of strict protected areas to achieve 10% target and for protecting benthic, pelagic habitats and oysters and taking into consideration future circumstances important for their location;

f) Trade-off guidelines (ESE 3 module) for addressing/informing work on selecting new protected areas in relation to ecosystem services;

g) High level practices linked to MSP and practices on transboundary environmental management (package of WP6 good practices and high-level good practices collected by ESE developers).

For more details on the scope of testing, please see the chapter below on adjusting ESE Framework.

4.3.9. Risks and challenges

Key risks and challenges are related to cross-border impacts on pelagic habitats in the test site. They can create problems with data acquisition from beyond Belgian waters and in finding adequate policy measures when policies (including MSP) of neighbouring countries are not aligned. Proper addressing of pelagic habitat protection would require a more holistic approach, since pelagic habitats do not respect national borders.

4.3.10. Towards adjusting the ESE Framework

There was a need for more detailed information on the environmental context of the test site, as well as clarification of what elements of the pelagic habitats should be targeted by the spatial measures. In the course of discussions, the test site leaders confirmed to focus on plankton biodiversity of pelagic habitats using plankton indicators. Additionally, the test site leaders will also focus on identifying important marine areas for fish spawning and nursery areas. In the next steps, pressures can then be analysed for these areas, linking them to the trade-offs and intensity of different activities. There is also a need to document the available knowledge of these areas and thereby determine the current knowledge gaps related to the pelagic habitat (e.g. pelagic species distribution). Due to the small size of the Belgian sea area, transboundary pressures should also be considered as they might have a decisive impact on both pelagic and benthic habitats in the test site. Additionally, since pelagic habitats play an important role in the transfer of oyster larvae from areas located outside Belgium sea waters, this could also be a part of the testing exercise provided a modelling tool offered by MSP4Bio could help to predict/show larvae transport taking into account the hydrodynamics and habitat suitability of the BPNS.

Important concerns were raised with regard to the temporal dimension. In future, due to climate change or intensification of some uses (e.g. offshore energy production, aquaculture) both benthic and pelagic habitats might be affected and change their composition and location. This might also be another problem that the ESE Framework can help to address.

Ideally it would be desirable to combine considerations on both pelagic and benthic habitats. However, this might be too demanding due to existing data and knowledge gaps, at least for a testing phase.

The following procedure was agreed on:

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a) Ecological, socio-economic and governance context of the test site and the test site ambitions and plans discussed at the meeting seem sufficient for starting the testing exercise.

b) ESE Framework developers will reflect on existing guiding questions (level 2 and level 3 questions) and come back to the test site leaders with a proposal of more detailed questions to retrieve necessary context knowledge (e.g. the need to take into consideration acidification has been mentioned as an example). This will help to better link the needs of test site with the ESE criteria.

c) ESE Framework developers will link these questions to the instruments and criteria developed by ESE. This will be done in coordination with project partners responsible for the development of the ESE modules and WP2. Specificity of the test site must be taken into consideration (i.e. data availability). The final proposal will be published in the existing working Excel sheet in the SharePoint.

d) Belgian test site leaders will verify proposals from the Excel sheet with regard to the ESE elements for their testing and will give feedback to the ESE Framework developers.

Results of the discussion so far and established connections between the test site guiding questions and ESE Framework modules are presented below.

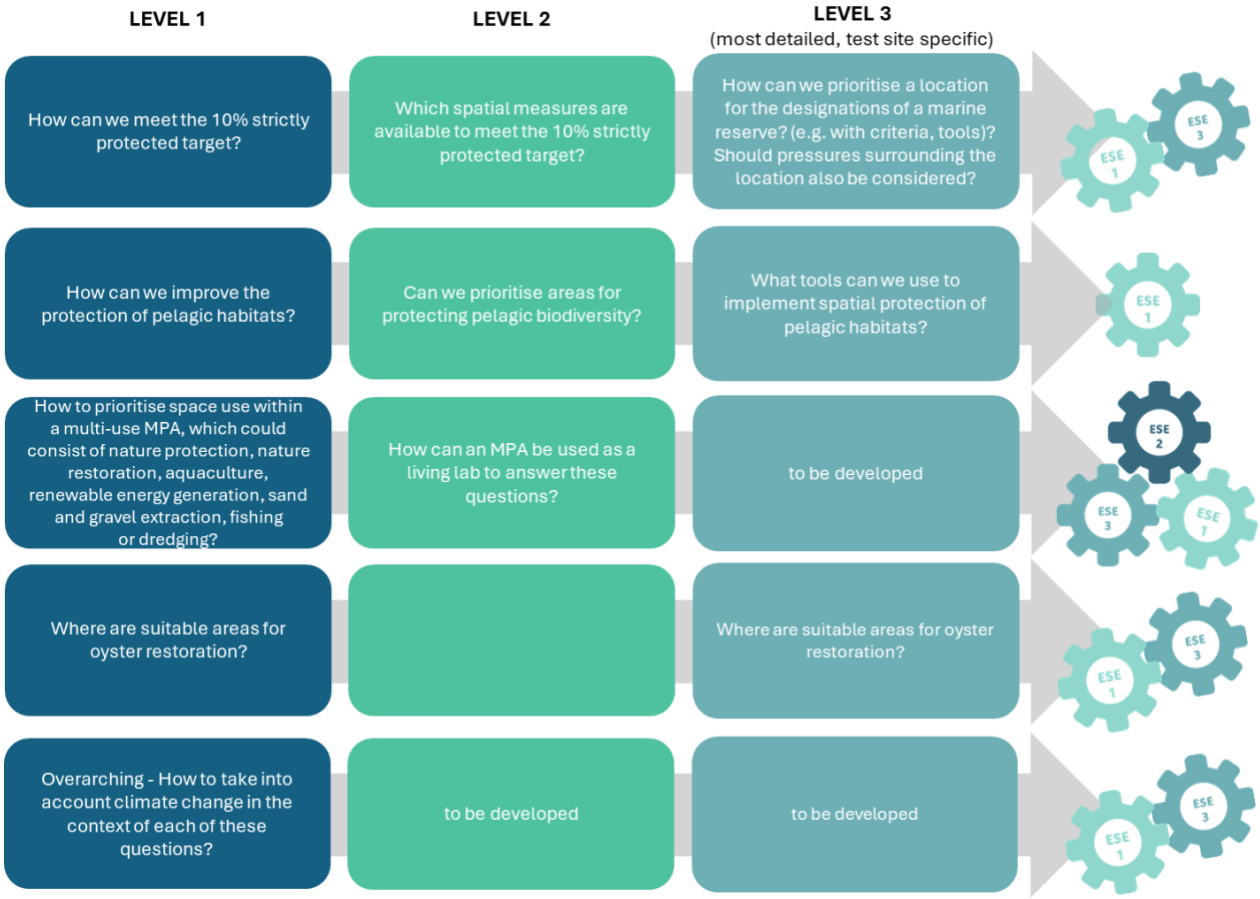

Figure 13 Belgian part of the North Sea Test Site Guiding Questions for ESE Framework and recognized connections, own elaboration.

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Based on the general participatory strategy described in detail in chapter3rdof the report, below you will find the strategy steps including Belgian part of the North Sea test site specific recommendations, suggestions and solutions. The steps encompass the whole project lifetime.

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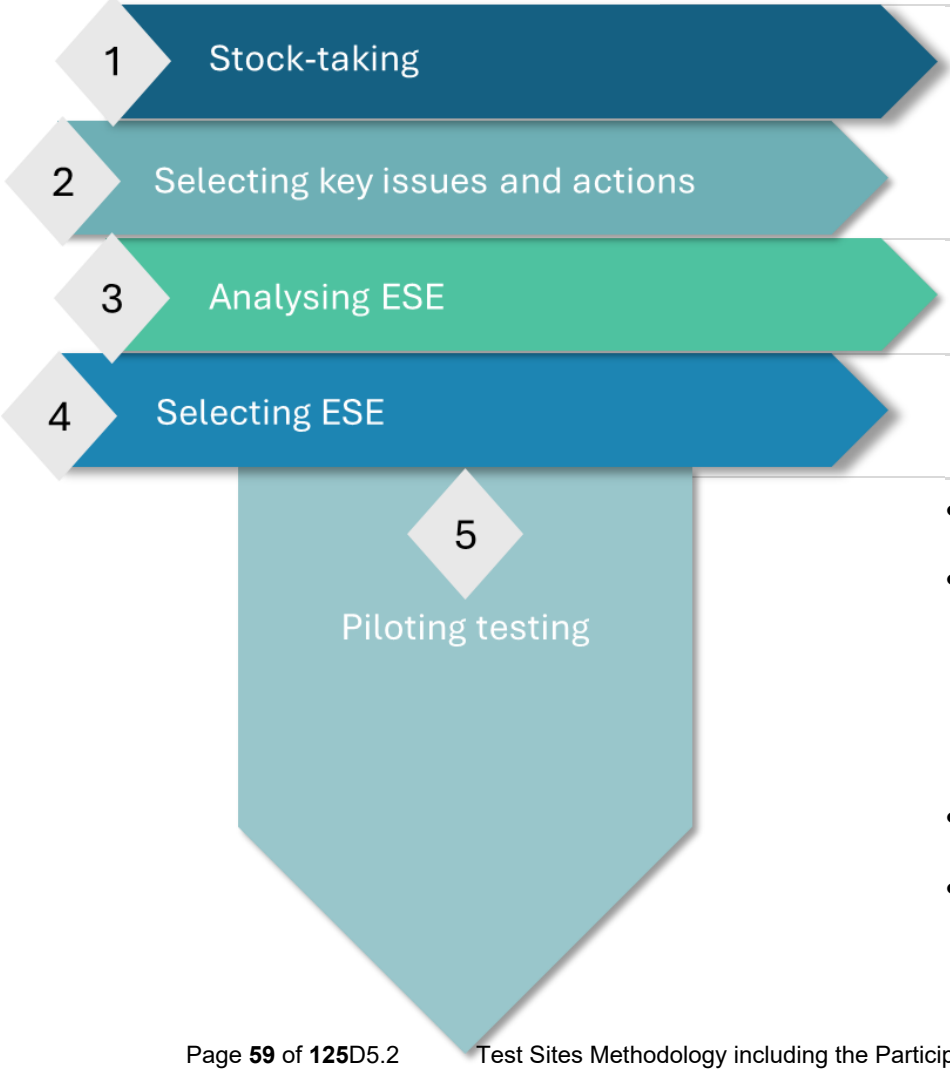
Steps how to adjust ESE Framework to Belgian part of the North Sea test site specificity



	Actions & results	Status
1 Stock-taking	Test sites characteristics, main focus and objectives. Main management questions/issues of the Belgian part of the North Sea test site have been formulated – described in Del. 5.1.	performed
2 Selecting key issues and actions		
3 Analysing ESE	ESE elements have been discussed and expected results & impacts for the test – site have been recognised; ESE guiding questions are ready.	performed
4 Selecting ESE	ESE elements to be tested have been recognised – all ESE modules seem applicable depending on question, dialogue with ESE developers will be continued.	in the course
5 Piloting testing	• Perform testing when ESE Framework will be elaborated, inform your CoP about the testing, if possible, include them in the task; • If data needed – check Kustportaalhttps://kustportaal.be/en for spatial data on human uses, https://www.marineatlas.be/en/data for MSP spatial data. For global- or Europe-scale climate projections check Bio-ORACLE, ESGF portal, Copernicus, etc. Some thermal tolerance data for species available from https://github.com/EMODnet/EMODnet-Biology-thermal-traitsor GlobTherm. Habitat maps and model outputs of potential habitat distributions are available. • Check WP6 for high level practices linked to MSP and practices on transboundary environmental management. • Consider the guidance provided by ESE developers for each guiding question (next page). For the overarching question 5 all recommendations apply.	draft ESE Framework will be ready in May 2024 (WP4)

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5

TESTING ESE

Guiding question 1

CC related practices & criteria

"Identifying key areas for conservation now and in the future under CC would help inform the selection of strict PA to achieve 10% target. The guidance provides a robust and transparent methodology for this very purpose. Answer to ""How can we prioritise a location [...]"":

(i) Define the main targets of the marine reserve as the location will change regarding it (step 1).

(ii) Analyse the capacity of each proposed areas to be productive under climate-change (considering different scenarios) as single MPA (step 4) and if it is possible and relevant to enlarge it regarding the local context

(iii) Analyse the potential of each proposed areas to the surrounding areas and MPA (step 4)

(iv) Consider the ease of finding trade-off with the activities inside the area (step 5) (v) hierarchise and test the propos scheme (step 5)"

ESE 1

Practice: Trade-off analysis using participatory mapping tool

The Trade-Off Guidelines provide a methodology that can be adapted to the local context to give some support to this question. See also the Portfolio of Arguments to enrich the discussion. Through the SeaSketch reports, for example, it is possible to draw polygons trying to meet the 10% strict protection.

ESE 3

Guiding question 2

practices & criteria

Instruments relating to pelagic habitats aiding in the protection of deep-sea habitats such as Vulnerable Marine Ecosystems (VMEs) such as the Criteria lists, taxa lists, indicators and habitat lists provided by ICES, FAO, GFCM and NEAFC are identified in the deliverable D2.2 Summary report of existing criteria, species and habitat lists used in conservation and restoration initiatives. These can aid the identification of ecologically important pelagic habitats for conservation. Aspects relating to pelagic habitats are discussed in D3.1, with 7.6% of represented marine domains in screened literature being pelagic and key functional processes relating to pelagic habitats such as Benthic-Pelagic coupling being part of the extraction guideline for the systematic review. The theme of connectivity, such as pelagic larval duration and species' migration routes, remain a focus point of the D3.2 Portfolio of Improved Ecological Criteria and can provide some guidance towards the prioritisation of pelagic habitats, for example Column H environmental conditions of plankton/primary productivity related to cetacean distribution hot spots.

ESE 1

CC related practices & criteria

The guidance can be applied on pelagic habitats, (i) Consider knowledge related to targeted species future distribution, knowledge of future upwellings, traits and sensitivity of key species.

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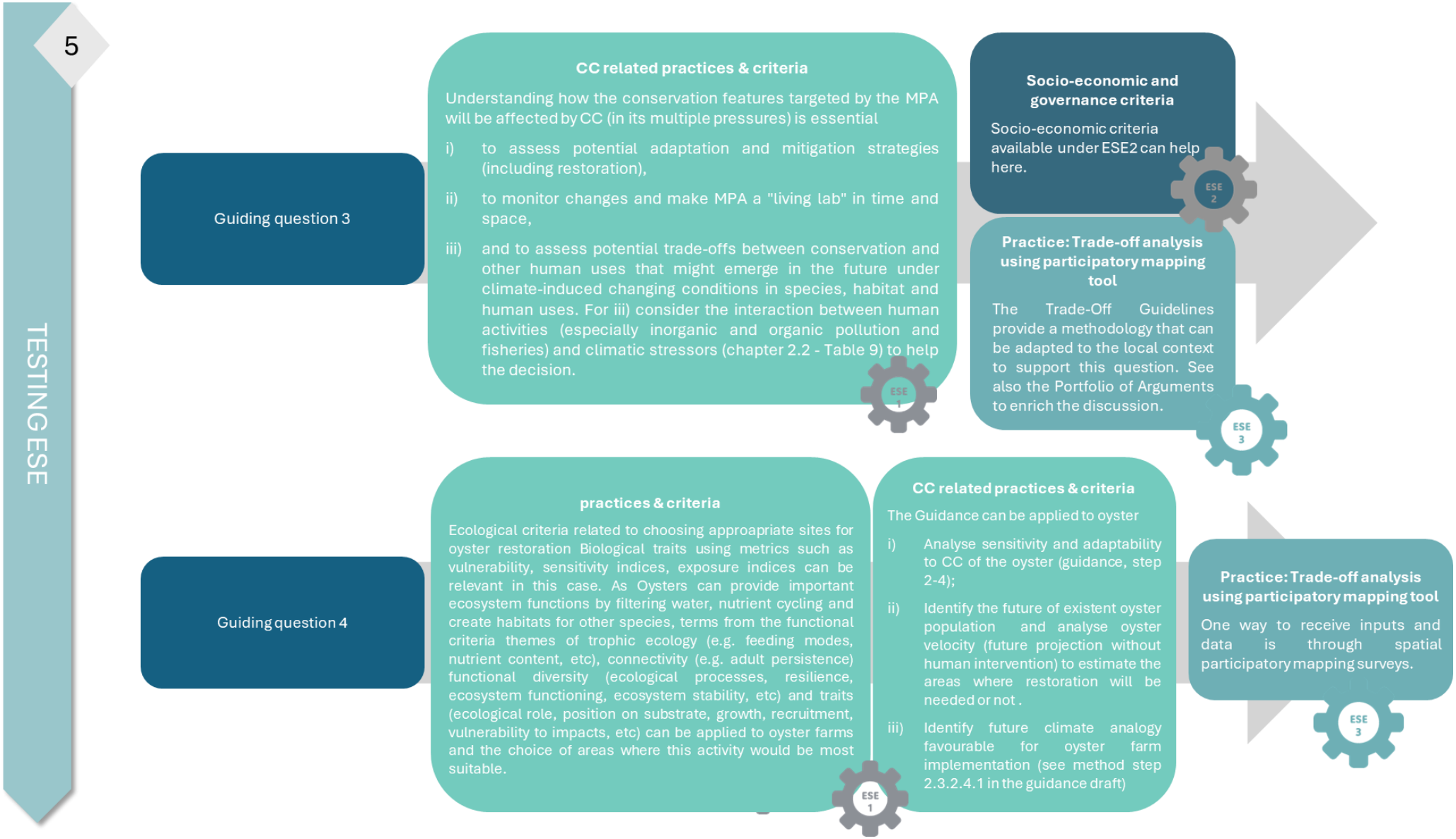

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	Actions & results	Status
1 Stock-taking 2 Selecting key issues and actions	Test sites characteristics, main focus and objectives. Main management questions/issues of the Belgian part of the North Sea test site have been formulated – described in Del. 5.1.	performed
3 Analysing ESE	ESE elements have been discussed and expected results & impacts for the test – site have been recognised; ESE guiding questions are ready.	performed
4 Selecting ESE	ESE elements to be tested have been recognised – all ESE modules seems applicable depending on question, continue dialogue with ESE developers.	in the course
5 Piloting testing – since may 2024	perform testing when ESE Framework will be elaborated, inform your CoP about the testing, if possible, include them in the task.	from May 2024 (WP4)
6 Validating workshop	Try to align with the still undergoing Belgian MSP revision process, as providing new scientific knowledge to the process. Try to align with the MPA monitoring and management - foster new experiences and good practices. Show the common picture for the whole area, show added-value of cross-border solutions included in the ESE modules. Approach regional North Sea networks. Approach right pool of stakeholders to start validation. Consider wider group than your CoP, address other decision-makers.	future

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4.4. Black Sea – Western Black Sea test site

4.4.1. Test site key characteristics

The Western Black Sea test site (from Cape Tuzla to Cape Kaliakra) is part of the Black Sea. This is a coastal, onshore and offshore sub-sea basin of the size 2,750 km^2. The test site is shared by Bulgaria and Romania, so from its nature it is a cross-border testing site covering both territorial waters and the EEZ. The relevant blue sectors are fisheries and tourism. The following are key characteristic features of the test site:

- Diversity of marine domains;
- MPAs support huge biodiversity and ecosystem services;
- MPAs are fragmented with limited operational management.

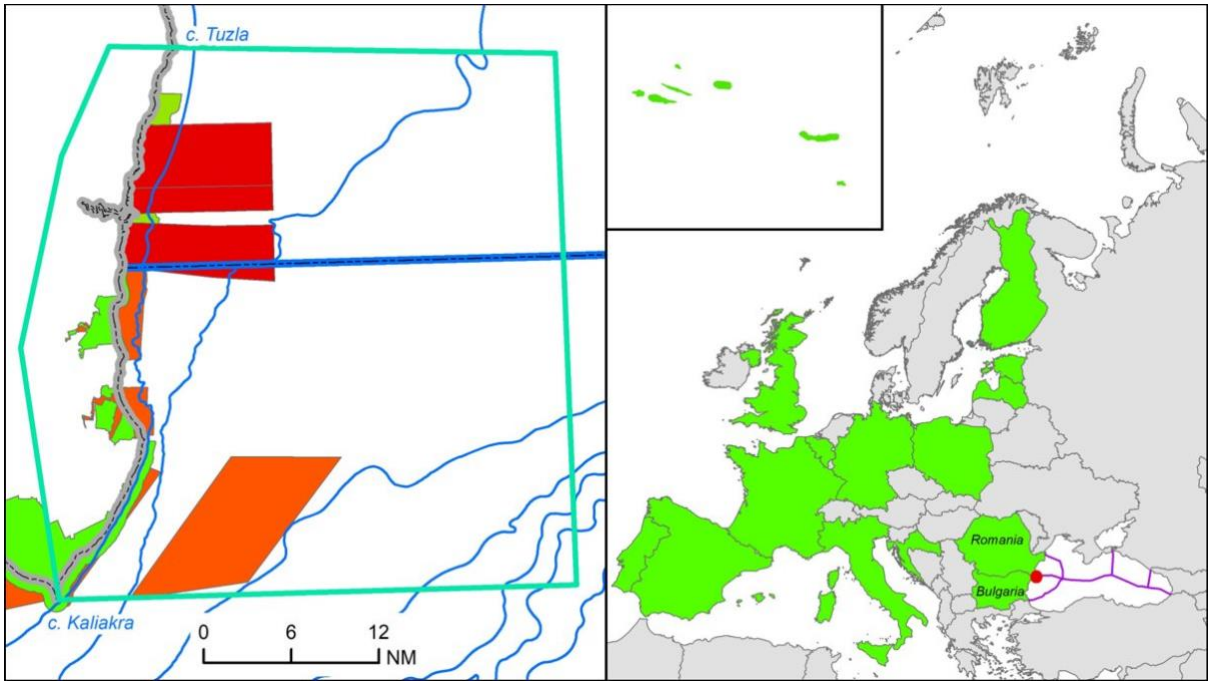

Figure 14 Location of the Black Sea test site. Source: Withouck et al. 2023a

4.4.2. Main focus and objectives of the test site

The current MPA network (national and Natura 2000) is well designated in Bulgaria, but no operational implementation, management plans or monitoring have been provided yet. The current protection is insufficient, ineffective and non-functional given the spatial distribution, the connectivity and the lack of specific management objectives. The MPA network is underdeveloped, with key gaps in terms of valuable/vulnerable biodiversity, ecological corridors and coherence. Habitat protection areas offshore have not been fully explored and designated. The main challenge is to ensure effective management and provide up-to-date scientific data and information on species distribution and behaviour. Due to limited coverage of MPAs, an expansion of protected areas is needed.

A similar although slightly better situation is in Romania. Even though the criteria with which new MPAs were designated (or the area of existing ones were extended) are adequate, there are many gaps in the scientific information and data about the present diversity of marine species and habitats and their spatial distribution. Not all the MPAs have management plans and/or regulations, and those that exist have not been updated since 2010, whilst since then MPAs have been expanded. It was indicated that the management plans in place need to be reviewed and supplemented with regulations. The impossibility of sanctioning violations is a key obstacle. Perhaps expansion of protected areas is needed (one or two more small-sized SCIs should be established). New MPA designations should be made for fragile and/or habitats that have been observed and/or recovered more recently.

The main focus and objectives of the cross-border study are:

- Identify the conservation priorities to support the expansion/establishment of new and the efficiency of the current network of MPAs;
- Harmonise MPAs and other ABMTs to integrate in MSP and support a coherent networking (including identification of new ABMTs) to base management actions on prioritisation and ecological criteria;
- Shape MSP to sustain and support the evolution of the current conservation plans to have it coherent, efficient and shared (at national and cross-border level).

4.4.3. Key local issues and challenges to be solved with support of the MSP4BIO ESE Framework[4]

The following issues were highlighted as important challenges in the test site.

Topic	Description
Deficiencies in the current status of the MPA management	In Romania: Spatial coverage of the MPA network is appropriate and small distances between MPAs allow the migration of organisms and larvae between them. Key problems are related to: lack of ecological corridors connecting the marine region, insufficient scientific research on ecological connectivity and climate change impacts on species/habitats and ecosystem services and lack of scientific underpinning for SCI designations, need for better understanding of multiple pressures/impacts (as the PS area is important for human activities as tourism, fishing and marine transport).

[4]Entire chapter is based on direct or slightly changed citations from D.5.1 (Withouck et. al., 2023a)

	<u>In Bulgaria:</u> The coverage of marine protected areas is insufficient. Key problems are related to the: lack of marine ecological corridors, delays in elaboration of the conservation objectives and conservation measures, lack of specific measures to address climate change impacts on ecological features in MPAs, prevalence of restriction measures for management of the Natura2000 protected areas (lack of broader conservation measures such as restoration measures) as well as administrative capacity with clearly defined competences, resources and mechanisms are essential for carrying out the necessary studies and regular monitoring of the protected areas.
Coherence between area designations, MSP and other environmental legislation such as MSFD	Cross-border MSP is coherent in the region thanks to the EU funded projects MARSPLAN-BS I and II supporting the cross-border collaboration in implementing the MSP Directive. However, there is a lack of coherence of MPAs across borders. <u>In Romania:</u> MPA protection and MSP are two different processes. The MSP recognizes EU Biodiversity and MPAs however, it does not identify the space required for designating new sites/extending the existing ones. The current version of the plan does not designate, identify and/or redefine the space required for the different uses of the marine area (including those related to environmental protection). <u>In Bulgaria:</u> The MPA and MSP policies and processes are still not well connected and well aligned and are also different processes. MPAs have to be taken into account in the development of the national MSP, and the MSP also considers the need to further develop the marine ecological component. However, the MSP does not allocate zones for new or extended MPAs, as it has no mandate to do so.
The integration of social and economic aspects in MPAs	In both countries ecosystem services and ecological activity need better attention of the policy makers. Socio-economic aspects are

	limited in their consideration. Incorporation of socio-economic dimensions to MPAs management needs strengthening. In Romania: The rules concerning the socio-economic aspects of protected areas have been established by the Romanian government. The documents regulate the activities allowed in MPAs and the related obligations: any activities or actions that could affect MPA integrity or that could have a significant negative impact on the protected natural elements are prohibited. However, licensing procedures seems unclear and administratively difficult. However, due to the lack of MPA management plans, the procedures seem unclear and administratively difficult. In Bulgaria: The maritime activities are not properly managed in the MPAs. The main gaps or needs for management improvement are: lack of specific objectives and measures at zone level; lack of coherence; lack of management plans and need for governing bodies and control. The key management issues are: better understanding of impacts and trade-offs/balance of stakeholder interests, better cooperation between institutions and compliance with certain maritime activities, e.g. military exercises, and control over unregulated activities.
Stakeholder confidence in MPA and MSP processes	In both countries the problem is related to rising stakeholders' knowledge and awareness on MSP and lack of stakeholder-friendly graphical means for presentation of the planning options. Capacity building measures seem also insufficient. In Romania: The involvement of stakeholders, especially in MPA processes, has been deficient or absent. The main reason is the lack of adequate management frame. In Bulgaria:

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	The current organisation of stakeholder engagement does not efficiently build confidence and there are gaps both in MSP and MPA processes: diverse categories of stakeholders should be involved – not just governmental representatives. In general, the current process of involving stakeholders in the management of the Natura 2000 network is evaluated to be insufficient

Source: based on Withouck et. al., 2023a

4.4.4. Community of Practice (CoP) involvement

There are two CoPs in the test site. Originally 18 stakeholders' representatives were invited to the CoP in Bulgaria. They have represented various institutions and various governance level from Ministry responsible for MSP and Ministry responsible for nature protection up to NGOs, local fishers' associations, marine museum and private business representatives (Bulgarian company, operating for exploration, development and exploitation of oil and gas fields). Exactly the same number was targeted in Romania, although in this case one can observe larger number of regional and local entities including representatives of fishery sector. Such stakeholder composition was in line with the specificity of the test site. However out of these 36 representatives only 8 persons from Bulgaria and 7 persons from Romania have actively participated in the 2nd CoP interaction for Ecosystem services evaluation. Separated CoPs are not a problem due to long lasting co-operation between MSP responsible authorities in the frame of transnational projects.

4.4.5. Stage of the MSP plan and the MPA designation process

The respective MSPs have been approved in Bulgaria and in Romania. Both Maritime Spatial Plans correspond with each other since they have been based on the results of two cross-border projects ("Cross-border Maritime Spatial Planning for Black Sea - Bulgaria and Romania" MARSPLAN-BS I and II).The test site includes diverse coastal, onshore and offshore domains, MPAs (both nationally designated areas and Natura 2000 sites), wetlands that support huge biodiversity, as well as ecosystem services. Some challenges to the integration of MPAs and the MSPs exist, such as lack of operational management plans for MPAs. The MSP in Bulgaria does not envisage the establishment of new or enlargement of already existing MPAs, as it does not have the remit to do so as a strategic document. MPAs currently cover only 8% of the Bulgarian maritime space and the extension is expected due to EU ambitions in this regard (30% of protected areas). There is a fragmentation of MPAs between the coast and offshore, and at the cross-border level. Therefore, there is a need to integrate ecological corridors through the enlargement of the existing or establishment of new MPAs. In Romania MPAs cover much larger part of the sea waters thus extension is not an issue here. In both countries MPAs and MSP are run as separate processes.

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In the marine part of the test site there are eight Sites of Community Importance (SCI), according to the 92/43/EEC Habitats Directive and four on Special Protected Area (SPA according to the 79/409/CEE Birds Directive) – six in Bulgaria and six in Romania. Moreover, there is one nationally designated MPA in Bulgaria (Kaliakra Natural Reserve, corresponding to category Ia IUCN) and in Romania, the VamaVeche Marine Reserve, important due to the presence of habitats of European interest (corresponding to category IV IUCN – Protected area managed mainly for conservation through management intervention – Habitat/Species Management Area). The aim of the reserve is protecting and conserving marine natural habitats and species. It is an important area both due to its biodiversity and location (the southern limit being at the Romania-Bulgaria border). In Romania there are also some Natura 2000 and nationally designated MPAs in coastal areas.

4.4.6. ESE expected results

The key guiding questions highlighting the main concerns/needs of the test site that can be addressed through the usage of the ESE Framework are the following:

1) better incorporating social and economic criteria in MPAs identification/ designation;
2) method of assessing compatibility of maritime uses and MPAs conservation objectives, considering the local context;
3) methods for evaluating cumulative impacts/trade-offs in MSP and MPAs;
4) methods for anticipating climate change effects in the MPA network;
5) improving the reliability/accuracy of the spatial data for MPAs identification;
6) identifying the extent of a new marine protected area to reach the EU Biodiversity 2030 targets;
7) better integrating the MPAs (extended and new established) in the MSP plan/process;
8) increasing the stakeholder knowledge and awareness on MPAs and MSP.

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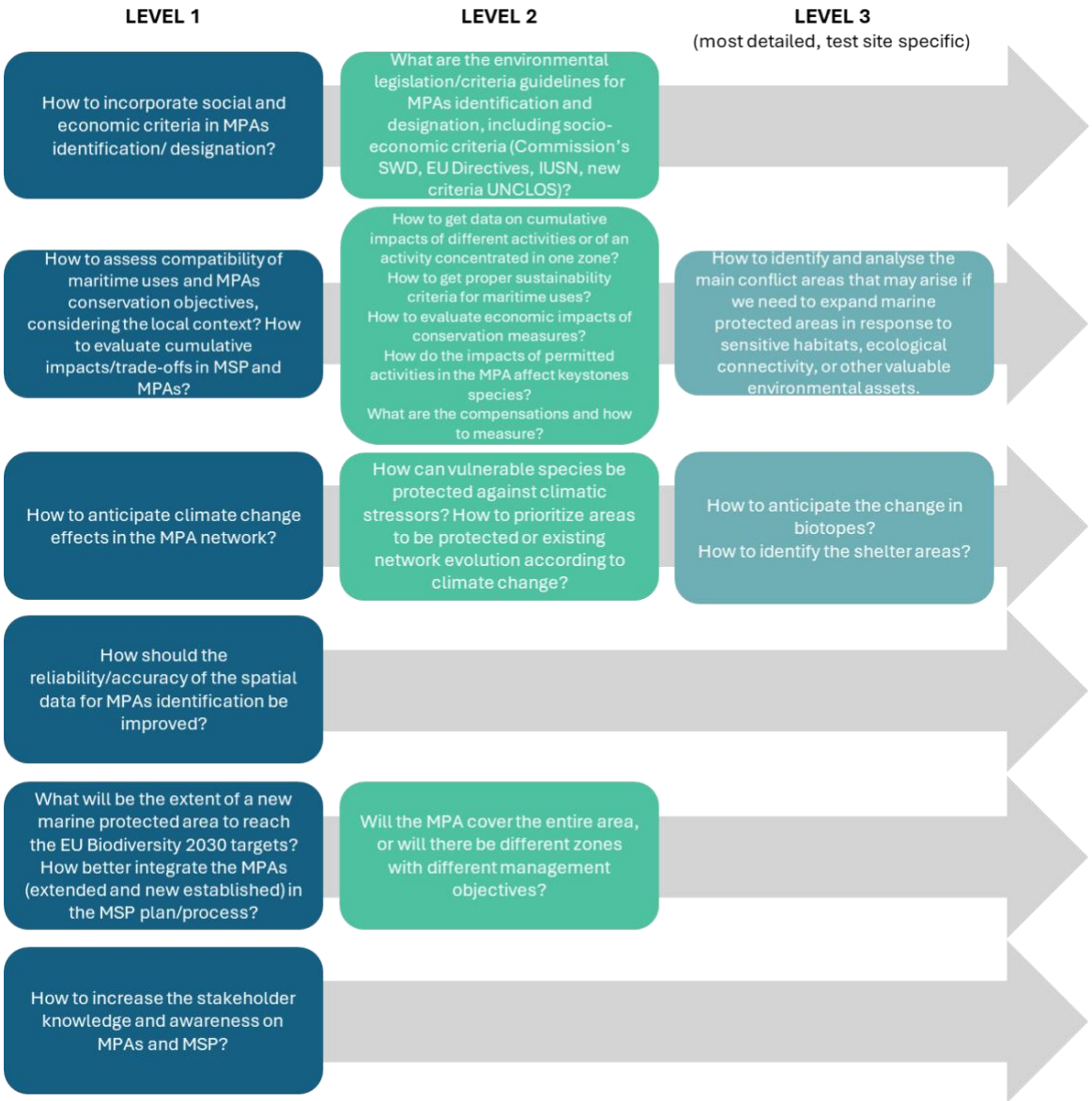

Figure 15Black SeaTest Site Guiding Questions for ESE Framework, own elaboration.

So, they key ambition of the test site is to inform through ESE Framework the process of MPAs extension (Bulgaria) or consolidation (Romania) in line with the MSP elaboration.

For several key issues (above listed guiding questions) – more detailed investigations and discussions were undertaken by the test site CoP.

For the fourth issue/ guiding question or dilemma on climate change the more detailed considerations are related to (i) protection of vulnerable species against climatic stressors, (ii) prioritizing areas to be protected (iii) steering existing network evolution according to climate change. For that, more profound knowledge is necessary on anticipating the change in biotopes vis a vis climate change and methods allowing proper identification of the shelter areas (refugia).

For the third and second issues/guiding questions on co-use or multi-use, key concerns are related to (i) acquiring up to date relevant data on cumulative impacts

of different activities or of an activity concentrated in one zone, (ii) identifying proper sustainability criteria for maritime uses, (iii) methods for evaluating economic impacts of conservation measures, (iv) way of assessing how and to what extent the impacts of permitted activities in the MPA affect keystone species, (v) and methods of using compensations and measuring their impacts. The most detailed concerns that specify and deepen the ones listed above are related to the methods of identifying and analysing the main conflict areas that may arise if there is a need to expand marine protected areas in response to sensitive habitats, ecological connectivity, or other valuable environmental assets.

For the sixth and seventh issues/guiding questions, dealing mainly with MPA extension, a more elaborated concern has been addressed in relation to the dilemma of whether the MPA should cover the entire area, or if there is a need for different zones with different management objectives.

4.4.7. ESE expected impacts.

An expected ESE impact should be on better aligning MSP with the nature protection processes and initiatives. In Bulgaria it is expected that ESE will help in guiding or informing the MPAs extension, ensuring connectivity between valuable habitats and facilitate the migratory activities of marine species. In both Romania and Bulgaria ESE should help in better managing the MPA sites, in particular in integrating socio-economic criteria into MPAs and providing more profound information on the protected species, their spatial requirements and possible adjustments of MPAs locations due to climate change (scientific underpinning of the MPA processes). However, in both countries ESE might help to integrate extended or reformulated MPAs into the MSP plan and process. So far these are separate process i.e. MPA designation and MSP elaboration but Ministries responsible for them have just started a reciprocal dialogue. They need advice on how to operationalise and better integrate MPA designations into MSP in the revision or implementation stage and ESE might help in that. As an ultimate impact one can expect improvements in the fragmented governance related to the marine issues. This means better policy integration and dialogue, (e.g. involving MSP authorities in biodiversity strategy implementation), aligning contradictory objectives of sectoral policies (e.g. fishery policy and conservation of natural environment), and better exploiting opportunity of using MSP as a policy integrator.

4.4.8. ESE elements to be tested.

As the result of the meeting between ESE Framework developers and the test-site leaders, the testing scope and range was discussed. The focus of testing should be on mobile emblematic species, i.e. marine mammals and fishes, some coastal habitats, and uses that might impact them i.e.: shipping, coastal activities, fishery, tourism, offshore wind (Bulgaria), aquaculture. The scale/resolution of data seems an important issue for testing, due to small size of the entire test site. The Black Sea case can be used to test the ESE Framework with regard to emblematic species, whether they have a good status, how to include them in the MSP, the impact of various sectors (mitigate their pressures) on emblematic species, and where to

enlarge the existing or create new MPAs. Also, an issue of cumulative effects might be tested together with the possible risks based on climate changes.

The formulated above scope of testing related to emblematic species might require different products of the MSP4BIO. In the Western Black Sea test site, the following can be used/tested:

a) availability of data (WP2 can help with searching for data at the required resolution and with facilitating data flow to the ESE Framework);
b) ecological models developed by WP 3 (ESE 1 module);
c) socio-economic criteria and impact on ecosystem services (Task 4.1);
d) five sectoral sheets that bring main ecosystem services impacted by sectors and include good management practices for these activities (developed by Task 4.2);
e) good practices on increasing stakeholder knowledge and awareness, or on extension of MPAs to reach the 30% EU target (developed by WP6).

For more details on the scope of testing, please see the chapter below on adjusting ESE Framework. It remains open (for further discussions) how aforesaid MSP4BIO deliverables will be incorporated in the ESE, and how: as tools or other instruments theymight be indeed demonstrated and validated with CoPs.

4.4.9. Risks and challenges

Key risks and challenges are related to cross-border characteristics of the test site which might mean slightly different approaches and ambitions in aligning MSP and MPA processes in both countries. Important risks are related to availability of data. As already indicated the test site is small and the scale of analysis must be in line with its size, but in many cases, data are available only in much less detailed resolution e.g. scale of data on spatial distribution of benthic habitats is insufficient for such small test site.

4.4.10. Towards adjusting ESE Framework

To start adjusting, there is a need for more detailed information on the ecological needs of the test site in particular in a cross-border set-up. There is also a need to see what knowledge is available and where are the knowledge gaps (e.g. knowledge on connectivity of species and habitats). In particular what knowledge is important to reach a goal of 30% conservation. Only then can ESE tools and criteria be applied or offered i.e. the one that are proposed by ESE e.g. single ecological criteria or socio-economic criteria in MPAs designation.

The following procedure was agreed:

a) ESE Framework developers will reflect on existing guiding questions (level 2 and level 3 questions) and come back to the test site leaders with proposal of more detailed questions in order to retrieve necessary context knowledge. Information will be needed on key habitat and species the conservation should be focused on. ESE Framework developers must understand the context of the test site. This is important in order to propose relevant ESE modules to be applied. If information contained in the existing deliverables, general assembly

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presentations and working Excel sheet is not complete enough, the test site leaders will provide more context information on demand.

b) Having received contextual information on prioritized species or/and habitats,ESE Framework developers will link problems to species e.g. climate change. Then they link to these problems the tools and criteria developed by ESE. This will be done in the working Excel sheet in the Sharepoint.

c) Black Sea test site leaders will verify proposals in the Excel sheet with regard to the ESE elements for their testing.

Results of the discussion so far and established connections between the test site guiding questions and ESE Framework modules are presented below.

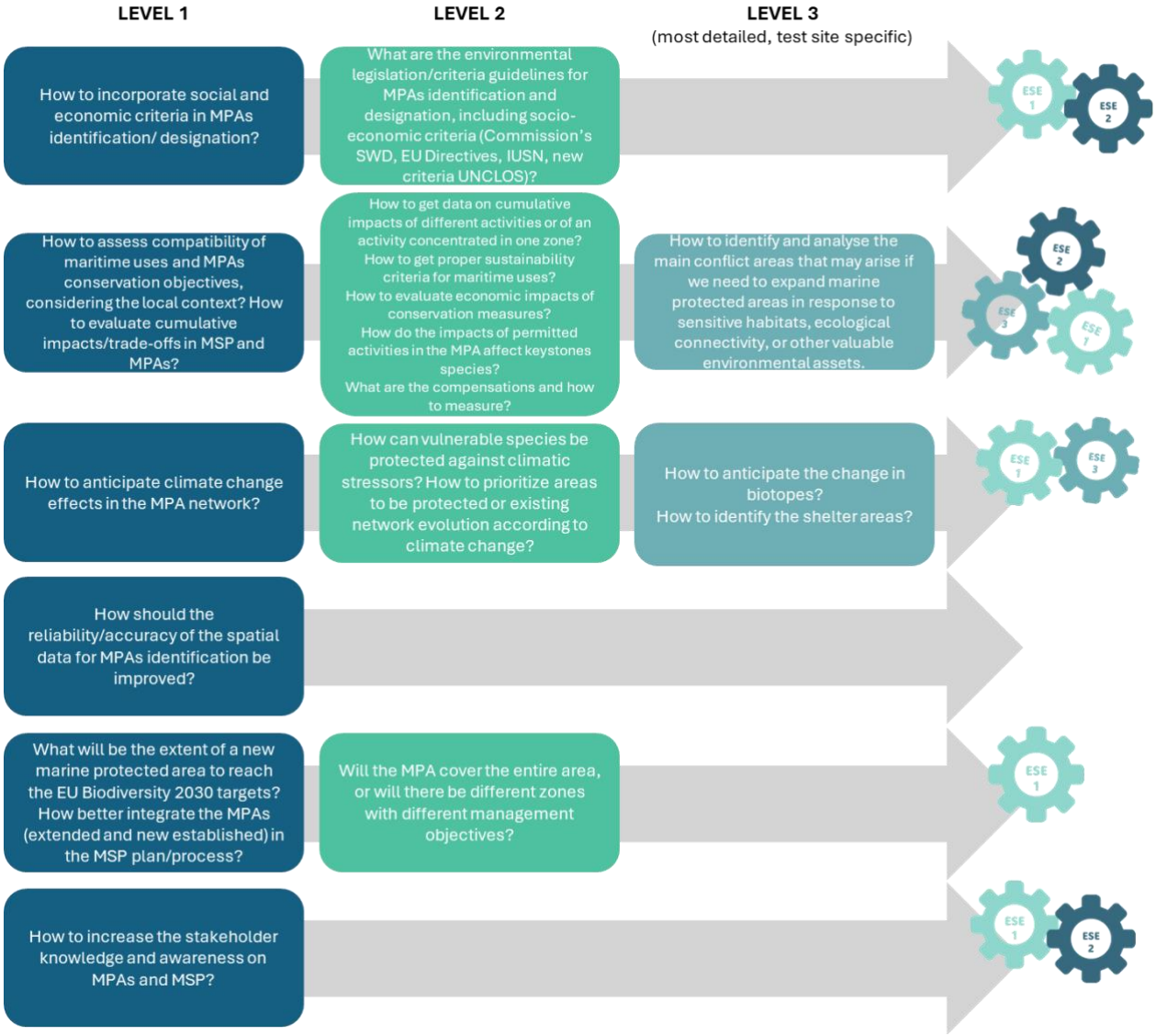

Figure 16Black Sea Test Site Guiding Questions for ESE Framework and recognized connections, own elaboration.

Based on the general participatory strategy described in detail in the 3rd chapter of the report, below you will find the strategy steps including Black Sea test site specific recommendations, suggestions and solutions. The steps encompass the whole project lifetime.

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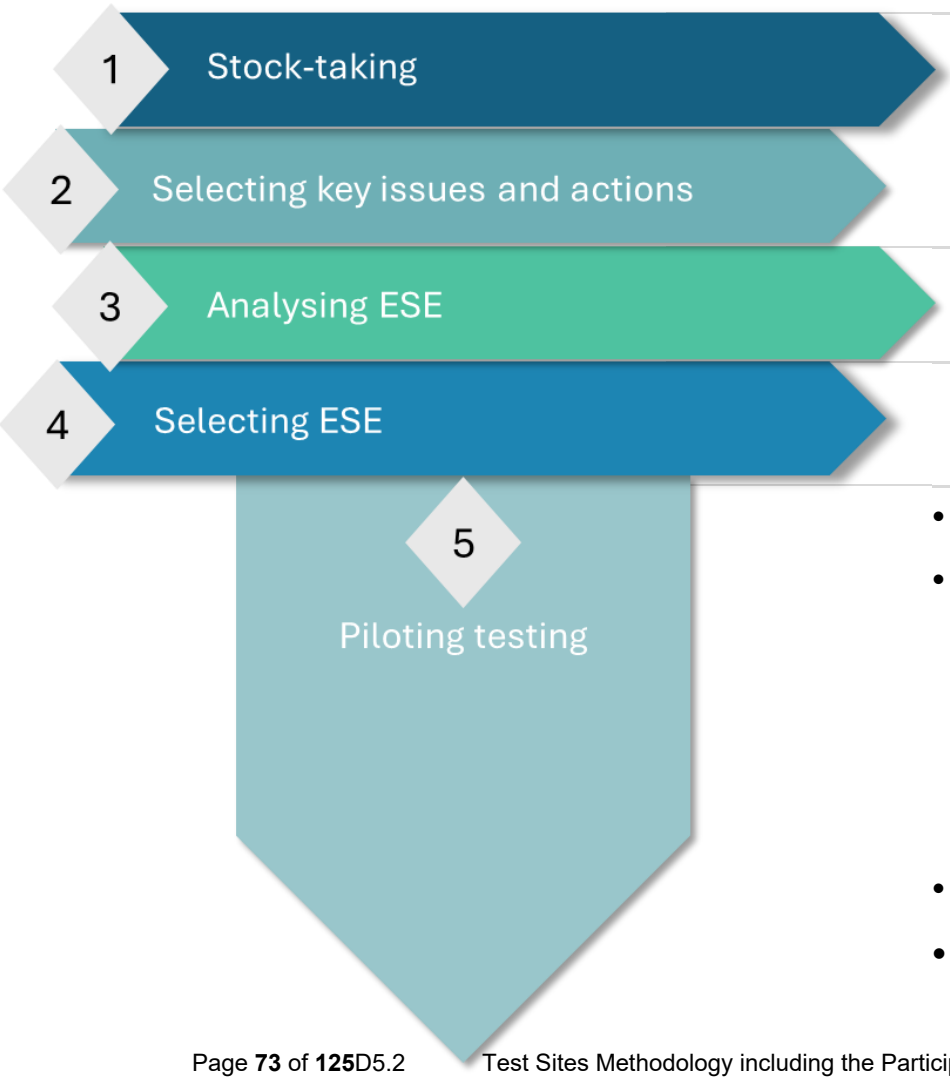
Steps how to adjust ESE Framework to Black Sea test site specificity



	Actions&results	Status
1 Stock-taking 2 Selecting key issues and actions	Test sites characteristics, main focus and objectives. Main management questions/issues of the Black Sea test site have been formulated – described in Del. 5.1.	performed
3 Analysing ESE	ESE elements have been discussed and expected results & impacts for the test – site have been recognised; ESE guiding questions are ready.	performed
4 Selecting ESE	ESE elements to be tested have been recognised –all ESE modules seem applicable 3 (depending on questions and data availability), continue dialogue with ESE developers.	in the course
5 Piloting testing	• perform testing/validation when ESE Frameworkis entirely elaborated, inform your CoP about the testing; • If data needed – available data on human impacts and activities (Global Fishing Watch, EMODnet chemistry contaminant and human activities data, hydrocarbon extraction areas in Romania http://www.namr.ro/resurse-minerale/15887-2/, water abstraction in Bulgaria https://www.bsbd.org/uk/index.html). MSP spatial data for Bulgaria checkhttp://mspbg.ncrdhp.bg/?pp=15&lg=enand for both countries from the MARSPLAN-BS II project http://www.marsplan.ro/en/ for climate projections check Bio-ORACLE, ESGF portal, Copernicus, etc. For thermal tolerance data for species checkhttps://github.com/EMODnet/EMODnet-Biology-thermal-traitsor GlobTherm.(The problem is that spatial data are not in digital downloadable format for use.); • check WP6 good practices on increasing stakeholder knowledge and awareness, or on extension of MPAs to reach the 30% EU target; • consider the guidance provided by ESE developers for each guiding question.	draft ESE Framework will be ready in May 2024 (WP4)

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5

TESTING ESE

Guiding question 1

CC related practices & criteria

i) Clarify the key conservation features (i.e., species, habitats and ecosystem) that are of priority for conservation (guidance D3.3, step 1);

ii) Analyse sensitivity and adaptability to CC of the key conservation features (guidance, step 2-4);

iii) Identify potential trade-off with economic and social preferences (step 5)

ESE 1

Socio-economic and governance criteria

Provide a framework to support the selection of the main socio-economic and governance criteria for an area based on different legislation and policies. The connection of the socio-economic criteria to the main ecosystem services they depends on connect such activity with the ecosystem that should be prioritize support the discussion in the negotiation of trade-offs streaming line the connection among Ecosystem-Socio-Economic Criteria-Management Approach.

ESE 2

Guiding question 2

CC related practices & criteria

i) MPAs conservation objectives are established by policy makers;

ii) Make sure that you include an objective related to consider climate adaptability and vulnerability to CC of your key conservation features and climate-smart MPAs.

ESE 1

Practices & Criteria

distribution of species of priority and ecological features from T2.2 and prioritize (see support tools for crossing human uses and CEA)

Tools & data

Cumulative Effect Assessment tool (within ESE1)

Socio-economic and governance criteria

The framework presented in ESE2 and the guidelines of Del. 4.2 provide a relation between socio-economic criteria and the ES they are related to.

Del. 4.2 show also the main pressures on ES of the main blue economic sectors/activities. These two approaches can support the evaluation of the CI based on ES.

ESE 2

Practices: Strategic and Spatial measures for blue economy sectors

Criteria and good management practices provided under D4.2 (ESE3).

Practice: Trade-off analysis using participatory mapping tool

The Trade-Off Guidelines provide a methodology that can be adapted to the local context to support this question. See also the Portfolio of Arguments to enrich the discussion.

ESE 3

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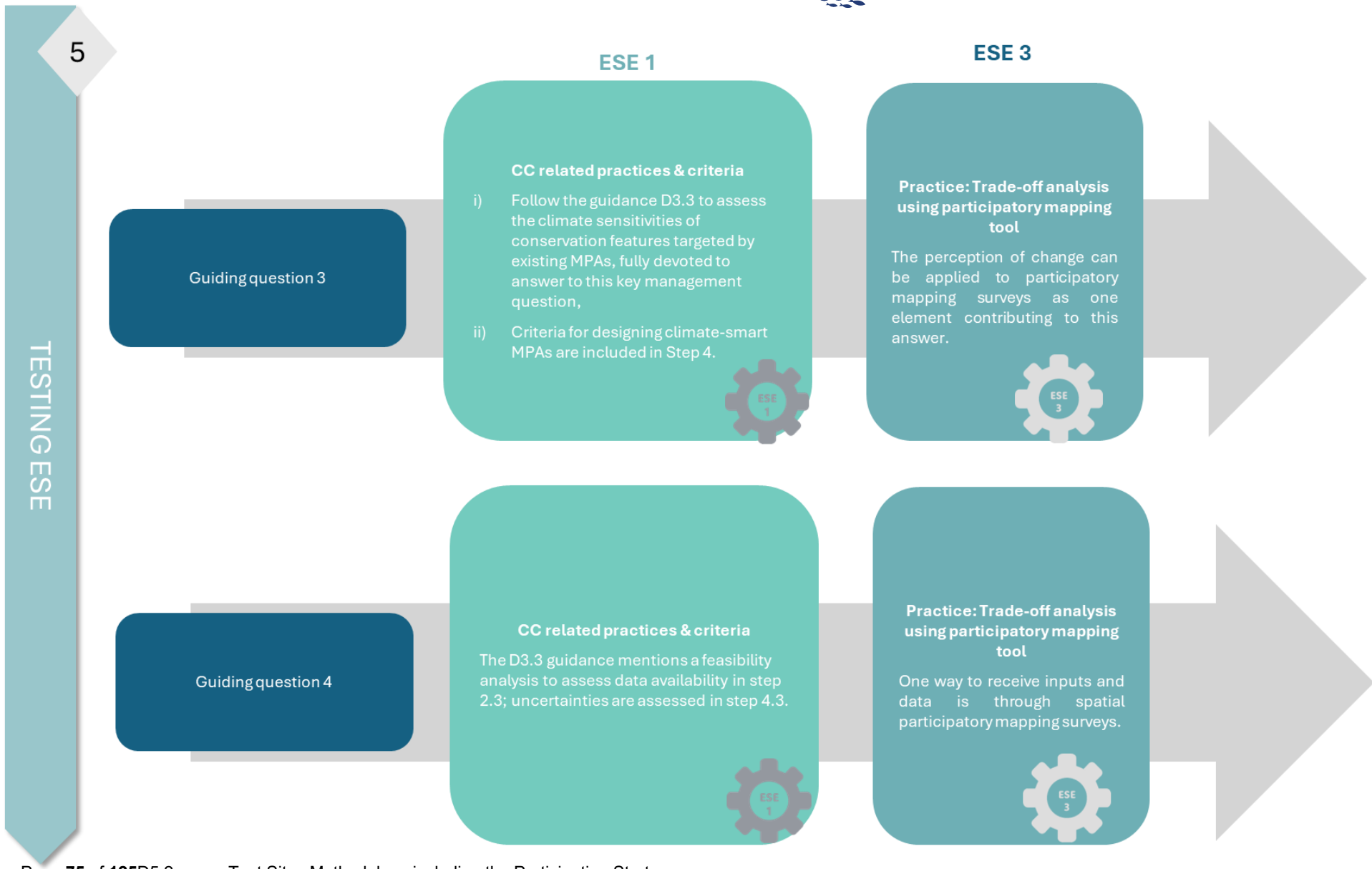

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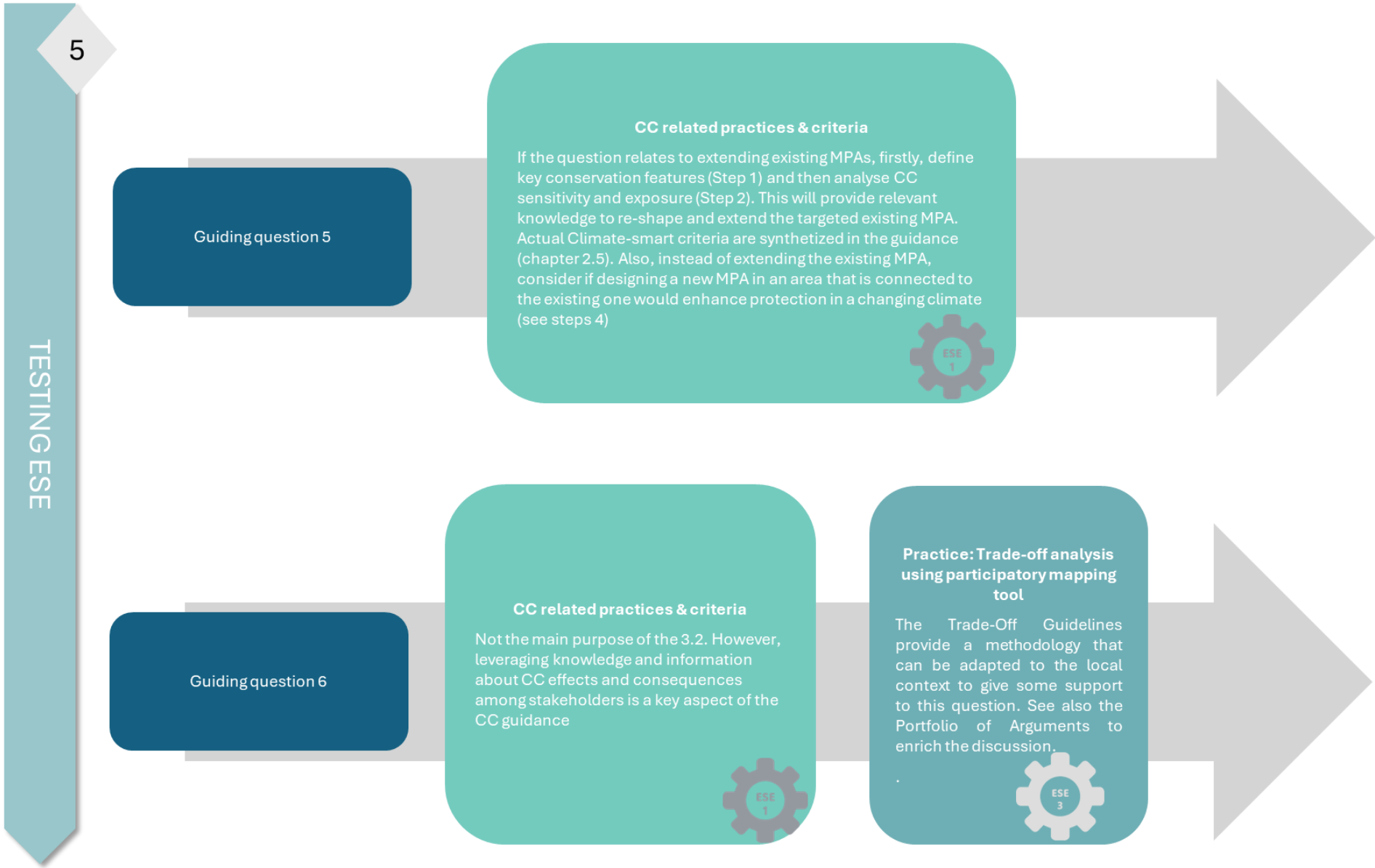

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	Actions&results	Status
1 Stock-taking	Test sites characteristics, main focus and objectives. Main management questions/issues of the Black Sea test site have been formulated – described in Del. 5.1.	performed
2 Selecting key issues and actions		
3 Analysing ESE	ESE elements have been discussed and expected results & impacts for the test – site have been recognised; ESE guiding questions are ready.	performed
4 Selecting ESE	ESE elements to be tested have been recognised – all ESE modules seems applicable 3 (depending on questions and data availability), continue dialogue with ESE developers.	in the course
5 Piloting testing – since may 2024	perform testing when ESE Framework will be elaborated, inform your CoP about the testing, if possible, include them in the task;	from May 2024 (WP4)
6 Validating workshop	Try to bring together MSP authorities and these responsible for MPA management to show them the results, foster new experiences and good practices to open the possibility of building possible management plans. Show the common picture for the whole area, show added-value of cross-border solutions included in the ESE modules. Approach right pool of stakeholders to start validation. Consider wider group than your CoP, address other decision-makers.	future

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4.5. The Cadiz Bay test site

4.5.1. Test site key characteristics.

The Bay of Cádiz (*Bahía de Cádiz*) is a body of water in the province of Cádiz, Spain, adjacent to the south-western coast of the Iberian Peninsula. The shores of the Bay of Cádiz include the municipalities of Cádiz, San Fernando, Puerto Real, El Puerto de Santa María, and Rota. The bay forms a natural harbour. The Bahía de Cádiz Natural Park is located on the shores of the Bay of Cádiz. Relevant blue sectors: Fisheries, aquaculture and tourism. The Bay of Cadiz is part of Spanish Atlantic waters named the South Atlantic "Sudatlántica" marine demarcation, -an area of 14,978.3 km^2.

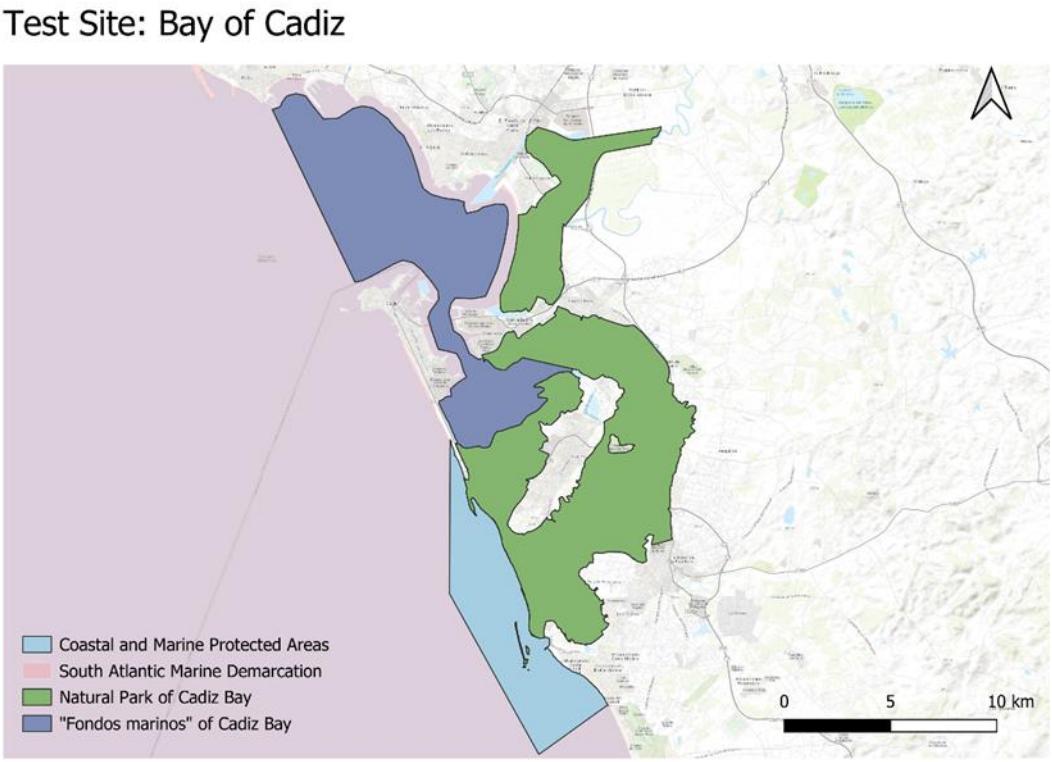

Figure 17 Location of the Cadiz Bay test site. Source: Withouck et al. 2023

Characteristics of the test site are as follows:

- Hot spots with special needs for MSP and MPA;
- Need for improvement of MSP and stronger consideration of land-sea interactions;
- Nearby human activities threaten MPAs.

4.5.2. Main focus and objectives of the test site

While a significant portion of the area is already under protection, the type of protection applied to the protected areas is not sufficient to protect the ecological features. Theoretically, the legally established protection is deemed sufficient, but

implementation is lacking. The surveillance in the marine environment is not feasible, making it difficult to execute the measures included in the management plans. It is necessary to develop new management tools and promote the use of existing ones. Tools to support the management of protected areas exist, but they are not being used. Moreover, there is a need for a better consideration of socio-economic criteria alongside ecological criteria, to take into account social, cultural and economic values. Natural features need to be linked with their services for a more comprehensive evaluation of the added value of protected features. Management is hampered by human and financial resources, as well as administrative constraints.

4.5.3. Key local issues and challenges to be solved with support of the MSP4BIO ESE Framework[5]

In principle, there are four local issues and challenges to be solved with support of the MSP4BIO ESE Framework:

Topic	Description
Deficiencies in the current status of the MPA management	Key issue is lack of relevant policy framework for proper MPA management. MPAs or MSP are existing but existing administrative structures and institutional set-up are insufficient to secure achievement of the key ecological objectives declared in the official documents. As a result, a Natura 2000 park in Andalucia has been recently removed from IUCN green list due to 'mismanagement'.
Coherence between area designations, MSP and other environmental legislation such as MSFD	Coherence between MSP and environmental legislation is limited. The result is insufficient connection between the key protected areas as well as between offshore and coastal areas due to their designation on the basis of different pieces of legislation. The following management gaps have been identified: (i) the lack/ weakness of cooperation between different levels of administration (local, regional, and national); (ii) the sectoral character of management tools; (iii) the bureaucratization of management processes; (iv) low and weak public participation.
The integration of social and economic aspects in MPAs	Social and economic aspects are poorly integrated into MPAs process (i.e., limited consideration social/economic criteria during designation of MPAs). Protected areas are

[5]Entire chapter is based on direct or slightly changed citations from D.5.1 (Withouck et. al., 2023a)

	considered as a barrier to the local and regional development. Illegal activities have been growing in a disorganized way and they represent considerable pressure on Cadiz Bay environment.
Stakeholder confidence in MPA and MSP processes	Engagement of local stakeholders into the MSP consultation processes has been rather limited. There is an organizational frame for stakeholders' involvement into management of the Cadiz Bay Natural Park, however it suffers from two obstacles: the low frequency of meetings and the little discretionary power that their participants might enjoy.

Source: based on Withouck et. al., 2023a

4.5.4. Community of Practice (CoP) involvement.

Out of originally envisaged 45 stakeholders' representatives 14 persons were invited to Cadiz Bay CoP. They came from various levels of public administration, business sector, science and general public (mainly NGOs). They were expected to form an important reference group for the MSP4BIO project in the Cadiz Bay. Public authorities represented regional and local administrative tiers in this group. Both representatives of environmental protection institutions and these responsible for local and regional development were invited. Out of these 14 persons only 10 have agreed to participate. 9 persons participated in 2nd CoP interaction for Ecosystem services evaluation.Key problem underlined by CoP is governance – emphasised by all interactions in CoP. All stakeholders worried about governance problems. So good governance and good practice are necessary as a key solution for Cadiz Bay challenges.

4.5.5. Stage of the MSP plan and the MPA designation process.

In February 2023, the Maritime Spatial Plans of the five Spanish marine demarcations were approved. The Cadiz Bay test site is located in the South Atlantic "Sudatlántica" (14,978.3 km^2) marine demarcation. Currently MSP is in its initial implementation phase. The South Atlantic marine demarcation is a territorial delimitation for both MSP and MSFD.

MPAs have been established before the MSP and cover almost the entire Cadiz Bay. Monitoring of their functioning is insufficient in particular with regard to socio-economic consequences. Also, MSP lacks relevant approaches to assess them. In many cases the problem is a lack of meaningful results of many initiatives due to a missing policy governance framework.

Stakeholders are also concerned about illegal activities in Cadiz Bay, but they are culturally accepted (e.g. catch-fishing without any control). There are no options to manage activities when they are illegal. There are estimation of 1000 people doing

illegal activities. There is a need for coordination of different institutions, and a need to strengthen coordination, and/or connections between MSP and MPAs.

As previously mentioned, in the case of Cadiz Bay, the current need considered most relevant according to the CoP is related to WP6 –the governance system. Although this need affects everything and it´s difficult to move forward without a proper governance framework, it is also clear that once this is achieved or even concurrently with the efforts towards a more streamlined management of the area, the various ESEs provide significant support for the MSP and MPA in the region.

For example, ESE 1 outlines the framework that should be established to address climate change. Given the exposed geomorphological and ecological features susceptible to changes such as sea-level rise, establishing a connection with land-sea interactions is crucial. Having a framework that supports the development of strategies in this aspect is fundamental.

ESE 2 emphasizes the connection of the ecosystem with economic activities in the area. Although, as mentioned, the region is almost entirely under protection, the type of protection in place allows for various uses and activities. This, in fact, is of great interest to the region. Management support, especially in dealing with illegal activities which is a very sensitive issue in the area since it impacts not only the environment (areal protection) but also the income of a very vulnerable and traditional community that depends on this activity and resource, Therefore, finding alternative source of income for these traditional communities could be extremely important for the region.

ESE 3provides a framework that is valuable for the development of trade-offs, supporting not only the management of the MPA but also the MSPs that border these MPAs. Once again, this underscores the importance of considering land-sea interactions.

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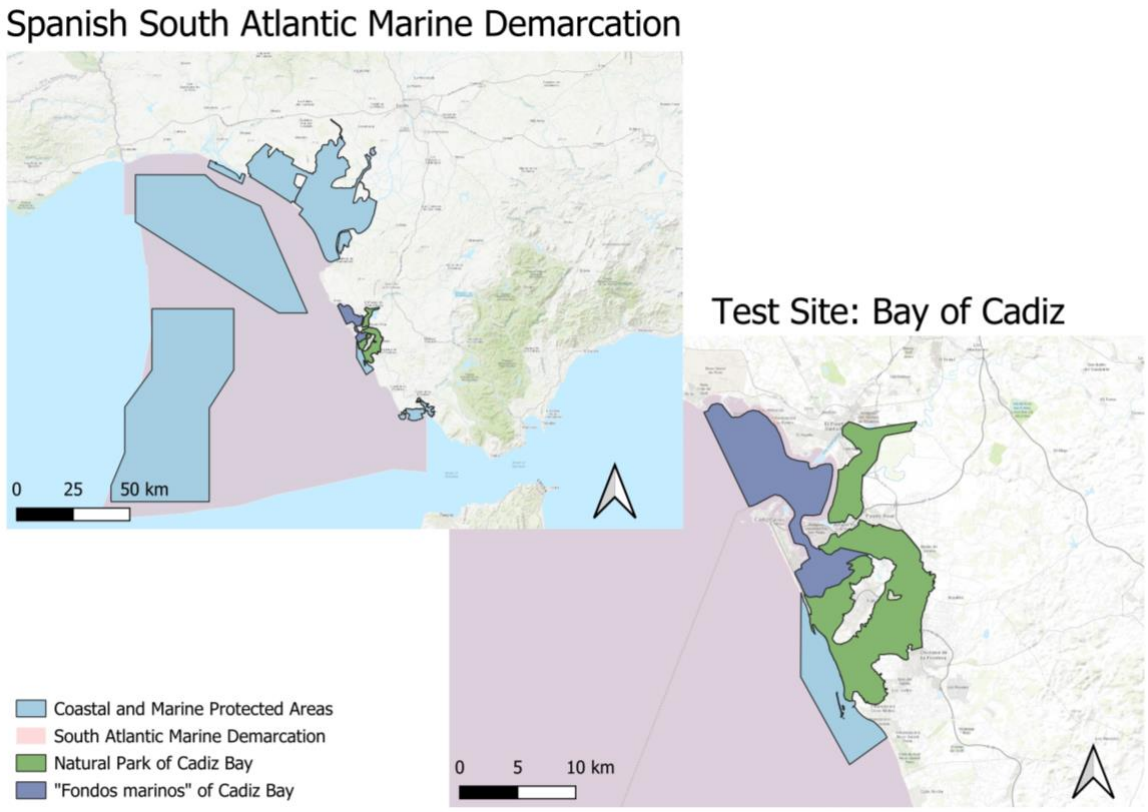

Figure 18Top map: South Atlantic Marine Demarcation and its respective marine and coastal protected areas where the Bay of Cadiz is located. Botton map: Bay of Cadiz and its marine and coastal protected areas. Source: Withouck et al. 2023a

4.5.6. ESE expected results.

In the Bay of Cadiz, the expected results from the ESE application are the following:

a) finding ways to transform participation in a cultural behaviour;

b) improving assessment and monitoring of the ecosystems providing the ecosystem services that are connected to the socio-economic criteria prioritised by the stakeholders;

c) improving cohesion in addressing the different scales of management (MSP-MPA);

d) creating a culture of collaboration among responsible institutions.

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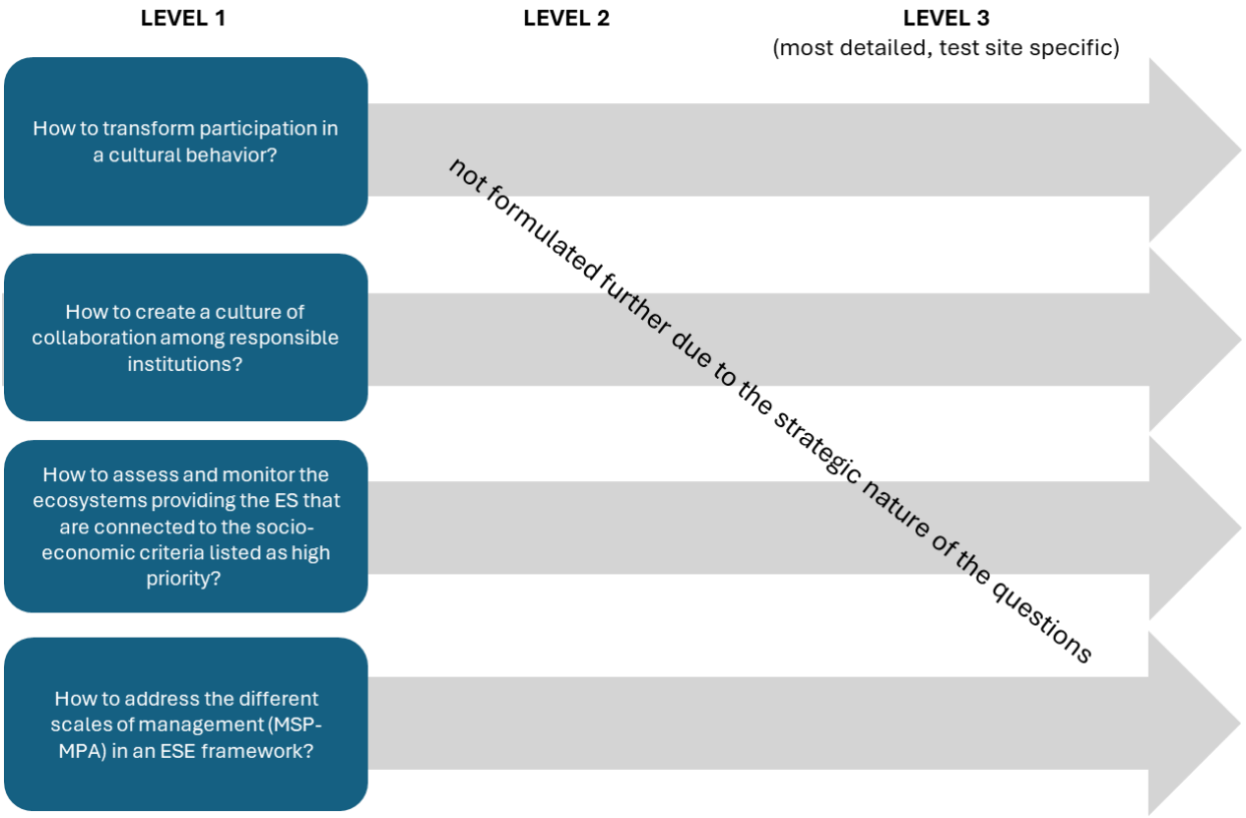

Figure 19Cadiz Bay Test Site Guiding Questions for ESE Framework, own elaboration.

The last expected result seems the most important one since the other three are the means facilitating its achievement. In fact, the problem is how to both attract and include stakes and interests of local people in all aforesaid management processes.

All above mentioned questions (validated and prioritised by the CoP) are general and lack necessary level of detail but this is a typical situation when questions deal with the policy challenges like in the case of Cadiz Bay. So general level questions are sufficient to start validation of the MSP4BIO results in this case. It is difficult to go to third level (detailed) questions if there are no preconditions. The key problem is that “paper parks” are not enforced and miss a framework for integrating stakeholders in their implementation. Adjustment of the ESE Framework in Cadiz Bay should be in line with a short-term necessity to have conditions to build a framework to go further into constituencies to create culture of participation and to create support to MSP.

4.5.7. ESE expected impacts.

The ultimate impact should be the creation of intellectual and emotional links between different spatial management processes (MSP and/or MPAs) and local people that should consider them not as a constraint but instead as an opportunity for their personal development. This should result in increased and deeper awareness of the value of protecting ecological features among stakeholders including local and regional authorities and the general public. It should also lead to a better collaboration between them for protecting the local natural environment. In Cadiz Bay technical solutions are presented as a secondary priority by the CoP

members. On the other hand, the creation of policy preconditions for the implementation of the ESE Framework seems like the main enabler for successful of the MPA in the region. The MSP4BIO work can be continued either as a pilot project or as a strategy building exercise. In some cases, developing a strategy can give access to EU funds that can help in working with regional governance further on.

4.5.8. ESE elements to be tested.

In Task 4.2. Good practices were identified about new opportunities (but mainly related to sectors and economic activity) (Pegorelli et al. 2024). ESE 1 outcomes are not presented as the most relevant for the Cadiz Bay case. In contrast, the WP6 deliverable can answer many problems of Cadiz Bay(MSP4BIO results on governance and relevant good practice need to be explored). Policy suggestions will be generalised, but they can inspire specific solutions for test site stakeholders. So WP6 should be integrated into ESE questions and more generally into the ESE Framework. It is necessary that WP6 and Task 4 (Pegorelli et al. 2023). will help to link the Cadiz Bay questions with their results (i.e. results of their WP work) as indicated in practical terms under point “Towards adjusting ESE Framework”. This is the solution for the time being, i.e. before the validation workshop. There is an urgent need for policy recommendations before starting ESE application in the Cadiz Bay case, since preconditions for applying ESE are not existing there. So, for that particular reason it is necessary to focus the adjustment (i.e. T 5.2. activities) on the creation of preconditions for applying the ESE Framework, e.g. stages of success, changes in behaviour, marine governance/administrative structure, etc. But this is difficult in the short run. It would require time (that needs intergenerational work e.g. education, changes in the hierarchy of values). So expected policy solutions for Cadiz Bay are not technical, and they should be soft, oriented on changes in the behaviour of people, and policy should be treated as a precondition for applying the ESE Framework. Implementation of this kind of policy solution and seeing outcome in the society requires time. WP6 can also provide assistance by addressing policy barriers and recommendations that might support the analysis of the trade-off outcomes in Cadiz Bay. In WP6, policy barriers and levers are identified at the EU, regional, and national levels. Under T6.2, the project will generate policy recommendations and showcase good practices from different sea basins. And therefore, the adjustment phase in Cadiz Bay should lead to the selection of the relevant policy good practices that can be implemented further on (after completing MSP4BIO) in various forms e.g. strategy building or various pilot projects. Perhaps in the long run the ESE Framework can be permanently extended to cover policy issues and policy options and tools, since the validity of a unified framework including WP6 has been positively verified by the Cadiz Bay case. This can be part of the ESE Framework that should also cover policy type good practices.

For more details on the scope of testing, please see the chapter below on adjusting ESE Framework.

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4.5.9. Risks and challenges.

WP6 is prepared to support the Cadiz Bay test site by offering relevant policy recommendations. A specific workshop can be organized to thoroughly explore potential challenges and the resistance encountered in trade-off decisions. However, a significant obstacle remains: the absence of a policy framework for addressing trade-offs, preventing Cadiz Bay from progressing in this area. It is necessary to build first an adequate policy framework, instead of going towards technical solutions addressing trade-offs. Another challenge is that the work of WP6 has focused on the national level. But this can be overcome since some WP6 results are also relevant at test site level. The remaining challenges are of a general nature. Among them the most important are the following: resource constraints, lack of proactive measures in MSP directive for MPAs that would make a validation workshop less interesting for public authorities responsible for MSP, interministerial coordination constraints, that might hinder participation in the validation workshop, general policy insistencies among the policy level that might dominate the agenda of the validation workshop.

4.5.10. Towards adjusting ESE Framework.

A link to general high-level practices present in ESE is needed, that concern screening, diagnosis and/or creating preconditions. CNR will contact ESE developers with proposals of general high-level practices. They can try to offer/adjust them to the needs of the case of Cadiz Bay. ESE developers are asked to check where their elements fit with the Cadiz Bay questions. Also, WP6 developers should check how they want to contribute to answering the Cadiz Bay questions (barriers, levers and synergies identified in the deliverable of WP6 that seem relevant for Cadiz Bay problems). Synergies and drivers identified under WP6 can be interesting for Cadiz Bay to build a better policy framework there. A column should be added to the working table (which is guiding the adjustment of the ESE Framework) to identify solutions for questions aimed at policy solutions (like in Cadiz Bay). But anyway, WP6 developers should indicate policy-relevant Cadiz Bay questions in the working Excel sheet and on that basis, a meeting of Cadiz Bay leaders with WP6 leaders might be organised.WP6 and ESE developers must consider whether they can provide answers to the Cadiz Bay questions. Moreover, ESE 2 has identified the main governance criteria for each site, and they can be used.

The following procedure has been agreed:

a) ESE and WP6 developers will reflect on existing guiding questions and come back to the test site leaders with a proposal of more detailed questions to retrieve necessary contextual knowledge. A separate online meeting for discussion is an option for deepening the contextual knowledge.

b) With the contextual information on prioritized problems in mind, ESE and WP6 developers will link problems to products offered in their WPs in a proactive way. This will be done in the working Excel sheet in the SharePoint.

c) Cadiz Bay test site leaders will verify proposals in the Excel sheet with regard to the ESE and WP6 elements for their testing.

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A general conclusion is that the elements of the ESE Framework tested in the Cadiz Bay must be of strategic nature and cannot be composed only of technical tools and criteria; it must also encompass management, policy making, strategy, collaboration elements, etc. The validation workshop can also indicate how to overcome aforesaid integration obstacles. Perhaps a pilot project would be sufficient and would allow to start planning when the more constituencies will be on board. Or an alternative is launching a strategy-building process.

Results of the discussion so far and established connections between the test site guiding questions and ESE Framework modules are presented below.

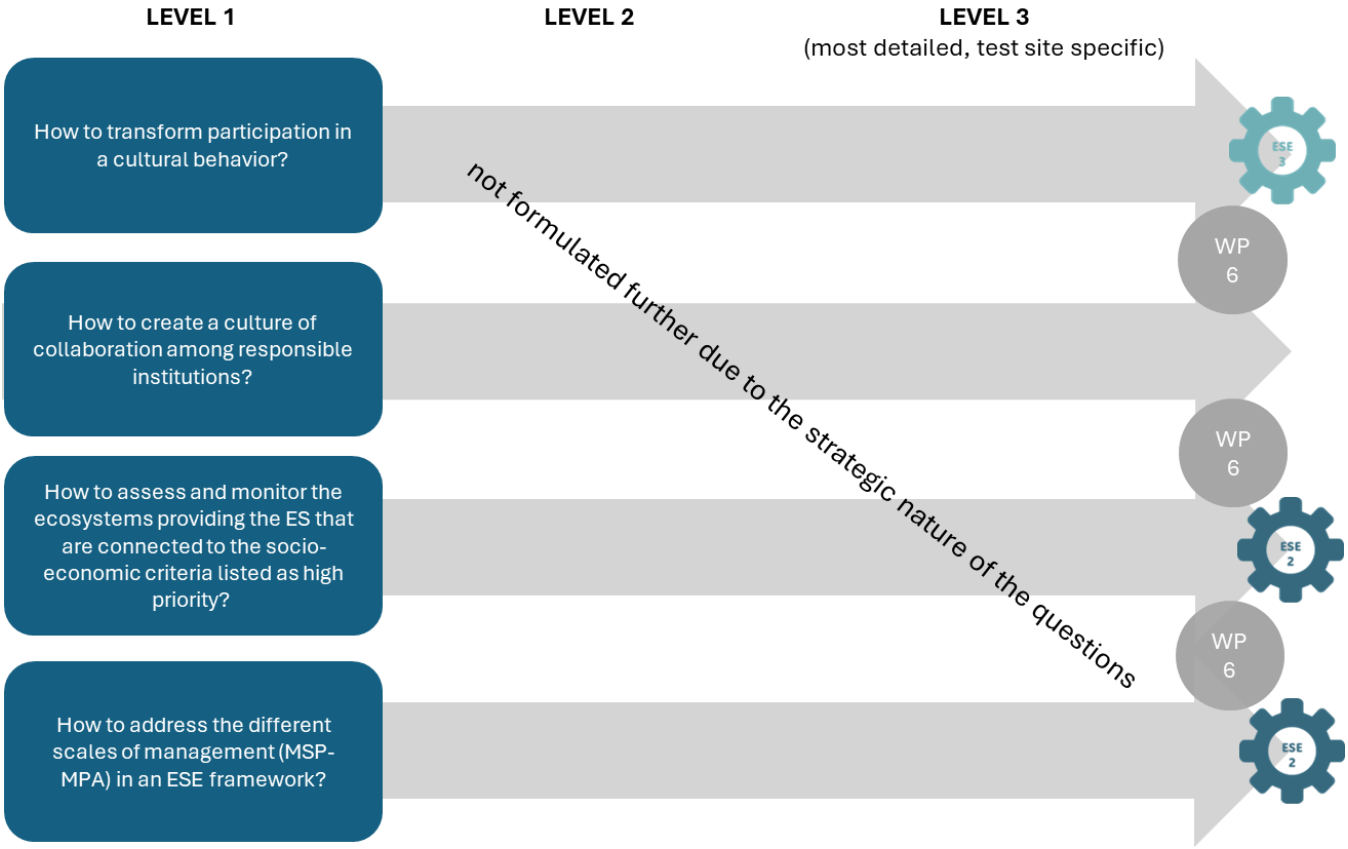

Figure 20Cadiz Bay Test Site Guiding Questions for ESE Framework and recognized connections, own elaboration.

Based on the general participatory strategy described in detail in the3rdchapter of the report, below you will find the strategy steps including Cadiz Bay test site specific recommendations, suggestions and solutions. The steps encompass the whole project lifetime.

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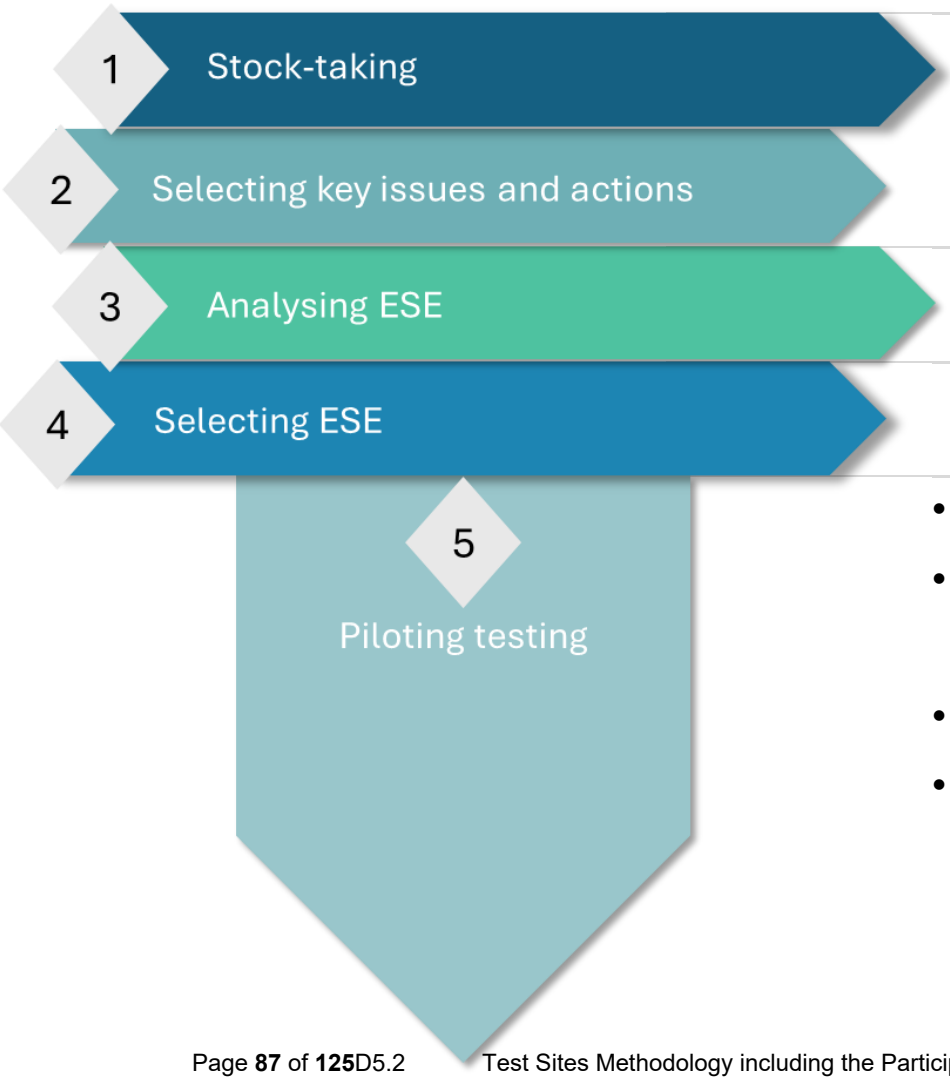
Steps how to adjust ESE Framework to Cadiz Bay test site specificity



	Actions&results	Status
1 Stock-taking	Test sites characteristics, main focus and objectives. Main management questions/issues of the Cadiz Bay test site have been formulated – described in Del. 5.1.	performed
2 Selecting key issues and actions		
3 Analysing ESE	ESE elements have been discussed and expected results & impacts for the test – site have been recognised; ESE guiding questions are ready.	performed
4 Selecting ESE	ESE elements to be tested have been recognised - ESE 1 and 2 might be relevant, but input from WP6 is more crucial. Maintain the dialogue.	in the course
5 Piloting testing	• perform testing when ESE Framework will be elaborated, inform your CoP about the testing, if possible, include them in the task; • if data needed –especially in case of ES monitoring – check the habitat maps from EMODnet Seabed habitats https://emodnet.ec.europa.eu/geoviewer/and UNEP-WCMC https://data.unep-wcmc.org/ • check WP6 solutions (T 6.2) to select the relevant policy good practices that can be implemented further on (after completing MSP4BIO); • consider the guidance provided by ESE developers for each guiding question (next page).	draft ESE Framework will be ready in May 2024 (WP4)

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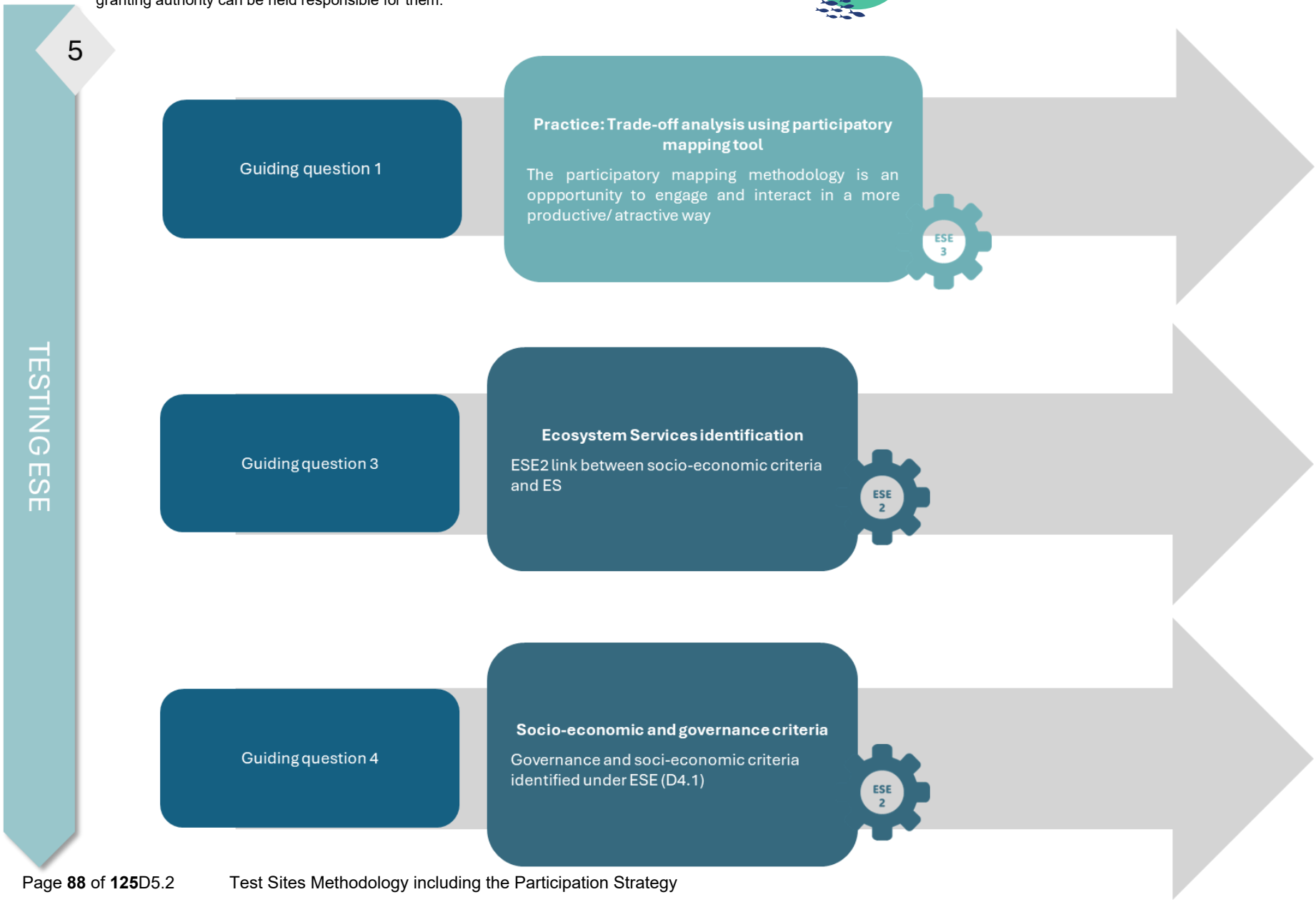

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	Actions&results	Status
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2 Selecting key issues and actions		
3 Analysing ESE	ESE elements have been discussed and expected results & impacts for the test – site have been recognised; ESE guiding questions are ready.	performed
4 Selecting ESE	ESE elements to be tested have been recognised - ESE 1 and 2 might be relevant, but input from WP6 is more crucial. Maintain the dialogue.	in the course
5 Piloting testing – since may 2024	perform testing when ESE Framework will be elaborated, inform your CoP about the testing, if possible, include them in the task.	from May 2024 (WP4)
6 Validating workshop	Approach right pool of stakeholders to start validation. Consider wider group than your CoP, address other decision-makers. Try to align with the MSP and MPA management processes - foster new experiences and good practices – show the added value of the new decision support tools to create policy preconditions for the (future) implementation of ESE Framework. Consider MSP4BIO continuation as a pilot project or as a strategy building exercise – that might give access to EU funds and help in working with regional governance further on.	future

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4.6. The Northwest Mediterranean Test Site

4.6.1. Test site key characteristics.

The Northwest Mediterranean (NW-Med) test site covers a cross-border area shared between three countries, France, Monaco and Italy, extending from the Gulf of Lion in France to the coast of Tuscany in Italy (Fig 21). It covers 130,000 km^2 of sea area, consisting of coastal, offshore and deep-sea parts (internal sea waters, territorial sea waters and EEZ). The test site is at sub-sea basin scale with an important cross-border component (French, Italian and Monégasque EEZs in the Western Mediterranean Sea). It encompasses different spatial scales in terms of MPA management: from the local scale characterising small MPAs to the transnational and cross-border level of the Pelagos Sanctuary and governance complexity. Thus, there is a need to address management of the different spatial scales, from the small MPA to the transboundary level.

Figure 21The location of Northwest Mediterranean Test Site, with Pelagos Sanctuary marked.Source:tethys.org

The following are key characteristic features of the test site:

- Governance complexity as area is shared between 3 countries;
- Large spatial scale;
- Diversity of marine domains;
- Multiplicity of human activities.

Key blue sectors in the test site encompass fisheries, aquaculture, tourism, renewables.

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4.6.2. Main focus and objectives of the test site.

An important objective of the test site is to support the process of extending the network of Strictly Protected Areas (SPAs).

The spatial coverage of the French MPA network in the Mediterranean basin is quite extensive and could be considered sufficient. However, for further work it could be relevant to assess the MPA network coverage regarding some ecological criteria such as functionality, connectivity or climate change resilience that are not taken into account at the network level today. Regarding the protection provided within the MPAs, the levels depend on each MPA status and related governance. There is a lack of consistent knowledge on the effectiveness of the protection level of the MPAs. There is a need to expand the number and coverage of strictly protected areas. This is addressed by a national target of 10% of national waters by 2030 and a particular target for the Mediterranean of 5% by 2027.

The current Italian network of MPAs (also considering the areas that are in the process of being declared MPAs) is sufficiently representative of protection needs with regard to territorial waters (under the jurisdiction of the coastal state), but it should be expanded for the High Seas.

Finally, coherence of these MPA networks need to be assessed at cross-border scale (between French and Italian but also at the Mediterranean basin scale) to raise their efficiency.

Long-term data on ecological features are necessary to identify areas of importance for biodiversity conservation and to estimate their status. MPAs should be the primary process to promote data collection, protect marine biodiversity, especially when they are well-enforced and fully protected, and are organised into networks. Data on actual human uses are often difficult to obtain at an adequate spatial and temporal scale that allows to assess the level of impacts, identify conflicts between activities, uses and conservation. The consultation of stakeholders (including businesses) in the MSP process has been weak, so far.

The following must be taken into consideration while extending SPAs:

a) targets that pave the way for the extension:
    - France: National target of 5% of the French EEZ covered by 2027;
    - Italy: 10-30% target declared in the draft plan;

b) environmental components that should be concerned in priority:
    - Mobile Species (Marine mammals – Pelagos Sanctuary, PSSA);
    - Deep Ecosystems (VME);
    - Coastal habitats;

c) maritime uses that should be concerned in priority:
    - Maritime traffic;
    - Bottom fishing;
    - Other coastal activities.

Priority focus should be on mobile species since their protection is deemed insufficient in the case study by the marine mammals' experts. A focus on deep habitats and more precisely vulnerable maritime ecosystems would be a great added value of the project as today those habitats are still not necessarily protected.

In this context MSP4BIO is expected to:

a) provide cutting-edge knowledge on:
   - Environmental criteria to ensure comprehensiveness, adequacy, connectivity of SPA network;
   - Climate change impacts with available data;
   - Socio economic criteria;

b) facilitate cross-border exchanges on these topics.

4.6.3. Key local issues and challenges to be solved with support of the MSP4BIO ESE Framework[6]

The following issues were highlighted as important challenges in the test site.

Topic	Description
Deficiencies in the current status of the protection ensured by MPA	In France: One highlighted problem is insufficient and inconsistent knowledge on MPA protection effectiveness. The challenges are related to identification and agreement on relevant monitoring criteria to measure protection within MPAs (and OECMs), and improvement of their level of effectiveness (at the MPA scale and at the whole MPA network basin scale). Another issue is the lack of protection for mobile cetaceans and lack of knowledge and protection of VMEs. In Italy: Key problems are related to unevenly distributed network of MPAs inadequate for protecting the pelagic environment. The area suffers from simplified Natura2000 sites management– prevalence of measures targeting single species/habitats –hardly fulfilling the requirements of the ecosystem-based approach Moreover, deficit of detailed ecological knowledge makes ecosystem management even less effective.
Coherence between area designations,	In France: MPAs were integrated into the first round of MSP in

[6] Entire chapter is based on direct or slightly changed citations from D.5.1 (Withouck et. al., 2023a)

MSP and other environmental legislation such as MSFD	France, although there is a need of some improvements related to better informing MSP on (i) MPAs management objectives and measures (ii) and contribution of other managed areas to the achievement of the good ecological status of the basin. French MSP fully integrates MSFD but there are problems with consistent implementation of the different environmental directives (MSFD, WFD, Natura 2000). In Italy: MSP integrates existing MPAs (referees to their approved management plans), pays attention to the need of potential extension of their protection zones and strives to achieve European-level protection goals (specified in the MSFD and WFD directives). However, there is a need for stronger pro ecological MSP measures in particular the ones preventing the negative environmental impacts of marine uses
Transboundary coherence in MPA designation and in MSP environmental provisions	Transboundary integration of conservation efforts in the NW Med basin is inadequate and requires improvement. Coherence assessments are needed at transboundary scale, both on the spatial distribution of conservation areas and on management/regulatory measures adopted on the two sides of the border.
The integration of social and economic aspects in MPAs	In France: The existing tools and procedures for assessment of economic impacts of nature conservation (both positive and negative) are inadequate and therefore there is a knowledge and information gap on the positive impacts of protection measures. Moreover, there is a lack of monitoring capacity, notably for wider and offshore areas. In Italy: The need to secure "social acceptability" of the environmental conservation objectives and measures by the inhabitants has not been paid sufficient attention to. Thus, there is a need to foster dialogue on marine uses and protection. MSP is expected to play catalytic role in balancing potential conflicts between the economy/society and the environment.
Stakeholder confidence in MPA	In France: MSP process has integrated all relevant stakeholders

and MSP processes	through the Mediterranean Sea Basin Council and through workshops, public consultation or debate processes. Moreover, 'parliament of the sea', acting at regional scale, provides a dialogue forum on marine uses and protection. However, this process is still deemed distant by some more local stakeholders such as MPA managers who are not directly involved in the Sea Basin Council In Italy: The involvement of stakeholders in the planning of MPAs/MSPs is limited mainly to the Strategic Environmental Assessment (SEA Directive) process. This is a right frame for involving pro-ecological stakeholders but hardly facilitates the participation of non-environmental ones. Also, there is a need for strengthening of social acceptability of the protected areas.

Source: based on Withouck et. al., 2023a

4.6.4. Community of Practice (CoP) involvement

Initially, 70 persons were envisaged as CoP members: 31 from France and 39 from Italy. The composition of invitees was balanced encompassing members of national administration (9 and 8 respectively), MPA managers (7 and 9 respectively), scientists (2 and 4 respectively), business entities (6 and 11 respectively), local and national governments (6 and 4 respectively with prevailing number of regional ones) and NGOs (1 and 3 respectively). Only some of these persons accepted the invitation and have started to participate actively in the CoP. Currently there are 3 cooperation groups within the test site CoP: French group, Italian group, international group with international agreements of institutes representatives and national representatives speaking English. International group is composed of 7 persons, the French one of 12 persons and the Italian one 7 persons. Three persons representing WWF participate both in French and Italian group. The composition of the groups is balanced although international group is composed of the representatives of international conventions and agreements and non-profit research institute whereas national French groups has more balanced composition (in terms of triple helix), whereas the Italian one is dominated by regional governments (plus research representative and WWF representatives). So far one international CoP meeting was organised, two meetings of the French group and two mixed meetings for members of different groups together (related to trade-offs and ranking socio-economic criteria and ecosystem services per criterion).

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4.6.5. Stage of the MSP plan and the MPA designation process.

NW-Med test site: MSP context

The MSP strategic part for the Mediterranean Sea was adopted in 2019 in France, while the operational part was adopted in 2022. The second planning cycle has been launched in 2023. For Italy the MSP process is ongoing. Italy currently is concluding the first planning cycle.

NW-Med test site: Marine protection context

The management measures already in place are listed below (and see also figures22 and 23 for the French and Italian designations respectively):

International Measures

- the Pelagos Sanctuary;
- Specially Protected Areas of Mediterranean Importance (SPAMI);
- Natura 2000 sites;
- Particularly Sensitive Sea Area (PSSA);
- two Ecologically and Biologically Significant Areas (EBSAs):
    - NW-Mediterranean Pelagic Ecosystem and
    - NW-Mediterranean Benthic Ecosystem (presence of both pelagic and benthic habitats);
- two Important Marine Mammal Areas (IMMAs);
- two Critical Cetacean Habitats (CCHs);

National Measures

- National parks;
- Marine parks;
- other type of MPAs defined by respective national law.

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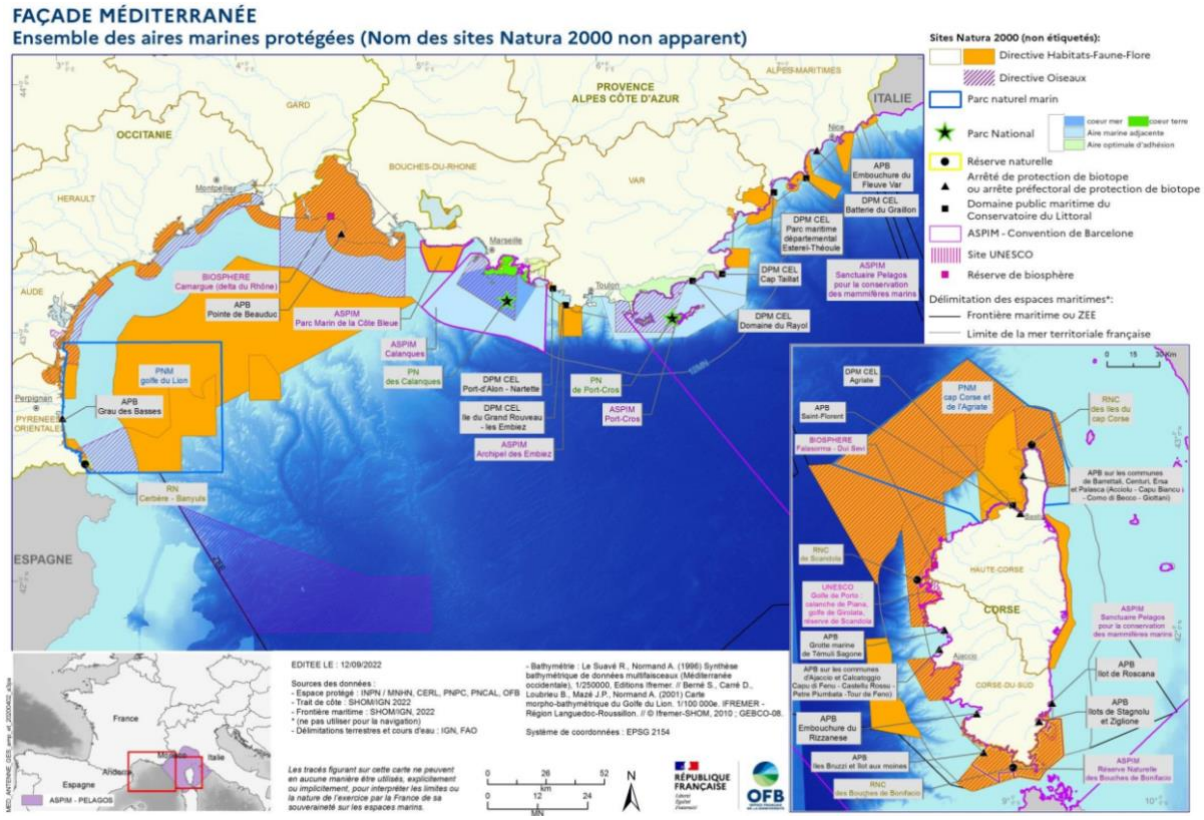

Figure 22Overview of protected areas in the French part of the Northwest Mediterranean test site. Orange - the Habitat Directive areas, pink - the Bird Directive areas. Other designations include marine natural parks, national parks and natural reserves (Map by Office Français de la Biodiversité).Source:French Mediterranean Marine Spatial Plan 2019

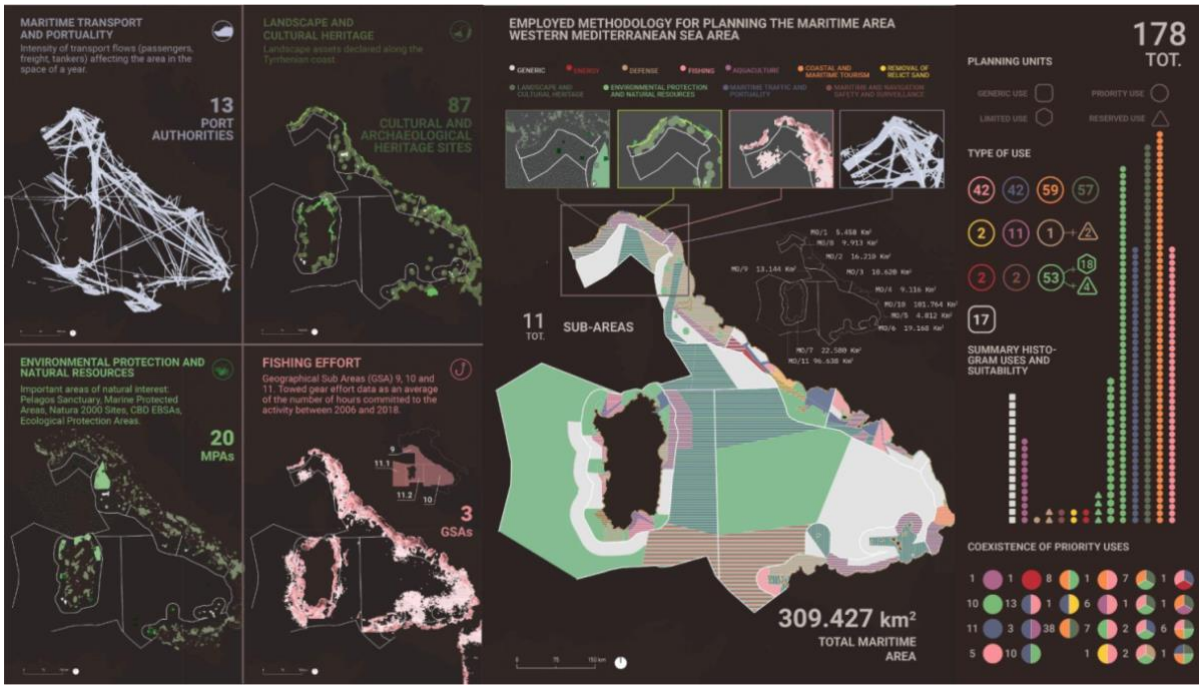

Figure 23Uses and planning units for the Western Mediterranean maritime area in the Italian MSP plan. Source: Withouck et al. 2023a

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4.6.6. ESE expected results

The key guiding questions highlighting the main concerns/needs of the test site that can be addressed through the usage of the ESE Framework are the following:

1) methods, ways and approaches for achieving the strict Protection Area Target (10% by 2030);
2) method, ways and approaches for assessing the transboundary ecological coherence of the MPA network;
3) methods ways and approaches for better addressing ecological functionalities in conservation objectives.

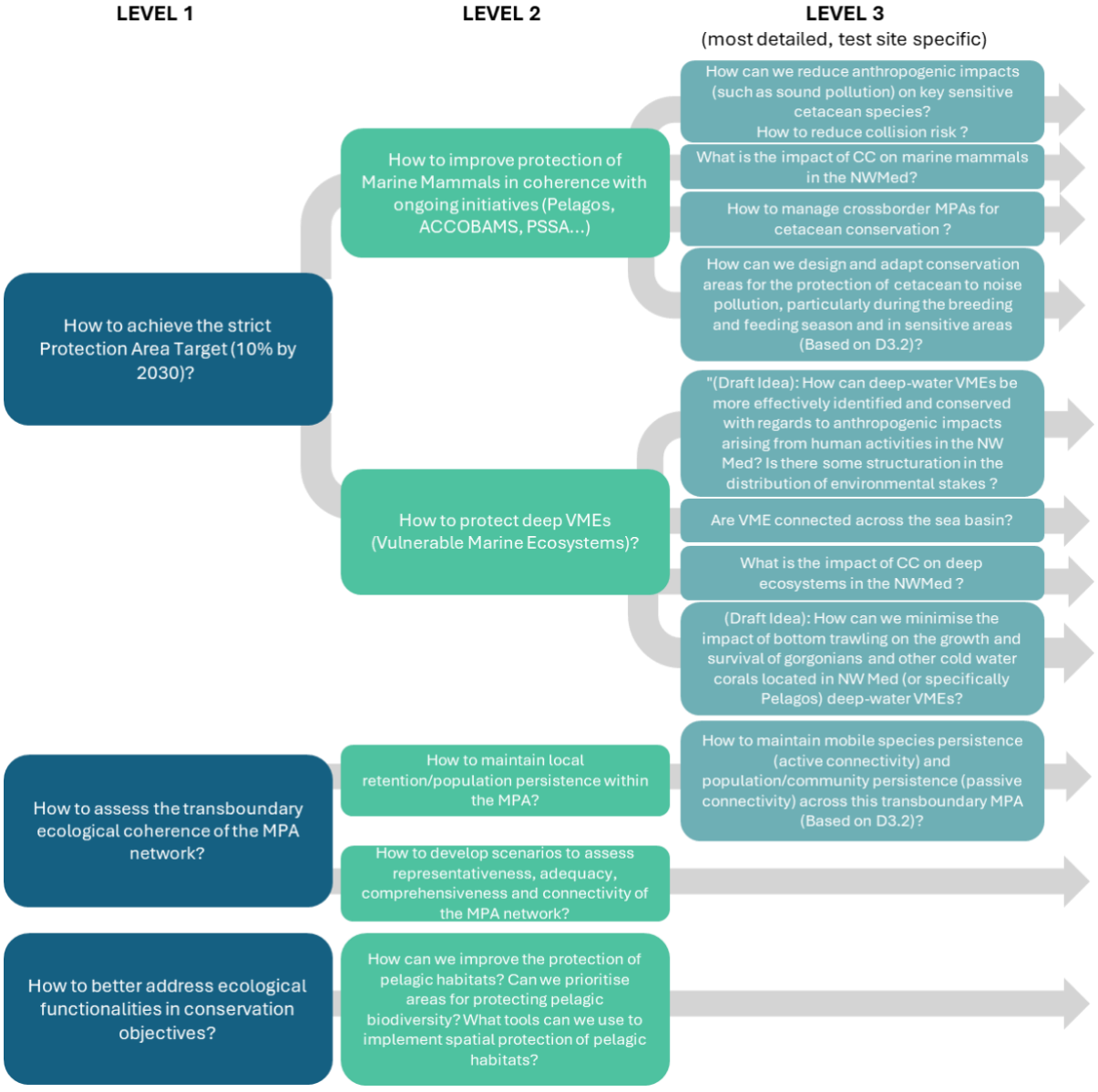

Figure 24Northwest Mediterranean Test Site Guiding Questions for ESE Framework, own elaboration.

So, the key ambition of the test site is to inform through the ESE Framework the process of MPA extension with the focus on the strict Protection Areas regarding marine mammals and VMEs.

For several key issues (above listed guiding questions) - more detailed investigations and discussions were undertaken by the test site CoP.

For the first issue/ guiding question or dilemma on the strict Protection Area Target the more detailed considerations are related to (a) improving protection of Marine Mammals in coherence with ongoing initiatives (Pelagos, ACCOBAMS, PSSA), (b) protecting deep VMEs (Vulnerable Marine Ecosystems). For that purpose, more profound knowledge is necessary on: (ai) reducing anthropogenic impacts (such as sound pollution) on key sensitive cetacean species. How to reduce collision, (aii). impact of CC on marine mammals in the NWMed, (aiii) management cross-border MPAs for cetacean conservation, (aiv) design and adapting conservation areas for the protection of cetacean to noise pollution, particularly during the breeding and feeding season and in sensitive areas, (bi) effective identification and conservation of deep-water VMEs with regards to anthropogenic impacts arising from human activities in the NW Med-structuration in the distribution of environmental stakes, (bII) connectivity of VME across the sea basin, (biii) impact of CC on deep ecosystems in the NWMed, (biv) minimising the impact of bottom trawling on the growth and survival of gorgonians and other cold water corals located in NW Med (or specifically Pelagos) deep-water VMEs.

For the second issues/guiding questions on the transboundary ecological coherence of the MPA network key concerns are related to (a) maintaining local retention/population persistence within the MPA, (b) developing scenarios to assess representativeness, adequacy, comprehensiveness and connectivity of the MPA network at cross-border scale. The most detailed concerns that specify and deepen the ones listed above are related to the methods for maintaining mobile species persistence (active connectivity) and population/community persistence (passive connectivity) across this transboundary MPA.

For the third issues/guiding questions, dealing mainly with ecological functionalities, a more elaborated concern has been addressed in relation to the following dilemmas: (i) how to improve the protection of pelagic habitats, (ii) how to prioritise areas for protecting pelagic biodiversity, (ii) tools that should be used to implement spatial protection of pelagic habitats.

4.6.7. ESE expected impacts

An expected ESE impact should be on better aligning MSP with the nature protection processes and initiatives related to Strictly Protected Areas (SPA) and their spatial extension, while paying attention to the national and cross-border coherence of such a network. In particular, the ESE application in the test site is expected to result in improved local and cross-border ecological and socio-economic criteria for MPA identification and prioritization, with a focus on SPAs. A map of ecological and socio-economic interactions (pressures, impacts, conflicts/synergies) should help to inform policy and stakeholder dialogue on that issue. Maps of extended or newly established MPAs should serve as a starting point for extension. A methodological proposal for MSP coherence is also important for the ambition to better align MSP with the nature protection processes in the test site.

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4.6.8. ESE elements to be tested.

As the result of the meeting between ESE Framework developers and the test-site leaders, the testing scope and range was discussed.

The focus of testing should be on mobile emblematic species, especially the iconic species for local communities - the marine mammals and their conservation in the Pelagic Sanctuary area as well as deep sea ecosystems (VME) and coastal habitats. The main human activities considered that might impact them are shipping, bottom fishery and tourism.

The formulated above scope of testing related to emblematic species might require different products of the MSP4BIO, not only ESE modules. In the Northwest Med test site, the following can be tested/used:

a) Most importantly, criteria lists, taxa lists, indicator and habitat lists, for protecting pelagic species (deliverable D2.2 ESE 1 module), with regards to functional diversity or trophic ecology (e.g. there is a need to have a good understanding of trophic ecology of marine mammals in the test site);

b) Portfolio of Improved Ecological Criteria can provide some guidance towards the indicators on SPA/MPA network coherence, (deliverable D3.2 ESE 1 module);

c) Availability of data (WP2 can help search for data at the necessary resolution and help facilitate data flow to the ESE Framework);

d) the Trade-off guidelines (ESE 3 module) for addressing/informing work on extending the network of Strictly Protected Areas (SPA) complying with France and Italy's national targets and ensure that the network notably addresses mobile species and deep ecosystems;

e) Extraction guideline for the systematic review in its aspects related to pelagic habitats (deliverable D3.2 ESE 1 module);

f) CC guidelines (ESE 1 module) e.g. for providing a methodology to assess exposure, sensitivity, and vulnerability of key species, and to include adaptation in the design of MPAs or for identifying key areas for conservation now and in the future under CC would help inform the selection of strict PA to achieve 10% target;

g) High level practices linked to MSP and practices on transboundary environmental management (package of WP6 good practices and high-level good practices collected by ESE developers).

For more details on the scope of testing, please see the chapter below on adjusting ESE Framework.

4.6.9. Risks and challenges.

Key risks and challenges are related the nature of the test site (large area, cross-border character and to the human resources employed in MSP4BIO). Thus, key risks for testing ESE can be summarised as following:

1) human resources and time constraints: CoP members receive a lot of requests from various European Projects or analyses and have in general little time to work for testing (difficulties to engage them)
2) dispersed and complex nature of the problems: NW-Med test site is a broad area with different challenges depending on the area (e.g. offshore versus coastal) and the MSP4BIO resources do not allow to tackle all of them in a comprehensive manner,
3) Language is a barrier for many local stakeholders, so translation of the work is necessary, for example the gap analysis.

4.6.10. Towards adjusting ESE Framework

The Northwest Mediterranean (NW-Med) Test Site has elaborated on the guiding questions and has cooperated with ESE Framework developers on the ways to adjust the framework to the Test Site specificity and needs. The questions might potentially need to be slightly reshaped or amended, but in general terms the main needs and directions are represented.

There is a need for more data and knowledge to identify (to map) the deep-water habitats, and more advice is needed on how to manage, how to protect to end up with “strict protection”, what management measures should be applied (like a ban of bottom fishery in such areas). The knowledge of how to evaluate costs of such management is essential, how to map them, how to calculate economic costs – therefore the trade-off analyses seem to be very important here.

There is an understanding within the test site leaders that the scope of questions and ambition (especially with regards to enlarging the protected areas) might go beyond the MSP4BIO project frames as it needs the attention of political and decision-making levels as well, especially if we would like to be included in the official processes as e.g. MSP. Introduction of MSP4BIO results into national processes might also be of educational nature, as the national priorities or marine areas might be different. Then it is crucial to present well established designations with scenarios, reasonable argumentation and clear trade-offs if MSP4BIO is to inform national processes.

With regards to the protection of marine mammals, there is no clear answer on how to protect mobile species on such a large scale. What is important to recognise here is the maritime traffic: where are the main routes and what would be the costs of introducing traffic changes or speed limits to avoid some areas important to cetaceans. There is a need for an analytical tool to evaluate such kind of interactions. Also – recent CoP discussions showed that the proposed areas (and measures) did not meet agreement on stakeholders’ side, as they recognise these areas as important and crucial also for them.

To start testing there is a need for more detailed information on ecological needs of the test site, for screening of criteria and here the connections with WP3 should be established.

The dialogue with WP4 should be deepened in the next months.

The Test Site leaders started to strengthen the knowledge base and list the studies they can rely upon, identify the existing datasets useful for targeted maps and analyses (to calculate specific indicators) – so the connections with WP2 results are also in place.

The main work should focus now on calculating indicators supporting scenarios on MPA developments, which could be presented to decision-makers and discussed with stakeholders, administrations and experts from both sides of the border.

Organising a cross-border consultation seems to be challenging but necessary to shape this process. How can it be aligned with ongoing MSP discussions and the ongoing discussions regarding process of the nature protection designations? Both countries are not at the same steps. In Italy, MSP is at the adoption phase, and it is probably not the time to put such analyses at the table, but in France – the MSP revision is ongoing and such a discussion is timely. The challenge here is to gain the attention of decision makers. Here the solution might be to enter such dialogue only on the French side, not to lose the momentum, but to engage the Italian experts and partners to inform about the cross-border connection and necessity to introduce similar measures on marine areas of both countries. Such scientific expertise, kept so far at the ”technical level” might be then used in more decision-making oriented discussions.

The following procedure was agreed:

a) ESE Framework developers will reflect on existing guiding questions (level 2 and level 3 questions) and come back to the test site leaders with a proposal of how they could approach them and how relevant ESE modules to be applied. If information contained in the existing deliverables, general assembly presentations and working Excel sheet is not complex enough, the test site leaders will provide more contextual information on demand.

b) Having contextual information on prioritized species or/and habitats ESE Framework developers will link problems to species e.g. climate change. Then they link to these problems the tools and criteria developed by ESE. This will be done in the working Excel sheet in the SharePoint.

Results of the discussion so far and established connections between the test site guiding questions and ESE Framework modules are presented below.

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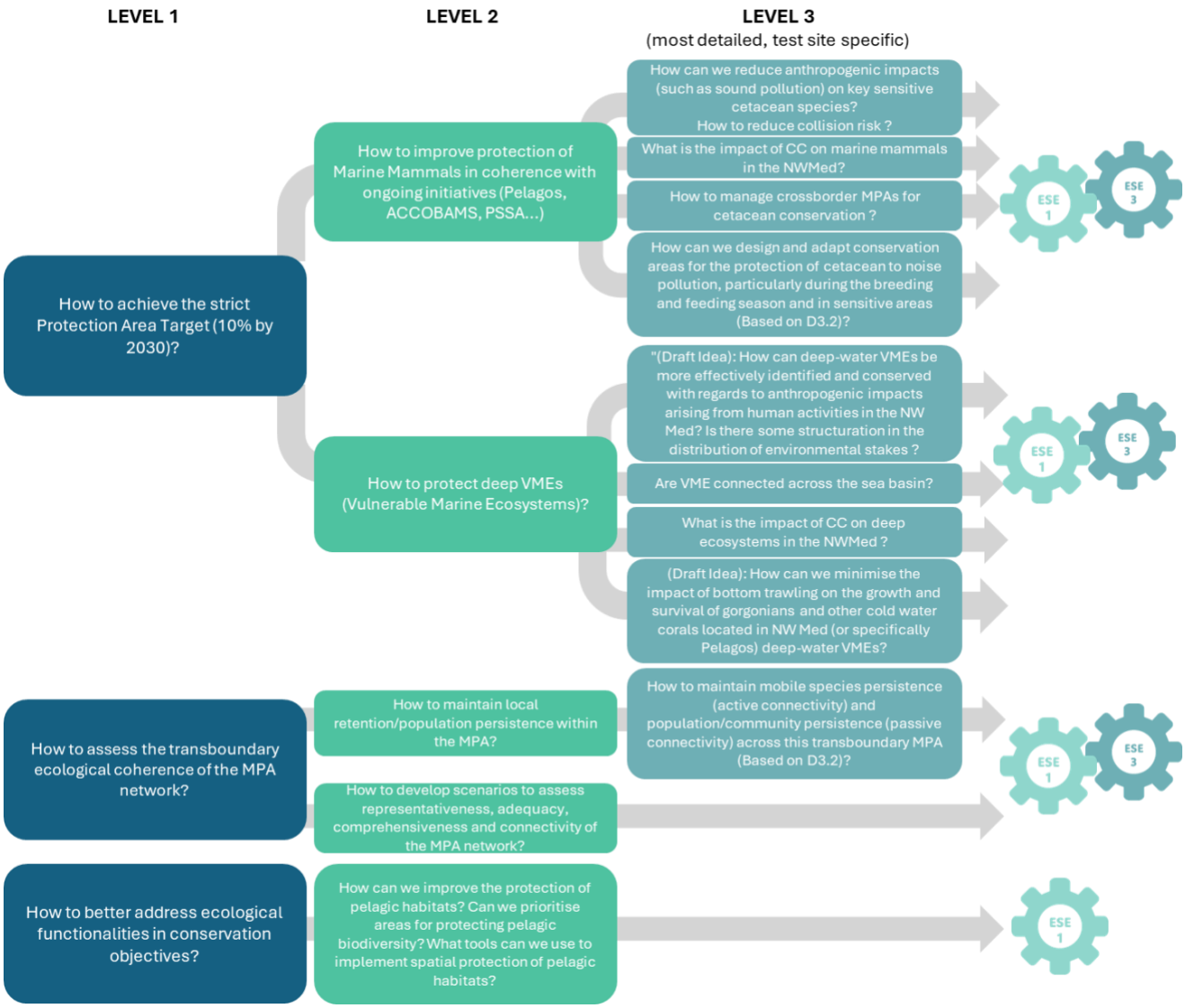

Figure 25Northwest Mediterranean Test Site Guiding Questions for ESE Framework and recognized connections, own elaboration.

Based on the general participatory strategy described in detail in the 3rdchapter of the report, below you will find the strategy steps including Northwest Mediterranean Island test site specific recommendations, suggestions and solutions. The steps encompass the whole project lifetime.

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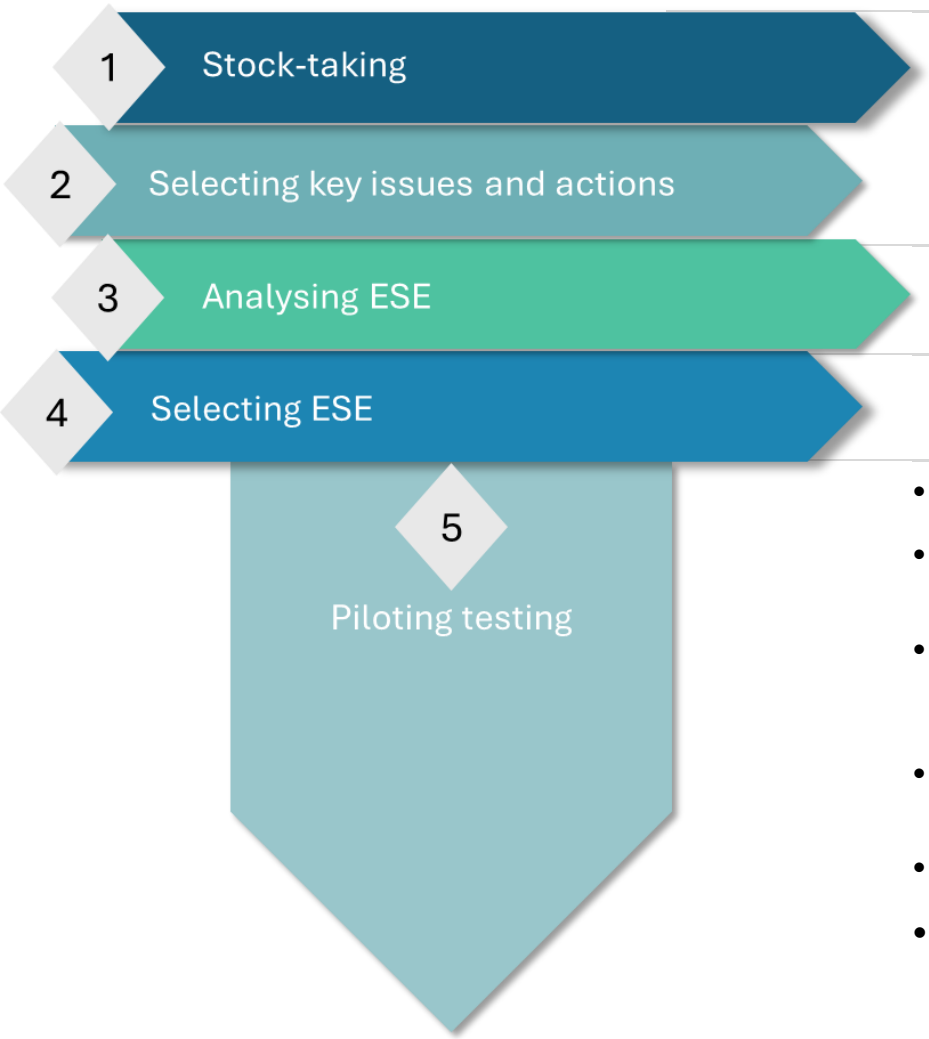
Steps how to adjust ESE Framework toNorthwest Mediterranean test site specificity



	Actions&results	Status
1 Stock-taking	Test sites characteristics, main focus and objectives. Main management questions/issues of the Northwest Mediterranean test site have been formulated – described in Del. 5.1.	performed
2 Selecting key issues and actions		
3 Analysing ESE	ESE elements have been discussed and expected results & impacts for the test – site have been recognised; ESE guiding questions are ready.	performed
4 Selecting ESE	ESE elements to be tested have been recognised - all ESE modules seem applicable (depending on question), continue dialogue with ESE developers.	In the course
5 Piloting testing	• perform testing when ESE Framework will be elaborated, inform your CoP about the testing, if possible, include them in the task; • if data needed — for anthropogenic sound check EU ecosystem assessment(also available for France). For marine mammal occurrence and distribution check OBIS, ACCOBAMS, PelaObs, seawetra, and other sources; • For traits data check Marine Species Traits, EMODnet Biology Thermal Traits, GlobTherm, PHYLACINE, etc.; for CC projections check ESGF, Bio-ORACLE, Copernicus, also Are Mediterranean marine threatened species at high risk by climate change? (Chatzimentor et al., 2023); • MPA spatial data check Protected Seas, SPAMIs, IMMAs, Data on human activities check EMODnet Human Activities, see also Millieumarinfrance and SidMit. VME data is available from ICES,INFREMER and Millieumarinfrance • check WP6 solutions for high level practices linked to MSP and practices on transboundary environmental management; • consider the guidance provided by ESE developers for each guiding question (next page).	draft ESE Framework will be ready in May 2024 (WP4)

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5

TESTING ESE

Guiding question 1.2.1

Guiding question 1.2.2

Guiding question 1.2.3

Guiding question 1.2.4

Practices & Criteria

Practices such as modelling to track larval movements (physical dispersion model, lagrangian) using a metric of larval exchange can help evaluate the larval exchange between marine habitats (Source and Sink sites) and identify if there is adequate larval supply as well as genetic exchange, which can aid in the conservation of deep-water corals in the NW Med. To protect a specific VME consisting of deep-water corals and located in an MPA, biophysical dispersal models based on fecundity or survival can be utilised, which use

local retention as a metric to find the proportion of reproductive output (larvae) that recruits back into the donor population and in essence provides details on replacement and therefore persistence of a population.

ESE 1

CC related practices & criteria

The guidance provides a method to define functional traits of VMEs and sensitivity of VMEs to CC. This is essential to understand potential future climate-induced changes in VME and identify actions to protect them. Moreover, the feasibility and uncertainty analysis are essential to make knowledge gaps and uncertainty explicit in deep VMEs.

Practices & Criteria

Practices such as photos and video recording can be used to assess identify where the growth rate and mortality of these VME-located species are being the most impacted, which types of gear are responsible (assess whether is it mainly from bottom trawling, other fishing gear or CC) and how this should this be addressed. For example once areas are identified as having been greatly impacted by bottom trawling, discussions can be made between MPA managers, policy makers, fishermen and other relevant stakeholders in order to encourage a feasible and logical plan of action that seeks to minimise the industry's effect on these cold-water corals.

CC related practices & criteria

The guidance provides a methodology to assess exposure, sensitivity, and vulnerability of key species, and to include adaptation in the design of MPAs. The analysis can be centred on key sensitive species to cross CC exposure and sensitivity with other existing and future anthropogenic pressures

Practice: Trade-off analysis using participatory mapping tool

The Trade-Off Guidelines provide a methodology that can be adapted to the local context to support this question. See also the Portfolio of Arguments to enrich the discussion. One way to receive inputs and data is through spatial participatory mapping surveys. The perception of change can be applied to participatory mapping surveys as one element contributing to this answer.

ESE 2

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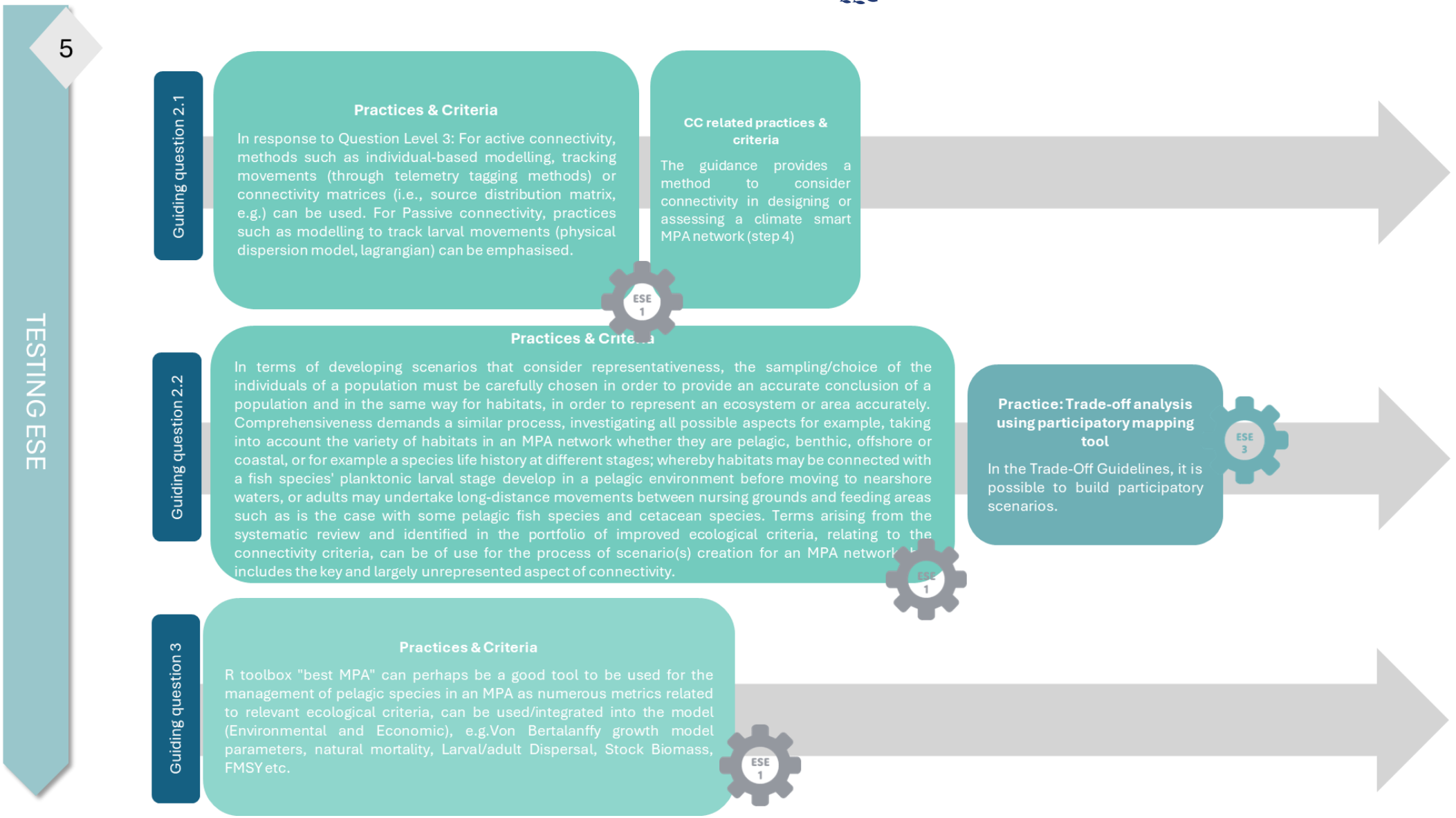

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	Actions&results	Status
1 Stock-taking	Test sites characteristics, main focus and objectives. Main management questions/issues of the test site have been formulated – described in Del. 5.1	performed
2 Selecting key issues and actions		
3 Analysing ESE	ESE elements have been discussed and expected results & impacts for the test – site have been recognised; ESE guiding questions are ready.	performed
4 Selecting ESE	ESE elements to be tested have been recognised - all ESE modules seem applicable (depending on question), continue dialogue with ESE developers	in the course
5 Piloting testing – since may 2024	perform testing when ESE Framework will be elaborated, inform your CoP about the testing, if possible, include them in the task;	from May 2024 (WP4)
6 Validating workshop	Try to align with the ongoing Italian MSP revision process and the French MSP 2nd MSP cycle, as providing new knowledge. Try to align with the review process of the MPAs - foster new experiences and good practices to open the possibility of building possible management plans. Provide scenario analyses to the CoP to foster discussion on how to build the best SPA scenario with state-of-the-art knowledge. Approach right pool of stakeholders to start validation. Consider wider group than your CoP, address other decision-makers.	future

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5. ESE Adjustment Procedure – Evaluation and Implementation at Test Sites

This chapter presents the MSP4BIO experience regarding the use of the aforesaid adjustment methodology (referred to in this deliverable as the *General Methodology*, including the participatory strategy for the ESE Framework testing phase).

Overall, the aforementioned procedure/methodology for ESE adjustment can be considered successful. When asked its implementers whether the proposed steps had been implemented, all coordinators of the test sites responded affirmatively, and only two of them identified specific challenges.

The first challenge pertained to the scale of the test sites. One site leader noted:

“For example, species-based approaches recommending scientific developments are not suited [due to the scale of the test site].”

Another issue stemmed from time constraints. This limitation initially hampered the selection of appropriate decision-support tools (DSTs) for testing. However, all problems were overcome thanks to the proactive approach of the test site leaders and the support provided by the ESE developers and those responsible for the tools.

In general, the ESE was successfully adjusted to the needs of each test site. The test sites formulated their management needs and management questions, which were rationalized under D5.2, then collected, polished, and refined by the ESE developers.

As a result, the majority - though not all - components of the ESE were tested by the test sites, in line with the varying levels of interest expressed across sites (for example, in the North Sea test site, the Climate Change guide was not tested due to a lack of data, resources, and time constraints). This was expected, given the specificities of each test site. However, at the project level, all ESE elements have been adjusted and tested.

More importantly, the ESE itself was expanded to incorporate elements related to policy-making. This inclusion was a direct outcome of the interactions initiated during the ESE adjustment process, which led to a decision to integrate outputs from Work Package 6 (WP6), focusing on the alignment of various policies.

5.1. Stocktaking

5.1.2 Data

Prior to initiating the adjustment procedure/methodology, all test site leaders assessed the availability of relevant data. Earlier project activities −such as the project database[7] generated under WP2 *Scoping and Gap Analysis* and documented in D5.1 *Site-Specific Gaps and Opportunities to Support Knowledge-Based MSP* − proved particularly useful in this regard. Various data sources at national, EU, and international levels were consulted, including HELCOM databases and EMODnet. These investigations and previous project outputs helped the test site leaders identify the most current data available for their respective regions.

[7] https://msp4bio.vliz.be/

In four test sites, there was no need to obtain additional data. In the case of the North Sea/Belgium, the required data were sourced in-house. In the Azores, however, challenges arose due to the fact that some data resided in private research databases and were not publicly accessible, despite being funded by public resources.

In five cases, the analysis provided clear conclusions. However, some limitations were noted. These included the restricted timeframe of the adjustment procedure/methodology:

“We did one run with the ABC planner. It produced very good results, but a second run with adjusted parameters and possibly more data would be beneficial.”

If a conclusive diagnosis was difficult to reach, the ESE adjustment procedure/methodology recommended expert consultation. This was not necessary in the Baltic test site, where clear and undisputed conclusions were reached from the very beginning. Nonetheless, in the other test sites a proactive approach was again evident:

“We developed a participatory approach to gather the missing information (which worked to some extent).”

In the three additional test sites where uncertainties required expert input, knowledge and DSTs available within the project were utilized. In one instance, external experts were consulted, allowing the NW Mediterranean test site to carry out a “pragmatic adaptation of criteria to the protection strategies tested.”

5.1.2. Covering the future

The stocktaking phase in all test sites covered both current and future states, as suggested by the ESE adjustment procedure/methodology. Test site leaders reported specific challenges in this area. For example:

“There is very little information available about future conditions, except for climate change scenarios,”

− since climate change is more commonly modelled. Even here, limitations arose − for example, in the North Sea/Belgium:

“At that time, climate models for pelagic fish species were not available, as they were part of another ongoing project and the data had not yet been released.”

Stakeholders at the Cadiz test site also expressed concerns about the difficulty of referring to future governance frameworks, since during the adjustment phase such a framework had only entered the initial stage of discussion.

Nevertheless, many positive experiences were recorded. For instance, in the Black Sea test site, current and future scenarios were incorporated into the CEA tools, and CES spatial data were used to evaluate potential future offshore wind farm expansion. In the Azores, the scenario approach was developed through a participatory mapping workshop combined with a trade-off analysis, which helped establish key argumentative foundations.

In cases where elaborating future scenarios of marine ecosystems proved problematic, the adjustment procedure/methodology recommended consulting WP3

leaders regarding ecosystem dynamism. This recommendation was followed by five test sites. For example, in the Black Sea:

“In the analysis using PlanWise4Blue CEA tools, a WP3 team member played a leading role.”

And in the Baltic test site:

“WP3 partners shared various climate change projection datasets, such as BioOracle.”

However, limitations were also noted, particularly in capturing human activities, or where ecosystem dynamism was deemed less relevant to the specific issues of a test site (e.g., Cadiz, Azores). In the North Sea test site, a deliberate decision was made to obtain climate change scenario data from an external project, but this proved to be difficult due to the aforementioned reasons.

5.2. Selecting key issues for a test site

5.2.1. Refining ESE guiding questions

All six test sites succeeded in identifying a suitable focus in terms of key issues for their respective locations, specifically by defining an appropriate set of ESE guiding questions. A crucial role in this process was played by interactions with stakeholders, primarily those organized within the framework of the Community of Practice (CoP) group active in each test site.

For example, as described by the team from the North Sea/Belgium test site:

“The questions were first proposed by our team after the interviews and gap analysis with the stakeholders. By using the scope exercise, we tried to understand and characterise the questions/key issue better.”

Similarly, the test site leaders from the Azores pointed out that “the validated guiding questions had a central role in defining the focus of the test site.”

In some cases, the process of selecting key issues required expanding the group of stakeholders, as was done, for instance, in the Cádiz test site. As reported by the leaders of this test site:

“Although we were able to establish priorities for the area, it is important to note that our third CoP interaction included participation beyond our CoP members. We organized a workshop for trade-off analysis, extending invitations to additional stakeholders who were initially not part of our CoP.”

In general, positive opinions prevailed regarding the process of selecting key issues. A good example comes from the leaders of the Black Sea test site, who noted:

“It was the combined effort of test site leader expert knowledge and repeated discussions with our CoP group. Our CoP members themselves also have a lot of expert knowledge on the subjects.”

Importantly, in most cases, if the initial guiding questions were too general, the test sites managed to refine and detail them during the validation phase in order to achieve greater clarity and precision regarding the objectives. This was confirmed by many of the test site leaders. For instance:

- "After CoP 4 interaction the questions reached their final form. Prioritisation and sharpening." (North Sea)
- "Our guiding questions were shaped over time to comply with Task and CoP expectations." (Azores)
- "Especially, tool applications (e.g., trade-off exercise) were used to tailor detailed guiding questions." (Baltic)

5.2.2. Administrative framework

In contrast, mixed opinions were expressed concerning the possibility of securing the involvement of an appropriate administrative framework to support MSP4BIO project actions. Generally, in most test sites, such frameworks were already available—possibly with the exception of the Atlantic Sea basin. In cases where they were not available, the project helped establish them through its own activities.

For instance, in the Azores test site:

"CoP interactions were sufficient to establish an appropriate administrative framework and define a possible MPA expansion area."

However, it seems that some issues did arise, at least in certain test sites. An illustration of this is the statement from the NW MED test site, where an administrative framework existed but was not open to cooperation with the test site leaders. As they reported:

"The administrative framework exists already, but the process of MSP revision was ongoing, and the authority was not totally open to a possible interference of our project."

Nevertheless, even in this case, a "rescue strategy" was implemented, involving:

"The CoP with a few representatives from the sea basin council and the observation of the stakeholders' interactions, as well as the results of the public consultation organised by the National Council for Public Debate."

The absence of administrative frameworks increased the need for consultation and support from project partners in charge of policy and governance aspects. These partners were helpful in launching such frameworks. This support was used mainly by test sites where frameworks were lacking, such as Cádiz, or by those that independently developed the necessary administrative structures, such as the Azores.

In the case of the Azores, this support resulted in improvement of the administrative framework. On the other hand, the Cádiz team has been working together with HELCOM (MSP4BIO partner in charge of policy solutions) to draft some proposals related to administrative challenges.

5.3. Analysing ESE Framework

In accordance with the process outlined in the adjustment procedure/methodology, all test site leaders examined whether the ESE modules and appertaining tools were appropriate for the specific needs of their test sites.

5.3.1. ESE Modules

In general, all of them proceeded with ESE Framework showcasing, validation, and application of specific ESE modules relevant to their test site. In this process, some questions and uncertainties emerged. For instance, the leaders of the North Sea/Belgium test site noted that:

"The ESE modules and appertaining tools were suitable for our test site," but at the beginning they were unsure how to start the validation phase. This was resolved in consultation with the developers of the ESE modules and the DSTs (Decision Support Tools), who assisted in the selection process.

In accordance with the steps proposed in the adjustment procedure/methodology, as many as five test site teams took advantage of more tailored support from ESE developers, while the sixth test site received support from the DST creator/leader. These interactions helped in the further consolidation of the ESE modules and appertaining tools. Thanks to that, the ESE Framework can be used independently after the project closure without intensive coaching by MSP4BIO project partners.

In some cases, the ESE offer turned out to be too narrow. Therefore, at this stage, efforts were initiated to incorporate policy solutions into the ESE platform. This decision was based on earlier interactions (seminars held at the beginning of 2024) between test site leaders and the developers of the ESE and policy-related components.

Nevertheless, many unconditional positive opinions were expressed regarding the suitability of the ESE modules for the test sites' needs. For example, the Black Sea test site reported:

"In general, we were well acquainted with the ESE offer and the opportunities it provides."

At this stage, the adjustment procedure/methodology also offered the possibility of rethinking test site needs. As already mentioned, this was not necessary, as the ESE Framework was extremely suitable. However, in one case − namely the Cádiz test site − this process did take place and resulted, as previously mentioned, in the expansion of the ESE to include policy-making aspects.

The next recommendation was related to the possibility of taking advantage of the selectivity of the ESE Framework. Due to the different scopes and focuses of the MSP4BIO test sites, it was clear from the very beginning that not all of them would benefit from applying the entire ESE Framework. Priorities for each test site were defined in the proposal phase and then confirmed with stakeholders in D5.1. The option of narrowing down the testing of the ESE Framework to the priorities of the test sites was used to varying degrees by three test sites, while two others did not see such a need due to the high level of suitability of the ESE to their needs. One site (Cádiz) opted instead for an expansion of the ESE scope, as discussed earlier.

The Framework as a whole was presented and showcased in all the test sites, and test site leaders collected CoP members' feedback for its further development and improvement.

The outcome of this stage of the adjustment procedure/methodology was a more detailed analysis of the ESE modules suitable for each test site's needs, and all six test sites succeeded in this task. As stated by the NW MED test site leaders:

"We looked at all ESE modules and made profit as much as possible of them."

For example, at the Baltic test site, the selection of ESE elements to be tested included "applications for trade-offs and cumulative impact assessments, and in addition the climate change scenarios." In the Black Sea test site, the selected elements for testing included: "SeaSketch DST, including participatory mapping (ESE3) and trade-off exercise." The site also decided to apply CEA for the integration of MPAs and MSP using PlanWise4Blue (ESE1). In the case of Cádiz, additional analyses were even conducted on the topic of illegal fishing.

5.3.2. ESE Tools

Similarly positive outcomes were achieved in the subsequent step of selecting DST elements for testing, specifically in assessing their suitability. In three cases, the suitability was evaluated as high (Cádiz, Baltic, Azores), and in one case as moderate (Black Sea).

At this stage, interest also emerged in policy tools and good practices that could complement the selected ESE modules. In two test sites, this did not occur, but three test sites (Cádiz, Baltic, Azores) engaged in dialogue with the policy solutions partners. For example, the Azores team indicated:

"We have been participating in the policy interactions and contributing to best practices in our region."

The stage of the adjustment procedure/methodology described in this paragraph − **Analysing the ESE Framework** − concluded with the preliminary selection of ESE modules and DST elements to be tested. The next phase in the selection procedure focused on assessing to what extent the test site leaders were prepared to test these elements in real-world conditions.

5.4. Selecting ESE modules, tools and guidelines for testing (more in-depth preparations)

5.4.1. Data

The first element involved verifying whether the available data and information (i.e., those necessary for the application of selected DSTs) were sufficient to support the testing of selected ESE modules and, if applicable, tools and policy solutions. This step, as proposed in the adjustment procedure/methodology, was successfully carried out by all test sites.

As the Azores team noted, this was made possible thanks to earlier project activities:

"The previous list gathered in D5.1 per test site helped us to be aware of the most updated data in place in the region."

In cases where data-related issues emerged, solutions previously tested during the *Stocktaking* phase were applied.

5.4.2. Skills

Five test sites assessed the availability of skills among their leaders to apply the selected ESE elements or modules. The only exception was NW MED, which may be attributed to their role as one of the main ESE developers − making such an

assessment potentially unnecessary. Overall, this stage did not reveal any critical skill gaps. In cases where some uncertainty existed, dialogue with experts helped address the concerns.

In line with the adjustment procedure/methodology's suggestions, ad hoc meetings were organized to address skill gaps. For example, the Azores team reported having shared knowledge and exchanged best practices with policy solutions partners.

It is worth recalling here that series of meetings were organised by Task 5.2 with test site leads and tools/ESE developers (at the end of 2023 and beginning of 2024, and then continued throughout 2024). All those meetings properly informed the selection of the ESE modules and tools and clarified the issues related to necessary skills.

5.4.3. Boundary-spanning objects

All six test sites selected boundary-spanning objects (such as maps, charts, etc.) necessary to initiate the ESE validation workshop. Test site reports reflected a high level of enthusiasm for this step in the adjustment process.

A few illustrative quotes include:

"We used a lot of maps, SeaSketch, QGIS." (Black Sea)
"Yes, we have validated the MPA proposed in the 3rd CoP meeting, and all the material produced in the participatory mapping tool." (Azores)

In general, test site leaders either had sufficient skills to independently prepare these objects or, in three cases, relied on support from project experts, as suggested in the adjustment procedure/methodology, for example by using SeaSketch for participatory mapping.

5.4.4. Securing stakeholders participation

Similarly, all six test sites ensured the knowledge and participation of stakeholders essential for successful validation. The Cádiz team explained:

"We provided our CoP members with the results of the various interactions we had with them. Our meetings were always organized based on their availability. When necessary, we facilitated online validation of the materials we developed. All materials presented to them were translated into Spanish, except for the online platform."

Only in the case of NW MED were there initial difficulties, which were addressed by expanding the CoP to include experts and individuals responsible for MPAs or relevant organizations, such as GFCM and ACCOBAMS. As a result, the NW MED CoP became highly inclusive.

According to North Sea/Belgium test site leaders, their

"CoP is made of a few representatives of the Sea Basin Council, where all stakeholders are represented."

This allowed them to bypass the step of verifying whether their CoP had sufficient capacity to conduct the validation, as suggested in the adjustment procedure/methodology.

Thus, the CoP concept proved effective. Despite occasional challenges in organizing regular meetings (which sometimes had to be held online), when CoP capacity was deemed insufficient to support ESE validation, test site leaders were aware of this in advance and took steps to include the necessary stakeholders − just as NW MED had done. Similarly, in the Azores, test site leaders

“included more members in our CoP to do the Trade-off exercise.”

In all other cases, the CoPs had sufficient capacity to engage in the validation and testing process.

Regarding the final question of whether it was necessary to reconsider the selection of ESE modules and tools for testing at this stage, nearly all test sites responded negatively. Only NW MED reported some previously noted challenges. This confirms the positive conclusion of this phase of the adjustment procedure/methodology.

Therefore, following the completion of the *Selecting ESE Modules, Tools and Guidelines for Testing* stage, reconsidering the initial selection of the ESE elements to address site priorities was deemed unnecessary.

5.5. Piloting

Under piloting, the selected boundary-spanning objects were prepared and tested. This phase of the adjustment process was regarded as an unquestionable success by the test site leaders. All test sites succeeded in producing the boundary-spanning objects required to initiate the validation workshop, as envisioned in the previous stage. No test site reported any issues in this regard.

They produced various boundary-spanning objects, sometimes with assistance from project experts (as in the case of Cádiz), such as: maps indicating proposed MPA sites developed in collaboration with CoP members, cumulative impact maps, and maps for new MPAs. Not a single test site reported that the selected boundary-spanning objects failed to fulfil their intended purpose.

As the Cádiz team declared:

“The material provided helped to guide the discussion and more suggestions also were presented by the members and later incorporated in the final material.”

As a result, there was no need to seek assistance from ESE or policy solutions developers for either verifying the proposed boundary-spanning objects or altering their selection. According to the test site leaders, no ambiguous or ineffective boundary-spanning objects were produced.

5.6. Engaging stakeholders for validation

5.6.1. Inviting stakeholders

Five test sites have managed to decide on the right pool of stakeholders to start validation. In general, previously selected CoP members were considered sufficient. Only one test site (NW MED), as already mentioned, reported problems in this regard:

"Both the national authority and the National Debate Commission, after agreeing to take advantage of MSP4BIO, declined at the last moment our proposals of managing respectively a debate with the ad hoc working group set up about strictly protected areas under the Sea Basin Council, and the workshops with the public in Nice."

For that reason, there was a need to extend the CoP. Test sites in general were happy with their CoPs as a validation vehicle. This can be illustrated by the following statements from the North Sea and Black Sea respectively:

"Our CoP is a group with a lot of expert knowledge on diverse topics around MSP/MPA planning in Belgium and biological knowledge. They are also all involved to a certain extent with the MSP/MPA planning of Belgium." "Our CoP includes a variety of stakeholders, as representatives of MPA & MSP authorities, NGOs, private companies, etc."

As suggested by the adjustment procedure/methodology, in some cases CoPs were extended for the purpose of the validation phase. As explained by the Baltic team:

"The initial group was too limited, with a couple of experts representing only some Baltic Sea countries. Therefore, larger working groups were contacted."

NW MED also considered widening the CoP, but it followed this idea only after encountering problems with the engagement of some of the initially selected CoP members. Cádiz Bay CoP was widened for some tasks only. But, for the other sites, initially established CoPs were maintained, and the CoP members fulfilled their role. This choice was also motivated by the need to diminish stakeholder fatigue, as indicated by the North Sea.

All test sites prepared the stakeholder list in advance. For instance, in Bulgaria, 18 stakeholder representatives were invited to join the CoP. They represented various institutions and various governance levels − from ministries and administrations responsible for MSP and MPAs management to environmental NGOs, local fishers' associations, and maritime museums.

All test sites have followed the suggestions of the adjustment procedure/methodology and have checked whether they had a sufficient pool of experts/people to be engaged in each testing element. For that reason, all test sites have analysed existing CoP composition, i.e. whether they had experts/people suitable for the validation of each testing element. This was a very useful suggestion and allowed flexibility in validation. As indicated by the Cádiz team:

"Our CoP members were considered well-equipped to provide feedback on the validation process. However, for the trade-off analysis, we invited additional stakeholders."

Also, the NW MED test site took advantage of this suggestion and selected some new members for the CoP. Summing up: in three cases (Azores, Black Sea, and North Sea/Belgium part), initial CoPs were used for validation; in the three sites (NW MED, Baltic, Cádiz), some adjustments with regard to CoP composition were applied.

Despite proper identification of stakeholders, in two cases their willingness to participate was screened to an insufficient extent. This has resulted in the

aforementioned problems of NW MED with stakeholder engagement, which they had to fix. Four test sites followed the proposal of the adjustment procedure/methodology to screen stakeholder willingness at the beginning, and they adjusted their work according to the findings. For example, the Azores underlined the problem of stakeholder fatigue. For that reason, they offered another timeline for those who were not able to participate in person to fulfil the validation obligations online. The Azorean team was also ready to develop extra meetings if needed.

Also, the diverse members (policy and science) were sometimes difficult to host in one workshop. So, for CoP interaction, the Belgian team organised separate interactions with policy members and scientists to give everybody an equal voice. The model approach was applied by the Cádiz team. In this test site:

“The willingness of CoP members was confirmed at the beginning of the CoP formation, when the project was explained and they were asked to sign.”

The team managed to maintain strong participation from CoP members in all interactions.

5.6.2. Participation of stakeholders in pre-testing activities

Five test sites have followed the adjustment procedure/methodology suggestion and tried to strengthen stakeholders’ commitment before the validation phase (by e.g. advertising ESE products and engaging stakeholders in pre-testing activities). For instance, the Azorean team translated part of the ESE components for their stakeholders. Only one test site (NW MED) failed to engage stakeholders in pre-testing activities due to time constraints. They presented the ESE Framework to the original CoP members (4th CoP interaction, with pre-conclusions). Then the 5th CoP interaction was organised with the extensive group of stakeholders for validation of application results, and there was no time to engage additional CoP members in the pre-testing activities.

5.6.3. Engagement strategy and methods

All six test sites have managed to tailor their engagement strategy to the needs of stakeholders’ ability to participate and have checked that materials prepared for testing were understandable and easy to learn for stakeholders. The North Sea team, for instance, tailored the different interactions/meetings according to the stakeholders’ expertise to get as much feedback as possible on the parts of the framework where they would have the most valuable input. The feedback from stakeholders was positive. In the Black Sea, all materials were communicated via emails in an easy-to-read format to CoP members during the whole project. In the Baltic Sea, MIRO interactive boards and online meetings were utilized.

The majority of test sites managed to inform stakeholders in advance about questions to be discussed. For instance, the North Sea team always informed the stakeholders beforehand what the agenda was going to be for the workshop/interaction, and what would be discussed, but tried to limit the detailed information on the topics. A similar procedure was applied in Cádiz. The stakeholders got a general overview of what would be discussed, but without additional materials:

"As some of them are the managers of the area, we didn't want to warn them in advance of the specificities of the meeting."

Two test sites applied the snowball method for stakeholder engagement, as proposed in the adjustment procedure/methodology. For instance, in the Baltic test site (in the local test site application) for trade-offs, stakeholders invited other Polish colleagues to identify new MPAs in the Gdańsk Bay. In the Azores, this resulted in CoP extension, as already mentioned. The other test sites refrained from using this method mainly due to stakeholder fatigue and reliance on the existing CoP composition.

Five test sites used active methods of stakeholder engagement. Among them were smaller subgroups (North Sea, Cádiz), phone calls prior to stakeholder meetings (Azores), personal interviews, workshops, round tables, open questionnaires, SeaSketch, whiteboard exercises (Cádiz), and ad hoc working groups (NW MED). Working in smaller groups was used by three test sites (Cádiz, Baltic, and North Sea/Belgium) and was tried without success by NW MED. In the Azores, the CoP was too small to justify splitting it (the Azorean team offered alternative timelines to meet others who were not available), and in the Black Sea, the CoP group consisted of members located in different places; thus, online/web platform meetings were mainly applied.

5.6.4. Collaborative partnership strategies

All test sites have considered building collaborative partnership strategies in the context of MSP and MPAs integration. For instance, the Baltic team organized a joint workshop for the HELCOM-VASAB MSP Working Group and HELCOM BioDiv working group to share ideas on MSP–MPA integration and to discuss developed policy solutions. In the Azores, MPA and MSP managers were part of the CoP, and this solution fostered communication and collaboration. The Cádiz team managed to develop a proposal to establish collaborative partnership strategies in the context of MSP and MPAs integration and discussed them with the CoP members.

5.6.5. Communication with stakeholders

All test sites have managed to follow the commitments of the PILOTING phase and have indeed translated complicated scientific boundary objects into a simpler format that was easier to grasp by the stakeholders (graphical tools), as suggested by the adjustment procedure/methodology. The experience was positive. As indicated by the Black Sea, it helped in the case of limited time for meetings and sometimes complicated information.

For instance, the Cádiz team developed a fact sheet to present results simply to the CoP members. In the Baltic Sea, MIRO interactive boards were utilized. NW MED displayed information in the ESE demo viewer as an ESE synthesis. The North Sea team used SeaSketch and StoryMaps.

In this case, some problems were signalled. The actual use of tools to inform test site planning solutions wasn't really of interest to the Belgian policy members, because this part of the MSP/MPA planning is usually outsourced to scientific institutes. So, decision-makers were interested in the results, but not so much in how the results were obtained.

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5.7. Validating

5.7.1. Existing decision-making processes

All test sites have managed to fully, or at least to some extent, identify and take advantage of the decision-making processes in their test site area (and beyond, i.e., at national and regional levels) for validation purposes, as suggested by the adjustment procedure/methodology.

The Cádiz team has worked with managers of MPAs and the administration managing the area; the Azorean team, with the group responsible for the MPA revision in the area; the Black Sea team, with MSP and MPAs competent authorities in Bulgaria, the Black Sea Commission, and the Black Sea Economic Cooperation Organization.

The NW MED team was very well acquainted with national decision-making processes, but it was interesting for them to learn about the processes in neighbouring countries. In one case (Baltic Sea), this stage resulted in updating analyses already conducted at the project level. As stated:

“SPIA application has already been performed during the HOLAS 3 assessment for all human activities. During MSP4BIO, the Baltic team performed the cumulative impact assessment only in marine protected areas and improved the details of MPA-focused assessments.”

5.7.2. Potential users

All six test sites have followed the adjustment methodology suggestions and made several attempts to communicate the ESE modules/results to potential users.

For instance, the ESE Framework was demonstrated to a wider group of Bulgarian and Romanian stakeholders and key regional actors, even beyond the CoPs. Bottom trawling in HELCOM MPAs, potential economic revenue, and ecosystem services were analysed and presented to different HELCOM working groups (e.g. WG Fish, WG BioDiv). The North Sea team shared the validation results with other projects active in the field of MPAs, nature conservation, and restoration.

As a result of such interactions, the Azorean team suggested to the ESE developers to revise a figure based on comments accumulated during this phase.

Five test sites (all except North Sea/Belgium, where MSP has already been completed) have tried to go even further and inform broader communities of the validation results.

For example, the Cádiz team presented some results at international congresses and also in academic publications. Afterwards, they were approached by a local company interested in using SeaSketch for their planning purposes. The Black Sea team established connections with stakeholders from the fisheries and aquaculture sectors and also involved colleagues from other sister projects (i.e., MPA Europe and MSP-GREEN) to promote the ESE modules and DSTs.

5.7.3. Dialogue with policy makers

Among key MSP4BIO stakeholders are decision-makers. Their role is important in facilitating the use of MSP4BIO outputs.

Five test sites tried to be proactive and proposed some input to individuals involved in decision-making processes. The exception was the North Sea (Belgium part), where MSP has already been completed and there was no policy interest in being informed. However, even here, the designations and planning completed in the most recent MSP were cross-checked with MSP4BIO results (such as – the need for enhanced regional coordination to manage pelagic habitats and mobile species or spill-over effects of protecting marine areas, where ecological benefits extend beyond protected zones, potentially enhancing fisheries and local economies around these zones.).

This dialogue with policymakers on the validation outcomes took place either through existing CoPs − e.g. in Cádiz, Black Sea, and the Azores (the Cádiz team translated fact sheets into Spanish and provided them to CoP members working in public administration; in the Azores, final recommendations are planned to be communicated to the group responsible for the MPA revision) − or through external channels (e.g. the Baltic team used think tank meetings).

In the case of NW MED, the attempt was not successful. Despite these problems, all six test sites have attempted to create clear recommendations for the policy level (sometimes including MSP planners).

Work on recommendations targeting policymakers has been initiated − for instance, in the Black Sea, by preparing the report *Site-specific solutions for accelerating biodiversity protection and restoration in MSP* (Section 4.6 Report on solution of the Western Black Sea test site (Bulgarian part)). The preparation of this report was informed by the validation phase.

Similar efforts were undertaken by other test sites; however, in the case of Cádiz, NW MED, and the North Sea, the impact has not been observed yet (work in progress).

Three attempts to produce recommendations for marine spatial planners were undertaken by the test sites (Baltic, Black Sea, NW MED). For instance, in the Black Sea, such recommendations are to be included in the aforementioned report *Site-specific solutions for accelerating biodiversity protection and restoration in MSP*.

In addition, in the Azores, an extra meeting will be arranged with MSP planners before the end of the project to share new information. The Cádiz team is still working on final recommendations for the area, and the final project validation workshop was organised in April 2025. A similar validation workshop was held in Romania (Black Sea test site), together with other projects.

In Belgium, the new MSP plan has already been finalised, and therefore the test site team had no opportunity to influence its content (timing issue) via recommendations for MSP planners. But the MSP4BIO results have informed the planning process.

5.7.4 Cross-border approach

Three MSP4BIO test sites were of a cross-border character (Baltic, Black Sea, and NW MED). In all of them, a common picture for the entire area was developed, accompanied by the identification of added value from cross-border solutions included in the ESE modules.

For that reason, in the Baltic test site, all tasks were carried out for the entire Baltic Sea region, except the local test site application for trade-offs (applied to the Gdańsk Bay). In the cross-border test site Western Black Sea, the team explored integration of CEA in MSP by utilising PlanWise4Blue, including analyses in both Romania and Bulgaria.

6. Concluding part

At the very beginning, the adjustment phase encountered some challenges and barriers. These issues were mainly related to time pressure in adjusting the ESE Framework as a working draft to be tested and validated with CoPs in each test site. Fortunately, these problems were resolved primarily through the dialogue initiated under Task 5.2 (T5.2) between the ESE developers and test site leaders. This dialogue made it possible to achieve a sufficient level of confidence in the validity of the ESE modules in each test site and enabled the preparation and implementation of site-specific adjustment strategies following the common methodology outlined in D5.2.

The experience from ESE testing has generally been positive, as explained in Chapter 5 of this deliverable.

The primary conclusion drawn from this exercise is that adjustment is an ongoing process. It should continue beyond the completion of D5.2 and the MSP4BIO project itself in order to support further work in each test site regarding the integration of MSP, MPAs, and biodiversity concerns. In particular, new challenges (e.g., those related to climate change or other risks jeopardizing biodiversity) may require the application of additional DSTs or the reorganisation of existing CoPs.

However, the most important step has already been completed: the adjustment methodology has been developed, tested, and validated, and it can serve as a robust starting point for future rounds of adjustments and for application in other EU and global marine sites. The relevant DSTs have been identified and linked to the ESE modules applicable across different marine areas, and the ESE Framework has been published online in a format enabling wider application − i.e., beyond the MSP4BIO project test sites.

The second conclusion, specific to T5.2, highlights the need for flexibility. T5.2 meetings confirmed the importance of incorporating policy-relevant elements into the ESE Framework. This need was particularly evident in the Cádiz Bay and Baltic Sea cases. As a result, necessary arrangements were made under T5.2 to accommodate such requirements.

This was made possible by the openness and cooperation of the ESE developers and policy solution leaders. In the future, to ensure the transferability of MSP4BIO results, such openness and willingness to cooperate should be further encouraged − especially since the ESE Framework may need to be integrated with other frameworks and decision-making processes. The ESE is not static, and future users are invited to continue its adaptation.

The third conclusion from T5.2 relates to the effectiveness of transferability. If the ESE Framework is to be applied in areas beyond those covered by the test sites, future users need clear guidance to understand (and even experience) the potential and opportunities it offers. This will also support the selection of the most relevant ESE elements.

Therefore, the following preliminary measures are proposed by D5.2 to MSP4BIO project partners to address this need:

a) elaborating online tutorials and other e-learning materials explaining the application and extension of the ESE Framework,
b) establishing a pool of experts ready to assist future ESE Framework users after the conclusion of the MSP4BIO project
c) organising ESE Framework trainings within existing MSP networks (as done in the case of Poland).

The implementation of Task 5.2 confirmed the validity of the MSP4BIO approach − i.e., applying one common methodology to prepare test sites for ESE Framework implementation, based on key findings and gaps identified in D5.1.

The ESE Framework proved to be flexible enough to allow adjustment of its modules to the local needs and specific contexts of the six test sites located in various EU sea basins.

The proposed common methodology also served as a basis for the transferability analysis (D5.4). It facilitated cross-site comparisons and the formulation of recommendations on the transferability of results and identification of barriers to upscaling.

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Annex 1:

D5.2 Common methodology (template table of content) /common approach

serving as a basis for individual plans for each test site ESE adjustment for its validations/application (related to preliminary objectives of the studies and results from the CoP interactions and co-design: identified needs/gaps and selected guiding questions/socio-economic criteria and ES)

Common key aspects/questions to be addressed by each test site (individual test site methodology)

1. Where: describe where your test site is located	Geographical location and scale of the test site (please include a map of the test site).
2. What: describe the main focus and objectives of your test site	Here the preliminary defined objectives and goals of the test site should be described, highlighting also the main uses/activities, MPAs and valuable habitats and species (maps can be included if relevant).
3. Why: describe the key local issues and challenges to be solved also with support of the MSP4BIO ESE Framework	Reflection and description of the results from WP5, D5.1 on identified needs and gaps assessment following the four themes: 1) the current status of the MPA network, 2) the (transboundary) coherence between area designations, MSP and other environmental legislation such as MSFD, 3) the integration of social and economic aspects in MPAs and 4) stakeholder confidence in MPA and MSP processes.
4. Who: describe who has been involved and to whom the ESE Framework validation and results are targeted	Description/details on established CoP, and approaching beyond to broader community/stakeholders – building a participatory strategy (what kind of collaborative partnerships will be built/what kind of advocacy strategies are needed in the context of MSP and MPA integration).
5. What MSP and MPA: describe the stage of the MSP plan and the MPA designation process	Consider different stages of MSP from inception to monitoring & evaluation and review for each test site, to provide guidance for biodiversity integration at different levels and stages; describe the policy barriers that need to be overcome to improve integration and how test site plan addresses these barriers (inputs from WP5, D5.1; WP3, WP4, Task 4.4 and WP6).
6. What ESE expected results: describe what do you expect from the MSP4BIO ESE application	Highlight what are the expected results from the ESE application and validation with clear focus on test site objectives, considering improved ecological and socio-economic criteria, addressing also CC issues, ES, trade-offs, etc. (inputs from WP3 and WP4).
7. What ESE expected impacts: describe the anticipated impacts of the MSP4BIO ESE Framework	Describe the expected impacts from ESE Framework validation/implementation, considering also the integration of MSP and MPAs (what might be the connection/relation between the identified needs and expectations) in a short and a long-term.
8. **What ESE to test:** describe	Specify the selected guiding questions to each test site detailed at level 2 and 3 – results from

what ESE Framework elements/modules might be tested/validated	D5.1,2nd CoPinteractions and the current test site meetings (similar questions to be clustered for all test sites); identified socio-economic criteria and ES; trade-offs details and results/ which modules elements from ESI – ecological (which criteria/indicators/ addressing also CC); socio-economic or the whole ESE (depends on data availability/resources and site specific issues to MPAs and MSP).
9.Towards ESE validation workshop: what is your ability of ESE implementation	Describe your ability of ESE implementation: expected stakeholders; whom you can really involve; what are the most important barriers (data, knowledge, legislation, participation, participatory mapping, other); how can we overcome these barriers; why should the CoP members and other stakeholders be interested in ESE tools; how do we bring added value/benefits to the stakeholders.

Source: WP5 meetings, Margarita Stancheva, CCMS