Advancing Coastal Restoration through the IUCN Global Standard for Nature-based Solutions

Running the Standard in REST-COAST Pilot Sites

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LIST OF ABBREVIATIONS

BACI Before-After, Control-Impact

CORE-PLAT COastal REstoration PLATform

EIA Environmental Impact Assessment

ESIA Environmental and Social Impact Assessment

ESS Ecosystem Services

EU European Union

IBA Important Bird Area

IBW PAN Institute of Hydro-Engineering of Polish Academy of Sciences

IO-BAS Institute of Oceanology, Bulgarian Academy of Sciences

IUCN International Union for the Conservation of Nature

NbS Nature-based Solution

PROVV.OO.PP. Provveditorato alle Opere Pubbliche per il Veneto, Trentino Alto Adige e Friuli Venezia Giulia

REST-COAST Large Scale RESToration of COASTal Ecosystems through Rivers to Sea Connectivity

SAT Self-Assessment Tool

SET Sedimentation Erosion Table

SMART Specific, Measurable, Achievable, Relevant, Time-bound

UAV Unmanned Aerial Vehicle

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EXECUTIVE SUMMARY

Nature restoration is becoming a central priority in global and European environmental agendas, including the United Nations Decade on Ecosystem Restoration, the Kunming-Montreal Global Biodiversity Framework (Target 2), and the Nature Restoration Regulation and the Green Deal of the European Union, which together set ambitious objectives to restore ecosystems by 2030. Coastal areas, as highly dynamic land-sea interfaces, are among the most vulnerable environments, having experienced significant long-term degradation. As a result, large-scale restoration is emerging as a key strategy for climate change adaptation, biodiversity recovery, and risk reduction. In this context, large-scale restoration initiatives and projects, such as REST-COAST (Large scale RESToration of COASTal ecosystems through rivers to sea connectivity), are becoming increasingly relevant, demonstrating how Nature-based Solutions can support coastal resilience, ecosystem recovery and climate adaptation, and are expected to play a key role in shaping future coastal management efforts.

Ensuring that restoration actions are effective, sustainable, and beneficial for both nature and society, requires alignment with Nature-based Solutions approaches. The IUCN Global Standard for Nature-based Solutions™ provides a robust and practical framework to guide the design, assessment and improvement of such interventions, supporting better decision-making, managing trade-offs, and enabling scaling up and replication.

This report presents the application of the IUCN Global Standard for Nature-based Solutions across the nine Pilot Sites of the REST-COAST project. Using a structured and comparable methodology, the assessment evaluates the alignment of restoration interventions with the criteria and indicators of the NbS Standard, identifying strengths, gaps and opportunities for improvement.

Overall, the results show strong performance in the identification of societal challenges and in ecological design and monitoring. However, recurring challenges remain across Pilot Sites, particularly in ensuring long-term financial sustainability, strengthening inclusive and empowering governance, and systematically addressing trade-offs and risk management. These findings highlight the need to move beyond technically sound pilot interventions towards more institutionalised, scalable, and durable restoration approaches.

The lessons derived from REST-COAST provide a valuable evidence base to inform future coastal restoration initiatives and strengthen the application of Nature-based Solutions in complex socio-ecological systems.

Rice fields behind coastal dunes in the Ebro Delta

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RECOMMENDATIONS BRIEF

- **Strengthen the integration of societal challenges** by grounding NbS interventions in robust, evidence-based assessments, early identification of social barriers, and proactive awareness-raising to ensure relevance and local ownership.

- **Adopt a systemic, multi-sectoral and interdisciplinary approach** that recognises interactions between ecological, social and economic systems, promotes multifunctionality, and aligns NbS interventions with broader territorial and policy frameworks.

- **Prioritise ecological integrity and measurable biodiversity gains** by defining clear biodiversity objectives, generating NbS-specific data, applying biologically meaningful indicators (including biodiversity net gain), and adjusting actions based on ecological responses.

- **Secure long-term financial sustainability and equitable benefit-sharing** by integrating NbS into public policies and financial instruments, developing risk- and benefit-sharing mechanisms, and demonstrating cost-effectiveness to attract sustained investment.

- **Move towards shared and empowering decision-making** by embedding inclusive participation from the design stage, institutionalising grievance and conflict-resolution mechanisms, and establishing dedicated governance arrangements for NbS management.

- **Operationalise safeguards and risk management** through NbS-specific impact assessments, dynamic risk registries covering environmental, social and financial risks, and the active application and monitoring of corrective measures.

- **Embed adaptive management into implementation** by linking monitoring to decision-making, using evidence (including Environmental and Social Impact Assessment outputs and risk information) to actively adjust interventions, and fostering continuous learning and capacity building.

- **Enable scaling, replication and institutionalisation of NbS** by systematically documenting lessons learnt, building on existing initiatives and capacities, leveraging policy momentum, and translating NbS outcomes into long-term strategies and regulatory frameworks.

1. INTRODUCTION

1.1 BACKGROUND

European coastal ecosystems are among the most productive and valuable natural systems, providing essential ecosystem services such as coastal protection, biodiversity conservation, carbon sequestration, water purification, food production, and recreational opportunities. However, these ecosystems are increasingly threatened by climate change, sea-level rise, habitat fragmentation, unsustainable land use, and intensive infrastructure development. These pressures disrupt natural ecological processes, reduce biodiversity and weaken the capacity of coast systems to provide essential ecosystem services. As a result, many coastal areas across Europe are becoming more vulnerable to flooding, salinisation, erosion, and habitat degradation (IPCC, 2022).

Traditional grey infrastructure solutions alone have often proven costly, rigid, and insufficient to address the complexity of these interconnected challenges. There is therefore a growing need for large-scale restoration approaches that work with nature rather than against it, restoring ecosystem functions while also delivering social, economic, and environmental benefits (European Union (EU), 2020). It is within this context that the REST-COAST (Large-scale RESToration of COASTal ecosystems through rivers to sea connectivity, 2021-2026) project was developed. As a Horizon 2020 Innovation Action funded by the European Union, REST-COAST aims to demonstrate that large-scale coastal restoration can provide a low-carbon adaptation pathway, reduce coastal risks while generating biodiversity gains and strengthening the resilience of vulnerable coastal ecosystems.

The project brings together 37 partners across 11 countries, working through nine Pilot Sites representing the main European regional seas, Black Sea, North Sea, Atlantic Ocean, and the Mediterranean Sea. These Pilots are located in **Arcachon Bay** (France), **Ebro Delta** (Spain), **Foros Bay** (Bulgaria), **Nahal Dalia** (Israel), **Rhone Delta** (France), **Sicily Lagoon** (Italy), **Venice Lagoon** (Italy), **Vistula Lagoon** (Poland), **Wadden Sea** (The Netherlands, Denmark, Germany) as shown in **Figure 1**. This geographical diversity allows the project to test restoration approaches across different ecological, climatic, governance, and socio-economic contexts, generating scalable and transferable solutions for coastal adaptation across Europe and beyond.

REST-COAST addresses coastal restoration through a systemic and multidisciplinary approach structured around several complementary pillars. First, the project implements **hands-on restoration actions** supported by new tools, datasets and assessment frameworks to evaluate coastal risk reduction under different climate change scenarios. Second, it explores **innovative financial arrangements and business plans**, to improve the long-term financial feasibility of restoration upscaling. Third, the project codesigns **transformative governance models**, including policy recommendations and governance roadmaps to overcome implementation barriers and foster transformative change from local to EU and international levels. Finally, REST-COAST deploys communication tools, digital platforms, and stakeholders' engagement mechanisms to **support knowledge transfer**, uptake and long-term exploitation of project outcomes.

A central objective of the project is to develop scalable large-restoration solutions, explicitly addressing trade-offs and synergies between biodiversity conservation and socio-economic development. By combining ecological restoration with governance innovation, financial sustainability, and robust monitoring systems, REST-COAST aims to demonstrate that coastal NbS can provide resilient, cost-effective, and replicable solutions that support both climate adaptation and ecosystem recovery.

Each Pilot Site applies different **restoration measures** that fall under **six categories** defined within the project framework: coastal wetland restoration, sediment management, restoring hydraulic connectivity, artificial habitat creation, climate-resilient food production, and flood protection. The description of these adaptation measure categories is presented in **Figure 1**, together with their application across the different REST-COAST Pilot Sites.

Wetland landscape in the Venice Lagoon area

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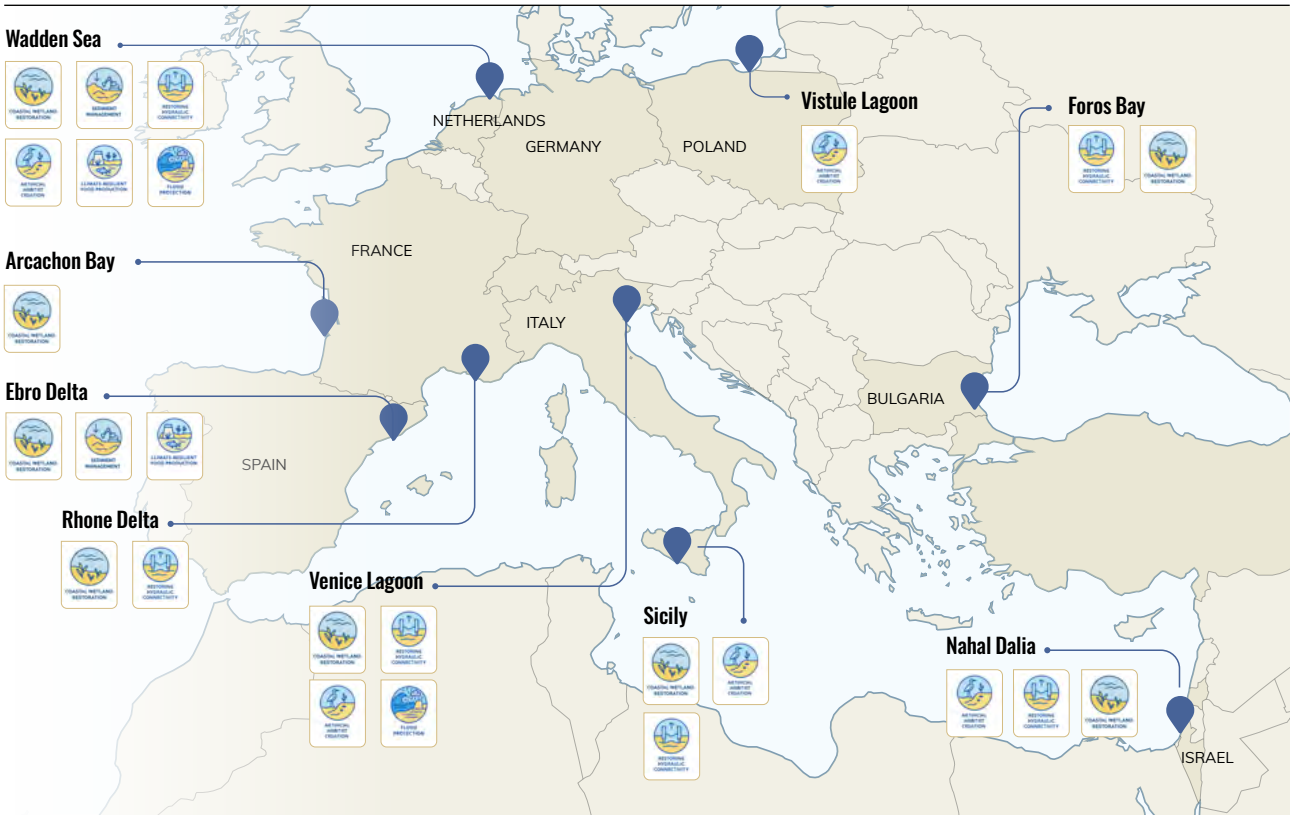
1.2 THE IUCN GLOBAL STANDARD FOR NATURE-BASED SOLUTIONS

Nature-based Solutions (NbS) definition was formally adopted at the IUCN World Conservation Congress in 2016 (WCC-2016-Res-069) as "***actions to protect, sustainably manage, and restore natural or modified ecosystems, that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits***". This definition established the conceptual foundation for NbS and provided a common framework for their design, implementation, and evaluation.

This concept is further guided by **eight core principles** for NbS, which emphasise biodiversity conservation, landscape-scale approaches, social equity, stakeholder participation, and the integration of NbS into policy and decision-making processes (Cohen-Shacham *et al.*, 2019), as presented in **Table 1**.

FIGURE 1. LOCATION OF REST-COAST PILOT SITES AND ADAPTATION MEASURE CATEGORIES APPLIED.



DESCRIPTION OF ADAPTATION MEASURE CATEGORIES USED FOR UPSCALING RESTORATION IN COASTAL REGIONS. SOURCE: TAI *ET AL.*, 2025.

It refers to the restoration and/or conservation of coastal wetland ecosystems such as saltmarshes, tidal flats, or seagrass meadows, in areas where these habitats have been degraded or lost due to human intervention or natural pressures. Restoration efforts may involve direct actions (e.g. planting seagrass, sediment replenishment) or indirect support (e.g., constructing sheltering structures to reduce wave energy or enhance sediment retention). Such interventions aim to restore ecological functions and enhance biodiversity, while providing ecosystem services (ESS) in improving water quality by acting as a sink for nutrients, organic carbon, and suspended material, as well as increase resilience to storm hazards by attenuating wave energy and increasing the resistance of the soil to erosion.

It refers to the strategic addition, removal, or redistribution of sediment to support ecological, hydrological, or infrastructural functions. Sediment management techniques include beach nourishment to support dune formation, or sediment extraction to reduce turbidity and improve light penetration for aquatic vegetation. When designed with ecological and hydro-morphological dynamics in mind, sediment management can serve multiple objectives, including coastal protection during storm hazards, as well as providing ESS through targeted habitat enhancement.

It refers to the re-establishment of natural water flow between previously connected water bodies such as rivers, estuaries, lagoons, and wetlands, where this connectivity has been disrupted by embankments, dams, or infrastructure. Measures may include dike breaches, culvert installations, or the removal of barriers. Restoring hydraulic connectivity provides ESS by reducing coastal erosion through enhanced sediment transport, improve water quality through nutrient exchange, aid biodiversity by providing migration routes, and improve the resilience of aquatic and wetland ecosystems against freshwater shortages.

It refers to the construction of new habitats in locations or under conditions where natural habitat formation would not occur or be sustainable without human intervention. These habitats are often designed to serve specific ecological or socio-economic purposes. An example is the creation of a bird nesting island with stabilised shorelines or engineered substrate to prevent erosion. Artificial habitat creation can support biodiversity conservation, ecological restoration, and adaptation to sea-level rise by providing habitats that are designed to withstand future hazards.

It refers to the development and maintenance of agricultural landscapes that are adapted to climate change impacts such as flooding, drought, and salinisation. This includes sustainable land use practices, agroecological approaches, and engineering solutions such as raising farmlands with dredged sediment to prevent crop loss and improve drainage. Climate-resilient food production ensures long-term food security, sustains livelihoods, and preserves multifunctional landscapes.

It refers to a set of engineered and hybrid nature-based measures designed to reduce flood risks by managing water retention and/or preventing flooding. This includes traditional grey infrastructure such as levees, dikes, and flood barriers, as well as hybrid NbS like vegetated buffers along traditional infrastructure and retention basins. The primary aim is to prevent inundation of land and assets, while also supporting broader goals of safety, resilience, and ecosystem functionality. While the inclusion of ecosystems is targeted specifically at providing flood protection services, additional services may be achieved depending on the types of NbS the flood protection function is combined with.

TABLE 1. PRINCIPLES FOR NATURE-BASED SOLUTIONS (WCC-2016-RES-069)

Principle 1	NbS embrace nature conservation norms (and principles)
Principle 2	NbS can be implemented alone or in an integrated manner with other solutions to societal challenges (e.g. technological and engineering solutions)
Principle 3	NbS are determined by site-specific natural and cultural contexts that include traditional, local and scientific knowledge
Principle 4	NbS produce societal benefits in a fair and equitable way in a manner that promotes transparency and broad participation
Principle 5	NbS maintain biological and cultural diversity and the ability of ecosystems to evolve over time
Principle 6	NbS are applied at a landscape scale
Principle 7	NbS recognise and address the trade-offs between the production of a few immediate economic benefits for development, and future options for the production of the full range of ecosystem services
Principle 8	NbS are an integral part of the overall design of policies, and measures or actions, to address a specific challenge.

To support the operationalisation of this concept, IUCN launched the first Global Standard for Nature-based Solutions (IUCN, 2020; IUCN, 2020a). The IUCN Global Standard for NbS (hereafter referred to as the NbS Standard) consists of eight criteria and associated indicators, providing a practical and robust framework for designing, verifying, and scaling up NbS interventions (Annex I, NbS Standard V2). It helps ensure that actions are environmentally sound, socially equitable, economically viable, and institutionally sustainable.

By applying the NbS Standard, interventions can be more clearly aligned with biodiversity conservation, ecosystem integrity and social equity, while ensuring measurable and verifiable outcomes. Therefore, the NbS Standard provides a solid foundation for:

- **Design and planning**, by providing a robust framework to design new NbS interventions aligned with biodiversity gain, ecological integrity and social equity.
- **Verification**, by helping ensure that NbS interventions are sustainable, effective, and capable of delivering the expected positive outcomes.
- **Upscaling**, by providing guidance for expanding successful small-scale pilot interventions into larger and more impactful actions.
- **Managing trade-offs**, by helping identify potential conflicts between biodiversity conservation and human needs, fostering balanced interventions and minimising negative impacts.
- **Self-assessment and improvement**, by identifying gaps in the NbS performance and supporting adaptive management to improve results over time.
- **Mainstreaming NbS**, by providing a common framework and language that standardises the understanding and application of NbS across policies, programmes and practices at local, national and international levels.

Additionally, IUCN established a user-friendly Self-Assessment Tool (SAT) that enables practitioners to verify whether an intervention qualifies as NbS and assess its level of alignment with the NbS Standard criteria and indicators. The SAT supports evidence-based evaluation, helping to identify strengths, gaps, and opportunities for improvement while ensuring that interventions are consistent with internationally recognised NbS concept.

Thus, **by evaluating the level of adherence to the NbS Standard's criteria and indicators, REST-COAST project and Pilot Sites can:**

- Verify and strengthen the integrity of NbS interventions, ensuring that restoration actions are credible, evidence-based, and aligned with NbS Standard.
- Strengthen the effectiveness of restoration interventions and improve the delivery of the expected outcomes.
- Enhance the credibility of their restoration interventions when engaging with decision-makers.
- Promote engagement and communication across sectors, interventions and geographies.
- Support enabling conditions for NbS mainstreaming, innovation and future research.

1.3 THE REST-COAST PROJECT AND PILOT SITES

The restoration activities implemented under the REST-COAST project were codesigned through Living Lab approaches, engaging a wide range of stakeholders through innovative Coastal Restoration Platforms (CORE-PLATs). These platforms facilitate joint decision-making, co-management and alignment with planning processes at different levels.

Throughout the project, hands-on restoration actions were accompanied by the development of a common monitoring framework based on homogeneous biodiversity and ecosystem-service metrics. Baseline conditions were established using historical data, field surveys, remote sensing and modelling, followed by continuous monitoring to track changes over time. Multidisciplinary data collection included habitat extent, species of conservation interest, water quality parameters, hydromorphological conditions, carbon sequestration and greenhouse-gas fluxes among others. These data supported before/after comparisons and cross-pilot analyses of restoration performance.

In parallel, the project assessed coastal risks and the delivery of ecosystem services linked to restoration. Coupled hydro-morpho-ecological models were applied to simulate present and future conditions, enabling the analysis of flooding, erosion and water-quality dynamics with and without restoration interventions. Scenario analyses and early-warning indicators were developed to explore how restoration extent and sequencing influence risk reduction over short- and long-term horizons.

Pilot-specific governance assessments, mapping of existing institutional frameworks and the review of planning instruments were also carried out to support the co-development of governance transformation roadmaps. Policy-relevant recommendations were formulated to strength restoration implementation in coastal areas and were disseminated in relevant policy events. From an economic perspective, financial analyses and business plans were developed to explore funding and financing models for scaling up restoration, linking ecosystem service benefits to potential revenue streams and public investment mechanisms.

All this technical information was integrated in the Quick Scan Strategy Tool, a visual and user-friendly digital tool designed to help coastal managers and practitioners to explore, compare and discuss restoration adaptation-pathways. The tool allows users to quickly assess potential effects and trade-offs of different alternatives, informing and supporting strategic planning and decision-making.

Communication, dissemination and stakeholder engagement also played a key transversal role throughout the project. Results and experiences were translated into targeted communication products, including pilot-specific restoration demonstrations, videos, factsheets and visual materials aimed at practitioners, managers, and decision-makers. Additional digital tools such as the project website, the "Coastal Challenge" game, an interactive application or a digital platform (dashboard) facilitated broader access to pilot data and project results. These activities ensured that restoration knowledge and lessons learnt were shared beyond the project boundaries.

The broad scope and diversity of the REST-COAST actions, encompassing multiple dimensions addressed by the NbS Standard criteria, make the project particularly suitable for assessing alignment with the NbS Standard. A summary of the main restoration actions implemented across the Pilot Sites is presented in **Table 2**. These interventions have been analysed using the NbS Standard framework with the objective of achieving a comparable evaluation of restoration upscaling plans and generate additional recommendations for further interventions.

This report presents the process of applying the NbS Standard across the REST-COAST Pilot Sites and provides a set of recommendations and conclusions aimed at strengthening restoration intervention and improving their scalability in coastal areas.

TABLE 2. BRIEF DESCRIPTION OF RESTORATION ACTIONS IN THE REST-COAST PILOT SITES

PILOT SITE	MAIN RESTORATION INTERVENTION	KEY BENEFITS
ARCACHON BAY	Seagrass meadow restoration using biomimetic "Roselière" structures	Sediment stabilisation, blue carbon sequestration, climate resilience
EBRO DELTA	Reconnection of sea, lagoons, and saltmarsh systems through removal of artificial barriers	Improved ecological connectivity, increased coastal resilience, flood risk reduction
FOROS BAY	Seagrass (*Zostera noltei*) restoration through in situ transplantation	Flood and erosion risk reduction, biodiversity enhancement, blue carbon sequestration
NAHAL DALIA	River and wetland restoration through dam removal, rewilding, and habitat enhancement	Increased biodiversity, improved water quality, ecosystem resilience
RHONE DELTA	Coastal realignment through dike removal, inland protection, and hydraulic reconnection	Flood prevention, improved water exchange, habitat restoration
SICILY LAGOONS	Bird habitat creation, saltmarsh restoration, and hydraulic connectivity improvements	Biodiversity conservation, flood and erosion risk reduction, habitat restoration
VENICE LAGOON	Maintenance and renaturalisation of artificial saltmarshes using dredged sediments	Habitat restoration, coastal resilience, biodiversity enhancement
VISTULA LAGOON	Artificial island creation using dredged sediment for bird habitat restoration	Bird conservation, improved water quality, fish spawning support
WADDEN SEA	Restoration of seagrass meadows, saltmarshes, and shrub levees	Storm mitigation, erosion reduction, carbon sequestration, water management

2. METHODOLOGY

To ensure a comparable, consistent and evidence-based evaluation across all REST-COAST Pilot Sites, a step-by-step methodology was followed for the application of the NbS Standard. The process began with the review of existing project information to identify available evidence and potential data gaps, followed by the development of a tailor-made questionnaire and dedicated interviews with Pilot Site teams to ensure data accuracy and consistency before running the NbS Standard. Preliminary results were then reviewed collectively to identify potential shortcomings, clarify interpretations, and strengthen robustness of the final assessment. The overall methodology is summarised in **Figure 2**.

STEP 1. ANALYSIS OF INFORMATION

The first step focused on reviewing all relevant information and available evidence that could support the means of verification required for the NbS Standard assessment. The objective was twofold: first, to avoid duplicating work already carried out within the project, and second, to identify information gaps that would require further clarification from Pilot Sites.

The information collected focused on activities and outputs developed under the REST-COAST project that were relevant to different criteria of the NbS Standard, including ecological restoration, governance, finance, stakeholder engagement, and long-term sustainability.

STEP 2. QUESTIONNAIRE DEVELOPMENT

Based on the identified information needs, a tailor-made questionnaire was developed to collect additional data from the nine Pilot Sites. The questionnaire was validated beforehand with IUCN NbS Global Standard experts and designed as a Google form to facilitate both data collection and comparative analysis.

The questionnaire combined both structured scoring and qualitative explanations. Closed questions were aligned with the criteria and indicators of the Standard, while open questions allowed Pilot teams to explain responses, and provide supporting evidence, and reflect the specific context and characteristics of each site. The questionnaire contained a total of 91 questions, organised by Criterion. Additionally, a short guidance note of the questionnaire was provided to Pilot Sites, to support preparation, facilitate internal coordination among project teams, and ensure that the most appropriate focal points contributed before final submission.

STEP 3. INTERVIEW SCHEDULING AND IMPLEMENTATION

Interviews were conceived as a space for clarification and dialogue, allowing a more fluid and personalised exchange before completing the questionnaire. Their objective was to improve the quality of responses, clarify key concepts, and ensure a common understanding of the NbS Standard criteria and indicators.

Before the interviews, IUCN introduced the purpose of the process and shared background information to familiarise Pilot teams with the assessment approach and the NbS Standard requirements. Each interview was conducted online, and notes were taken for documentation purposes. During interviews, participants had the opportunity to clarify doubts, provide additional information, explain specific responses, and share relevant supporting evidence before the NbS Standard was applied.

STEP 4. FIRST RUN OF THE NBS STANDARD

Following the interviews and the review of all available information, the first NbS Standard assessment was conducted. The assessment followed the official methodology established under the NbS Standard, Second Edition (IUCN, 2026). The scoring process was based on the evidence collected through documentation review, questionnaire responses, and interviews, ensuring that the valuation reflected both the implementation status and the planning dimension of each intervention.

STEP 5. REVIEW OF PRELIMINARY RESULTS

After the first assessment, the preliminary results of each Pilot Site were carefully reviewed. This analysis considered not only the scores obtained for each criterion and the overall result, but also the rationale behind them, with particular attention to unusually high or low scores. The objective of this step was to harmonise the interpretation across Pilot Sites, reduce inconsistencies in scoring, and ensure a common

understanding of both the performance across criteria and the restoration actions implemented. This was particularly important given that some interventions were still under implementation, requiring careful distinction between planned actions and completed actions.

To support this process, IUCN convened an additional two-hour online session with the Pilot teams and selected REST-COAST partners working on specific topics such as finance and governance. Prior to the meeting, a summary of the overall results and key observations was shared with participants. During the session, the results from NbS Standard were presented and discussed, outstanding questions were clarified, and potential adjustments were identified. Following this exchange, Pilot teams were given time to review their submissions and revise any responses, where considered necessary.

STEP 6. SECOND RUN OF THE NBS STANDARD

Five Pilot Sites provided revised answers and additional information following the review process (Ebro Delta, Nahal Dalia, Rhone Delta, Venice Lagoon, Wadden Sea). Based on this updated input, a second assessment using the NbS Standard was carried out for these Sites. The objective of this second run was to better reflect site-specific realities, harmonise evaluation results across Pilot Sites and strengthening the basis for recommendations aimed at upscaling and mainstreaming NbS within restoration actions. The results of the reassessment provide a more robust indication of how individual interventions, as well as the overall project, align with the NbS Standard.

Isla de Buda, Ebro Delta (Catalonia, Spain).

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FIGURE 2. SUMMARY OF THE METHODOLOGY USED IN THE APPLICATION OF THE NBS STANDARD IN THE REST-COAST PROJECT

1.

1. ANALYSIS OF EXISTING INFORMATION

Review of relevant documentation and available evidence to support the means of verification required for the NbS Standard assessment.

- Avoid duplicating work already carried out within the project.
- Identify information gaps to be addressed with Pilot Sites.

OUTCOME: OVERVIEW OF AVAILABLE INFORMATION AND IDENTIFICATION OF DATA GAPS.

2.

2. QUESTIONNAIRE DEVELOPMENT

Design of a tailor-made questionnaire to collect additional information from the nine Pilot Sites.

- Validated with IUCN NbS Standard experts.
- Combination of closed (aligned with criteria and indicators) and open questions (explanations, context, evidence).
- 91 questions organized by Criterion.
- Guidance note provided to facilitate preparation and internal coordination.

OUTCOME: VALIDATED QUESTIONNAIRE READY FOR DATA COLLECTION.

3.

3. INTERVIEWS: SCHEDULING AND IMPLEMENTATION

Interviews with Pilot Sites to clarify concepts, gather additional information, and ensure a common understanding.

- Online interviews (approx. 1 hour) with Pilot teams and key experts.
- Questionnaire shared beforehand to guide the discussion.
- Notes taken and all relevant evidence collected.

OUTCOME: CLARIFIED RESPONSES, ADDITIONAL INFORMATION AND SUPPORTING EVIDENCE.

4.

4. FIRST RUN OF THE IUCN NbS STANDARD

NbS Standard self-assessment conducted by a certified NbS Standard expert, with support from IUCN.

- Assessment carried out using the IUCN NbS Standard Self-Assessment Tool (SAT).
- Based on information collected through documents, questionnaire and interviews.

OUTCOME: PRELIMINARY SCORES FOR EACH CRITERION AND OVERALL ASSESSMENT.

5.

5. REVIEW OF PRELIMINARY RESULTS

Review and analysis of preliminary results to harmonize interpretation and ensure consistency.

- Analysis of scores and underlying reasoning (focus on high/low scores).
- Two-hour online session with Pilots and selected partners (e.g. finance, governance).
- Discussion of results, clarification of questions and scoring.
- Pilots given time to review and revise responses if needed.

OUTCOME: SHARED UNDERSTANDING AND REVISED RESPONSES (WHERE NECESSARY).

6.

6. SECOND RUN OF THE IUCN NbS STANDARD

Reassessment for Pilot Sites that provided revised answers and additional information.

- Second run conducted for: Ebro Delta, Nahal Dalia, Rhône Delta, Venice Lagoon, Wadden Sea.
- Ensures results better reflect site-specific realities and are harmonized across all Pilots.

OUTCOME: FINAL SCORES AND ROBUST ASSESSMENT ALIGNED WITH THE EIGHT CRITERIA OF THE NBS STANDARD.

FINAL OUTPUT

Compilation of results, analysis and recommendations to support upscaling and mainstreaming of NbS within restoration actions.

3. RESULTS OVERVIEW

All assessment results were consolidated into a single spreadsheet to support integrated score processing and project-level analysis across the REST-COAST Pilot Sites. To ensure consistency and comparability, levels of adherence to the NbS Global Standard were assigned according to score ranges established under the Second Edition of the IUCN Global Standard for NbS (Table 3). A traffic-light colour-coding system was also applied to facilitate interpretation and provide a quick visual understanding of performance levels across criteria and Pilot Sites.

TABLE 3. NBS STANDARD ADHERENCE CATEGORIES AND SCORE RANGES

Strong	75–100%	Partial	25–49%
Adequate	50–74%	Insufficient	0–24%

The results of the assessment, disaggregated by Pilot Site and by Criterion, are presented in Table 4 and Table 5. They reflect the full assessment process, including the review of supporting evidence, clarification of responses with Pilot Sites teams, and the second run of the NbS Standard where necessary.

TABLE 4. RESULTS OF THE FIRST RUN OF THE ASSESSMENT IN THE REST-COAST PILOT SITES.

CRITERIA	PILOT SITES									REST-COAST AVERAGE
	ARCACHON BAY	EBRO DELTA	FOROS BAY	NAHAL DALIA	RHONE DELTA	SICILY LAGOONS	VENICE LAGOON	VISTULA LAGOON	WADDEN SEA	
C1. Societal challenges	78%	72%	83%	78%	61%	78%	72%	33%	56%	**68%**
C2. Integrated systems perspective	56%	33%	72%	61%	56%	44%	39%	33%	28%	**47%**
C3. Enhanced biodiversity and ecosystem integrity	76%	76%	95%	67%	76%	67%	57%	38%	43%	**66%**
C4. Financial feasibility and economic justification	20%	27%	53%	67%	33%	73%	33%	20%	20%	**38%**
C5. Inclusive governance and equity	11%	19%	56%	63%	37%	33%	59%	30%	33%	**38%**
C6. Balancing goals and impacts	27%	0%	27%	7%	73%	40%	80%	13%	33%	**33%**
C7. Adaptive management	61%	39%	67%	61%	39%	67%	72%	17%	28%	**50%**
C8. Enhancing sustainability and mainstreaming	67%	73%	60%	60%	40%	53%	73%	33%	33%	**55%**
PILOT OVERALL SCORE	**48%**	**42%**	**65%**	**48%**	**52%**	**56%**	**61%**	**28%**	**35%**	**48%**

TABLE 5. RESULTS OF THE ASSESSMENT IN THE REST-COAST PILOT SITES (SECOND RUN).

≥75 STRONG | ≥50 & <75 ADEQUATE | ≥25 & <50 PARTIAL | <25% INSUFFICIENT

CRITERIA	PILOT SITES									REST-COAST AVERAGE
	ARCACHON BAY	EBRO DELTA	FOROS BAY	NAHAL DALIA	RHONE DELTA	SICILY LAGOONS	VENICE LAGOON	VISTULA LAGOON	WADDEN SEA	
C1. Societal challenges	78%	78%	83%	78%	67%	78%	72%	33%	78%	**72%**
C2. Integrated systems perspective	56%	39%	72%	61%	72%	44%	67%	33%	56%	**56%**
C3. Enhanced biodiversity and ecosystem integrity	76%	76%	95%	67%	86%	67%	95%	38%	48%	**72%**
C4. Financial feasibility and economic justification	20%	40%	53%	67%	53%	73%	80%	20%	53%	**51%**
C5. Inclusive governance and equity	11%	19%	56%	63%	48%	56%	70%	30%	59%	**46%**
C6. Balancing goals and impacts	27%	20%	27%	7%	73%	40%	87%	13%	93%	**43%**
C7. Adaptive management	61%	39%	67%	61%	72%	67%	89%	17%	72%	**61%**
C8. Enhancing sustainability and mainstreaming	67%	73%	60%	60%	67%	53%	73%	33%	73%	**62%**
PILOT OVERALL SCORE	**48%**	**47%**	**65%**	**59%**	**67%**	**60%**	**79%**	**28%**	**65%**	**57%**

At project level, the **REST-COAST average score reached 57%, corresponding to an Adequate level of adherence to the NbS Standard.** Among the eight criteria, the strongest overall performance was recorded under Criterion 1 "*Societal challenges*" and Criterion 3 "*Enhanced biodiversity and ecosystem integrity*", both achieving an average score of 72%, followed by Criterion 8 "*Enhancing sustainability and mainstreaming*" (62%), Criterion 7 "*Adaptive management*" (61%), and Criterion 2 "*Integrated systems perspective*" (56%).

Lower average scores were observed under Criterion 4 "*Financial feasibility and economic justification*" (51%), Criterion 5 "*Inclusive governance and equity*" (46%), and Criterion 6 "*Balancing goals and impacts*" (43%).

At Pilot Site level, Venice Lagoon recorded the highest overall score (79%), corresponding to a Strong level of adherence. This was followed by Rhone Delta (67%), Foros Bay (65%), and Wadden Sea (65%), all classified as Adequate. Nahal Dalia (59%) and Sicily Lagoons (60%) also achieved an Adequate level of adherence, while Arcachon Bay (48%) and Ebro Delta (45%) were classified as Partial. The lowest overall score was recorded for Vistula Lagoon (28%), corresponding to an Insufficient level of adherence to the NbS Standard.

To complement the tabular results, radar charts at both Pilot and project levels provide a more visual and comparative reading of performance across the NbS Standard. **Figure 3** presents the comparative performance of all REST-COAST Pilot Sites against each criterion, allowing cross-site comparison

and identification of stronger and weaker areas of performance. **Figure 4** illustrates the average project performance by criterion, highlighting the overall level of adherence of REST-COAST to the NbS Standard. Lastly, **Figure 5** provides the individual performance profiles of each Pilot Site, showing how each intervention performs against the four levels of adherence: Strong, Adequate, Partial, and Insufficient.

These results presented here are further explored in the following sections through a more detailed analysis by Pilot Site and by criterion, providing the basis for the overall conclusions and the formulation of targeted recommendations for strengthening and scaling up NbS interventions across the REST-COAST project.

FIGURE 3. COMPARATIVE PERFORMANCE OF REST-COAST PILOT SITES ACROSS THE EIGHT CRITERIA OF THE NBS STANDARD.

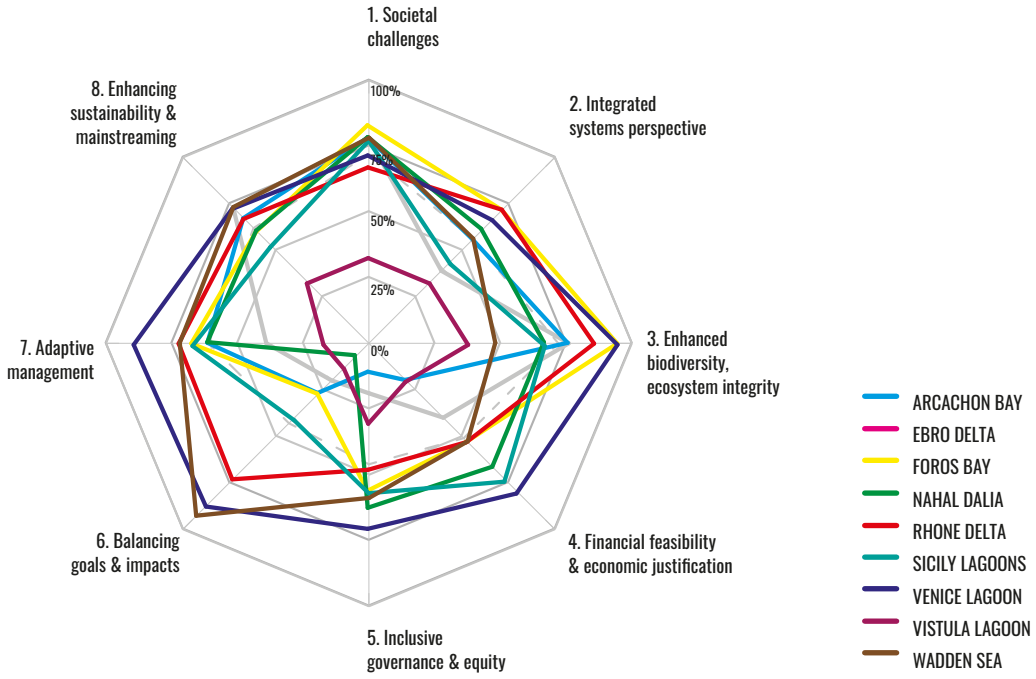


FIGURE 4. AVERAGE PERFORMANCE OF REST-COAST PILOT SITES BY CRITERION AGAINST THE NBS STANDARD.

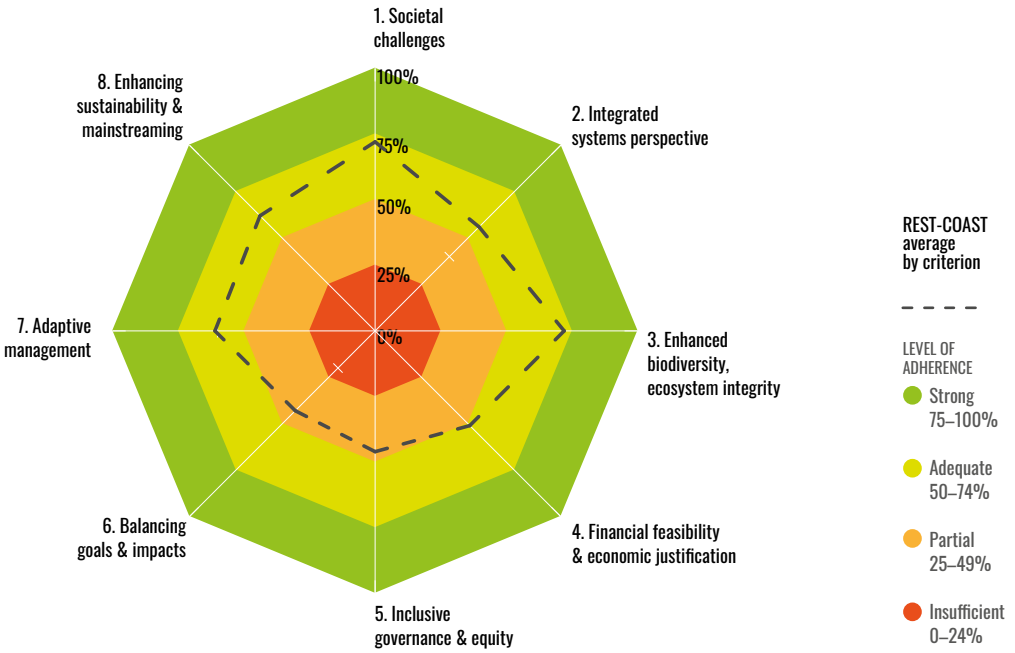
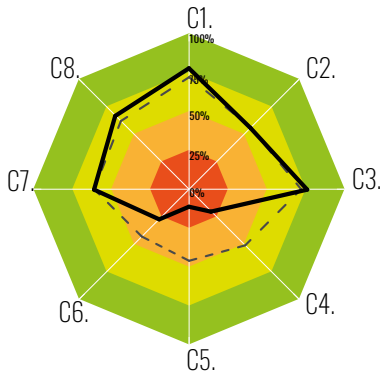
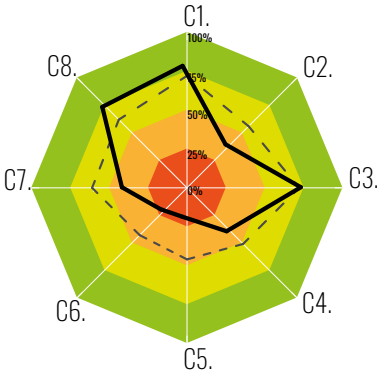


FIGURE 5. INDIVIDUAL PERFORMANCE PROFILES REST-COAST PILOT SITES ACROSS THE EIGHT CRITERIA OF THE NBS STANDARD.

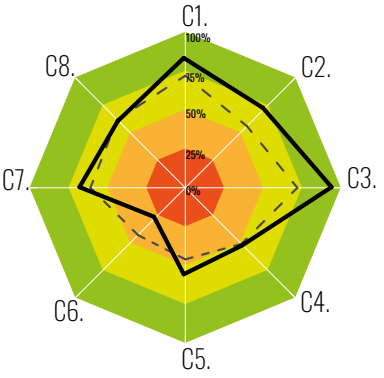
ARCACHON BAY



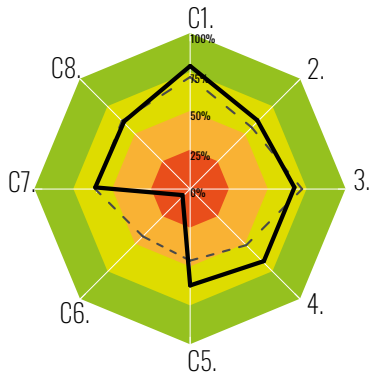
EBRO DELTA



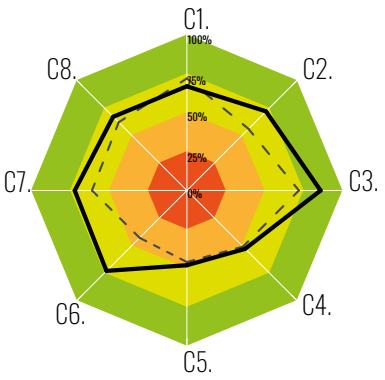
FOROS BAY



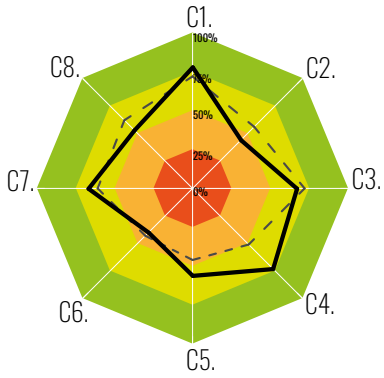
NAHAL DALIA



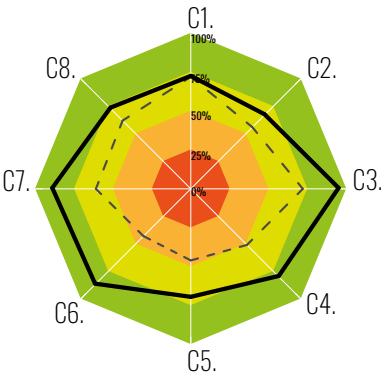
RHONE DELTA



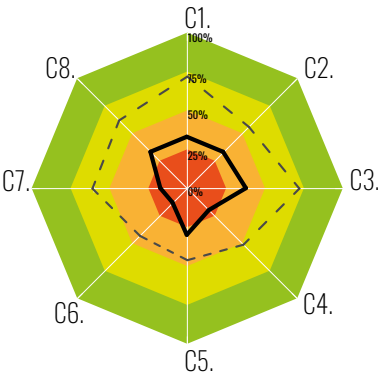
SICILY LAGOONS



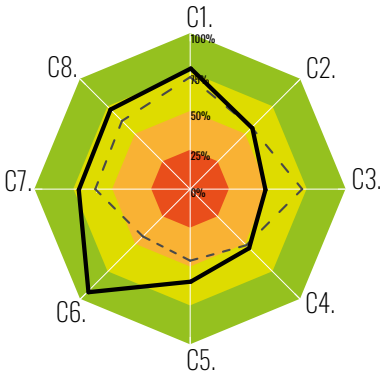
VENICE LAGOON



VISTULA LAGOON



WADDEN SEA



NbS GLOBAL STANDARD CRITERIA

C1. Societal challenges	C2. Integrated systems perspective	C3. Enhanced biodiversity, ecosystem integrity	C4. Financial feasibility & economic justification	LEVEL OF ADHERENCE Strong 75–100% Partial 25–49% Adequate 50–74% Insufficient 0–24%	PILOT SITE SCORE REST-COAST AVERAGE
C5. Inclusive governance & equity	C6. Balancing goals & impacts	C7. Adaptive management	C8. Enhancing sustainability & mainstreaming		

4. ANALYSIS OF REST-COAST PILOT SITES' ADHERENCE TO THE IUCN NBS GLOBAL STANDARD

The results of the Standard application were further analysed both by criterion and by the overall performance, for each Pilot Site and for the project. The assessment results indicate a heterogeneous level of performance across Pilot Sites (**Figure 3**), with most interventions meeting the NbS Standard at least at an **Adequate** level for almost all criteria (**Figure 4**). The overall balance and performance profile varies considerably among Pilots, reflecting differences in implementing maturity, ecological and socio-economic contexts, enabling conditions, governance structures and institutional capacity.

Although performance levels vary substantially among Pilot Sites, the overall pattern reveals several common challenges across the project. These include limited accounting of costs and benefits, insufficient economic feasibility or cost-effectiveness analyses, constraints in establishing inclusive and transparent governance mechanisms, and difficulties in explicitly identifying, assessing and managing trade-offs between ecological, social and economic objectives.

The aggregated results in **Table 5** show that none of the NbS Standard's Criteria reached the "Strong" level at project average, although **Criterion 1** "*NbS effectively address societal challenges*" and **Criterion 3** "*NbS result in positive change in the state of biodiversity and enhanced ecosystem integrity, including connectivity*" recorded the highest average scores, both reaching a project average score of 72%, corresponding to the upper range of the "Adequate" level. This strong performance can be attributed to the fact that, across most Pilots, societal challenges are clearly identified, documented and prioritised, while interventions are supported by evidence-based assessments, baseline studies and biodiversity monitoring frameworks.

Adequate performance, although at a lower level, was also observed for **Criterion 8** "*Sustainability and mainstreaming*" (62%), and **Criterion 7** "*Adaptive management*" (61%). This reflects that many Pilots have established monitoring, evaluation and learning mechanisms that support iterative learning and, in several cases, have begun to engage with policy frameworks and longer-term institutional arrangements.

In contrast, **Criterion 5** "*Inclusive governance and equity*" (46%) and **Criterion 6** "*Balancing goals and impacts*" (43%), were consistently identified as the weakest criteria, closely followed by **Criterion 4** "*Economic viability*" (51%). These results indicate persistent gaps in stakeholder participation, governance transparency, benefit-sharing mechanisms, long-term financing strategies, and the explicit management of trade-offs between biodiversity conservation and socio-economic development.

Across the eight criteria, **Criterion 2** "*Integrated systems perspective*" showed the highest level of homogeneity in assessment results among the Pilot Sites, with comparatively lower variability in scores. This suggests a more consistent consideration of interactions between ecological, social and economic systems across the Pilots, compared to other criteria where performances diverge more markedly.

At Pilot Site level, overall scores ranged from strongly performing sites, such as Venice Lagoon (79%) and Rhone Delta (67%), closely followed by Foros Bay (65%) and Wadden Sea (65%), to Pilots with more limited alignment across multiple criteria. Vistula Lagoon represents the clearest example of the latter, scoring below the project average across all eight criteria and achieving an overall score of 28%, very close to the Insufficiency (0-24%) and substantially lower than the project average (57%).

Taken together, the assessment results and graphical evidence suggest that, while NbS implementation across the Pilots is generally robust in ecological and technical terms, **greater attention is needed to strengthen economic viability, inclusive governance, and the explicit assessment and management of trade-offs**. Addressing these dimensions will be critical for improving the long-term sustainability, scalability and mainstreaming of NbS interventions beyond the pilot phase and across broader policy and planning frameworks.

Intertidal zone in the Schleswig-Holstein Wadden Sea National Park (Germany)

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4.1 ANALYSIS BY PILOT SITE

This section presents a criterion-by-criterion analysis of the application of the IUCN NbS Global Standard at pilot level. Each Pilot Site is introduced through a concise overview of the local context and the adaptation measure categories applied, which is complemented by results visualised using a radar chart and an extended analysis of the criteria. Lastly, a summary of the strengths and weaknesses identified through the assessment is provided, supporting the formulation of conclusions and recommendations. Together, these elements offer a structured basis for understanding how the assessed restoration actions relate to the different criteria of the Standard.

ARCACHON BAY
PARTIAL (48%)

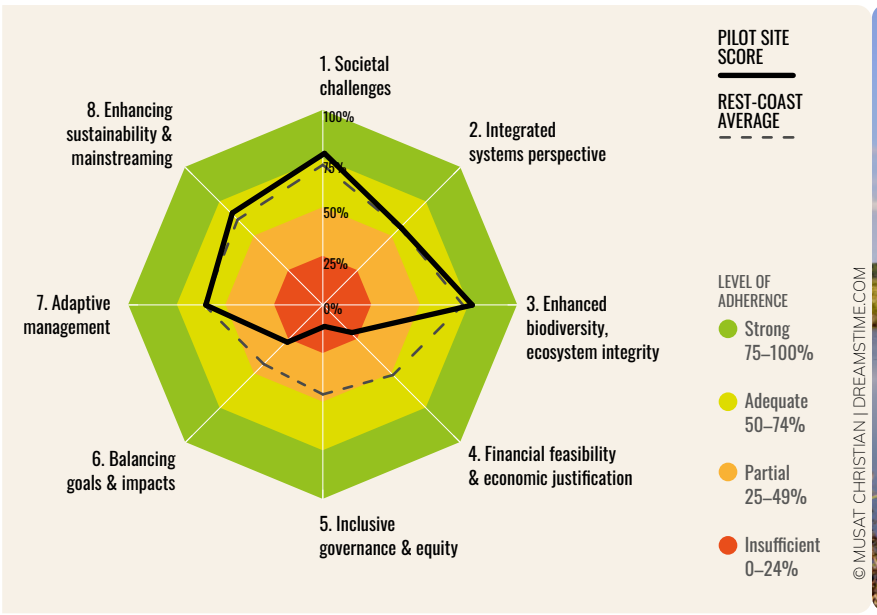
COASTAL WETLAND RESTORATION

The Arcachon Bay Pilot Site focuses on restoring and enhancing intertidal seagrass meadows, primarily *Zostera noltei*, as a response to long-term degradation driven by hydrodynamic stress, sediment instability and increasing climate-related pressures. The bay is a highly productive land–sea transition system, characterised by extensive intertidal flats, seagrass beds, saltmarshes and shallow subtidal areas, which play a key role in sediment dynamics, carbon storage, water quality regulation and habitat provision. These habitats support high biodiversity and underpin important ecosystem services, including fisheries productivity, shoreline stabilisation and climate regulation.

Arcachon Bay is a protected and intensively managed coastal system, designated under multiple conservation and management frameworks, including Natura 2000 and national marine protection instruments, which provide a legal and institutional basis for conservation, restoration and spatial planning. At the same time, the bay sustains strong socio-economic activities, particularly shellfish farming, fisheries, tourism and recreation, requiring restoration interventions to be carefully integrated within a complex multi-actor governance setting.

Within this context, the Pilot implemented a biomimetic NbS based on modular, permeable structures (Roselière®) inspired by the configuration and functioning of natural saltmarshes and seagrass meadows. These structures are strategically deployed to attenuate wave energy and tidal currents, reduce near-bed shear stress, and promote sediment deposition and stabilisation, thereby improving substrate stability and enabling the natural recovery and expansion of seagrass meadows. The approach prioritises the use of ecological processes over hard engineering, relying on untreated or low-impact materials and reversible installation techniques to ensure adaptability and environmental compatibility. Monitoring activities have included hydrodynamic measurements, sediment dynamics and ecological indicators such as seagrass shoot density, spatial expansion, and associated biodiversity. Through these measures, the intervention aims to deliver multiple ecosystem services, including carbon sequestration (blue carbon), shoreline stabilisation, habitat provision, and increased ecosystem resilience to climate-driven pressures such as sea-level rise and storm intensification.

FIGURE 6. ARCACHON BAY PILOT PERFORMANCE AGAINST THE IUCN NBS GLOBAL STANDARD CRITERIA.



Marshes in the Bay of Arcachon near Arès

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FIGURE 7. GENERAL VIEW DURING DEPLOYMENT (OCTOBER 2023) AND SPATIAL PROGRESSION OF VEGETATION FROM THE TRANSPLANT AREAS (2025) AT THE ARCACHON BAY PILOT SITE. © SEABOOST

2023 2025

Criterion 1 (78%, Strong). The Pilot has identified and developed a good understanding of the societal challenges addressed by the intervention and their underlying drivers at different levels. This information has been made accessible to stakeholders and rights-holders, supporting transparency and awareness. However, not all the work undertaken has been systematically documented, resulting in a partial knowledge gap. Societal challenges relevant to stakeholders and rights-holders have been prioritised through ongoing engagement and discussion, although a formal and consolidated documentation process is still lacking. In addition, the Pilot has carried out a robust identification, benchmarking, and assessment of the intervention outcomes at the pilot-scale level. Expected outcomes have also been modelled to explore potential scaling-up effects and to better define medium- and long-term impacts. Overall, the identified outcomes are firmly grounded in ecosystem-based solutions and supporting the strong performance of the Pilot under this criterion.

Criterion 2 (56%, Adequate). The implemented intervention recognises and responds to key interconnections between ecosystems, local economic activities and societal uses within the Arcachon Bay context. These interactions have been explicitly considered throughout the design and deployed phases of the intervention, supporting a better understanding of the potential performance of the intervention over time. It has been developed and implemented in conjunction with complementary scientific, governance and management actions, reflecting an integrated approach grounded in ecological and operational knowledge. However, synergies across sectors have not been systematically identified or documented, indicating a remaining gap in assessing and understanding cross-sectoral impacts beyond the immediate ecological domain. In addition, while potential risks associated with the intervention have been identified and documented, a comprehensive and formalised risk management plan has not yet been developed. This limits the Pilot's ability to systematically assess, monitor and respond to risks, and represents an area for further strengthening under this criterion.

Criterion 3 (76%, Strong). The Pilot has developed a robust baseline assessment of the status of relevant ecosystems prior to the implementation of the intervention, providing a sound reference point for subsequent monitoring activities. This baseline assessment has been informed by scientific evidence, academic inputs, and available datasets. A similar level of analysis has been applied to the identification and assessment of key drivers of ecosystem degradation and biodiversity loss. In addition, the Pilot has identified and assessed opportunities to enhance ecosystem integrity, although some of these elements have not yet been fully documented, indicating a remaining knowledge gap. SMART biodiversity outcomes have been defined; however, they only partially address biodiversity enhancement or ecosystem recovery objectives. Biodiversity targets and indicators are in place but have so far been only partially assessed, which limits the ability to comprehensively demonstrate biodiversity gains and creates some uncertainty regarding the overall intervention performance in this respect. Furthermore, a monitoring plan has been defined to support the assessment of biodiversity outcomes and potential impacts. Nevertheless, additional clarification and documentation are needed regarding the content, implementation and use of this plan to fully support long-term monitoring and management of biodiversity net gain.

Criterion 4 (20%, Insufficient). Stakeholders and rights-holders associated with societal costs and benefits of the intervention have been identified through stakeholder mapping and governance processes. Even so, understanding and documentation of both upfront and future financial and social costs and benefits remain limited. This constrains the ability to demonstrate distributional equity and to substantiate the economic justification of the restoration intervention. Furthermore, the Pilot has not conducted a cost-effectiveness analysis or comparable assessment comparing the intervention against alternative solutions, resulting in a significant knowledge gap regarding the relative economic and social benefits of the restoration. Likewise, financial mechanisms to ensure long-term viability of the intervention have neither been identified nor secured, which limits planning capacity for sustained performance, maintenance and potential upscaling.

Criterion 5 (11%, Insufficient). The Pilot has not identified or documented directly and indirectly affected stakeholders and rights-holders, nor clarified their respective rights, uses and responsibilities in relation to the restoration intervention. While a wide range of actors are present in the Arcachon Bay context, including authorities, scientific institutions, NGOs and oyster farmers, stakeholder engagement remains fragmented and uneven, reflecting broader institutional complexity and competing socio-economic interests highlighted in the governance analysis conducted under the project. The Pilot operates externally to formal local governance and has no formal mandate within decision-making bodies. As a result, no transparent and accessible grievance and conflict-resolution mechanism have been developed or implemented, despite ongoing tensions related to space use and restoration activities, particularly with oyster farming interests. Although dissemination and dialogue efforts have increased awareness of restoration benefits among some actors, these processes have not translated into inclusive, structured or effective participation in decision-making. Furthermore, the Pilot has not established a transparent, documented and accessible decision-making process. While the intervention approach is conceptually based on principles of inclusive participation, mutual respect and equality, there is limited evidence demonstrating how these principles are operationalised in practice. Taken together, these gaps indicate a low level of alignment with the requirements of inclusive governance and equity under this criterion, largely constrained by institutional fragmentation and the external positioning of the Pilot within the local governance framework.

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Oyster farming.

Criterion 6 (27%, Partial). The Pilot has established safeguards and corrective actions to address potential risks associated with the intervention. The decision-making process underpinning these safeguards is described as transparent, inclusive, and participatory, involving relevant stakeholders and rights-holders, and is implemented through the management plan of the Arcachon Bay Natural Park. Nevertheless, the Pilot has not provided clear evidence that these safeguards and corrective actions have been effectively implemented, monitored, or systematically documented. In addition, it remains unclear whether information on these measures is available and accessible to affected stakeholders and rights-holders. There is also no evidence demonstrating that the safeguards and corrective actions are periodically reviewed and adapted based on observed outcomes. These gaps limit the ability to assess how trade-offs and unintended impacts are actively managed over time, indicating partial alignment with the requirements of this criterion.

Criterion 7 (61%, Adequate). Based on the Nature Park management plan, the Pilot has defined expected intervention in light of prevailing conditions and drawing on scientific, local and traditional knowledge. Learning processes have also been supported through the development of modelling and scenario-based tools (e.g. ESS assessment and QSST outputs), which provide a robust evidence base on the performance and potential impacts of the intervention. A monitoring and evaluation framework has been established supporting adaptive learning; however, gaps remain in the systematic documentation and consolidation

of information gathered during implementation and monitoring activities. While the Pilot contributes to learning, knowledge sharing and strategic reflection on restoration scenarios, this knowledge is not yet consistently translated into operational management adjustments. Furthermore, although corrective actions and improvements have been discussed through an inclusive and participatory approach, these actions have not been triggered, guided or revised through the monitoring and evaluation plan. This limitation is likely linked to the external positioning of the Pilot with respect to formal governance structures, which constrains the ability to close adaptive feedback loops between evidence generation, decision-making and management adjustment. Overall, the Pilot demonstrates partial alignment with adaptive management requirements, with stronger performance in learning and evidence generation than in the implementation of adaptive responses.

Criterion 8 (67%, Adequate). The Pilot has identified and documented key lessons learnt through the design and implementation of the restoration intervention, which have informed potential upscaling pathways. Tangible impacts have been demonstrated at local and sub-national levels, notably in relation to seagrass restoration, ecosystem services provision and coastal resilience, strengthening the case for wider replication. However, while the intervention shows strong potential to inform broader restoration strategies, evidence of influence on national or international policy, financing or regulatory frameworks remains limited. Despite growing recognition of the Pilot's technical and scientific outputs among local and subnational actors, the absence of formal institutional embedding and the external positioning of the Pilot within governance structures constrain its capacity to effectively mainstream NbS approaches at higher levels. Overall, the Pilot performs well in generating transferable knowledge and supporting future scaling-up efforts, but stronger alignment with formal governance, policy and funding frameworks would be required to fully enable long-term mainstreaming of this NbS beyond the local and sub-national context.

STRENGTHS

Understanding Challenges (C1): Excellent identification of social challenges and their causes. Expected outcomes are scientifically modelled to anticipate long-term impacts and facilitate scaling up.

Solid Ecological Basis (C3): Very robust baseline assessment supported by scientific and academic data. SMART targets for biodiversity have been defined, and there is a good understanding of what degrades the ecosystem.

Lessons Learnt (C8): Adequate capacity to document lessons learnt during design and implementation to inform future projects.

Use of Knowledge (C7): Outcomes are based on a combination of science and local/traditional knowledge, integrated into the Natural Park's management plan.

WEAKNESSES

Inclusive Governance (C5): This is the greatest weakness. The Pilot operates outside of formal decision-making bodies, lacks conflict resolution mechanisms (despite tensions with oyster farmers), and stakeholder participation is fragmented.

Economic Viability (C4): Funding for long-term maintenance has not been identified or secured. A cost-effectiveness analysis comparing this solution with traditional alternatives is lacking.

Risk Management and Safeguards (C2 and C6): Although risks have been identified, there is no formalised risk management plan. Safeguards exist in theory within the Natural Park, but there is no evidence that they are monitored, documented, or shared with those affected.

Documentation Gaps: Despite the positive technical results (C1, C2, C3), information and intersectoral synergies need to be systematised, leading to knowledge gaps that affect transparency.

EBRO DELTA
PARTIAL (47%)

COASTAL WETLAND RESTORATION

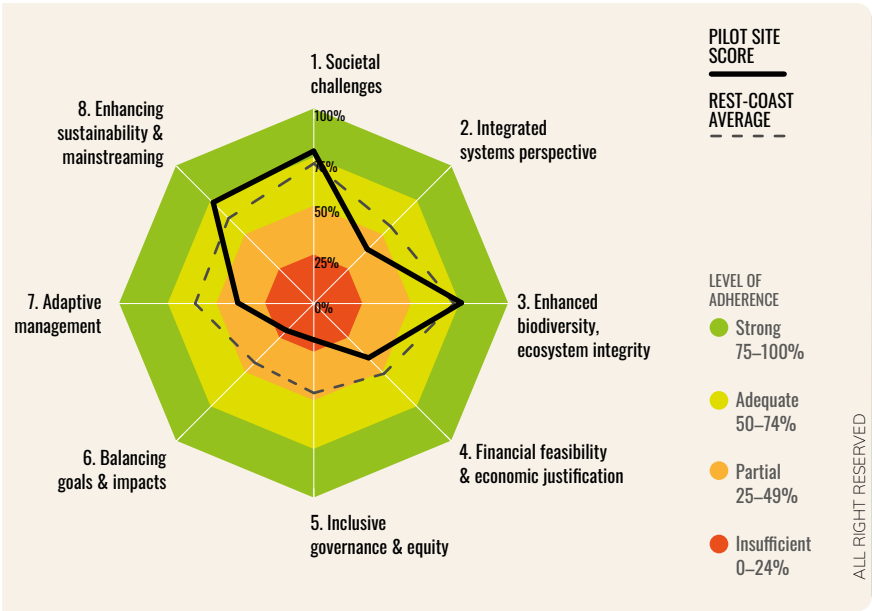
SEDIMENT MANAGEMENT

CLIMATE-RESILIENT FOOD PRODUCTION

The Ebro Delta Pilot Site is focused on increasing the room for the coast as a response to long-term sediment deficit, coastal erosion and increasing climate-related risks. The area encompasses a mosaic of coastal and transitional habitats, including sand beaches, dune systems, coastal lagoons, wetlands and saltmarshes, which are key to support high ecological productivity and play a critical role in sediment dynamics, water quality regulation and flood attenuation maintaining ecosystem services and biodiversity. The Ebro Delta is also a biodiversity hotspot, particularly for avifauna, formally designated as protected under different instances, Natural Park by the Catalonian government, Natura 2000 site under the Habitats and Birds Directives, and Ramsar site providing the area with ground tools for management and planning as well as legal framework for conservation and restoration. That protection status underpins the implementation of nature-based restoration measures while requiring careful coordination with multiple stakeholders and productive uses, including agriculture, fisheries and aquaculture. The objective has been to enable cross-shore and longshore ecological connectivity by removing or softening artificial barriers and reconnecting the Mediterranean Sea with backshore lagoon and saltmarsh systems across the deltaic plain and fostering continuous sediment fluxes in the nearshore zone, as well as pilots of river pulses to connect (in terms of solid transport) the lower river course to the delta. This approach aims to restore natural hydro-morphological processes, improve water renewal and sediment circulation in the lower river, coastal bays (e.g. Fangar), and enhance the natural resilience of wetlands, beaches and dune systems under flooding, erosion and salinisation.

The restoration strategy has been developed and implemented within a complex multi-level governance context, involving national, regional and local authorities, water and land managers, protected area administrations, irrigation communities, conservation organisations, and local economic actors, particularly those linked to agriculture, fisheries and aquaculture. Governance arrangements have relied on structured stakeholder engagement through participatory platforms, including the REST-COAST CORE-PLAT processes, which builds on previous co-management Tables and civil society engagement, supporting dialogue, knowledge exchange and coordination among actors with diverse and sometimes conflicting interests. These mechanisms have been particularly relevant in addressing trade-offs related to sediment management, water allocation, coastal protection and productive uses of the delta.

FIGURE 8. EBRO DELTA PILOT PERFORMANCE AGAINST THE IUCN NBS GLOBAL STANDARD CRITERIA.



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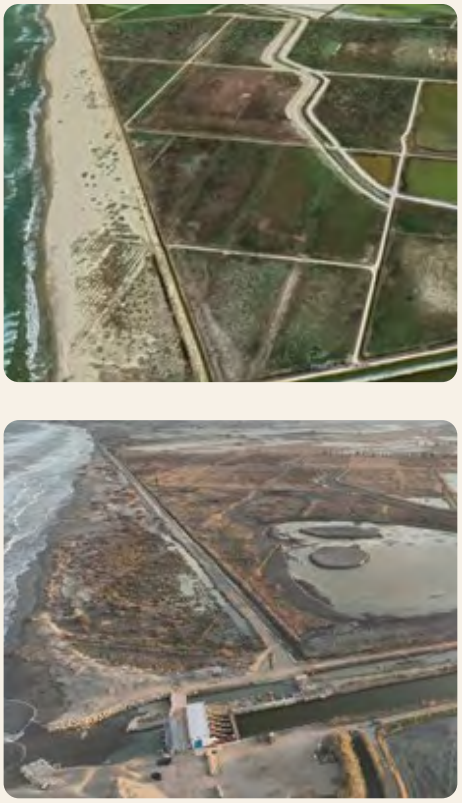
Bivalve aquaculture in Fangar Bay, with rice fields bordering the coastline in the northern hemidelta.

Criterion 1 (78%, Adequate). The Pilot has clearly identified the main societal challenges addressed by the restoration, particularly those related to coastal erosion, flood risk, sediment deficit, salinisation, and the long-term viability of productive and natural systems in the Delta. These challenges are well understood and have been largely documented through technical reports, scientific studies and governance analyses. Remaining information gaps are primarily related to long-term dynamics and uncertainties, such as sediment management at basin scale and future climate impacts, which are still being addressed within the scope of the Pilot and ongoing institutional processes. The most pressing societal challenges for stakeholders and rights-holders have been identified and prioritised through structured multi-stakeholder dialogue, notably via the CORE-PLAT, which has served as a key arena for aligning perspectives among public authorities and their competent bodies (from local to national), irrigation communities, agricultural representatives and conservation organisations. Relevant information underpinning these challenges is publicly available through reports, institutional documentation and scientific publications. The Pilot has also benchmarked and periodically assessed several restoration outcomes linked to the identified societal challenges. However, not all outcomes have yet been systematically benchmarked or assessed indicating scope for further strengthening the comprehensiveness of outcome evaluation. Monitoring data collected before and after implementation of restoration measures are stored in institutional repositories, and when results are disseminated, primarily through scientific papers, at least the abstract is made publicly accessible. This demonstrates an adequate performance of the restoration interventions under this criterion, while highlighting the need to further consolidate long-term documentation and assessment of societal outcomes.

Criterion 2 (39%, Partial). The Pilot has designed the restoration measures with a clear recognition of key interconnections between ecological processes, socio-economic activities, and cultural practices within the context of the Delta. In particular, interactions related to coastal erosion, sediment dynamics, agricultural uses, water management and local livelihoods have been identified and considered during the design and implementation of the intervention. Some of these interdependencies have also been discussed over time through multi-stakeholder dialogue platforms, such as the CORE-PLAT, supporting shared understanding across sectors. However, while synergies with initiatives in other sectors have been identified (e.g. sediment management, wetland restoration and climate resilient food production), the Pilot has not systematically integrated complementary interventions into a coherent, cross-sectoral strategy. On the other hand, governance

FIGURE 9. UPSCALING AREA AT THE EBRO DELTA PILOT SITE BEFORE AND AFTER RESTORATION. © GOOGLE (2023); FERRAN VALERO GILS/MITECO (2025)



research highlighted that complex and overlapping governance structures, divergent institutional priorities and misaligned timelines across policy domains limit the operationalisation of an integrated systems perspective at scale. Potential risks related to restoration intervention, including those linked to sediment availability, salinisation, water governance conflicts and long-term climate impacts have not been comprehensively identified, documented or assessed in an integrated manner. No stand-alone or consolidated risk management plan has been developed to capture these systemic risks. This constrains the Pilot's capacity to fully anticipate, manage and adapt to interactions across ecological, economic, social and cultural systems. Altogether, these gaps indicate partial alignment with this criterion, with stronger performance in recognising system interconnections than in operationalising them through integrated planning and risk management.

Criterion 3 (76%, Adequate). The Pilot has designed the monitoring of the restoration measures performance using a BACI approach. As a result, datasets, monitoring, protocols and a substantial share of reports and scientific publications are structured around a clearly defined ecosystems and biodiversity baseline, as well as the main drivers

Flooded rice fields in Ebro Delta

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affecting the site. This approach provides a solid foundation for evaluating biodiversity change and ecosystem responses to the NbS intervention. In addition, the Pilot has identified and assessed several opportunities to enhance ecosystem integrity, and a long-term monitoring programme is being implemented accordingly, including a sample monitoring of land levels with SET and the emerged beach evolution with UAV. Biodiversity enhancement, ecosystem integrity, and connectivity have been core objectives of the REST-COAST restoration actions at the site, and public technical and scientific reports explicitly address these aspects. Nevertheless, while biodiversity-related targets and indicators have been put in place, their assessment remains partial, indicating scope for strengthening quantitative evaluation of outcomes. Thanks to the long-term monitoring programme, potential unintended impacts on the interventions on nature are periodically identified and assessed. Nevertheless, the monitoring framework does not yet include clearly defined response mechanisms to systematically guide management adjustments when such impacts are detected. This limits the full operationalisation of adaptive biodiversity management and represents a remaining gap under this criterion, despite the overall solid performance of the restoration in terms of biodiversity and ecosystem integrity.

Criterion 4 (40%, Partial). The Pilot's restoration interventions represent one of the final steps in a long-term process aiming to restore the ecological functioning of wetlands and dune systems in the Ebro Delta. Implementation has followed a funding model, whereby the actual cost of doing the intervention associated with the design and execution have been covered through successive co-funded projects, where the competent administrations and research groups have been involved. These costs have been estimated upfront and detailed in the corresponding project proposals. Long-term maintenance has been assigned to the Ebro Delta Natural Park or the relevant coastal and basin authorities, which have identified the required types of maintenance activities and understand their associated costs. However, while maintenance needs are recognised, long-term operational cost planning is not consolidated within a dedicated and secured financial framework, remaining dependent on institutional capacity and annual budget availability. The Pilot has relied on the identification of stakeholders and rights-holders established by the Natural Park Authority, without further developing an analysis of the distribution of long-term costs, benefits, risks and returns among these actors. Furthermore, the Pilot has not carried out a cost-effectiveness analysis or comparable economic assessment comparing the interventions with alternative solutions, resulting in limited evidence on the relative economic advantages of the intervention. Consequently, the economic justification of the restoration measures remains only partially documented. At the same time, the long-term economic viability of the interventions is based on the functioning of the intervention itself and the commitment of competent authorities. This approach focuses on restoring natural ecological and hydromorphological processes, supported

by monitoring, technical control and CORE-PLAT discussions. Following an initial active phase to re-establish cross-shore and long-shore connectivity by removing artificial barriers, providing further sediment volumes in the nearshore and reconnecting the sea with backshore lagoon and saltmarsh systems, ecosystem recovery is largely driven by self-regulating dynamics. Natural coastal dynamics, however, are not enough in severely eroding areas affected by high relative sea level rise rates. Vegetation colonisation and habitat regeneration significantly reduce the need for recurrent technical maintenance over time in deltaic plain areas while such a technical maintenance, although reduced, is still required for the coastal fringe. This process-based approach contributes to long-term economic feasibility by minimising recurrent costs while delivering multiple co-benefits, including coastal protection, biodiversity recovery and climate resilience, particularly in areas where flood, erosion and salinisation risks make traditional rice farming an urban settlement maintenance progressively more challenging. Overall, while the financing approach has enabled implementation and supports a low-maintenance NbS model in the long term, gaps remain in demonstrating comparative economic performance, distributional equity and fully secured long-term financial sustainability, justifying a partial alignment with this criterion.

Criterion 5 (19%, Insufficient). The Pilot has identified directly affected stakeholders and rights-holders, their rights, uses and responsibilities. The design of the intervention was developed in collaboration with the landowners (a private foundation for the deltaic plain, and the Ministry of Ecological Transition for the coastal fringe), with the agreement of the local environmental authority (Ebro Delta Natural Park), rice farming representatives and other competent authorities. These actors actively participated in most of the CORE-PLAT sessions, which served as a key platform for dialogue and coordination during the implementation phase of the intervention. The Pilot has not established a transparent, accessible and formally implemented grievance and conflict-resolution mechanism. As highlighted in the governance analysis, where the CORE-PLAT has enabled dialogue and trust-building among several stakeholders, it does not constitute a dedicated or institutionalised grievance mechanism capable of systematically addressing disputes or safeguarding stakeholder rights over time. This represents a significant gap in ensuring inclusive governance. Furthermore, although the NbS is conceptually grounded on inclusive participation, mutual respect and equality, there is limited documentation demonstrating how these principles are operationalised in practice. The governance analysis conducted in the project also indicates that participation remains uneven, with challenges in ensuring the sustained and effective inclusion of all relevant stakeholder groups, particularly beyond

A rigid coastal defence structure protecting a historic restaurant from coastal erosion (La Punta del Fangar, Deltebre)

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project-driven engagement processes. In addition, the Pilot has not defined a transparent, documented and accessible decision-making process that clearly explains how stakeholder inputs are considered and integrated into decisions. Taken together, these limitations indicate weak institutionalisation of inclusive governance mechanisms and insufficient safeguards for equitable participation, justifying an insufficient level of performance under this criterion.

Criterion 6 (20%, Insufficient). The Pilot is using monitoring results, unevenly distributed over time, to assess intervention performance and impacts, but has not yet developed structured safeguards and corrective action plans to address potential trade-offs or unintended socio-ecological impacts associated with the interventions. Consequently, maintenance continues being a mix of reactive and proactive measures, with a partial documentation which hinders implementation or transfer to stakeholders and rights-holders. In the absence of more systemic plans and corrective measures, there is only partial evidence to assess negative impacts, with insufficient data for systematic identification, monitoring or management. Moreover, no structured mechanisms are in place to periodically review or adapt responses to emerging risks or impacts. This indicates a partial consideration for balancing objectives and managing trade-offs throughout the restoration intervention life cycle. This criterion indicates the need to carry out a more structured planning across scales and domains, leading to better documented processes or actions to safeguarding against unintended impacts and balancing goals. Such an advance would reduce the current gap in the implementation of the restoration interventions, providing an objective base for a fair balance in goals and compensation or mitigation of impacts.

Criterion 7 (39%, Partial). The Pilot has defined expected restoration outcomes given prevailing environmental conditions and drawing on scientific, local and traditional knowledge. The limited documentation demonstrating how this knowledge has been systematically captured and used to guide NbS implementation over time, can be illustrated by the blueprints and papers for the embryonic dune construction, including data UAV monitoring. A Monitoring and Evaluation Plan has been developed and implemented, providing a basis for continuous learning and more proactive maintenance. Nevertheless, the plan shows gaps in terms of scope and completeness, as not all relevant aspects of NbS implementation, performance and impacts are consistently considered. Available information shows that monitoring results are analysed and used to inform management decisions in the frame of bilateral meetings, which should be run more regularly and with a stable protocol, such as the one proposed for the CORE-PLATs. Moreover, only some no corrective actions have been implemented or explicitly triggered through the plan or the associated learning processes. As a result, feedback loops between monitoring, learning and management adjustment are only partial and need an improved structure to become fully operational. These limitations indicate that, while some adaptive management is in place, a systemic NbS adaptative management remains partial and could be substantially improved.

Criterion 8 (73%, Adequate). The Pilot has captured and documented key lessons learnt from designing and implementing the interventions, although the derived information is not yet fully consolidated in a systematic and comprehensive manner. Nevertheless, these lessons have been actively used to support the replication of the restoration actions in four additional coastal areas under the same approach. Two of them have been already implemented, while the other two are currently being projected. The contribution of these restoration actions to relevant jurisdictional environmental, economic, and social targets and frameworks has been proven, reinforced by the two replication initiatives, also illustrating the transferability of the approach and its relevance beyond the original intervention area. Overall, the Pilot shows good performance in terms of mainstreaming and upscaling, while further strengthening documentation would enhance the robustness and visibility of these efforts.

STRENGTHS

Knowledge Management and Science (C1): Excellent identification and prioritisation of societal challenges. Monitoring data is stored in institutional repositories and published in scientific articles, ensuring transparency.

Rigorous Ecological Monitoring (C3): Use of a sound scientific approach (BACI: Before-After, Control-Impact). A long-term monitoring programme is in place to assess changes in ecosystem integrity and connectivity.

Scalability and Replication (C8): Lessons learnt have already been used to successfully replicate the solution in two other coastal areas, demonstrating strong scalability.

Process Sustainability (C4): The approach based on natural processes (self-regulation) reduces the need for continuous technical maintenance, improving long-term economic viability by minimising recurring costs.

WEAKNESSES

Safeguards and Impacts (C6): Uneven monitoring and only partial safeguards or corrective actions are in place. This limits the potential to curb negative impacts and reduce risks, which could be greatly enhanced by more systemic and regular observation and analyses, leading to an informed balancing of goals.

Governance and Inclusion (C5): Low inclusive participation, although with a strong positive gradient compared to the former situation. There are not yet structured conflict resolution mechanisms or documented decision-making protocols for stakeholders.

Risk Management (C2): Although it acknowledges systemic interconnections, the Pilot has provided a partial identification of the risks associated with the intervention and lacks a formal risk management plan.

Adaptive Management (C7): Despite having a monitoring plan, corrective actions could be improved by a continuous learning process, integrating all available data and knowledge to support adaptive decisions. The Pilot is currently working on aggregating social-ecological data, new corrective actions are being designed and implemented, following a set of adaptation pathways that are being discussed with all competent authorities and stakeholders. This continuous adaptation process builds on the established CORE-PLAT, integrating all available data and knowledge to support adaptive decisions that evolve with climate and human pressures.

Economic Analysis (C4): There is a significant gap due to the lack of a cost-effectiveness analysis compared to other solutions, making it difficult to demonstrate the actual positive economic impact of the restoration.

FOROS BAY
ADEQUATE (65%)

COASTAL WETLAND RESTORATION

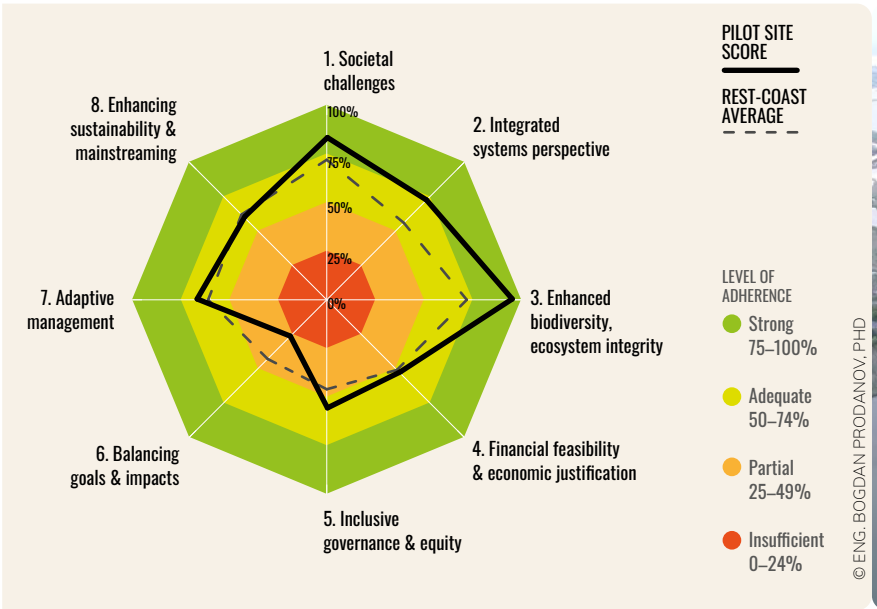
RESTORING HYDRAULIC CONNECTIVITY

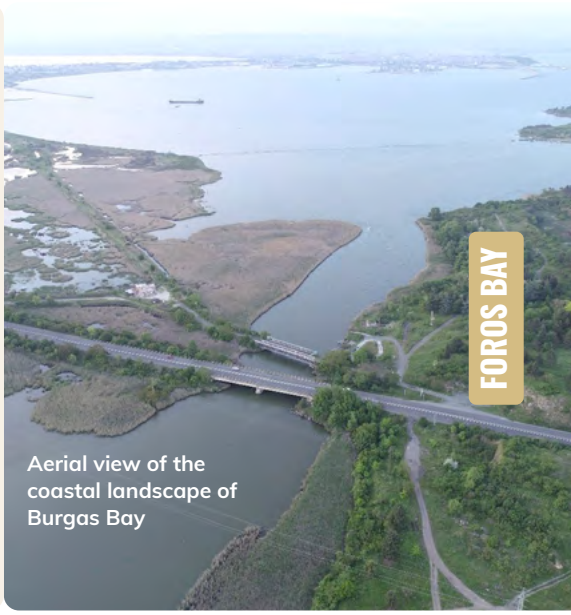
The Foros Bay Pilot Site, located in Burgas Bay on the Bulgarian Black Sea coast, focuses on the assessment and early implementation of NbS aimed at enhancing coastal protection, ecosystem functioning and ecosystem service provision. The area hosts ecologically valuable habitats, including sandbanks, estuaries, large shallow bays, reef communities and submerged angiosperm meadows, notably *Zostera* spp., as well as a high number of threatened and endangered species. These values led to include it in the Natura 2000 network, designated under both the EU Habitats and Birds Directives. However, the area is subject to long-term anthropogenic pressures that have significantly altered hydrodynamics, sediment transport and sea-land connectivity. Historical wetland drainage, port construction and expansion, the construction of hydraulic barriers, artificial connections with adjacent lakes, and increasing eutrophication from urban, industrial and agricultural sources have collectively reshaped the structure and functioning of the system. While many of these changes are irreversible, restoration efforts aim to stabilise current conditions, recover key habitats and prevent further ecological degradation.

The governance context involves environmental authorities at different levels, basin and water management institutions, municipalities, research organisations and protected-area managers. Key stakeholders include the Ministry of Environment and Water, the Black Sea Basin Directorate, the Regional Inspectorate of Environment and Water, the Municipality of Burgas, and scientific institutions, alongside local fishermen, community representatives and private actors with interests in coastal protection and port development. Governance challenges relate to balancing biodiversity conservation objectives with industrial, port and urban development pressures, as well as coordinating responsibilities across sectors and administrative levels.

Within this context, a demonstrative seagrass restoration intervention represents the most tangible climate adaptation measure implemented, targeting a sheltered sublittoral silty-sandy area currently devoid of seagrass but suitable for restoration due to low wave exposure. Restoration has been carried out using an *in situ* transplantation method designed to support assisted recolonisation of soft-bottom shallow habitats, integrating field observations with numerical modelling and ecosystem service assessments. The intervention contributes to flood and erosion risk reduction, biodiversity enhancement and blue carbon sequestration. Initial inspections indicated favourable conditions for transplantation and follow-up surveys confirmed the establishment of new shoots, with

FIGURE 10. FOROS BAY PILOT PERFORMANCE AGAINST THE IUCN NBS GLOBAL STANDARD CRITERIA.





Aerial view of the coastal landscape of Burgas Bay

© ENG. BOGDAN PRODANOV, PHD

an estimated survival rate of approximately 5%. While these results remain modest, the Pilot has generated valuable knowledge on feasibility, site suitability and technical constraints, providing critical lessons to support adaptive refinement, scaling-up potential and integration into scenario-based coastal adaptation pathways. In parallel, additional interventions aimed at restoring hydraulic connectivity between Foros Bay and adjacent water bodies have been explored at analytical and governance levels. Although these measures remain beyond the current implementation scope, they are recognised as key components for future restoration and climate-adaptation planning within the broader Burgas Bay system.

Criterion 1 (83%, Strong). The Pilot has clearly identified the most pressing societal challenges relevant to the site with their underlying drivers. These challenges have been prioritised, and relevant stakeholders and rights-holders have been identified. Information on societal challenges has been made accessible to stakeholders and rights-holders through regular exchanges, including CORE-PLAT meetings, targeted meetings, participation in conferences and workshops, and dissemination of project deliverables, scientific papers, policy briefs, and interviews. Moreover, the Pilot has identified the restoration outcomes linked to the addressed societal challenges and has benchmarked and periodically assessed them. Overall, this shows a strong level of performance in facing societal challenges the intervention NbS regarding, in line with the requirements of this criterion.

Criterion 2 (72%, Adequate). The Pilot has clearly justified and identified the interconnections and interactions between ecological processes, socio-economic activities and ecosystem services linked to the restoration intervention, and these interactions have been considered over time providing a solid system understanding. Synergies across sectors have also been clearly defined for complementary interventions, demonstrating coherence with broader sectoral objectives. The Pilot has identified most of the relevant risks affecting the restoration, particularly in relation to environmental dynamics. However, there is not a clear mention to a comprehensive risk management. This shows a remaining gap in the operationalisation of a full-system perspective. Despite this limitation performance under this criterion reflects adequate alignment with the Standard.

Criterion 3 (95%, Strong). The Pilot has developed a robust baseline assessment of ecosystem and biodiversity conditions albeit some remaining gaps. Key drivers of ecosystem degradation and biodiversity loss have been clearly identified and assessed. In addition, opportunities to enhance ecosystem integrity, including connectivity, have been well identified, evaluated and documented. The restoration's outcomes clearly respond to enhancing and recovering biodiversity and ecosystem values, with targets and measurable indicators in place and periodically assessed, providing strong evidence of ecological performance. Furthermore, a structured monitoring plan has been developed, incorporating well-justified mechanisms to manage observed changes and guide adaptive implementation. These elements demonstrate a very high level of performance in achieving biodiversity net gain and maintaining ecosystem integrity, reflecting strong alignment with the requirements of this criterion.

Criterion 4 (53%, Adequate). The Pilot has well identified, assessed and documented both upfront and future financial and societal costs and benefits associated with the intervention. Stakeholders and rights-holders who bear these costs and derived benefits have been identified through a stakeholder-mapping process. Likewise, an optimistic and pessimistic cost analysis (scoring) embedded within the adaptation pathway framework has been developed, allowing comparative evaluation of economic feasibility under different scenarios. The Pilot is also actively working on reviewing financial and other resourcing mechanism, including resourcing packages that consider risks and returns. These elements indicate an adequate level of performance

FIGURE 11. BEFORE-AND-AFTER SEAGRASS RESTORATION AT THE FOROS BAY PILOT SITE. © IO-BAS

with regard to economic feasibility. However, some gaps remain in securing the sustained viability of the restoration interventions.

Criterion 5 (56%, Adequate). The Pilot has well identified and mapped stakeholders and rights-holders who are directly and indirectly affected by the restoration intervention, using a full participatory approach through the process. Stakeholder engagement has included representatives from local fisheries, municipal authorities, conservation bodies, and technical experts, ensuring diverse perspectives and knowledge systems informed intervention design and prioritisation. Particular attention has been given to safeguarding the legitimate rights and interests of small-scale resource users and local communities potentially affected by spatial planning measures. Furthermore, the NbS design and adaptation pathway development has been grounded in principles of inclusive participation, mutual respect, and non-discrimination. Moreover, the Pilot is working towards the establishment of a grievance and conflict-resolution mechanism to further strengthen inclusive governance. Likewise, the Pilot is working on documenting a transparent decision-making framework that responds to the rights and interests of affected stakeholders and rights-holders. These elements demonstrate an adequate level of performance under this criterion. However, as some governance mechanisms are still under development, gaps remain in the full operationalisation of inclusive governance.

Criterion 6 (27%, Partial). The Pilot has initiated the development of safeguards and corrective actions to address potential risks and negative impacts associated with the interventions. However, they remain at an early stage and have not yet been implemented, monitored, or systematically documented. In addition, these actions have not been made available or accessible to affected stakeholders and rights-holders. Furthermore, no procedures are currently in place to ensure the periodic review and updating in response to emerging risks, changes in activities or evolving stakeholder needs. As a result, the Pilot lacks an operational framework to effectively balance goals and prevent or mitigate unintended long-term impacts. This reflects a low but improvable level of performance under this criterion, with significant scope for strengthening the management of trade-offs and negative impacts over time.

Typical Cymodocea nodosa seagrass meadow

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Criterion 7 (67%, Adequate). The Pilot has defined and articulated explicit assumptions on how the interventions are expected to achieve intended outcomes under prevailing and changing economic, social and ecological conditions, drawing on the best available scientific, local and traditional knowledge where relevant. These assumptions provide a clear conceptual basis for adaptive implementation. In addition, the Pilot is currently working on a monitoring and evaluation plan that covers the key aspects required to support learning and management adjustments over time. While this framework is not yet fully operational, its design reflects an intention to enable adaptive management. Overall, this indicates an adequate level of performance under this criterion, although some gaps remain to be addressed to close the feedback loop between monitoring, learning and adjustment.

Criterion 8 (60%, Adequate). The Pilot is in an early phase in capturing and documenting lessons learnt during the design and implementation of the intervention. Similarly, the use of these lessons to inform and enhance environmental and finance policy frameworks for mainstreaming is still under development, and documenting process also remains partial. Even so, the Pilot has provided a strong and consistent plan to address all these gaps, outlining clear steps to consolidate learning, support wider uptake and embed restoration outcomes within broader planning and policy processes. These steps reflect an adequate level of performance with respect to sustainability, mainstreaming and upscaling, with clear potential for strengthening as implementation progresses.

STRENGTHS

Excellence in Biodiversity (C3): This is one of the two highest scores across the REST-COAST Pilots. It features an exceptional baseline assessment, measurable indicators evaluated regularly, and a structured monitoring plan with clear response mechanisms.

Managing Social Challenges (C1): Outstanding identification and prioritisation of challenges. Communication is very active and transparent through multiple channels (CORE-PLAT, articles, interviews, and workshops).

Systems Approach and Synergies (C2): Strong justification of the interconnections between the economy and ecosystems. It has clearly defined the synergies between sectors and the necessary complementary interventions.

Inclusive Governance and Equity (C5): The design is based on mutual respect and non-discrimination. It highlights the special attention given to the rights of small resource users and local communities in spatial planning.

WEAKNESSES

Safeguards and Impacts (C6): This is the main weakness. Safeguards and corrective actions are in a very early stage of development: they have not been implemented, monitored, or shared with stakeholders.

Risk Management (C2): Although most risks have been identified, the pilot lacks a formalised risk management plan, which weakens its systems perspective.

Economic Viability (C4): Despite having optimistic and pessimistic cost analyses, they are still working on securing resource packages to cover risks and returns, which creates gaps in economic feasibility.

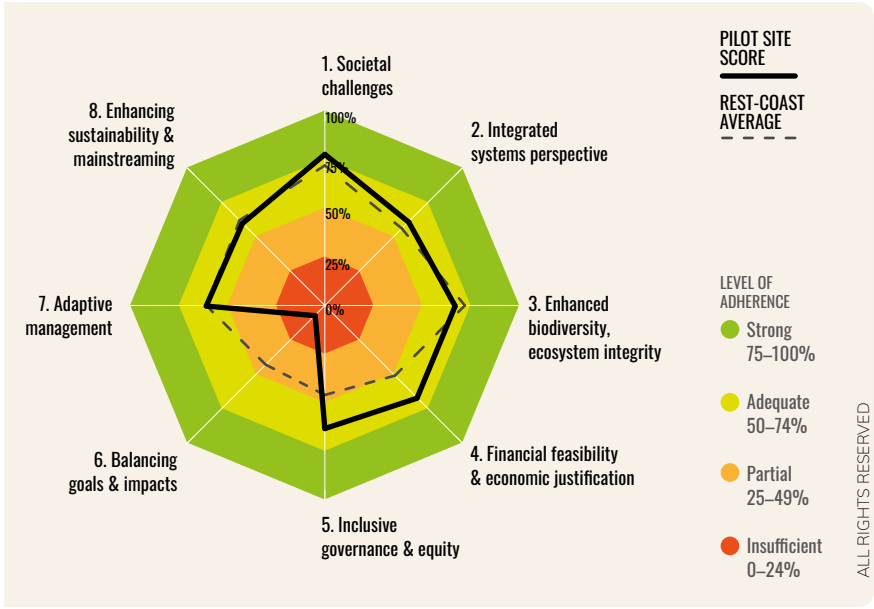
Process Documentation (C5, C7, and C8): Several critical aspects, such as the conflict resolution mechanism, the decision-making document, and the capture of lessons learnt for public policy, are still in development or early phase.

NAHAL DALIA
ADEQUATE (59%)

The Nahal Dalia Pilot Site has implemented a set of complementary interventions aimed at restoring hydrological connectivity and enhancing ecosystem functioning and biodiversity. The site comprises an estuary and coastal saltmarsh complex that supports diverse taxonomic groups, including submerged and emergent vegetation, macroinvertebrates, fish, reptiles, mammals and breeding, wintering and migratory waterbirds, including species of conservation concern. The Pilot responds to long-standing ecosystem degradation driven primarily by alterations to the natural water regime, loss of river-to-sea connectivity caused by dams, and water pollution linked to fishpond effluents.

The restoration actions include intensively managed fishponds that are being rewilded and transformed into semi-natural wetlands, leading to reduce eutrophication, improved water purification processes, the creation of buffer zones between agriculture areas and the reserve, and the establishment of diverse breeding habitats for birds and other wildlife. A floodwater reservoir designed with nature-based features was also developed to capture winter runoff, with the objectives of attenuating peak flows, increasing habitat diversity and supporting bird populations. The removal of existing dams and their replacement with a dynamic dam system, together with the relocation of a dam further upstream to restore connectivity between the stream and the estuary, reintroduce seasonal water-level fluctuations, reduce accumulation of both sediment and organic load, and enable the free movement of aquatic species, are currently discussed with the local community. Habitat heterogeneity was further enhanced through riverbank restoration, the creation of diversified slope profiles, and the establishment of permanent and seasonal water bodies. The restoration actions also included the construction of a levee, approximately 2 metres high, within the northern part of the reserve in order to divide the area into two distinct water bodies with seasonal characteristics and fluctuating water levels. This intervention was designed to create a dynamic hydrological regime: during winter, when water levels rise, the levee becomes submerged and the two water bodies merge into a single connected system. Under these conditions, the eastern water body functions as a floodplain, receiving floodwaters from Nahal Dalia through the new weirs. During summer, or when water levels decline due to evaporation or water pumping, the levee re-emerges, separating the eastern basin and allowing it to function as a seasonal water body. Together, these changes

FIGURE 12. NAHAL DALIA PILOT PERFORMANCE AGAINST THE IUCN NBS GLOBAL STANDARD CRITERIA.



Daily activity of Common terns (*Sterna hirundo*) on the constructed nesting islands.

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were intended to increase habitat diversity and support a more heterogeneous wetland system. In addition, an artificial island was created to provide nesting areas for birds, contributing to measurable biodiversity gains. Together, these interventions form an integrated NbS approach that combines hydrological restoration, wetland recovery, artificial habitat creation and flood risk management.

Implementation takes place within a multi-level governance context characterised by strong institutional leadership from the Israel Nature and Parks Authority, in coordination with water authorities, drainage authorities, local municipalities and sectoral stakeholders. While the governance framework has enabled significant progress in planning, coordination and implementation, the Pilot also operates within a complex regulatory and socio-economic setting shaped by competing water demands, fisheries regulation and land-use interests.

Criterion 1 (78%, Strong). The Pilot Site has identified key societal challenges addressed by the intervention, together with their underlying drivers, and has documented part of this information through project analyses and ongoing implementation processes. Although these challenges have not been formally presented to stakeholders, in a consolidated manner, they are continuously discussed both with stakeholders and within the Pilot Site team in order to prioritise the most pressing issues. Ongoing efforts are made to bridge gaps by developing practical, on-the-ground solutions. A clear example of this approach is the development of a water allocation plan aimed at balancing water distribution among all users in the area, based on collaborative solutions agreed upon with stakeholders. This process proves a solid commitment to transparency and constructive engagement with stakeholders. Moreover, the Pilot has identified specific ecosystem-based outcomes, and several intervention outcomes have been benchmarked and periodically assessed. Overall, these actions demonstrate a strong and deliberate effort by the Pilot to effectively address societal challenges in Nahal Dalia area, consistent with the requirements of the criterion.

Criterion 2 (61%, Adequate). The implemented restoration intervention recognises and responds to key interactions and interconnections between economic activities, social dynamics, ecosystems and existing cultural norms. Several of these interactions have been considered throughout the design and implementation of the Pilot and some have been integrated into practice, although not yet formally documented. In addition, the Pilot has identified important synergies between their restoration interventions and other sectoral and complementary actions, indicating good integration potential and coherence with broader management approaches. Furthermore, the Pilot has developed a risk management plan in which a number of relevant risks have been identified. However, these risks are not yet fully documented or systematically assessed, indicating that further efforts are needed to comprehensively identify, understand and address all potential risks, including those extending beyond the immediate intervention areas. Overall, while the Pilot demonstrates a solid integrated systems perspective, improved documentation and risk analysis would strengthen alignment with this criterion.

Criterion 3 (67%, Adequate). The Pilot has established a solid baseline assessment of the status of the relevant ecosystems, drawing on multiple sources of ecological data. In addition, the main drivers of ecosystem degradation and biodiversity loss have been clearly identified and assessed, providing a robust understanding and knowledge of the biodiversity status of the Pilot Site. Likewise, the Pilot has identified and assessed several opportunities to enhance ecosystem integrity, although these have not yet been formally documented. The interventions are designed to enhance or recover biodiversity or ecosystem values, and biodiversity targets and indicators have been established. However, these

FIGURE 13. BEFORE-AND-AFTER RESTORATION AT THE NAHAL DALIA PILOT SITE. © AVIV KURT

indicators are only partially assessed to date, indicating scope for further improvement regarding the systematic monitoring and documentation of biodiversity gains. Furthermore, the Pilot has developed a monitoring plan that includes response mechanisms to address potential unintended consequences of the measures applied.

Criterion 4 (53%, Adequate). Actual social costs and benefits, as well as some projected future costs and benefits, have been identified, assessed and documented for the intervention. Moreover, the Pilot has identified the stakeholders and rights-holders who bear these costs and benefit from the intervention, reflecting a sound understanding of the distribution of costs and benefits and supporting distributional equity considerations. The Pilot has also undertaken a cost-effectiveness analysis, or a comparable assessment, comparing their interventions with other potential solutions. This analysis provides evidence of the social and economic advantages of the intervention relative to alternative approaches. Furthermore, the Pilot has identified and secured financial mechanisms to support the long-term viability of the measures. While the equitable distribution of risks and returns have not yet been fully addressed this aspect has been recognised and is planned to be incorporated to ensure the effective and sustainable performance of their measures.

Criterion 5 (63%, Adequate). Directly and indirectly affected stakeholders and rights-holders, including public authorities, landowners, leaseholders and local communities, have been clearly identified through stakeholder and interest mapping exercises and have been actively engaged through a functioning steering committee and thematic working groups. These mechanisms have supported dialogue, trust building and coordination across sectors, representing a significant improvement compared to the initial governance baseline. However, even directly affected stakeholders and rights-holders are participating in the design and implementation, indirect stakeholders are involved in the planning when they are relevant. This limits participation in the governance process The Pilot has established transparent and accessible mechanisms for dialogue, grievance handling and conflict management, which have proven effective in addressing recurring tensions related to land use, water management and fishpond operations. While they are operational and trusted by core stakeholders, they have not yet been fully institutionalised or regularly reviewed and adapted, revealing potential for further improvement and long-term consolidation. The restoration intervention is grounded in principles of inclusive participation, mutual respect and equality, regardless of gender, age, ethnicity, or social status. Despite this, affected stakeholders have not consistently been provided

River-to-sea connectivity prevented by a dam in the Dalia Stream estuary.

© AVIV KURT

with clear, accessible information or sufficient opportunities for providing meaningful input throughout the interventions' life cycle, which limits the effectiveness of their participation. Similarly, while a transparent, documented, and accessible decision-making process has been established, inclusive mechanisms enabling the full and effective participation of affected stakeholders in decision-making remain limited.

Criterion 6 (7%, Insufficient). The Pilot has not yet developed or formalised safeguards and associated corrective actions to address potential trade-offs or unintended social and environmental impacts arising from the intervention. As a result, safeguards and corrective measures have neither been implemented nor periodically reviewed, limiting the Pilot's ability to assess and manage the real performance of the interventions. This represents a clear gap in the systemic management of trade-offs and in ensuring that negative impacts are identified, mitigated and monitored over time with the requirements of this criterion.

Criterion 7 (61%, adequate). The Pilot has defined expected intervention outcomes based on prevailing conditions and drawing on scientific, local and traditional knowledge. In parallel, efforts are underway to systematically document this knowledge in order to better capture learning generated throughout the project implementation process. A monitoring and evaluation plan has also been established; however, it still shows gaps regarding the inclusion of key aspects of the interventions related to implementation, monitoring and management. While monitoring and learning processes have been envisaged to support improvement and potential upscaling, current management actions have not yet been effectively informed or adjusted based on the monitoring and evaluation results. This indicates a remaining gap in

the operationalisation of adaptative management and in the use of evidence-based feedback to guide decision-making and management adjustments.

Criterion 8 (60%, Adequate). The Pilot has identified and captured key lessons learnt throughout the design and implementation of the intervention and is actively working towards systematically documenting all the information collected. These lessons have been used to inform and engage stakeholders, however, the process through which lessons learnt feed into policy, financial or regulatory frameworks have not yet been documented. This represents a gap in demonstrating how the interventions contribute to its long-term mainstreaming. Nevertheless, the Pilot has demonstrated contributions to relevant environmental, economic, and social targets and frameworks at local and sub-national levels. Likewise, it continues to work on strengthening documentation efforts and on exploring opportunities to scale up the interventions to further enhance their broader impact and long-term sustainability.

STRENGTHS

Management of Social Challenges (C1): Strong identification of problems and commitment to transparency, highlighting the water allocation plan agreed upon with local stakeholders.

Systems Approach (C2): Good understanding of the interactions between the economy, society, and ecosystems, with coherent integration into broader management strategies.

Robust Ecological Base (C3): Clear diagnosis of the state of biodiversity and degradation factors, with established objectives and monitoring plans.

Economic Viability and Equity (C4): Identification of social costs and benefits, performance of cost-effectiveness analyses, and securing of long-term financial mechanisms.

Knowledge and Learning (C7 and C8): Definition of results based on scientific and local knowledge, with active efforts to capture lessons learnt to scale up the project.

WEAKNESSES

Safeguards and Impacts (C6): This is the weakest criterion (7%). There are no formalised safeguards or corrective actions to manage potential negative effects or trade-offs.

Documentation and Formalisation (C2, C3, C8): In several criteria key information or successes achieved are not properly documented, hindering their validation and replicability.

Participation and Governance (C5): Although grievance mechanisms exist, there is a lack of identification of indirectly affected stakeholders and an improvement in the quality of information to ensure truly effective participation in decision-making.

Adaptive Management (C7): Despite having a monitoring plan, its results are not yet systematically used to adjust project management in real time.

Risk Analysis (C2): The risk management plan is incomplete and lacks a systematic assessment, especially for risks that extend beyond the immediate area of intervention.

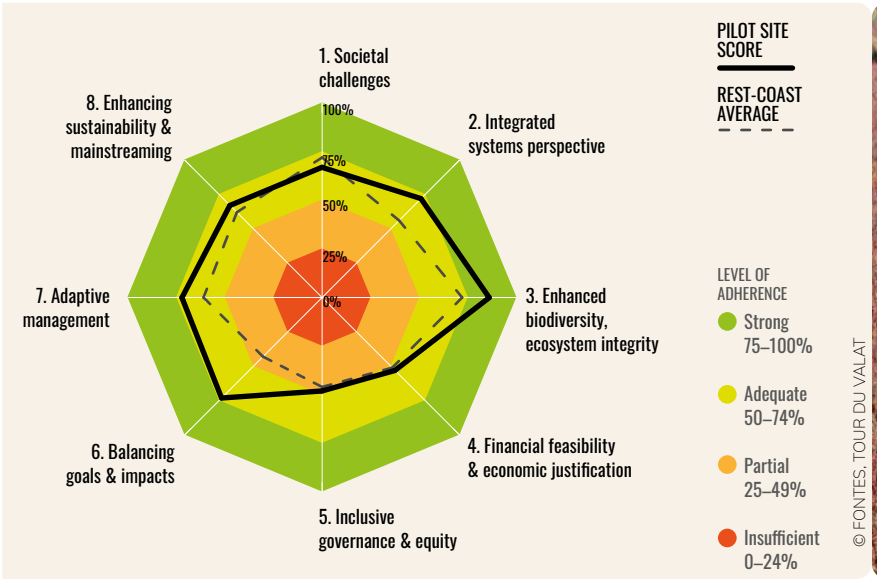
RHONE DELTA
ADEQUATE (67%)

This Pilot Site is located in the south-eastern part of the delta and focuses on adapting to coastal inundation risks and restoring natural hydrological and coastal dynamics in a low-lying and highly modified coastal system. The location encompasses a large mosaic of coastal and transitional habitats, including coastal lagoons, coastal barriers and sandy beach areas, Mediterranean halophilous scrubs, and saltmarsh communities many of which are listed as habitats of Community interest under the EU Habitats Directive. These habitats play a key role in regulating water salinity, supporting biodiversity, buffering coastal flooding and erosion, and enhancing ecosystem resilience under climate change.

The Pilot area corresponds to a site historically devoted to industrial salt production, where water management and dike maintenance were strictly managed with intensive hydraulic control. Following the acquisition of the site by the Conservatoire du Littoral between 2008 and 2012, a strategic shift in management was initiated, recognising that the long-term maintenance of coastal dikes and pumping systems was neither economically nor environmentally sustainable in the context of sea-level rise. This led to the adoption of a realignment strategy, whereby the historic sea dikes are no longer maintained, and flood protection efforts are concentrated on an inland dike located approximately 7 km from the coast, creating a large coastal buffer area that can accommodate natural dynamics. In addition to the landowners, governance involves three co-management organisations (Parc naturel régional de Camargue, Société Nationale de Protection de la Nature and Tour du Valat), local municipalities, local services responsible for dike management, water agencies, user groups and socio-economic actors, which indicates a complex multi-level governance framework. Governance arrangements rely on formal management committees and long-standing coordination mechanisms that bring together conservation objectives, flood-risk management, land-use planning and socio-economic activities such as fishing, hunting and tourism.

The restoration approach is centred on a realignment strategy that involves the abandonment of the existing dike and the future reinforcement of an inland protective dike to mitigate flooding and accompany coastal erosion. Interventions focus on a set of complementary measures aimed at re-establishing connectivity with the sea, within the lagoon system, and with the wider hydro-catchment. Passive restoration measures include natural breaching of coastal and lagoon dikes to enhance water exchange and restore coastal dynamics, while active

FIGURE 14. RHONE DELTA PILOT PERFORMANCE AGAINST THE IUCN NBS GLOBAL STANDARD CRITERIA.



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measures involve targeted hydraulic works and the creation of controlled breaches to improve internal circulation and freshwater inputs from the agricultural catchment connected to the Rhone River. Together, these measures support the restoration of coastal lagoons, lagoon seagrass, saltmarsh habitats and emerging beach systems, while reducing hypersalinity, improving water quality and strengthening the system's capacity to buffer floods and wave energy.

Criterion 1 (67%, Adequate): The Pilot has identified and developed a clear understanding of the main societal challenges addressed by the intervention, notably those related to flood risk reduction, water management, land-use conflicts and the long-term sustainability of wetland ecosystems. These challenges have been explicitly considered within a multi-level governance context and are reflected in the management plan for the Rhone Delta, which integrates ecological objectives with social, economic and territorial constraints. The most pressing societal challenges for stakeholders and rights-holders have been prioritised through structured participatory processes carried out during the development of the management plan, involving public authorities, local users and co-management organisations. Relevant information is publicly available and accessible through formal planning and governance instruments. However, some gaps remain in the systematic documentation of how societal challenges are continuously updated and monitored throughout the implementation phase. In addition, the Pilot has also benchmarked and periodically assessed several outcomes of the interventions linked to the identified societal challenges. Nevertheless, these assessments do not yet comprehensively cover all restoration outcomes, indicating scope for strengthening the completeness and consistency of outcome tracking under this criterion.

Criterion 2 (72%, Adequate). The Pilot demonstrates a strong understanding of the interconnections between ecological processes, socio-economic activities and governance arrangements. Interventions are specifically designed to address these interdependences, particularly in relation to flood risk management, wetland restoration, land-use practices and climate change adaptation, and are embedded within a multi-level governance context reflected in the validated management plan. Complementary interventions across sectors have been identified and integrated over time, aligning hydraulic restoration measures with biodiversity objectives, flood protection requirements and territorial planning. These synergies highlight a solid awareness of cumulative impacts and complementarities beyond the immediate intervention area. Key risks related to flooding, climate change and hydraulic management have also been identified and partially documented through existing planning instruments. However, the absence of a comprehensive and stand-alone risk management plan limits the systematic assessment, monitoring and anticipation of risks over time, indicating scope for strengthening adaptive and forward-looking risk management under this criterion.

Criterion 3 (86%, Strong). The Pilot has established a well-defined baseline for ecosystems and biodiversity. Key drivers of ecosystem change, such as increasing salinity and evapotranspiration, alongside decreasing precipitation, have been clearly identified, and their potential impacts on biodiversity have been analysed. These drivers have been explicitly linked to baseline conditions, supporting a coherent understanding of ecosystem dynamics. Additionally, the Pilot has identified and assessed opportunities to enhance ecosystem integrity and is in the process of systematically documenting this information. Biodiversity outcomes from the restoration have been defined with the objective of enhancing or recovering biodiversity and ecosystem values. While relevant targets and indicators are in place, their assessment remains partial, indicating scope for further strengthening quantitative evaluation.

FIGURE 15. BEFORE-AND-AFTER RESTORATION AERIAL VIEW AT THE RHONE DELTA PILOT SITE. IMAGES SHOW THE ABANDONMENT AND GRADUAL COLLAPSE OF THE SEAFRONT DIKE, CREATING A NEW INLET CONNECTING THE SEA TO THE LAGOON. © MICHEL GAUTHIER-CLERC (2011) AND LOÏC WILLM (2024)

2011

2024

A comprehensive monitoring plan has also been established, characterised by an appropriate monitoring frequency and clearly defined response mechanism. All these elements prove the strong performance of the restoration actions regarding biodiversity enhancement and ecosystem integrity.

Criterion 4 (53%, Adequate). The Pilot has identified stakeholders and rights-holders associated with societal costs and benefits arising from the intervention. Opportunities for future socio-economic development through restoration have been identified. However, neither upfront nor long-term financial and societal costs and benefits have been comprehensively identified, assessed or documented, indicating a knowledge gap despite the clear identification of relevant actors. At the same time, the Pilot has conducted a cost-effectiveness analysis comparing the restoration measures implemented with alternative solutions, providing evidence of the relative environmental and socio-economic advantages of the approach. In addition, relevant and innovative financial mechanisms have been identified and partially secured, contributing to the long-term viability of the intervention. Nonetheless, the financial planning framework does not explicitly address the equitable distribution of risks and returns among stakeholders and rights-holders. This limitation constrains the overall assessment of financial sustainability and highlights scope for further strengthening the economic justification of the restoration intervention under this criterion.

Criterion 5 (48%, Partial). The Pilot has undertaken substantial efforts to identify directly affected stakeholders and rights-holders including their rights, uses and responsibilities. Participation has mainly focused on key actors, notably the dike manager (SYMADREM) and the owner of the site (Conservatoire du Littoral), reflecting their central roles in flood protection and land management. At the same time, broader stakeholder engagement has been enabled through the CORE-PLAT implemented by the Pilot, which has provided opportunities for a wider set of actors to actively participate in discussions related to the restoration intervention. A transparent and accessible grievance and conflict resolution mechanism has been established and implemented through the management plan, which is supported by regular commissions to discuss management decisions and emerging issues. However, this mechanism has not yet been systematically reviewed or adapted over time, limiting its ability to respond dynamically to evolving stakeholder concerns. While the intervention has not been explicitly framed around principles of inclusive participation, mutual respect and equality, regardless of gender, age, ethnicity or social status, no formal exclusions or restrictions to participation have been identified. Nevertheless, governance research conducted over the project highlights that

Coastal salt deposits in the Rhone Delta, illustrating high salinity levels

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stakeholder engagement has been stronger during the development of the management plan than during its implementation phase, with participation declining among certain groups such as rice farmers, hunters and some environmental organisations. In addition, although decision-making processes exist within the management framework, the specific procedures through which stakeholders' rights and interests are addressed have not been documented in a transparent and accessible manner. Taken together, these elements indicate that, while foundational governance structures and participatory mechanisms are in place, important gaps remain in ensuring sustained, inclusive and well-documented participation throughout the full lifecycle of the restoration intervention.

Criterion 6 (73%, Adequate). The Pilot has identified a set of safeguards and corrective actions to address the main risks associated with the intervention. The decision-making process underpinning these measures is transparent, inclusive and participatory, and involves stakeholders and rights-holders through the dedicated water management commission established under the governance framework. Safeguards and corrective actions have been formally documented, and the relevant information is available and accessible to interested parties. Moreover, these actions are subject to periodic review through the presentation of an annual activity report to stakeholders, supporting transparency and accountability. However, despite this structured framework, safeguards and corrective actions have not yet been fully implemented on the ground. Overall, the Pilot demonstrates a solid capacity to identify, document and review measures to balance goals and manage potential impacts. Nevertheless, the lack of systematic implementation of safeguards and corrective actions represents a remaining gap, limiting the full operationalisation of impact management under this criterion.

Criterion 7 (72%, Adequate). The Pilot has defined expected restoration outcomes in line with prevailing environmental and socio-economic conditions. A new management plan began in 2023 providing the main framework for NbS implementation and is grounded in a comprehensive socio-economical diagnostic of the site. It considered key contextual elements, including historical land use, cultural heritage, and the expectations of the local population regarding the NbS. The management plan is structured around a diagnostic part and a set of objectives and actions and is intended to support a continuous learning process over time. Furthermore, the Pilot has implemented actions aimed at improving the restoration management. However, these actions are still being monitored and evaluated to update the future framework (management plan execution 2023-2032). As a result, while the foundations for adaptative management are in place, gaps remain in closing the feedback loop between monitoring results, learning processes and management adjustments.

Criterion 8 (67%, Adequate). The Pilot has systematically captured and documented key lessons learnt throughout the design and implementation of the restoration intervention. These lessons have been used to inform upscaling opportunities and to improve overall understanding of restoration performance across ecological, social and management dimensions. Additionally, the Pilot has provided evidence demonstrating the contribution of the restoration intervention to relevant regulatory and policy frameworks, including environmental, economic, and social dimensions. Overall, this indicates a solid performance in terms of knowledge transfer, upscaling potential and integration of the restoration outcomes into broader strategic contexts. Nevertheless, further efforts to strengthen long-term institutional anchoring and formal mainstreaming mechanisms would enhance the sustainability and wider uptake of the restoration beyond the Pilot scale.

STRENGTHS

Ecological Integrity (C3): This is the strongest point. It has a solid baseline, clear identification of degradation drivers (salinity, evapotranspiration), and a robust monitoring plan with defined response mechanisms.

Systemic Design and Synergies (C2): Excellent understanding of the interactions between ecological processes and socio-economic activities. The Pilot successfully aligns hydraulic restoration with flood protection and land-use planning.

Transparency and Safeguards (C6): Good performance in balancing objectives. Safeguards and corrective actions are documented, accessible, and reviewed through annual reports to stakeholders.

Financial Viability and Effectiveness (C4): The pilot project has a defined financial plan and secured funding mechanisms, as well as a cost-effectiveness analysis that demonstrates the superiority of the restoration interventions compared to other solutions.

Knowledge Management (C7 and C8): The 2022 management plan integrates socio-economic diagnoses and cultural heritage, capturing lessons learnt for scaling up and improving knowledge.

WEAKNESSES

Inclusive Governance (C5): Although a conflict resolution mechanism exists, participation is heavily concentrated among large managers (SYMADREM, Conservatoire du Littoral). The decision-making process is not sufficiently transparent or accessible to all stakeholders.

Risk Management (C2): Despite identifying key risks such as climate change, there is no comprehensive risk management plan, representing a significant operational gap.

Documentation Gaps (C1 and C4): There is a persistent lack of systematic documentation on how social challenges are addressed and an absence of concrete data on future financial and social costs and benefits.

Risk Sharing (C4): The financial plan does not address the equitable distribution of risks and returns among different stakeholders, which affects the perception of the project's fairness.

Safeguard Implementation (C6): Although the safeguards are well documented and reviewed, they have not yet been fully implemented.

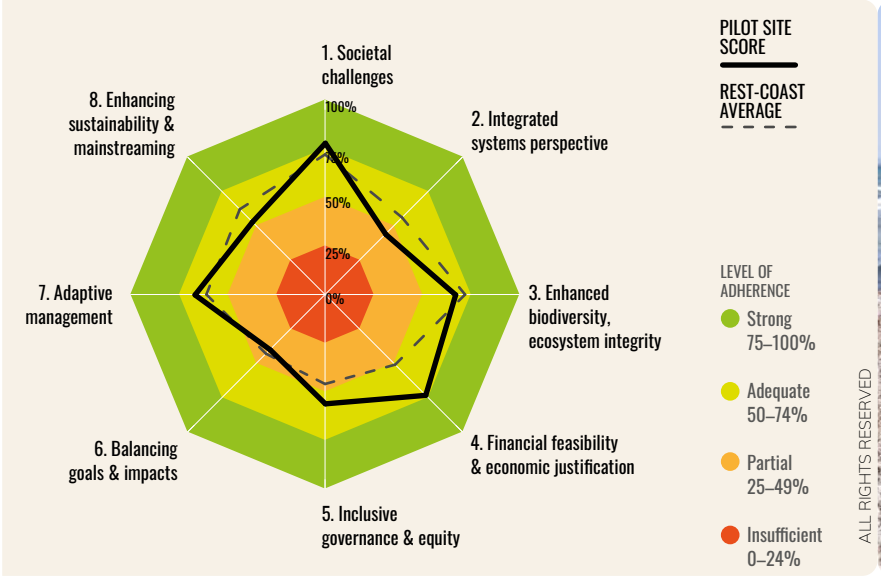
SICILY LAGOONS
ADEQUATE (60%)

The Sicily Lagoons Pilot Site, located in the Cuba-Longarini lagoon system in south-eastern Sicily, focuses on restoring hydraulic connectivity, habitat diversity and ecological functioning in a highly dynamic coastal lagoon environment subject to long-standing anthropogenic pressures. The area encompasses a mosaic of saline coastal lagoons, coastal saltmarshes, saline reedbeds, sand beach driftlines and shifting dune systems, which together support high ecological value and provide key ecosystem services such as water storage, water quality regulation, coastal protection and habitat provision. The lagoon system is of particular importance for biodiversity, especially for migratory and breeding bird species including vegetation communities characteristic of Mediterranean saline wetlands which underpins the ecological integrity of the system. The lagoon system overlaps with protected areas, notably within the Vendicari Nature Reserve, and is also subject to European conservation frameworks, including the designation as a Natura 2000 site under the EU Birds and Habitats Directives.

The Pilot addresses multiple pressures, including reduced lagoon-sea connectivity, habitat fragmentation, invasive species, water abstraction for agriculture, coastal erosion linked to dune degradation, and disturbance from tourism and illegal hunting. The restoration strategy has been developed within a multi-actor governance context, involving public authorities at different levels, water and land-use managers, protected-area managers, research institutions, conservation organisations, and tourism operators.

In response to the pressures, the restoration strategy combines on-the-ground interventions with adaptive water-management measures, including the creation of artificial bird islands to provide safe nesting and breeding habitats, saltmarsh restoration around the brackish lagoons to increase habitat extent and flood accommodation space, and the re-opening and dredging of internal channels to reconnect lagoon compartments and improve water circulation. A hydraulic barrier equipped with a gated device has also been installed to support adaptive regulation of lagoon water levels. In parallel, additional restoration options addressing flooding and erosion risks, such as seagrass restoration, dune revegetation, beach nourishment and lagoon-mouth sandbar management, have been investigated through numerical modelling and technical assessments, but have not yet been implemented. Together, the implemented and assessed measures reflect a phased NbS approach, combining practical restoration actions with evidence-based testing of complementary interventions.

FIGURE 16. SICILY LAGOONS PILOT PERFORMANCE AGAINST THE IUCN NBS GLOBAL STANDARD CRITERIA.



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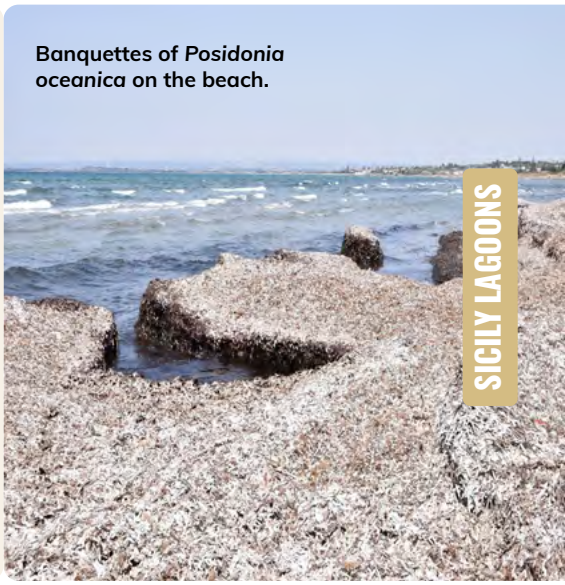


Banquettes of *Posidonia oceanica* on the beach.

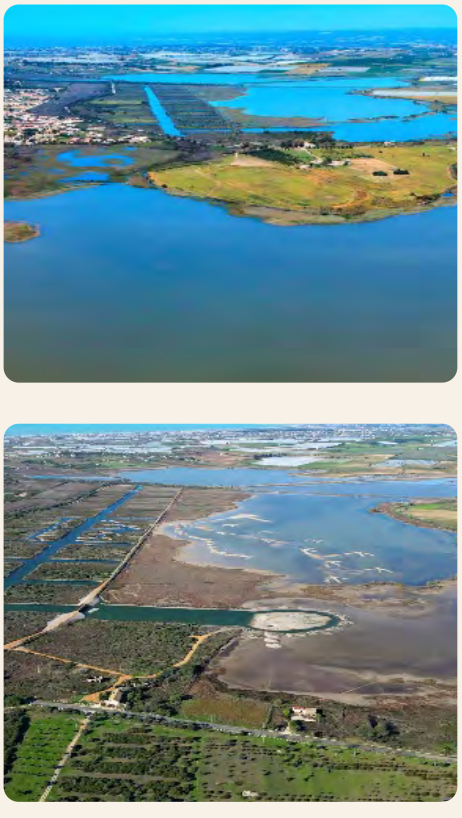
Criterion 1 (78%, Strong). The Pilot has identified key societal challenges and their drivers, providing a clear and well-structured explanation of the actions undertaken. The most pressing societal challenges have been prioritised, and stakeholders and rights-holders have been clearly identified. Likewise, these challenges and their drivers have been benchmarked and periodically assessed, supported by robust monitoring data and reports. This reflects a strong performance in addressing societal challenges through the restoration interventions.

Criterion 2 (44%, Partial). The Pilot has not systematically identified the interconnections and interactions between ecological processes, socio-economic activities, and broader systems dynamics in relation to the restoration interventions, nor has it explicitly considered them overtime. This limits the articulation and operationalisation of a clear integrated system perspective and represents a gap in the overall performance under this criterion. Nevertheless, the Pilot has implemented a number of complementary actions that support the implementation of restoration interventions and enable the assessment of selected outcomes. These include (i) the installation and operation of a local monitoring network to record water levels and key meteorological variables, supported by technical reports and datasets, and (ii) the development of a seagrass restoration prototype, which is still ongoing. In addition, potential synergies across sectors have been explored and partially identified, although they have not yet been integrated into a coherent, cross-sectoral strategy. Furthermore, the Pilot has evaluated certain risks, primarily related to flood and erosion risks, through modelling and analysis of available data. Even so, these considerations have not been consolidated within a comprehensive and formalised risk management planning framework. As a result, while individual components addressing system interactions are present, the absence of an overarching integrated perspective and management plan constrains performance under this criterion, leading to partial alignment with the Standard.

Criterion 3 (67%, Adequate). The Pilot has established a baseline assessment for the Cuba-Longarini lagoon system, including habitat mapping to characterise the spatial distribution and condition of key ecosystem components within the Pilot Site. In addition, opportunities to enhance ecosystem integrity, particularly with respect to connectivity, have been identified and assessed. The restoration intervention outcomes have been designed to respond to enhance or recover biodiversity and ecosystem values, and relevant targets and measurable indicators have been defined. Nevertheless, a comprehensive and structured monitoring plan has not yet been put in place to systematically track biodiversity changes over time. This limits the ability to robustly demonstrate and manage biodiversity net gains, indicating a remaining gap in the monitoring and management of biodiversity outcomes under this criterion.

Criterion 4 (73%, Adequate). The Pilot has well identified, assessed and documented actual costs and benefits associated with the restoration intervention. Regarding future costs and benefits, only a subset has been identified, assessed and documented to date. Relevant stakeholders and rights-holders who bear these costs and derive benefits have also been clearly identified. In addition, the Pilot has developed a cost-effectiveness analysis, or a comparable assessment, through a tailored finance and business plan. This work has included the estimation of life cycle costs for the maintenance of the restoration interventions and their linkage to expected ecosystem service and biodiversity outcomes, as well as to potential socio-economic benefits. Furthermore, some financial mechanisms have been secured, notably through the mobilisation of new project-based funding. Even so, long-term and dedicated financial mechanisms to ensure the sustained viability of the interventions beyond the project cycle have not yet been secured. This limits the robustness of long-term financial feasibility and

FIGURE 17. BEFORE-AND-AFTER RESTORATION (2023 VS 2026) AT THE SICILY LAGOONS PILOT SITE. © STIFTUNG PRO ARTENVIELFALT (2023) AND UNIVERSITY OF CATANIA (2026).



represents a remaining gap under this criterion, justifying and adequate, rather than strong, level of performance.

Criterion 5 (56%, Adequate). The Pilot has identified and documented directly and indirectly affected stakeholders and rights-holders, including their rights, uses and responsibilities. Even so, indirectly affected stakeholders and rights-holders have not yet fully and effectively been involved in the design and implementation of restoration interventions, indicating limitations in inclusive participation. A dedicated grievance and conflict resolution mechanism has not been established, representing a further gap in governance. While NbS are grounded in principles of inclusive participation, mutual respect and equality, the practical application and documentation of these principles remain incomplete. The Pilot is currently working towards addressing these gaps, including the documentation of participation processes and the development of a transparent, documented and accessible NbS decision-making framework. Although these steps demonstrate progress, inclusive governance mechanisms are not yet fully operationalised due to opposition of locals to restoration actions, resulting in partial alignment with the criterion's requirements.

Criterion 6 (40%, Partial). The Pilot has defined safeguards and corrective actions through a formal process based on an agreement with a local pro-biodiversity foundation. This provides an initial framework for addressing potential risks and unintended negative impacts related to the restoration intervention. However, these actions have not yet been implemented, monitored, or systematically documented, nor have they been made available and accessible to affected stakeholders. In addition, procedures to ensure the regular review and updating of safeguards and corrective actions, so as to reflect emerging risks, stakeholders' needs, or changes in activities, are not yet in place. As a result, while safeguards have been conceptually defined, their operationalisation remains limited. This indicated that the capacity of the Pilot to effectively balance goals and prevent long-term negative impacts is still under development, resulting in an improvable performance under this criterion.

Criterion 7 (67%, Adequate). The Pilot has defined expected restoration outcomes in relation to prevailing economic, social and environmental conditions, as well as anticipated changes in these conditions, and has drawn on scientific, local and traditional knowledge. A monitoring and evaluation plan that has been developed to support continuous learning

Marshes in Sicily.

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process over time. However, the evaluation and monitoring framework has not yet been designed within a fully systematic and comprehensive adaptive management plan. While monitoring activities and learning processes have enabled the identification and implementation of corrective actions over time, they have not consistently been triggered or guided through an inclusive and participatory approach. As a result, although the foundations for adaptive management are in place, gaps remain in the systematic operationalisation of learning, inclusiveness and feedback loops, indicating an adequate, but not yet strong, level of performance under this criterion.

Criterion 8 (53%, Adequate). The Pilot has captured and documented lessons learnt from the design and implementation of the restoration intervention, although some gaps remain in the systematic consolidation of this knowledge. These lessons have been used to inform initial upscaling efforts, but their application is not yet comprehensive or fully structured. Nevertheless, the Pilot has generally identified relevant local, subnational and national policy frameworks and targets. However, clear evidence demonstrating how the restoration interventions contribute to these frameworks and targets in a consistent and measurable manner is still limited. As a result, while foundations for mainstreaming and upscaling are in place, further clarification and documentation would be required to fully embed the restoration interventions within a broader policy and planning context, resulting in an adequate level of performance under this criterion.

STRENGTHS

Social Challenges and Monitoring (C1): Excellent performance in identifying and prioritising social challenges, supported by robust monitoring data and regular reporting.

Economic Viability and Planning (C4): The Pilot has developed a cost-effectiveness analysis and a detailed business plan that estimates the life cycle costs of the restoration interventions, linking them to socio economic benefits and ecosystem services.

Ecological Basis and Objectives (C3): The Pilot has a robust habitat mapping and has established measurable indicators for biodiversity recovery and ecosystem integrity.

Adaptive Management (C7): The Pilot uses scientific and local knowledge to define outcomes and allows for corrective actions over time through a continuous learning framework.

WEAKNESSES

Systems Perspective (C2): The Pilot fails to identify the interconnections between the economy, society, and ecosystems. Furthermore, it lacks a formalised risk management plan, relying instead on flood and erosion modelling.

Safeguards and Impacts (C6): Although agreements exist with local foundations to define safeguards, these have not been implemented, monitored, or documented in a structured manner and/or a way that is accessible to stakeholders.

Long-Term Financial Sustainability (C4): Despite securing funding for new short-term projects, the Pilot lacks long-term financial mechanisms to ensure its continuity.

Monitoring and Scaling Up (C3, C7, and C8): Systematic and formal monitoring plans are lacking. Furthermore, there are gaps in the documentation of lessons learnt and how the project specifically contributes to national sustainability frameworks and goals.

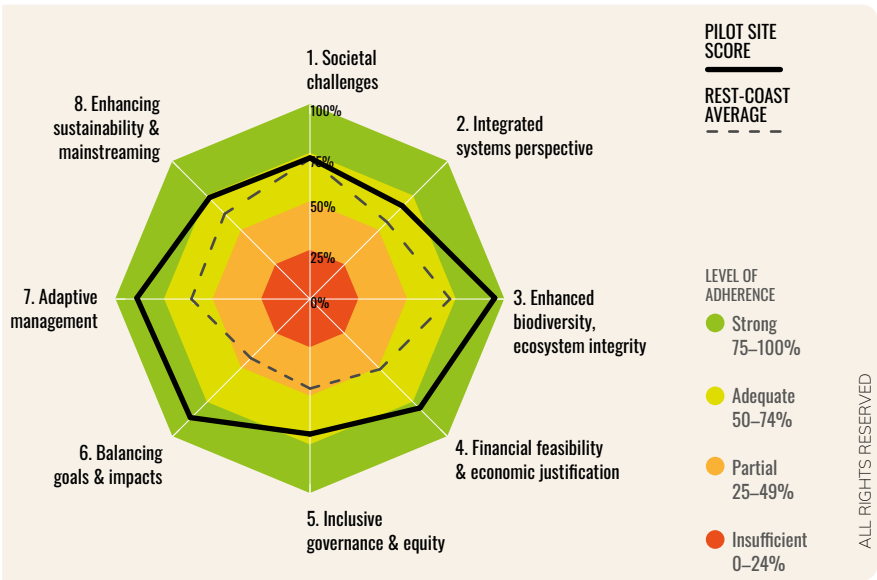
VENICE LAGOON
STRONG (79%)

The measures implemented in the Venice lagoon Pilot Site focus on the active maintenance and ecological enhancement of artificial saltmarshes in the central-southern lagoon. These restorations build on long-standing lagoon restoration practices and are designed to counteract saltmarsh erosion, habitat degradation and sediment imbalance in a highly modified and multi-use coastal system of national importance. The interventions take place in the broader context of the Venice Lagoon, a complex transitional system characterised by high ecological value, intense human activities and a layered governance framework shaped by special legislation for lagoon safeguarding.

The Venice Lagoon is subject to multiple, overlapping conservation and protection designations that reflect its exceptional ecological, cultural and landscape value, including Natura 2000, Important Bird Area (IBA) and Ramsar site (Valle Averto). These environmental protection regimes coexist with specific national safeguarding frameworks established under the Special Laws for Venice which recognise the lagoon as an area of primary national interest. The lagoon is recognised as a key biodiversity hotspot, particularly for avifauna, also hosting saltmarshes playing a critical role as nesting, feeding and resting habitats for many threatened bird species, whose populations are increasingly affected by sea level rise, habitat loss and the growing frequency of high-tide events, particularly during the reproductive season. In addition, lagoon habitats support diverse fish communities, seagrass species and halophytic vegetation, all contributing to ecosystem resilience and the provision of key ecosystem services.

The Pilot combines on-the-ground restoration works with long-term monitoring and modelling activities to assess ecosystem service delivery and inform adaptive management. Restoration activities are structured around two main phases: the first focuses on the construction and reinforcement of the saltmarsh perimeter, aiming to establish marsh edges and reduce erosion; and the second involves the nourishment of the salt marshes using high-quality sediments dredged from the lagoon, contributing to the restoration of marsh elevation and supporting natural dynamics. These engineered restoration phases are followed by a progressive renaturalisation process during which vegetation colonisation and ecological functions are expected to develop over time.

FIGURE 18. VENICE LAGOON PILOT PERFORMANCE AGAINST THE IUCN NBS GLOBAL STANDARD CRITERIA.



Artificial saltmarsh in Venice lagoon area.

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Criterion 1 (72%, Adequate). The Pilot has identified the most pressing societal challenges relevant to the context, and this information has been made accessible to stakeholders and rights-holders through the CORE-PLAT. These challenges have been prioritised, and main actors have been well identified through a stakeholder mapping. In addition, an appropriate range of indicators to monitor the effects and effectiveness of restoration interventions have been implemented. Likewise, a monitoring plan has been launched aiming to assess the evolution of the targeted saltmarshes before, during and after the restoration works. Together, these elements demonstrate a good level of performance addressing the societal challenges through the intervention, consistent with the requirement of this criterion.

Criterion 2 (67%, Adequate): The Pilot has developed an analysis of enablers and barriers affecting the restoration interventions, examining interactions between technical, governance and economic indicators through a multi-criteria analysis that also incorporates the stakeholder's perspective. Identified barriers and enablers have been discussed within the CORE-PLAT and collected opinions have been taken into consideration during the formulation of the restoration recommendations. Additionally, the Pilot has investigated the potential contribution of environmental restoration to drive economic benefits, and has identified complementary interventions, several of which have been already implemented. However, synergies across sectors have not yet been systematically explored or operationalised within a coherent cross-sectoral strategy. The Pilot has also modelled potential impacts and identified key risks linked to the intervention. These risks have been documented and integrated in a risk management plan, demonstrating a sound approach to anticipating and addressing system-related uncertainties. These elements show an adequate level of performance under this criterion, with a solid analytical foundation in place but scope for further strengthening system integration and synergy generation.

Criterion 3 (95%, Strong). The Pilot has established a strong and consistent baseline assessment, including a detailed habitat map of the site. Drivers of ecosystem degradation and biodiversity loss have been very clearly identified and assessed. Additionally, opportunities to enhance biodiversity and connectivity have also been well assessed and documented. Restoration outcomes are explicitly designed to enhance and/or restore key biodiversity and ecosystem values, with targets and indicators in place for periodic assessments. Furthermore, being extensively studied at national and EU levels, the monitoring plan in place allows to incorporate response mechanisms to inform management adjustments and improve the restoration performance over time. These elements demonstrate a strong level of performance in achieving biodiversity net gain and maintaining ecosystem integrity, reflecting high alignment with criterion's requirements.

Criterion 4 (80%, Strong). The Pilot has undertaken the assessment of financial aspects of saltmarsh restoration as part of the development of an innovative business plan, as well as a cost-effectiveness analysis to compare with alternative solutions. On the other hand, the actual funding mechanism supporting the lagoon management and restoration activities has been identified (i.e. the restoration works are currently sustained by the State only). Regarding future financing, several potential sources have been identified, although they have not yet been secured. Even so, the Pilot has also explicitly considered the equitable distribution of risks and returns, strengthening the socio-economic justification of the restoration. Overall, these elements indicate a strong level of financial and economic feasibility, while recognising that long-term financing arrangements still require consolidation.

FIGURE 19. BEFORE-AND-AFTER RESTORATION AT THE VENICE LAGOON PILOT SITE. © ENG. GIOVANNI ASSALONE, DIRECTOR OF WORKS. PROVVEDITORATO INTERREGIONALE PER IL VENETO, TRENTINO AA, FRIULI VENEZIA GIULIA

Criterion 5 (70%, Adequate). As part of the establishment of the CORE-PLAT, the Pilot has identified and mapped a broad list of stakeholders to be involved throughout the restoration processes. Although restoration is implemented by competent authorities the platform remains open for expansion. Initially 73 stakeholders were identified including public administrations at different levels, universities, research centres, private entities, NGOs, and local organisations with specific roles or interests in the safeguarding and management of the Venice Lagoon. Stakeholders' considerations have also been integrated into the financial analysis of the saltmarsh restoration, ensuring that actors linked to the intervention and their associated costs and benefits are taken into account. Furthermore, the establishment of a grievance and conflict resolution mechanism is supported by the CORE-PLAT throughout the development of a "restoration agreement" that was signed on February 2026 by competent authorities in order to maintain continuous engagement with stakeholders and foster conflict prevention through open dialogue and information exchange. The governance structure of authorities responsible for the Venice Lagoon is clearly defined, and efforts have been made to ensure transparency and accessibility of information related to the restoration intervention and decision-making. This indicates a good level of performance in inclusive governance, while recognising that further consolidation of participatory mechanisms and their operationalisation could strengthen alignment with this criterion.

Criterion 6 (87%, Strong). The Pilot has carefully planned the restoration interventions in advance, and their potential environmental impacts have been assessed through preliminary environmental impact assessments. With regard to Phase 1 of the works, namely the creation of the saltmarshes perimeter, ex ante and ex post monitoring activities have been conducted to assess biodiversity responses, morphological stability, and sediment quality. When monitoring results deviated from the expected objectives, adaptive management measures were applied to ensure alignment with restoration goals. The decision-making process has been well structured and transparent, ensuring the direct involvement of the competent authorities and the scientific community. In addition, the CORE-PLAT implementation has enabled the provision of timely information, supporting stakeholders' engagement and real-time dialogue with civil society organisations. Continuous monitoring during the construction phase has ensured effective control of restoration works and allowed for the timely identification of any necessary corrective actions. No additional interventions were required, as observed results were consistent with design objectives. Official technical and field reports produced by the lagoon authority and the Provveditorato alle Opere Pubbliche per il Veneto, Trentino Alto Adige e Friuli Venezia Giulia (PROVV.OO.PP.) are not systematically released for public access, but they can be made available upon request. In parallel, restoration progress and outcomes have been communicated transparently through the CORE-PLAT. Overall, these elements demonstrate a strong level of performance in balancing goals and managing potential negative impacts consistent with the requirements of this criterion.

Bird species surrounding an artificial saltmarsh.

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Criterion 7 (89%, Strong). Saltmarsh restoration interventions have been guided by a solid evidence base, including environmental studies, historical data and experience from previous projects. Therefore, the measures have been built on well-established scientific knowledge. Moreover, the current design and management of the saltmarshes integrate emerging research on water quality improvement and carbon storage, helping to ensure that expected ecological and social benefits remain effective under changing environmental and socio-economic conditions. Furthermore, the Pilot has developed a comprehensive monitoring plan that covers key aspects required to support adaptive management and continuous learning based on the interventions' performance. Corrective actions have been implemented where appropriate, and sustainability-oriented suggestions have been provided to competent authorities. These recommendations have been considered not only at pilot-level but also beyond it, contributing to broader learning and institutional uptake. All these elements show a strong level of performance in the adaptative management required for this criterion.

Criterion 8 (73%, Adequate). The Pilot has captured, documented and shared key lessons learnt during the design and implementation of the intervention. These lessons have been used to improve the enabling conditions for upscaling and replicating the restoration measures beyond the Pilot. Furthermore, relevant local, subnational and national policy frameworks and targets where the interventions can contribute have been identified. Overall, it demonstrates an adequate level of performance in terms of mainstreaming and upscaling. However, further consolidation of evidence and stronger linkage between restoration outcomes and formal policy, planning and financing frameworks would be required to fully embed the intervention at broader scales.

STRENGTHS

Excellence in Biodiversity (C3): The near-perfect score stands out for its consistent habitat map, regularly assessed biodiversity indicators, and clear response mechanisms.

Adaptive Management and Science (C7): The restoration is based on sound historical and scientific studies. The monitoring plan allows for continuous learning and has already generated sustainability recommendations adopted in a formal restoration agreement signed by the authorities.

Balanced Objectives and Safeguards (C6): Very high performance in mitigating negative impacts. Related to Phase 1 of the works, ex ante and ex post impact assessments are conducted, with structured decision-making involving the scientific community and authorities.

Economic Viability (C4): It developed an innovative business plan and performed a cost-effectiveness analysis. It stands out for its focus on an equitable distribution of risks and returns, an area where other Pilot Sites fall short.

Inclusive Governance (C5): The CORE-PLAT has identified 73 key actors and more than 30 were successfully engaged in the CORE-PLAT that has culminated in a "Restoration Contract", guaranteeing a continuous, open and formal dialogue, and information exchange.

WEAKNESSES

Synergy Search (C2): Although overall performance is good and complementary actions have been implemented, the Pilot acknowledges that it has not actively sought synergies with other sectors, which limits its systemic perspective.

Future Financial Security (C4): Despite sound planning, future funding sources have been identified but are not yet secured, posing a risk to long-term sustainability.

Public Access to Reports (C6): Official technical reports from the lagoon authorities are not directly publicly accessible (only upon request), although the CORE-PLAT platform mitigates this by sharing information transparently.

Limitation of Results (C6): Reported successes are currently limited to Phase 1 (restoration of the marsh perimeter), so the performance of subsequent Phase 2 remains to be validated

VISTULA LAGOON
PARTIAL (28%)

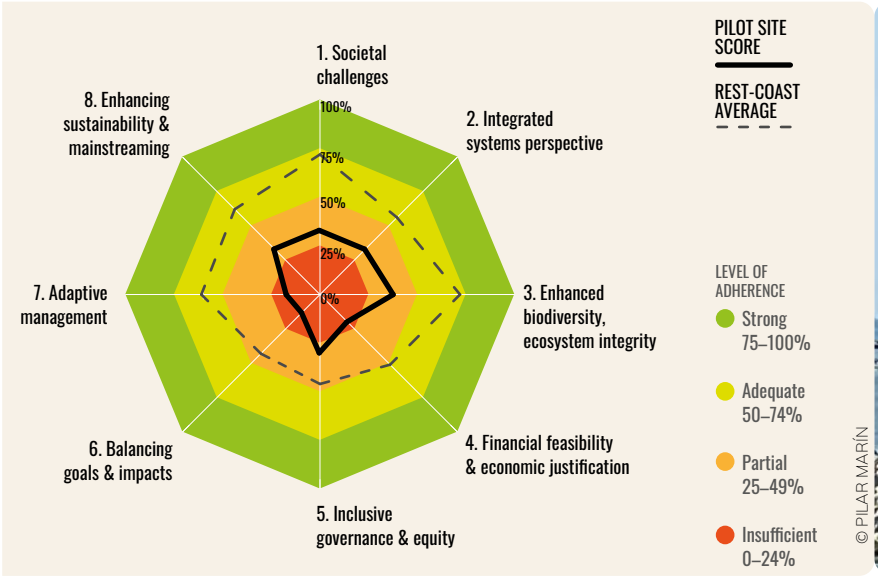
ARTIFICIAL HABITAT CREATION

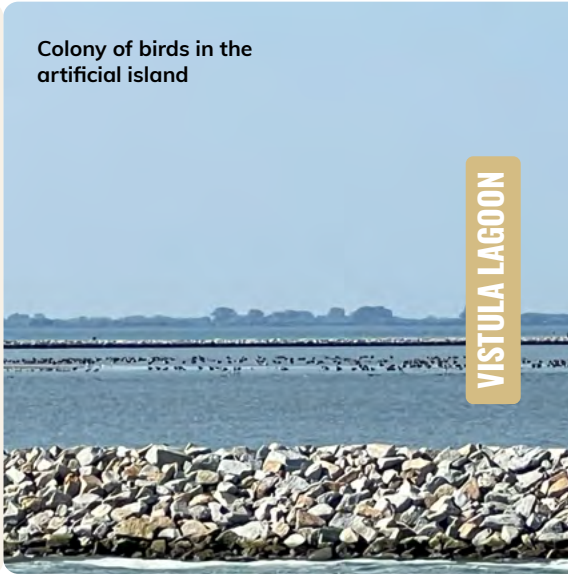
The Pilot Site, located in the Vistula Lagoon on the Polish coast of the Baltic Sea, is focused on the implementation and management of an artificial island, built to store sediment from a large hydraulic project, while developing a grassland to create a habitat for birds hatching. The Pilot overlaps with a Natura 2000 site encompassing priority habitats such as coastal lagoons, large shallow inlets and bays, estuaries and boreal Baltic inlets, which provide critical resting, breeding and wintering grounds for numerous bird species of conservation concern. The intervention responds to significant recent anthropogenic pressures associated with the construction of a new navigation channel connecting the lagoon to the Baltic Sea, which involved extensive dredging and land reclamation works. In this context, the artificial island has been developed following a "building with nature" approach, using dredged sediments to create new habitats that compensate environmental disturbances related to transformation to market economy after 1989. The governance context is marked by structural challenges, of a left behind region after the transformation to market economy. The lagoon region also reflects socio-economic disparities between the north and the south, as well as limited coordination between provincial authorities and low levels of trust and engagement among local communities.

Criterion 1 (33%, Partial). While the societal challenges addressed by the intervention have been identified, the verification means rely primarily on a previous external study of the lagoon, which was not updated prior to the REST-COAST implementation. As a result, the Pilot has limited capacity to refine, update or independently validate the societal challenges addressed by the intervention. In addition, access to and dissemination of this information is largely dependent on the Maritime Office, which holds the institutional mandate for communication and stakeholder engagement in the area, and constrains the Pilot's ability to autonomously manage information flows or directly engage stakeholders and rights-holders beyond the structures already established by the competent authority. The assessment, identification and benchmarking of the intervention outcomes are based on analytical work carried out by IBW PAN and on the Poland national regulatory frameworks. This means the Pilot relies heavily on external sources of information, which limits its capacity to refine, update or independently validate societal outcomes as required under this criterion.

Criterion 2 (33%, Partial). As under Criterion 1, the design and justification of the intervention largely rely on analytical work carried out by IBW PAN, limiting the Pilot's autonomy in addressing interactions between ecological, social and economic systems. Key associated risks have been identified and generally understood, and the Pilot is currently working towards

FIGURE 20. VISTULA LAGOON PILOT PERFORMANCE AGAINST THE IUCN NBS GLOBAL STANDARD CRITERIA.





Colony of birds in the artificial island

© PILAR MARÍN

the development of a Risk Management Plan. At present, the existing management framework addressing risk management is embedded within the plan required to comply with the Habitats Directive and Natura 2000 site management. However, these frameworks were not specifically designed to address NbS-related system interactions, trade-offs or cross-sectoral dynamics. Consequently, while certain system components and risks are recognised through established regulatory and scientific processes, the absence of a Pilot-led, integrated and adaptive systems framework limits alignment with this criterion, resulting in partial performance.

Criterion 3 (38%, Partial). Baseline conditions and biodiversity conservation targets for the Vistula Lagoon were established when designated as Natura 2000 site for both birds (2004) and habitats (2007-2011). However, these baselines are not aligned with updated, Pilot-specific data, and no dedicated baseline assessment was undertaken at the beginning of the Pilot intervention. This temporal mismatch limits the ability to directly attribute observed or anticipated biodiversity outcomes to the intervention. The identification of drivers of ecosystem degradation and biodiversity loss is largely based on analysis developed during the REST-COAST project and on the Environmental Impact Assessment (EIA) conducted for the construction of an independent passage to the Lagoon, intended to reinvigorate the city of Elbląg and its surrounding areas. This EIA identified potential ecological benefits in terms of biodiversity and ecosystem connectivity. However, no monitoring data directly generated by the intervention itself has been provided to substantiate these outcomes. Furthermore, biodiversity targets and objectives specific to the Pilot are not clearly defined. Biodiversity assessment has focused primarily on bird species, despite discussions at Pilot level on potential impacts on other taxa, such as lampreys and fisheries resources. Opportunities to enhance biodiversity are based on monitoring activities undertaken by the Maritime Office, including the presence of invasive species (e.g. raccoons). Beyond these elements, and based on the Pilot's own work, no additional drivers of biodiversity loss or unintended adverse impacts/risks have been identified, mainly due to the island's isolation from other terrestrial mammals (e.g. foxes) and its restricted human access. Overall, while the intervention is conceptually aligned with Natura 2000 conservation objectives, the lack of a Pilot-specific baseline, clearly defined biodiversity targets and intervention-generated monitoring data, constrain the demonstration and management of biodiversity net gain, resulting in partial alignment with this criterion.

Criterion 4 (20%, Insufficient). There is limited knowledge of the distribution of financial and societal costs and benefits associated with the intervention, resulting in a lack of evidence to demonstrate distributional equity. The Pilot has not undertaken a comparative assessment of the implemented action against alternative solutions from an economic and financial point of view, leading to a significant knowledge gap regarding the relative cost-effectiveness and added value of the intervention compared with other possible measures. In addition, the identification and securing of financial mechanisms to ensure the NbS long-term viability are exclusively dependent on the government responsibilities and existing public funding frameworks. This fact substantially constrains the Pilot's capacity to influence financial planning, secure diversified funding sources, or maintain long-term oversight of the sustainable functioning and maintenance of the intervention. Overall, the absence of comparative economic analysis, limited understanding of cost and benefit distribution, and lack of Pilot-level influence over long-term financing arrangements result in insufficient alignment with the requirements of this criterion.

Criterion 5 (30%, Partial). The Pilot engaged directly with stakeholders and rights-holders potentially affected by the intervention and invited them to participate across the different project processes. However, limited interest and engagement from

FIGURE 21. AERIAL VIEW OF THE VISTULA LAGOON PILOT SITE AT THE START OF RESTORATION WORKS (2021) AND AFTER IMPLEMENTATION (2025). © (A) WWW.POLSATNEWS.PL © (B) WWW.TECH.WP.PL

(A) 2021

(B) 2025

© PILAR MARÍN

Navigation channel connecting the lagoon to the Baltic Sea

local communities constrained full and effective participation. In addition, no residents are present within, or directly affected by, the physical restoration area, which further limits opportunities for meaningful place-based participation. Although the Pilot site made an exercise to map stakeholders and rights-holders, their identification was led by the Maritime Office, upon which the Pilot relayed. As a result, the Pilot had limited access to information on community perspectives regarding inclusive participation, as well as restricted influence over the availability, accessibility and practical implementation of grievance mechanisms and decision-making process. Overall, while initial stakeholder engagement efforts were undertaken, the Pilot's reliance on externally managed governance structures and the limited scope for autonomous participation mechanisms constrain the effective operationalisation of inclusive governance, resulting in partial alignment with this criterion.

Criterion 6 (13%, Insufficient). In this respect, the Pilot again relied on the work carried out by the Maritime Office regarding the establishment of safeguards and associated corrective actions through transparent, inclusive and participatory processes. This reliance limited the Pilot's capacity to independently identify, address and manage both intended and unintended negative social and environmental impacts associated with the intervention. Consequently, safeguards and corrective actions were neither documented nor formally shared with stakeholders and rights-holders under the Pilot framework. While the documentation of these measures is foreseen, its implementation remains dependent on national regulatory processes and competent authorities. In addition, the Pilot has not been able to periodically review the effectiveness of the safeguards and corrective actions in place. As a result, there is limited clarity regarding the actual performance of the intervention in balancing objectives and managing potential negative impacts. The absence of Pilot-led safeguards, documentation, review mechanisms and adaptive oversight results in insufficient alignment with the requirements of this criterion.

Criterion 7 (17%, Insufficient). Expected outcomes of the intervention are largely based on assumptions and planning framework established by the Maritime Office, which significantly limits the Pilot's scope of action in defining, testing and refining desired impacts. While the Pilot plans to periodically test these assumptions in line with national legal requirements, this process has not yet translated into the identification or implementation of management adjustments driven by monitoring results. Moreover, adaptive responses have not been developed or applied through an inclusive and participatory approach involving stakeholders and rights-holders. Feedback loops linking monitoring, learning and decision-making remain weak or absent, and changes to intervention management based on evidence or stakeholder input have not been defined or operationalised. As a result, adaptive management remains largely conceptual rather than functional under the Pilot, constraining its capacity to respond to emerging information, uncertainties or changing conditions. This leads to insufficient levels of alignment with the requirements of this criterion.

Criterion 8 (33%, Partial). Lessons learnt from the design and implementation of the intervention, including both barriers and enabling conditions, have not been clearly captured and documented. Moreover, there is limited evidence of how the intervention has informed and enhanced policy, financial or regulatory frameworks in a way that would support its long-term mainstreaming beyond the Pilot context. Regarding the contribution of the intervention to relevant jurisdictional environmental, economic and social targets, the Pilot is exploring the potential replication in another lagoon shared by Poland and Germany. In this prospective replication action, grassland maintenance is not planned based on the expectation that natural vegetation will re-establish over time. However, decision-making regarding this approach remains under the responsibility of the Maritime Office. The Pilot anticipated that, should the island demonstrate good results, the intervention could eventually inform and influence broader policy development, although such impacts have not yet been formally articulated or documented.

STRENGTHS

Identification of Ecological Benefits (C3): Potential benefits for biodiversity and connectivity have been identified, supported by existing regulatory frameworks (Natura 2000) and environmental impact studies.

Protective Isolation (C3): The physical nature of the intervention (an isolated island) acts as an effective natural safeguard against terrestrial predators and human disturbance.

Regulatory Compliance (C2): Risk management is aligned with Habitats Directive and national plans, ensuring a minimum legal basis.

Scalability Vision (C8): There is an intention to replicate the model in other transboundary lagoons, demonstrating an ambition for larger-scale impact.

WEAKNESSES

Lack of Autonomy (C1, C2, C5, C6): This is the most critical weakness. The Pilot relies excessively on the Maritime Office and previous external studies, limiting its ability to independently validate results or make agile decisions.

Deficiency in Monitoring and Data (C3, C7): Updated baseline assessments were not conducted at the start of the project, nor was monitoring data generated by the intervention itself provided to support the claimed benefits.

Limited Governance and Participation (C5): Low interest from the local community and total dependence on the national authority's grievance mechanisms restrict inclusive participation.

Economic and Financial Weakness (C4): There is no cost-effectiveness analysis compared to alternative solutions, and financial viability depends exclusively on the government budget, without diversification of funds.

Lack of Adaptive Management (C7): Management adjustments based on monitoring results or stakeholder input have not been defined or implemented.

Lack of Formal Safeguards (C6): There are no documents formalising social or environmental safeguards, nor are they reviewed periodically to mitigate unintended negative impacts.

WADDEN SEA
ADEQUATE (65%)

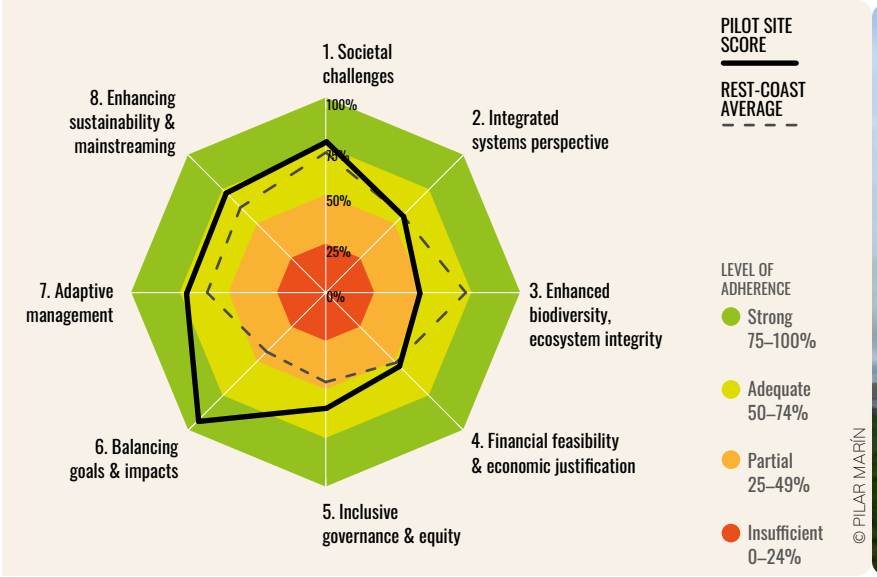
The Wadden Sea Pilot Site, located within the Ems-Dollard estuary in the transboundary Wadden Sea shared by the Netherlands, Germany and Denmark, focuses on assessing restoration interventions aimed at enhancing coastal resilience and ecosystem functioning under current and future climate conditions. The Ems-Dollard forms part of the wider Wadden Sea, one of the world's largest tidal systems, characterised by an extensive mosaic of mudflats, tidal channels, saltmarshes, estuaries and dunes, shaped by wind, waves and tides. This highly dynamic system supports exceptional biodiversity and is formally recognised under multiple protection frameworks, including designation as a UNESCO World Heritage and Natura 2000 sites under the EU Birds and Habitats Directives.

The Pilot addresses long-standing pressures related to sediment dynamics, turbidity, habitat loss and disruption of land-sea connectivity, driven by historical land reclamation, navigation dredging, industrial activities and inland subsidence. These pressures are further exacerbated by climate change impacts such as sea-level rise, increasing flood risk and erosion, which threaten intertidal and supratidal habitats, including saltmarshes and seagrass meadows that are critical for ecosystem services and biodiversity.

The restoration strategy is developed within a transboundary governance framework, involving national, federal and regional authorities in the Netherlands and Germany, operating under EU environmental legislation and coordinated through long-standing cooperation mechanisms such as the Trilateral Wadden Sea Cooperation.

Within this context, the Pilot examines three complementary interventions which address seagrass restoration in the German Wadden Sea, saltmarsh development in Ley Bay, and sediment management through brushwood dams in the Dollard. These interventions are assessed using numerical modelling, ecotope mapping and ecosystem service evaluations to analyse their potential contributions to flood-risk reduction, erosion control, carbon sequestration, water quality improvement and food provisioning, including under future sea-level rise scenarios. The results have shown that saltmarshes significantly attenuate storm impacts by reducing wave heights, flow velocities, and bed shear stress. Seagrass meadows effectively dampen waves and currents, enhance sediment stabilisation, long-term sediment accumulation and vertical growth. Brushwood dams, historically applied in the Ems estuary for land reclamation, also enhance sediment deposition and can be repurposed to increase wetland elevation and resilience. Together, these measures reduce hydrodynamic

FIGURE 22. WADDEN SEA PILOT PERFORMANCE AGAINST THE IUCN NBS GLOBAL STANDARD CRITERIA.



Ems-Dollard coastal landscape © PILAR MARÍN

forcing, promote sediment retention, and strengthen coastal adaptation to storms and sea-level rise.

Criterion 1 (78%, Strong). The Pilot has clearly identified the most pressing societal challenges relevant to the Wadden Sea context, together with their underlying drivers. These challenges include increasing flood risk, coastal erosion, sediment imbalance, climate-driven sea-level rise, and the need to reconcile ecological restoration with coastal safety, food production and spatial development in a highly dynamic, transboundary system. Several of them are well documented through strategic planning instruments, modelling exercises and technical assessments, and are articulated in a coherent and well-justified manner. Societal challenges have been prioritised within a strong governance and policy framework that spans local, national and cross-border levels between the Netherlands and Germany. The Pilot benefits from a shared strategic vision anchored in the Ems-Dollard 2050 programme, Natura 2000 objectives or national climate adaptation policies, fostering broad institutional recognition of the need for nature-based, sediment-focused and ecosystem-based responses to climate risks. Likewise, the Pilot has explicitly identified NbS delivering for both people and nature, demonstrating their relevance beyond the immediate intervention sites. Comparable and replicated intervention combinations have been identified, including reference cases such as Waterdunen in the south-west Netherlands reinforcing the robustness and societal relevance of the NbS approach. Overall, the clarity of problem definition, prioritisation of societal challenges and explicit linkage to restoration intervention benefits reflect a strong level of performance under this criterion.

Criterion 2 (56%, Adequate). The restoration interventions have been designed to recognise and respond to key interconnections between ecological processes, socio-economic activities and climate-driven pressures. Interactions related to flood risk, coastal erosion, sediment dynamics, water quality, carbon regulation and food provisioning have been considered over time and underpin the analytical framework applied. Through numerical modelling and assessments from both ecological and economic perspectives, the interventions have been implicitly linked via the derived ecosystem services including flood-risk and coastal erosion reduction, water purification, climate change regulation, and food provisioning. This demonstrates a sound understanding of the multifunctional role of the interventions within coupled human-natural systems. However, while synergies with other sectors and policy domains have been explored, complementary interventions have not been formally integrated into a coordinated, cross-sectoral implementation framework, indicating scope for improvement in operationalising an integrated systems approach. Furthermore, the Pilot has identified relevant risks associated with the interventions and has developed a risk management framework in which these relevant risks are considered. Nevertheless, further consolidation and integration of risk management within a broader, cross-sectoral planning approach would strengthen performance under this criterion.

Criterion 3 (48%, Partial). The Pilot has defined a baseline assessment of biodiversity conditions prior to the interventions, and several key drivers affecting ecosystem integrity have been identified. Opportunities to enhance biodiversity and ecosystem integrity have also been recognised, and some of these have been also assessed through modelling exercises and ecosystem service analyses. The NbS outcomes respond to enhance or recover biodiversity or ecosystem values, particularly through improved sediment dynamics, habitat formation and hydromorphological processes. However, clear, site-specific biodiversity targets are not yet fully defined. At present, only turbidity-related indicators have

FIGURE 23. WORKS WITHIN THE WADDEN SEA PILOT SITE (DOUBLE DIKE AND MARCONI SALTMARSH). © ED2050 PROGRAM.

been applied, while the development of dedicated biodiversity indicators is still ongoing. This is partly due to the regulatory context in the Netherlands, where Natura 2000 protection regime apply. In the inland estuarine tidal area, quantitative targets for several biodiversity indicators have not yet been formally established, and ecological improvements must be carefully balanced with liveability and landscape considerations. As a result, the current indicator framework limits the ability to robustly quantify biodiversity gains and ecosystem integrity improvements. Furthermore, the Pilot has not yet developed a comprehensive monitoring plan specifically focused on biodiversity outcomes, hampering the systematic assessment of biodiversity change over time and constrains the management of biodiversity net gain. As a result, while the intent and design of the NbS are aligned with biodiversity enhancement objectives, significant gaps remain in terms of indicators, targets and monitoring arrangements, resulting in partial alignment with this criterion.

Criterion 4 (53%, Adequate). The Pilot has identified, assessed and documented both actual and projected financial and societal costs and benefits associated with the interventions. Relevant stakeholders and rights-holders who bear these costs and derive benefits have also been identified. Moreover, a cost-effectiveness analysis, or comparable assessment, has been developed to compare the restoration interventions with alternative solutions, notably through the design of a scalable adaptation-through-restoration pathway intended to support implementation upscaling. Nevertheless, despite this analytical foundation, the Pilot has not yet identified or secured dedicated financial mechanisms to ensure the long-term viability of the restoration beyond the project phase. This gap limits the capacity to sustain implementation, maintenance and potential upscaling over time and represent a significant constraint of the overall financial feasibility of the intervention under this criterion.

Criterion 5 (59%, Adequate). The Pilot has identified directly affected stakeholders and rights-holders, including their rights, uses and responsibilities by mapping the governance context. This mapping reflected a multi-level and cross-sectoral governance setting and provided a clear overview of the actors involved. A grievance and conflict resolution mechanism has been defined and implemented

Dollard Clay Ripening Plant.

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and is available and accessible to stakeholders. The restoration intervention is based on inclusive participation, mutual respect and equality, regardless of gender, age, ethnicity or social status, and a transparent, documented and accessible decision-making process has been established. Nevertheless, while these governance mechanisms are in place, decision-making processes do not consistently or explicitly respond to rights, roles and interests of affected stakeholders. This limits the effectiveness of inclusive participation and shared decision-making in practice, indicating remaining gaps in the operationalisation of inclusive governance under this criterion.

Criterion 6 (93%, Strong). The Pilot has developed safeguards and corrective actions to address identified risks associated with the restoration intervention. The decision-making processes underpinning these measures are transparent, inclusive and participatory, and actively involve relevant stakeholders and rights-holders. These actions are supported by Risk/Management Protocols including technical, administrative and budgetary contingency measures designed to ensure high-quality and maximise positive impacts. All safeguards and corrective actions are documented in the protocols, and available and accessible to affected stakeholders and rights-holders. They also establish the periodic review of implemented safeguards and corrective actions to verify their effective implementation, proactively address conflicts and ensure they remain relevant over time. Overall, this shows a high level of performance in balancing goals and managing negative impacts, demonstrating strong alignment with the requirements of this criterion.

Criterion 7 (72%, Adequate). The Pilot has defined the expected restoration outcomes in line with prevailing conditions and drawing on scientific, local and traditional knowledge. A monitoring and evaluation plan is currently under development to support learning and adaptive implementation. In parallel, corrective actions have been already implemented through the monitoring plan using an inclusive and participatory approach. Overall, these elements show a solid basis for adaptative management. However, further consolidation of the monitoring and evaluation framework would strengthen the systematic use of evidence to inform ongoing management adjustments over time.

Criterion 8 (73%, Adequate). The Pilot has captured and documented key lessons learnt throughout the design and implementation of restoration interventions, and these have been used to support its upscaling. Moreover, the Pilot has provided evidence of the contribution of the restoration to relevant policy frameworks including environmental, economic, and social. These elements demonstrate a solid performance in terms of knowledge transfer, mainstreaming and upscaling the restoration intervention, supporting its relevance beyond the Pilot scale while indicating scope for further consolidation.

STRENGTHS

Risk Management and Safeguards (C6): This is the most outstanding aspect. The Pilot has high-quality risk management protocols that include technical and budgetary contingency measures, as well as transparent processes and regular stakeholder reviews.

Social Challenges and Transparency (C1): Excellent identification and justification of social challenges. The project uses successful external references (such as Waterdunen) to validate its mix of interventions.

Sustainability and Scalability (C8): Lessons learnt are effectively captured and are already being used to scale up the project, aligning with jurisdictional environmental and socio-economic goals.

Economic Analysis (C4): A cost-effectiveness analysis and a scalable plan have been developed to close the implementation gap, documenting future costs and benefits.

Adaptive Management (C7): Although a monitoring plan is under development, corrective actions have already been implemented using participatory and inclusive approaches.

WEAKNESSES

Biodiversity Monitoring (C3): This is a significant weakness. Clear objectives and biodiversity indicators are lacking (currently, only turbidity is measured), and a monitoring plan to ensure net biodiversity gains has not been formalised.

Long-Term Financial Viability (C4): Despite a sound economic analysis, the pilot has not identified or secured financial mechanisms to guarantee the restoration's long-term viability.

Systems Integration (C2): Although it links ecology and economics through ecosystem services, it has failed to integrate complementary interventions, limiting itself to seeking external synergies.

Inclusive Governance (C5): Despite having documented grievance mechanisms, the decision-making system does not fully address the rights and interests of affected stakeholders, creating a gap in inclusive management.

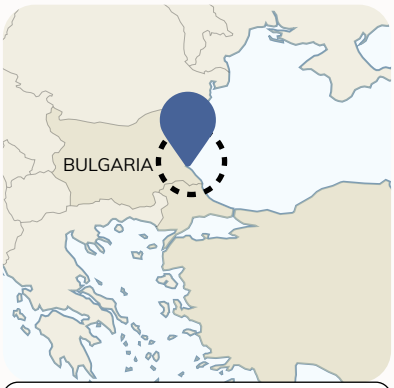
INFOGRAPHIC 1.
RESTCOAST NBS CRITERION CHAMPIONS: WHICH PILOTS LEAD ON WHAT

VENICE LAGOON

THE MOST BALANCED

Top overall performer, with the most consistent results across all criteria. The best in Biodiversity & Ecosystem Integrity, Adaptive Management, and Economic Viability with explicit risk and benefit-sharing.

Strong and formalised governance, through the Restoration Agreement engaging 73 stakeholders.



FOROS BAY

BIODIVERSITY AND SOCIAL INTEGRATION LEADER

Robust science-based ecological baseline assessment and high-quality biodiversity monitoring (95%).

Best in social transparency (83%), reflecting clear communication, high accessibility of information, and particular attention to the rights of small-scale local users.

WADDEN SEA

LEADER IN SAFETY AND RISK

Benchmark for safeguards and risk management (93%), with the most advanced safety framework, contingency protocols and emergency response capacity across Pilots.

High operational readiness, ensuring effective prevention, mitigation and response to unintended impacts for both ecosystems and stakeholders.

RHONE DELTA

STRONG TERRITORIAL INTEGRATION

Well-balanced pilot excelling in the integration of science and policy frameworks.

Strong performance in biodiversity and a Systemic Design that aligns restoration with flood-risk reduction and civil protection.

NAHAL DALIA

LEADER IN SOCIAL COMMITMENT

Leader in societal challenges driven by strong social consensus and a shared, multi-stakeholder water-management plan agreed with all user groups.

EBRO DELTA AND SICILY LAGOONS

SCIENTIFIC POTENTIAL

Strong scientific and monitoring foundations, with clear potential to strengthen governance and management structures to enhance long-term impact and scalability.

4.2 ANALYSIS BY CRITERION AT REST-COAST LEVEL

This section presents a criterion-by-criterion analysis of the application of the IUCN Global Standard for Nature-based Solutions across the REST-COAST project, providing a consolidated, project-level perspective. Building on the aggregated results of the assessment, it examines how the different restoration interventions collectively perform against each of the eight criteria of the Standard, highlighting common patterns, strengths and recurring gaps across Pilot Sites.

Rather than focusing on individual site performance, the analysis synthesises evidence across Pilots to assess the overall level of alignment with the Standard, identify areas where performance is consistently strong, and pinpoint criteria where implementation challenges remain. For each criterion, the analysis summarises key findings, discusses the degree of maturity reached at project level, and also includes a brief synthesis (highlighted) outlining priority areas for improvement to support long-term effectiveness, scalability and mainstreaming of NbS.

Greater Flamingo (*Phoenicopterus roseus*) in a protected coastal wetland in southern Spain (Parque Natural de la Breña y Marismas del Barbate, Cádiz)

© PILAR MARÍN

CRITERION 1
SOCIETAL CHALLENGES
(72%, ADEQUATE)

Further strengthening of documentation, harmonisation of communication practices and consolidation of verification mechanisms would enhance consistency and support long-term learning and upscaling.

The REST-COAST project demonstrates a solid foundation in identifying and addressing societal challenges, in line with the requirements of the IUCN Global Standard for Nature-based Solutions. Across the project, the most relevant **societal challenges and their underlying drivers** have been identified and documented, providing a clear rationale for the design and implementation of NbS. These challenges are generally well aligned with local and supralocal priorities, including climate adaptation, risk reduction, biodiversity conservation and ecosystem service provision.

In terms of **documentation and transparency**, most interventions are supported by structured assessments and clear narratives describing the societal challenges addressed. However, the level of detail, formalisation and consistency of this documentation varies across sites. While information on societal challenges is generally available to stakeholders, differences remain in how clearly this information is communicated and how accessible it is for non-technical audiences.

Regarding **monitoring and verification**, most interventions have established mechanisms to track progress and assess whether societal challenges are being effectively addressed over time. Outcomes for both people and nature are commonly identified and monitored, and in many cases linked to specific indicators. In several instances, benchmarks or reference conditions have already been defined to support performance assessment, while in others this process is still under development.

CRITERION 2
INTEGRATED SYSTEMS PERSPECTIVE
(56%, ADEQUATE)

Further progress in formalising complementary actions, strengthening cross-sectoral synergies and consolidating risk-management and verification processes would enhance consistency and support long-term effectiveness and scalability.

The REST-COAST project demonstrates a moderate level of performance under this criterion. In most cases, the interconnections and interactions between ecosystems, society and the economy have been identified and analysed, taking into account temporal dynamics and future trajectories. This integrated perspective provides a solid foundation for designing NbS that address complex coastal challenges in a systemic manner.

In many interventions, this **systems perspective** has already been translated into practice through the integration of ecological, social and economic considerations within planning and management processes, supported by appropriate means of verification. However, the depth of this integration varies, and in some cases the systems analysis remains more conceptual than operational.

With regard to **complementary interventions**, most NbS designs recognise the need for additional or supporting measures to enhance effectiveness, resilience and long-term outcomes. While several interventions have already integrated such complementary actions into their implementation, others remain at an earlier stage, having identified relevant measures but not yet fully incorporated them into practice. Verification mechanisms for these complementary interventions are present in most cases, although consistency could be further strengthened.

The search for **synergies across sectors**, including water management, agriculture, fisheries, coastal protection and spatial planning, is evident across a large part of the project. In several cases, these synergies are supported by documented coordination mechanisms and evidence of cross-sectoral collaboration, while in others they remain emerging or partially developed.

Risk identification and management represent an area with more uneven maturity. Most interventions have taken steps to identify and understand potential ecological, social and economic risks associated

with NbS implementation and to integrate them into management approaches. In some cases, these risks are formally documented and embedded in structured risk-management plans, while in others documentation and verification remain limited or incomplete.

CRITERION 3
ENHANCED BIODIVERSITY AND ECOSYSTEM INTEGRITY (72%, ADEQUATE)

Further strengthening the consistency and breadth of ecological indicators, and ensuring their systematic assessment over time, would enhance the robustness of performance evaluation and support long-term learning and upscaling.

Overall, REST-COAST shows a solid alignment with the requirements of the Standard under this criterion. Across the project, **baseline ecological assessments** have been established prior to intervention, or existing baselines have been effectively used, allowing a clear definition of the initial state of ecosystems. These baselines are generally supported by appropriate means of verification, providing a robust reference for assessing changes in biodiversity and ecosystem integrity over time.

There is a high level of consistency in the **diagnosis of threats to biodiversity and ecosystem integrity**. The main drivers of degradation and biodiversity loss have been identified and assessed, forming a solid foundation for the design of restoration measures. This shared understanding of pressures and threats strengthens the relevance and coherence of the NbS interventions implemented.

The identification of **opportunities to enhance nature** is also widely addressed. In most cases, opportunities for biodiversity recovery and ecosystem improvement have been identified, assessed and documented, demonstrating a proactive approach to ecological enhancement. In a smaller number of cases, these opportunities have been identified but their formal assessment is still under development.

With regard to **expected outcomes**, most interventions have defined objectives and targets that explicitly address the recovery of ecological values, including habitat quality, species presence and ecosystem functioning. However, while indicators to measure success are generally in place, the assessment of outcomes remains uneven. In several cases, indicators are only partially monitored or focus on a limited set of parameters, which constrains a comprehensive evaluation of biodiversity and ecosystem integrity outcomes.

CRITERION 4
FINANCIAL FEASIBILITY AND ECONOMIC JUSTIFICATION (51%, ADEQUATE)

While meaningful progress has been achieved in economic assessment and cost-effectiveness analysis, further consolidation of long-term financing mechanisms, equitable benefit-sharing arrangements and formally established, verifiable risk-monitoring frameworks would significantly strengthen compliance with the IUCN Global Standard for Nature-based Solutions.

The REST-COAST project shows mixed but tangible progress under this criterion, particularly in economic assessment and cost-effectiveness. Across the project, significant efforts have been made to identify, assess and document the financial and socio-economic costs and benefits associated with NbS, both in the short and long term. In many cases, current costs are well understood and transparently documented, while the assessment of future benefits and long-term value creation is still under development.

A strong and consistent aspect of performance relates to the **identification of stakeholders and rights-holders bearing costs and receiving benefits**. In most interventions, responsibilities, cost distribution and benefit flows have been clearly mapped, providing an important basis for economic justification and equity considerations. This mapping is generally supported by adequate means of verification.

In addition, a substantial share of interventions has undertaken **cost-effectiveness analyses**, demonstrating that NbS can be competitive with, or complementary to, traditional grey infrastructure solutions. These analyses provide credible evidence of economic efficiency and strengthen the case for NbS as viable alternatives for coastal protection and adaptation.

However, **long-term financial sustainability** remains the main challenge. While several interventions have identified or secured financial mechanisms to support future viability, the formalisation of long-term financing strategies and the equitable sharing of risks and benefits are not yet fully consolidated across the project. In some cases, funding sources have been identified, but arrangements for fair benefit-sharing and risk allocation still require further development.

Finally, **monitoring and response mechanisms for unintended negative impacts** represent an area of uneven maturity. Although most interventions recognise the need for such mechanisms, their formalisation, implementation and verification are not yet systematic. Strengthening transparency and accountability in the management of financial and ecological risks would enhance alignment with the Standard and support long-term credibility.

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Governance workshop with key stakeholders at Ebro Delta Pilot Site

CRITERION 5 INCLUSIVE GOVERNANCE AND EQUITY (46%, PARTIAL)

Strengthening inclusive decision-making, improving the quality and continuity of participation, and systematically reviewing governance mechanisms would significantly enhance empowerment, transparency and long-term legitimacy of NbS interventions.

Overall, performance under this criterion is uneven across the REST-COAST project, reflecting differing levels of maturity in governance arrangements and partial alignment with this criterion of the Standard.

In most cases, efforts have been made to identify and **document affected stakeholders and rights-holders**, including both direct and indirect groups. However, while stakeholder identification is generally well-developed, the depth and effectiveness of participation vary considerably across interventions. In several cases, **directly** affected stakeholders have been actively involved in the design and implementation of interventions. Nevertheless, the participation of **indirectly** affected stakeholders remains more limited, and in some contexts has not yet reached a level that could be considered effective or meaningful. This highlights a gap between stakeholder mapping and inclusive engagement throughout the full intervention lifecycle.

The establishment of **grievance, conflict-resolution and feedback mechanisms** represents a notable area of progress. Multiple interventions have implemented transparent, accessible and culturally appropriate mechanisms to address conflicts and concerns. However, differences emerge in how these mechanisms are maintained over time. While some interventions regularly review and adapt these processes, others operate static mechanisms that lack periodic evaluation and updating. In most cases, evidence supporting the existence of such mechanisms is available.

With regard to **principles of respect, equality and inclusion**, interventions are generally framed around commitments to non-discrimination and inclusive values, irrespective of gender, ethnicity or social status. However, practical gaps persist. In some cases, stakeholders and rights-holders have not consistently received clear, accessible information or sufficient opportunities to influence outcomes, limiting the effectiveness of these principles in practice.

Decision-making remains the most challenging aspect of governance performance. While some interventions have documented and accessible decision-making processes, mechanisms enabling full and effective participation in decisions are often partial or constrained. In several instances, existing arrangements do not yet fully address the rights, interests or concerns of all affected groups. Nonetheless, where such limitations exist, they are generally acknowledged and, in some cases, transparently documented through available verification mechanisms.

CRITERION 6
BALANCING GOALS AND IMPACTS
(43%, PARTIAL)

Strengthening the transition from planned safeguards to fully implemented and monitored corrective actions, and ensuring consistent verification and communication of trade-offs and responses, would significantly enhance the robustness, credibility and long-term sustainability of NbS interventions.

The REST-COAST project shows uneven but advancing performance, demonstrating partial alignment under this criterion. In most cases, **potential negative environmental and social impacts** associated with interventions have been identified, and safeguards and corrective actions have been designed to mitigate identified risks. These measures are often integrated into decision-making processes that emphasise transparency, participation and stakeholder engagement, and are generally supported by appropriate means of verification.

A key strength observed across the project is the recognition of the need to **balance multiple objectives**, including biodiversity conservation, risk reduction, socio-economic uses and long-term ecosystem functioning. In several interventions, this recognition has been translated into structured **safeguard frameworks and corrective protocols** aimed at avoiding, minimising or compensating unintended negative impacts.

However, a critical distinction emerges between **planning and implementation**. While many interventions have clearly defined safeguards and corrective actions, fewer have progressed to systematically monitoring, documenting and communicating the effectiveness of these measures in practice. Only a subset of interventions has moved beyond design-level commitments to operational implementation, with safeguards actively applied, monitored and made accessible to stakeholders and rights-holders.

In addition, the level of **formalisation and consistency of risk-management approaches** varies. In some cases, corrective actions are well documented but not yet fully operationalised, limiting their effectiveness in real-world conditions. In others, gaps remain in the definition of response procedures should negative impacts occur, or in the transparency of how such procedures are triggered and reviewed.

CRITERION 7
ADAPTIVE MANAGEMENT
(61%, ADEQUATE)

Further progress in consolidating monitoring frameworks, systematically linking results to decision-making, and embedding inclusive learning processes would significantly enhance the effectiveness and credibility of adaptive management across the project.

Following the assessment, the REST-COAST project demonstrates moderate to good performance under this criterion, through a solid conceptual foundation for adaptive management, despite variable levels of operational maturity. Across the project, **expected outcomes** of interventions have been clearly defined based on existing environmental, social and economic conditions. In most cases, this definition integrates scientific knowledge with local and, where relevant, traditional knowledge, supporting context-specific and realistic intervention objectives. This preparatory work is usually supported by evidence, although in a limited number of cases the approach remains more narrowly framed around technical considerations.

Monitoring is recognised as a central component of adaptive management across the project. Most interventions have established monitoring plans intended to track ecological, social and risk-reduction outcomes over time. However, the scope, depth and integration of these plans vary considerably. While some monitoring frameworks are comprehensive and explicitly designed to support continuous learning and adjustment, others still present information gaps, limited indicators or constraints that hinder systematic feedback into management decisions.

The capacity to **learn and adjust interventions based on monitoring results** also differs across the project. In several cases, corrective actions and management adjustments are informed by monitoring outcomes and embedded within structured learning processes. In other cases, adjustments are implemented in a more ad hoc manner, without being clearly linked to monitoring frameworks or supported by inclusive decision-making processes. This limits the effectiveness of adaptive management and reduces transparency.

Despite these challenges, a positive aspect is that many interventions have established **verification mechanisms** that allow them to document adjustments, acknowledge limitations and demonstrate responsiveness. This transparency provides a basis for strengthening adaptive management over time.

CRITERION 8
ENHANCING SUSTAINABILITY AND MAINSTREAMING
(62%, ADEQUATE)

Continued efforts to systematically translate documented lessons into operational guidance and scaling strategies would further strengthen long-term sustainability and mainstreaming of NbS outcomes.

The REST-COAST project demonstrates a good level of performance showing a high level of alignment with this criterion. Across the project, **lessons learnt** during the design and implementation of interventions have been systematically captured and documented, reflecting a high level of reflexivity and institutional learning. This knowledge generation process has been embedded within project activities and has not remained a purely internal or retrospective exercise.

In most cases, lessons learnt have been **actively used to inform conditions for replication and upscaling**, including technical feasibility, governance arrangements, financial considerations and stakeholder engagement. This forward-looking application of knowledge strengthens the long-term relevance of the interventions and supports their potential transfer to other coastal contexts and policy frameworks.

While **documentation of lessons learnt** is consistent across the project, differences emerge in how this knowledge is operationalised. In a limited number of cases, they have been recorded but have not yet been translated into concrete actions or strategies to support replication or scaling. This indicates scope for further consolidation of learning-to-action pathways.

A particularly strong aspect of performance under this criterion is the presence of **robust means of verification**. Across all interventions, evidence supporting lessons learnt, reflections and conclusions is available, enhancing transparency, credibility and accountability. This ensures that the knowledge generated through REST-COAST can serve as a reliable evidence base for future coastal restoration initiatives, programmes and policies.

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REST-COAST policy event at the European Parliament with MEP Mr. González Casares (Brussels, November 2025)

4.3 CROSS-CUTTING STRENGTHS AND WEAKNESSES ACROSS THE NBS STANDARD CRITERIA

The following table (**Table 6**) provides a consolidated overview of the main strengths and weaknesses identified across the REST-COAST project in relation to the eight criteria of the NbS Standard. It highlights recurring patterns observed during the assessment, capturing areas where performance is consistently strong, as well as cross-cutting gaps that may limit the long-term effectiveness, sustainability and scalability of the interventions. Rather than focusing on the performance of individual Pilot Site, this table offers a project-level reflection that supports comparative analysis, cross-site learning, and the identification of priority areas for improvement. This consolidated view also provides the basis for the targeted recommendations presented in the following section (**Infographic 2**).

TABLE 6. SUMMARY OF REST-COAST'S STRENGTHS AND WEAKNESSES ACROSS THE IUCN NBS STANDARD CRITERIA.

C1 – 72% ADEQUATE

SOCIETAL CHALLENGES

Strong diagnosis of the societal challenges: Most of pilot sites demonstrate a solid understanding of their local societal challenges and their underlying drivers, supported by baseline studies and contextual assessments.

Limited updating capacity and autonomy: Some Pilot Sites rely heavily on outdated or externally generated data and have limited capacity to update challenge assessments over time.

C2 – 56% ADEQUATE

INTEGRATED SYSTEMS PERSPECTIVE

Recognition of system linkages: Pilots generally show a strong understanding of how ecosystem health influences local economies, social being, and coastal resilience.

Weak formal risk management: Although risks are often acknowledged, few Pilots have formal and operational Risk Management Plans covering environmental, social and economic dimensions.

C3 – 72% ADEQUATE

BIODIVERSITY AND ECOSYSTEM INTEGRITY

Strong scientific baseline: High-quality ecological assessments and monitoring, including BACI (Before-After) monitoring, provide a robust technical foundation.

Limited biological response indicators: Monitoring often focuses more on physical parameters than on biodiversity response indicators. In addition, clear corrective mechanisms for ecological underperformance remain limited.

C4 – 51% ADEQUATE

FINANCIAL FEASIBILITY AND ECONOMIC JUSTIFICATION

Recognition of economic value: Several Pilots demonstrate that NbS can be more cost-effective and more efficient than other solutions.

Weak long-term financial sustainability: Post-project financing remains one of the main gaps, with limited long-term maintenance mechanisms and insufficient operationalisation of benefit-sharing approaches.

STRENGTHS **WEAKNESSES**

C5 – 46% PARTIAL

INCLUSIVE GOVERNANCE AND EQUITY

Strong stakeholder mapping: Pilots generally have a good understanding of local actors, user and institutions involved in the intervention areas, supported in some cases by tools like a "**Restoration Agreement**".

Limited decision-making power: Participation is often consultative rather than decisive, while grievance and conflict resolution mechanisms are frequently weak, temporary, or not institutional.

C6 – 43% PARTIAL

BALANCING GOALS AND IMPACTS

Transparency in intervention designs: Where safeguards exist, they are generally discussed openly with stakeholders, scientific community and rights-holders.

Major implementation gap (the most critical point): In several Pilots safeguards either remain conceptual or exist only on paper, with limited evidence of systematic monitoring, review, or active application.

C7 – 61% ADEQUATE

ADAPTIVE MANAGEMENT

Strong willingness to adjust: Several Pilots demonstrate responsiveness and have developed management plans that combine scientific evidence with local knowledge and practical learning.

Lack of systematic adaptive management: Corrective actions are often ad hoc and are not consistently linked to structured monitoring systems or formal learning processes that trigger management adjustments.

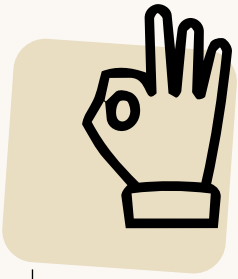
C8 – 62% ADEQUATE

SUSTAINABILITY AND MAINSTREAMING

Strong documentation of lessons learnt: Pilots perform well in documenting experiences, technical knowledge, and lessons learnt, supporting future replication and knowledge transfer.

Limited policy influence: Translating lessons learnt into permanent institutional frameworks, policies and regulatory frameworks remains one of the main barriers to long-term mainstreaming.

INFOGRAPHIC 2.
CONSIDERATIONS FOR A LONG-TERM IMPACT: WHAT WORKS, WHAT DOESN'T, AND WHAT MATTERS



THE EXCELLENCE

DIAGNOSIS AND SCIENCE

CRITERION RELATED C1, C3 and C8

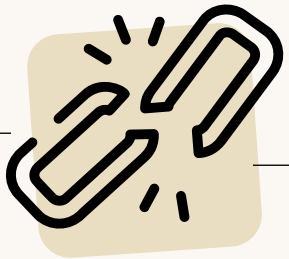
The project excels in its technical phase. All Pilots have established solid baselines, rigorously identified societal challenges, and documented lessons learned for the future. Replication is real, and Pilot Sites like Venice Lagoon and Foros Bay demonstrate that it is possible to achieve near-perfect ecological integrity (95%) through rigorous scientific monitoring.

THE CHALLENGE FOR SUSTAINABILITY

ECONOMIC VIABILITY

CRITERION RELATED C4

The project has demonstrated that NbS are cost-effective compared to traditional engineering (cost-effectiveness analysis), but dependence on public funds and one-off projects remains high. Future success will depend on the Pilot securing long-term financial mechanisms and, above all, achieving an equitable distribution of the economic benefits generated (tourism, fishing, coastal protection).



THE "ACHILLES' HEELS"

SAFEGUARDS AND RISKS

CRITERION RELATED C6

A critical gap exists between intention and formal protection. While Wadden Sea is the model to follow in terms of safety, other Pilots such as Ebro Delta and Nahal Dalia operate with a critical lack of documented safeguards. Mechanisms to guarantee that the intervention will not harm third parties or the ecosystem itself in the long term are needed.

GOVERNANCE: FROM DIALOGUE TO DECISION-MAKING

CRITERION RELATED C5

Although a culture of participation exists (almost all Pilots use the CORE-PLAT), inclusive decision-making remains the most difficult level to achieve. Many Pilots inform local stakeholders, but few (except Venice Lagoon with its «Restoration Agreement») have succeeded in giving local communities a real and binding vote on the intervention's future.

5. THE WAY FORWARD FOR COASTAL RESTORATION: RECOMMENDATIONS FOR EFFECTIVE NBS IMPLEMENTATION

A key conclusion of the REST-COAST NbS assessment is that restoration interventions are most effective when they embed community participation from the earliest stages, integrate complementary solutions, and rely on robust monitoring frameworks that support long-term biodiversity and climate-resilience outcomes. Overall, the assessment highlights a project with a strong scientific and ecological foundation, while also revealing recurring challenges related to the formalisation of governance arrangements, inclusive decision-making and the securing of long-term financial sustainability.

The results confirm that REST-COAST Pilot Sites can make a substantial contribution to coastal protection, ecosystem restoration and climate adaptation, reinforcing the role of nature as a credible and effective alternative to conventional engineered solutions. At the same time, the assessment shows that achieving lasting impact requires moving beyond the successful delivery of pilot actions towards more stable, institutionalised and durable management frameworks.

The central challenge identified is therefore the transition from time-bound, project-based interventions to operational, long-term territorial management models. This transition is essential to safeguard the durability, scalability and sustainability of NbS interventions, while ensuring continued alignment with the principles and criteria of the IUCN Global Standard for Nature-based Solutions.

In response to the gaps and areas for improvement identified through the assessment, this section presents a set of targeted recommendations designed to support future decision-making, prioritise improvement actions and facilitate the evolution of site-specific interventions into institutionalised, high-integrity, and scalable NbS for coastal restoration. These recommendations are grounded in the experience gained across the REST-COAST Pilot Sites, reflecting lessons learnt from a diverse range of adaptation measures implemented in different coastal contexts. They provide a practical evidence base for strengthening future restoration actions and supporting the long-term mainstreaming of NbS.

For clarity and coherence, the recommendations are structured in line with the eight criteria of the IUCN NbS Standard, with each recommendation accompanied by a concise set of corresponding actions (**Infographic 3**).

Posidonia mats acting as a natural barrier against beach erosion (Cabo de Gata, Almería, Spain).

© PILAR MARÍN

RECOMMENDATION 1. STRENGTHEN THE ARTICULATION AND OWNERSHIP OF SOCIETAL CHALLENGES.

- 1.1. Ensure that NbS interventions are grounded in **robust, evidence-based assessments** of societal challenges, including comprehensive stakeholder and rights-holder mapping, spatial analysis and baseline data.
- 1.2. Explicitly identify and address **social barriers and enabling conditions** early in the design phase, to enhance relevance, legitimacy and social acceptance.
- 1.3. Integrate **awareness-raising and communication** as core components of NbS design and delivery, supporting shared understanding of challenges and intended outcomes.

RECOMMENDATION 2. ADOPT A SYSTEMIC, MULTI-SECTORAL AND INTERDISCIPLINARY APPROACH.

- 2.1. Design NbS using an integrated **systems perspective** that clearly demonstrates the interactions between ecological, social, economic and governance dimensions over time.
- 2.2. Promote **multifunctionality** by clearly communicating how NbS deliver multiple benefits, including biodiversity enhancement, climate adaptation, coastal protection, livelihoods and social well-being.
- 2.3. Strengthen **interdisciplinary collaboration** by ensuring that ecological, engineering, social and economic expertise jointly inform planning, implementation and evaluation.
- 2.4. Improve **coordination across sectors and governance levels** by aligning local NbS interventions with broader territorial planning processes, sectoral policies and institutional frameworks to enhance coherence and effectiveness.

RECOMMENDATION 3. PRIORITISE ECOLOGICAL INTEGRITY AND BIODIVERSITY ENHANCEMENT.

- 3.1. Clearly **define NbS objectives that explicitly target biodiversity enhancement and ecosystem integrity** building on existing scientific and contextual knowledge while ensuring that each NbS intervention generates its own site-specific data and evidence.
- 3.2. Apply ecologically meaningful and **diverse monitoring indicators**, aligned where possible with existing national and international policy frameworks (e.g. EU directives - Water Framework Directive, Marine Strategy Framework Directive, EU Nature Restoration Regulation), and including **indicators of biodiversity net gain** to demonstrate measurable ecological improvement.
- 3.3. Establish **response mechanisms that allow timely adjustments**, ensuring that monitoring results are used to adapt interventions when ecological outcomes deviate from expectations.

RECOMMENDATION 4. SECURE LONG-TERM FINANCIAL SUSTAINABILITY AND EQUITABLE BENEFIT-SHARING.

- 4.1. **Integrate NbS into public policy instruments**, planning frameworks and financial programmes, reducing dependence on short-term project funding.
- 4.2. **Develop long-term financing and maintenance strategies**, including **risk- and benefit-sharing** mechanisms that clearly identify economic beneficiaries (e.g. tourism, insurance, infrastructure protection) and enable their contribution to NbS maintenance and operation.
- 4.3. Ensure **equitable distribution of costs, benefits and risks** among stakeholders and rights-holders, supported by transparent governance arrangements.
- 4.4. **Apply cost-effectiveness analyses** systematically to demonstrate the economic efficiency of NbS compared to conventional solutions, and to support engagement of public authorities and private investors.

RECOMMENDATION 5. MOVE TOWARDS SHARED AND EMPOWERING DECISION-MAKING.

- 5.1. Embed **inclusive participation from the earliest design stages**, recognising and valuing local and traditional knowledge as a core input to NbS design and management.
- 5.2. Strengthen governance arrangements to enable **meaningful and influential participation**, moving beyond consultative processes towards shared decision-making throughout the intervention lifecycle.
- 5.3. Institutionalise **transparent and accessible grievance and conflict-resolution mechanisms**, through written and public protocols with defined response timeframes, and ensure their regular review and adaptation.
- 5.4. Where feasible, establish **dedicated NbS management arrangements**, with a clear mandate, resources and coordination capacity to oversee implementation, monitoring, safeguards and corrective actions in collaboration with all relevant actors.

RECOMMENDATION 6. OPERATIONALISE SAFEGUARDS AND RISK MANAGEMENT.

- 6.1. Systematically identify and assess **potential trade-offs and negative impacts** across environmental, social and economic dimensions, including through NbS-specific Environmental and Social Impact Assessments (ESIA) where relevant.
- 6.2. Develop and implement **formal safeguard and risk-management plans**, including a dynamic Risk Registry covering environmental, social and financial risks, with clearly assigned responsibilities and corrective measures.
- 6.3. Ensure safeguards are actively **applied, monitored and adapted over time**, rather than remaining at a conceptual or purely documentary level.

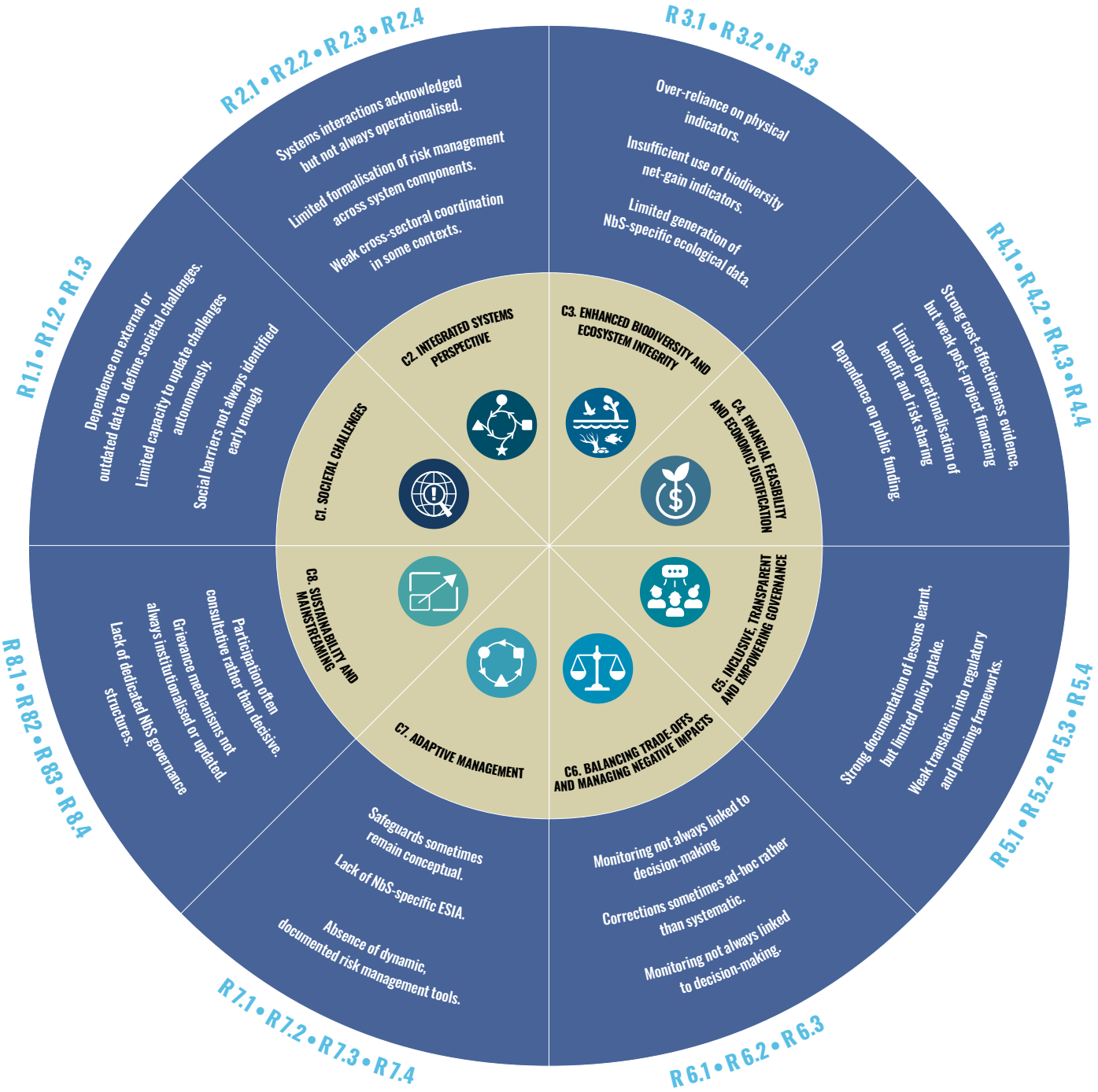
RECOMMENDATION 7. EMBED LEARNING, MONITORING AND ADJUSTMENT INTO IMPLEMENTATION.

- 7.1. Design **monitoring frameworks explicitly linked to adaptive management**, ensuring that monitoring is not an end in itself, but a tool to inform decision-making and guide changes in NbS design and implementation.
- 7.2. **Integrate risk monitoring** into adaptive management processes, using information on identified risks, safeguards and corrective actions (including ESIA outputs and Risk Registries where available) to guide timely and evidence-based adjustments.
- 7.3. Ensure that management **corrections are documented, transparent and iterative**, avoiding ad hoc responses and enabling continuous learning based on ecological, social and economic feedback.
- 7.4. **Promote knowledge exchange, peer learning and capacity building**, strengthening the ability of institutions and practitioners to interpret evidence, manage risks and adapt NbS interventions over time.

RECOMMENDATION 8. ENABLE SCALING, REPLICATION AND INSTITUTIONALISATION OF NBS.

- 8.1. Systematically **document and disseminate lessons learnt**, translating experience into actionable guidance for replication and upscaling.
- 8.2. Build on **existing initiatives and institutional** capacities, reinforcing continuity, ownership and long-term legitimacy.
- 8.3. **Leverage** the growing global and regional **policy momentum** on NbS, climate action and sustainability to mobilise financing and political support.
- 8.4. Support the translation of NbS outcomes into **long-term strategies, regulatory frameworks and development plans** at local, national and international levels.

INFOGRAPHIC 3.
TRACEABILITY FROM IDENTIFIED WEAKNESSES TO TARGETED RECOMMENDATIONS.



- NbS standard criterion
- Key weaknesses identified
- Relevant recommendations

R1.1 Evidence-based assessments of societal challenges.
R1.2 Early identification of social barriers and enabling conditions.
R1.3 Awareness-raising as a core NbS component.

R2.1 Systems-based NbS design.
R2.2 Promotion of multifunctionality.
R2.3 Interdisciplinary collaboration.
R2.4 Strategic coordination across scales and sectors.

R3.1 NbS-specific biodiversity objectives and data generation.
R3.2 Use of biologically meaningful indicators aligned with WFD/MSFD and net gain.
R3.3 Response mechanisms for ecological underperformance.

R4.1 Integration into public policies and funding instruments.
R4.2 Long-term financing and benefit-sharing mechanisms.
R4.3 Equitable distribution of costs, benefits and risks.
R4.4 Systematic cost-effectiveness analysis to attract investors.

R5.1 Early and inclusive participation.
R5.2 Shared and empowering decision-making.
R5.3 Formal grievance and conflict-resolution mechanisms.
R5.4 Dedicated NbS management arrangements.

R6.1 NbS-specific ESIA and trade-off assessment.
R6.2 Dynamic Risk Registry with assigned responsibilities.
R6.3 Active implementation and monitoring of safeguards.

R7.1 Monitoring linked to adaptive management.
R7.2 Evidence-based course correction using ESIA and Risk Registries.
R7.3 Transparent, iterative management adjustments.
R7.4 Capacity building and peer learning.

R8.1 Systematic documentation and dissemination of lessons learnt.
R8.2 Building on existing institutional capacities.
R8.3 Leveraging NbS policy momentum.
R8.4 Integration into long-term strategies and regulations.

6. ACKNOWLEDGEMENTS

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7. REFERENCES

Cohen-Shacham E, Andrade A, Dalton J, Dudley N, Jones M, Kumar C, ... & Walters G. 2019. Core principles for successfully implementing and upscaling Nature-based Solutions. Environmental Science & Policy, 98, 20-29.

European Commission. 2020. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. EU Biodiversity Strategy for 2030.

IPCC, 2022. Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [H.-O. Pörtner, D.C. Roberts M, Tignor ES. Poloczanska K, Mintenbeck A, Alegría M, Craig S, Langsdorf S, Löschke V, Möller A, Okem B. Rama (eds.)]. Cambridge University Press. Cambridge University Press, Cambridge, UK and New York, NY, USA, 3056 pp., doi:10.1017/9781009325844.

IUCN. 2016. IUCN World Conservation Congress Resolution on Defining Nature-based Solutions (WCC-2016 Res-069-EN). Hawaii.

IUCN. 2020. Global Standard for Nature-based Solutions. A user-friendly framework for the verification, design and scaling up of NbS. First edition. Gland, Switzerland: IUCN.

IUCN. 2020a. Guidance for using the IUCN Global Standard for Nature-based Solutions. A user-friendly framework for the verification, design and scaling up of Nature-based Solutions. First edition. Gland, Switzerland: IUCN

IUCN, 2026. IUCN Global Standard for Nature-based Solutions™. A user-friendly framework for assessing, implementing, and monitoring scalable, high-integrity NbS. Second Edition. IUCN.

Marín P, Cagide N, Costa G. 2025. REST-COAST Pilot Site Governance Briefs.

REST-COAST Fact Sheets. https://rest-coast.eu/pilots

Tai et al. 2025. Scalable plan for adaptation-through restoration to close the implementation gap. Deliverable D4.4. EU Horizon 2020 REST-COAST Project, Grant agreement No 101037097

8. ANNEX

IUCN NBS CRITERIA AND GUIDANCE (SECOND EDITION)

Criterion 1. NbS effectively address societal challenges. The purpose of this Criterion is to ensure that NbS respond to the societal challenges such as climate change, disaster risk, biodiversity loss and ecosystem degradation, unsustainable resource use and pollution, ensuring food security, water security, human health, and social and economic development, amongst others. These challenges should be identified, understood and prioritised through participatory processes (Criterion 5) involving those who are or will be directly affected.

Criterion 2. Design of NbS is informed by scale. The purpose of this Criterion is to ensure NbS recognise and respond to the complexity and uncertainty that occur in the ecological, economic, social and cultural systems within which they are designed and implemented. Understanding the complex interconnections and interactions within a system helps identify intended and unintended impacts of and on the NbS and inform any adaptive measures (Criterion 7). A participatory process is more likely to produce a context-specific rich representation of these interconnections and interactions, reflecting the views, knowledge, shared values, cultural norms and experiences of stakeholders and rights-holders (Criterion 5)

Criterion 3. NbS result in positive change in the state of biodiversity and enhanced ecosystem integrity, including connectivity. As the recognition of the fundamental role that biodiversity and ecosystems play in addressing societal challenges and supporting human wellbeing is the cornerstone of the NbS definition, the NbS design and implementation shall avoid undermining the integrity of ecosystems and, instead, proactively seek to sustain and enhance their functionality, biodiversity and connectivity. Doing so can also ensure the long-term resilience and durability of the NbS..

Criterion 4. NbS are financially feasible and economically justified. To be sustainable and scalable, NbS should be both financially feasible and economically justified. Financial feasibility refers to the ability of an intervention to attract the necessary investment and generate sufficient revenues to cover all costs over time, including capital, operations and maintenance. Economic justification takes a broader perspective; it is not limited to financial flows but seeks to capture the full societal value created or lost, including whether the monetary and non-monetary benefits outweigh the overall costs. This includes positive or negative externalities that may affect people beyond those directly involved in the project. Addressing the financial and economic dimensions of NbS helps prevent short-term dependencies, supports a just distribution of costs and benefits among affected stakeholders and through adequate safeguards and associated corrective actions (Criterion 6), informs the establishment of enabling financial and economic policies (Criterion 8) and reinforces the long-term viability of NbS..

Criterion 5. NbS are based on inclusive, transparent and empowering governance processes. This criterion requires that NbS identify, acknowledge, recognise, respect and include stakeholders and rights-holders, including Indigenous Peoples, local communities and vulnerable groups, who are directly or indirectly impacted by the NbS intervention, in decision making processes at all levels and throughout the NbS lifetime. At a minimum, NbS should adhere to and align with the prevailing legal and regulatory provisions, particularly those regarding Indigenous Peoples and local communities' rights. Governance provisions should be clear on where legal responsibilities and liabilities lie. However, as often is the case with natural resources, basic compliance should be complemented with ancillary mechanisms that actively engage and empower affected stakeholders and rights-holders.

If Indigenous Peoples and local communities are potentially impacted by the intervention, the NbS should not diminish or extinguish the rights that they currently have or may acquire in the future. NbS should respect their collective rights, including their right to Free Prior and Informed Consent (FPIC) before any implementation. Inclusive governance arrangements mean that Indigenous Peoples and local communities participate fully and effectively through their representatives designated by them, following their own procedures, to avoid that otherwise well-intended actions adversely affect the legitimacy of benefit and cost sharing arrangements.

Criterion 6. NbS seek to equitably reconcile the achievement of their primary goal(s) with any intended and unintended impacts on the continued provision of multiple benefits. NbS have the potential to deliver on multiple benefits. However, often the benefits to one area or to a certain stakeholder group come at the cost of another area or group. For example, restoration of a forest may benefit a water utility company in a downstream city, whose water treatment costs are stabilised due to avoided increase in sediment loading. At the same time, depending on how it is structured, the forest restoration may exclude local communities from those lands and waters. Determining who receives the benefits, and who might be negatively impacted by NbS, is critical to the long-term success and fairness of NbS. It also helps develop the right responses to avoid or mitigate negative impacts on different stakeholders and rights-holders, including vulnerable groups, Indigenous Peoples and local communities (recognitional justice).

Criterion 7. NbS are managed adaptively, based on evidence. This Criterion requires that NbS include provisions to enable adaptive management as a response to uncertainty and as an option to effectively harness ecosystem resilience. A degree of uncertainty is inherent when managing ecosystems due to their complex, dynamic and self-organising nature. This also means that ecosystems have greater resilience which confers a wider range of options to respond to unanticipated social, economic, ecological or climate events. The foundation of adaptive management is the evidence-base provided by regular monitoring and evaluation, drawing on scientific understanding as well as Indigenous, traditional and local knowledge. By proactively adopting an adaptive management approach, the NbS can continue to be relevant through the lifecycle of the intervention and the risk of redundancy and stranded investments minimised..

Criterion 8. NbS contribute to the enhancement of the enabling conditions for their implementation, sustainability and mainstreaming. This Criterion requires that NbS are designed, managed and implemented with a view to their long-term sustainability and mainstreaming, including scaling up (policy or programmatic mainstreaming), scaling out (expansion at the geographical or sectoral level) or replication. This can happen only if certain enabling conditions are in place, such as secure land tenure or appropriate land use planning, inclusive institutional mechanisms and governance, economic and financial incentives, risk sharing, social justice and stakeholder involvement, and other systemic enablers. As further assessment is needed – mainly to demonstrate the cost-effectiveness and social benefits of NbS in comparison to hard/grey infrastructure or other conventional interventions – NbS should inform, contribute to, and encourage the enhancement of the enabling conditions. This includes socio-economic conditions such as policy and market incentives, cross-sector collaboration, and inclusive governance and should ensure alignment with national development priorities and global frameworks, to support their implementation, sustainability, replication and/or scaling.

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