MANABAS COAST | Interreg North Sea

Co-funded by the European Union

MANABAS COAST Baseline Assessment

Results of the 1st Baseline Assessment Survey

26-03-2025

MANABAS COAST
NATURE-BASED SOLUTIONS

Table of contents

Introduction

Nature-based Solutions (NbS) are widely recognized as a sustainable way forward for dealing with the challenges of flooding and coastal erosion. They contribute to the ambition of creating a Blue Economy and generate climate resilience while providing benefits for human well-being and biodiversity. Nevertheless, a wide-scale application and implementation, or mainstreaming of NbS has not become a common practice yet. This is mostly due to a lack of understanding of the key criteria for success, i.e. the enabling factors for mainstreaming and implementing NbS.

An initial activity of MANABAS COAST WP2 is a description and Baseline Assessment of how each study pilot understands the enabling factors for mainstreaming and implementing NbS that will be used as the baseline to assess progress during the project and can aid in the future cooperation and learning among the study pilots. This report presents results from the first of the three MANABAS COAST Baseline Assessments.

MANABAS COAST focuses on how NbS can be implemented on different scales and in different natural and socio-economic settings in the North Sea Region. We do this by implementing fifteen study pilots covering the coasts from the north of France to the south of Sweden. We test six enablers developed by EcoShape in the study pilots to evaluate and learn about how each addresses mainstreaming NbS (figure 1). This learning-by-doing approach provides us with a wealth of information which is used to develop an accessible and evidence-based framework for widescale implementation of NBS in coastal areas.

We also work on a framework consisting of three principles that facilitate mainstreaming NbS (figure 2). The framework builds on work already done in the past such as the ISBAM approach, which was developed in the Interreg Building with Nature project. MANABAS COAST evaluates and builds on this framework as a starting point for providing guidance on mainstreaming across the North Sea Region.

Figure 1. MANABAS COAST Enablers

Figure 2: MANABAS COAST Principles

1. Acts at a landscape scale, including both the natural and socio-economic system;
2. Integrates management of multiple assets and functions within the landscape context;
3. Embraces and leverages upon the natural dynamics of the system, providing resilience and adaptability towards future (climate change related) challenges.

Within MANABAS COAST project, Work Package 1 (WP1) is concerned with refining a framework that provides guidance for upscaling and mainstreaming Nature based Solutions (NbS) in coastal regions at multiple levels. The aim of Work Package 2 (WP2) is to test if the identified Enablers are appropriate to mainstream Nature-based Solutions (NbS) in the different study pilots and to actively engage policy makers, coastal managers and local/national stakeholders in mainstreaming activities. Work Package 3 (WP3) aims to build capacity in the study pilots and beyond by transferring gained insights and experiences. It strives to enable integration of lessons into education, policymaking and professional practice during and after the project.

Table 1 presents the MANABAS COAST pilot cases, along with the Observer pilot of Jamaica Bay, NY, USA. These are separated into Muddy cases and Sandy cases.

Table 1. MANABAS COAST pilots

MUDDY PILOTS	PILOT AIMS
8 FJORDS (SE)	Prevent salt meadows from eroding using NbS and improved water quality of the adjacent shallow bays in four test sites. The design of the NBS will be based on the hydrodynamic forces, geological conditions, and ecological requirements at each site. Examples of solutions to be considered are sills based on biodegradable-material, blue mussels, or cobbles, breakwalls consisting of wood material, artificial reefs and establishing of eel-grass meadows. The final proposed solution for each site may be a combination of several of these solutions and will be co-created with local stakeholders.
EAST FRISIA WADDEN SEA (DE)	Update of integrated foreland management plan including the impact of climate change-related sea level rise
HALLIGEN (DE)	Providing NbS for Halligen in areas subject to erosion and inundation by winter storms. Protecting buildings located on dwelling grounds. Mainstreaming NbS that can have positive effects on a larger scale, i.e. the Waddensea
SALT MARSHES WADDEN SEA (NL)	Investigate upscaling possibilities for dikes in natural or semi-natural marsh areas for flood safety and ecology as well as other functions such as recreation, tourism, agriculture, landscape and CO2 capture.
WESTERN SCHELDT (NL)	Conserve the intertidal areas of the Scheldt estuary and its nature. Evaluate and learn from three NbS sites (Hedwigepolder, Perkpolder and Zwin) about enablers to mainstream NbS. For Zwin to combat silting and expand the estuarine nature by increasing sediment storage capacity, relating dikes and restoring natural drainage.
AFSLUITDIJK (NL)	Monitoring and evaluation of sections of the ecological dike (or dam) between the Wadden Sea and IJssel Lake. Monitoring of an ecotplayer (ecological top layer) on the dam for return of spoonbills and include more nature measures in large infrastructural water safety project to have more ecological value.

LANCIEUX BAY (FR)	To demonstrate, by example, the efficiency of NBS in the necessary adaptation of coastal territories to current changes (particularly climate change). To appropriating NBS as the most efficient, least costly and most resilient technical solution for implementing long-term adaptation. Particularly on the site that has been gradually reclaimed by water and polders being converted to grasslands.
ORNE ESTUARY (FR)	To demonstrate, by example, the efficiency of NBS in the necessary adaptation of coastal territories to current changes (particularly climate change). To appropriating NBS as the most efficient, least costly and most resilient technical solution for implementing long-term adaptation.
JAMAICA BAY (USA) (REFERENCE OBSERVER CASE)	Reduce vulnerability to coastal storm risks. Reduce future coastal storm risks in ways that will support the long-term sustainability of the coastal ecosystem and communities. Reduce the economic costs and risks associated with large-scale flood and storm events. Improve community resiliency, including infrastructure and service recovery from coastal storm events; and improve coastal resilience by reducing erosion and risk caused frequent flooding through the enhancement of natural storm surge buffers, also known as natural and nature-based features
SANDY CASES	PILOT AIMS
SKÅNE (SE)	Investigate different strategies to protect protected areas for nature in a changing climate, including allowing shoreline to retreat and investigate the possibilities to change land-use behind existing sea meadows by changing fields to meadows and find methods to mimic the requirements needed to change land use. Strengthening and adapting existing natural biotopes. Find strategies to introduce NbS in existing nature reserves and Natura 2000 by implementing climate adaptation measures in existing plans for maintenance of protected areas (management plans). Investigate which measures are most suitable in the pilot area according to site specific aspects. Guidance to gain municipalities to implement NbS in master plans and in protected areas with municipal responsibility. Cost-benefit analysis of different strategies and methods. Capacity building by showing concrete and creative solutions in existing legal systems and show where existing laws are incomplete
GREATER COPENHAGEN (DK)	The aim is to protect the greater Copenhagen area from flooding during storm surge events by establishing a storm surge protection. As the project is state-owned the four municipalities are project partners on equal terms alongside the project's other partners, The approach to include nature-based solutions is different, and perhaps, in some instances harder than what would be the case during municipality-owned projects. The four municipalities, however, share a vision in which NbS will be implemented where it is possible. In 2020/2021 the municipalities made a vision report, in which NbS is the main contributor to coastal protection
LODBJERG-NYMINDEGAB (DK)	Updating the future nourishment needs by analyzing the coastal development in relation to the sand nourishments carried out, as well as future projection including climate changes. Optimization of sand nourishments with a focus on larger nourishments and optimized design based on monitoring. Further analyzes of the erosion and deposition conditions when narrowing the Thyborøn channel by extending the jetties. Analysis of the possibility of dredging sediment in the depositional areas north of Horns reef and Nissum fjord. Preparation of a long-term risk management plan using nature-based methods, including an assessment of which passive coastal protection measures should be preserved. Guidance and stakeholder involvement to gain

	a greater understanding of coastal dynamics and the need for a holistic view. Capacity building around the use of nature-based coastal protection.
HHNK (NL)	Optimize maintenance and management of duces and beaches for flood risk, nature and recreation by a better understanding of the effects of human intervention, sandy solutions and nature development. Explore the integration of monitoring of nature values of sandy coast.
SAND MOTOR (NL)	Long-term coastal flood risk management through mega-nourishments. Cerate additional benefits for coastal functions such as nature and recreation. Innovative mega nourishment schemes.
RAVERSIJDE (BE)	The main aims are to intensely monitor the sandy coastal defense system in the area, including a dune for dike test area installed in 2021 along a stretch of 750 m, and to facilitate partners to add to the monitoring efforts in the area, as well as to research the data collected in order to improve the understanding of the sandy coastal defense system. It is a Living Lab environment also open to private companies e.g. wanting to test innovations.
AUTHIE BAY (FR)	To demonstrate, by example, the efficiency of NBS in the necessary adaptation of coastal territories to current changes (particularly climate change). To appropriating NBS as the most efficient, least costly and most resilient technical solution for implementing long-term adaptation.

Aim and methods of the Baseline Assessment

Aims

The aims of the Baseline Assessment are to:

- Assess progress and aid in future cooperation and learning among the study pilots.
- Establish the status of mainstreaming of NbS into the pilot and wider mainstreaming actions.
- Gain an understanding of how the pilots use the MANABAS COAST enablers and recognize the MANABAS COAST principles framework.

Methods

The Baseline Assessment (BA) survey was developed by the WP2 team with input from the WP1 and WP3 teams during the first half of 2023 and administered to the pilots during the second half of 2023 (see Annex 1 for the final Baseline Assessment survey). The first Baseline Assessment survey is divided up into three parts:

1) Description of the pilots: including general information (location, aims the NbS approached in MANABAS COAST), descriptions of the coastal and governance systems and an implementation scheme.

2) Enabler Analysis: questions concerning how each of the six enablers are currently addressed in the pilots, a ranking of the importance of each enabler for the pilot and suggestions of additional enablers.

3) Principles analysis: Brief questions about the MANABAS COAST framework (inspired by the three ISBAM principles), and a question concerning what "mainstreaming" means for each pilot.

Preliminary quantitative results about the importance the pilots attached to each enabler were analyzed and presented during the St. Malo Partner meeting in October 2023 and slightly revised to be presented at the Brugges meeting in March 2024. Table 2 presents the timeline of the Baseline Assessment.
Qualitative results from each pilot were collected and analyzed by a small team with representatives from WP1, WP2 and WP3 in Stockholm in January 2024. During the qualitative analysis the analytical team read and discussed each pilot of the 15 MANABAS COAST pilots, plus an Observer pilot from Jamaica Bay, NY, USA. See https://www.interregnorthsea.eu/manabas-coast/library#baseline-reports for all of the completed Baseline Assessment surveys.
This report presents results from both the quantitative and qualitative analyses.

Table 2: Baseline Assessment timeline

DATE	TASK	OUTPUT
Spring 2023	Baseline Assessment Survey developed	Baseline Assessment Survey sent to pilots
Summer 2023-January 2024	Pilots complete Baseline Assessment	15 MANABAS COAST Assessments completed, + reference pilot Jamaica Bay
Autumn 2023	Quantitative analysis (presented in St. Malo)	Thematic groups developed
Winter 2023-4	Qualitative analysis (presented in Brugge)	How-to questions/ groups developed
Autumn 2024	Baseline Assessment Synthesis Report	First Baseline Assessment Report

Spring 2025	Second Mid-term Assessment survey developed	Second Mid-term Assessment Survey sent to pilots

Quantitative Results

Enabler Analysis

In the Baseline Assessment survey, pilots were asked to rank the importance of each of the six enablers on a scale of 1 to 10 with 1 being least important and 10 most important. Results were divided into the between Muddy cases (n=8) and Sandy cases (n=7). Figure 3 presents the ranking of the importance of each enabler in the Muddy and Sandy cases arranged by the Ecoshape numbering. Figure 4 presents the aggregated scores of the enabler ranking but arranged by system (Natural system, Social system and Governance system).

Pilot cases on average ranked all Enablers fairly high with Enabler 6: Business case ranking lower in both Muddy and Sandy pilots. It should be noted that the assessments of the enablers reflects the specific context of each pilot case. For instance, if a pilot already has secured financing for implementing or mainstreaming NbS, the Business case enabler may be of relatively less importance.

Comparisons in the ranking between the Muddy and Sandy cases were quite similar, but with Muddy cases ranking Enabler 1: Technology and system knowledge slightly higher than the Sandy cases, and Sandy cases ranking Enabler 6: Capacity building slightly higher than the Muddy cases.

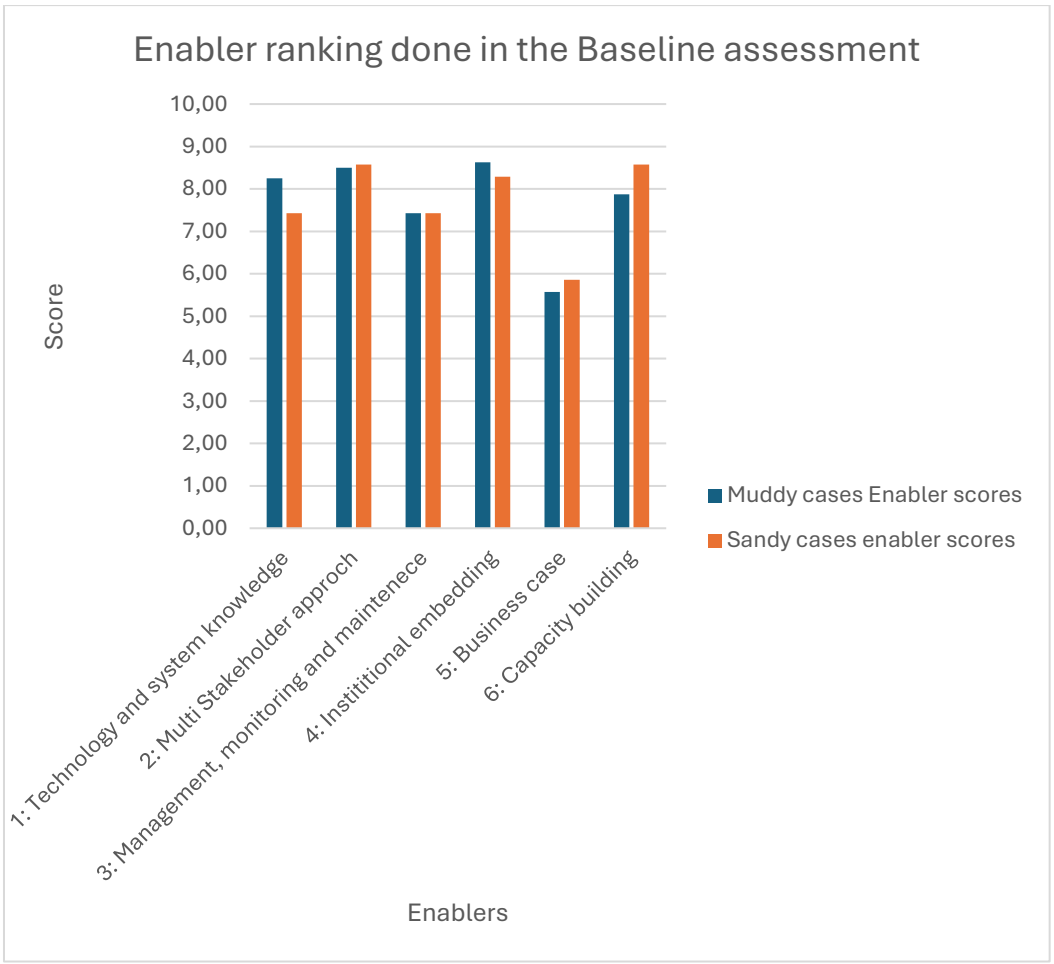

Figure 3. Ranking of Importance of each of the six Enablers scores.

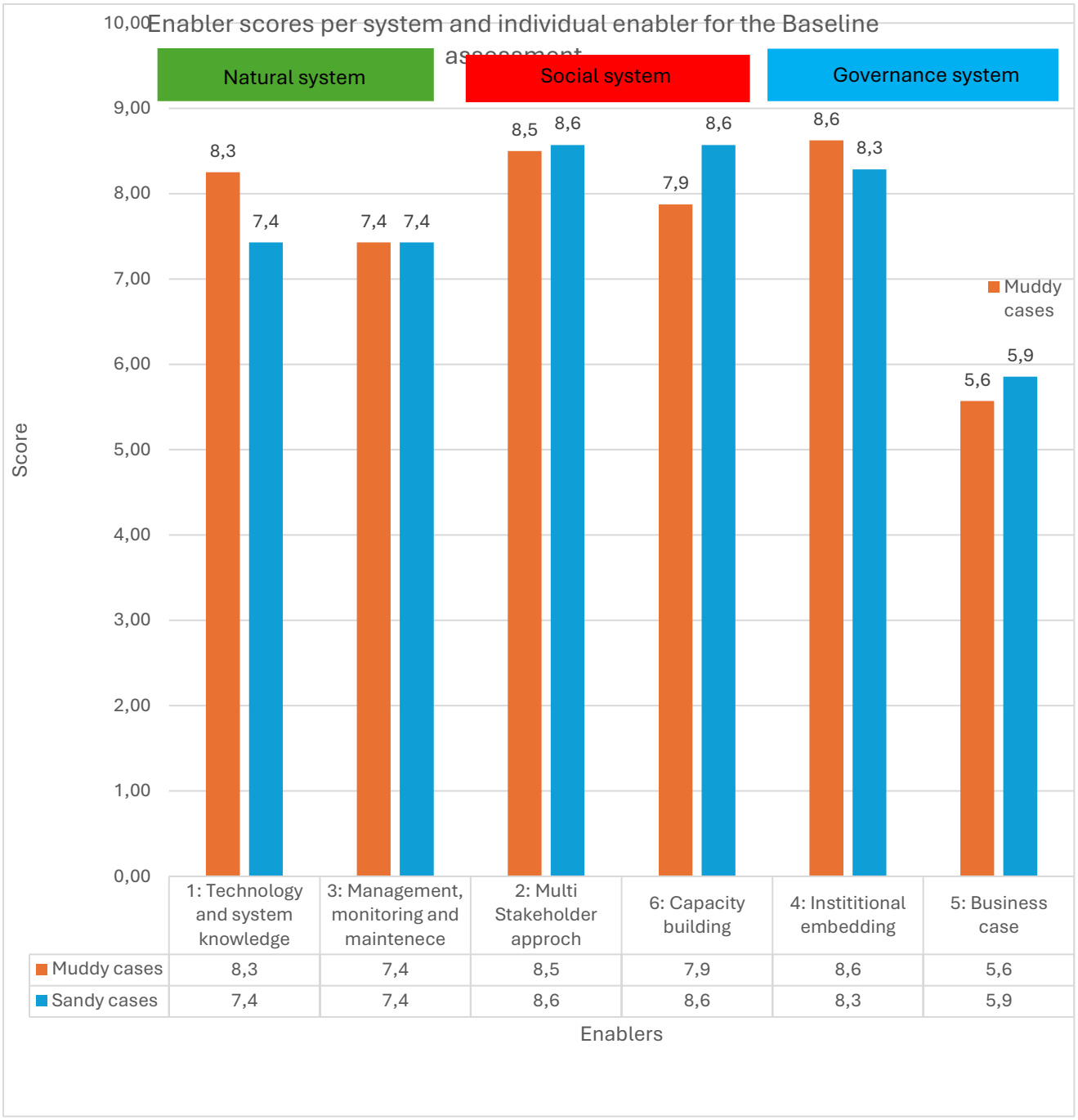

Figure 4: Ranking of importance of each Enabler arranged by system.

Figure 5 shows a heatmap of the actual rankings of importance of each enabler per pilot and shows the spread of the survey rankings. Green represents the highest ranking (between 8 and 10), yellow represents the middle ranking (between 7 and 5) and red indicates the lower rankings (between 1 and 4). None of the pilots ranked any Enabler lower than 3 and this lowest ranking was only seen for the Business case Enabler.

		Natural system		Social system		Governance system	
		Technology and system knowledge	Management, monitoring and maintenance	Multistakeholder approach	Capacity Building	Institutional embedding	Business case
FR	**Lancieux, Orne, Authie**	6	7	10	9	10	4
BE	**Raversijde**	9	7	10	7	7	7
NL	**Scheldt cases (HZ)**	10	8	8	8	9	9

NL	**Zandmotor**	5	8	7	6	9	5
NL	**HHNK**	8	10	10	10	8	4
NL	**Afsluitdijk**	8	8	8	8	8	10
NL	**Saltmarshes Dutch Wad Sea**	8	6	7	7	8	3
DE	**East Frisia Wadden Sea**	9	8	8	4	8	3
DE	**Halligen**	10	10	8	7	8	5
DK	**West Coast, Lodbjerg Nymindegab**	10	10	5	10	10	8
DK	**Greater Copenhagen**	9	6	9	10	4	5
SE	**Skåne Coast**	5	6	9	9	10	5
SE	**8 Fjordar**	9	8	10	10	9	10
USA	**Jamaica bay**	10	9	10	10	8	8

Figure 5: Heatmap ranking importance of Enablers per system.

MANABAS COAST Principles analysis

Pilots were asked to rank how well they adhered to the three MANABAS COAST Principles on a 10-point scale where 10 was “fully adhere” and 1 meant room for improvement. Ranking was quite similar looking at the average of all pilots, with Principle #1 Act at a landscape (system) scale, including both the natural and socio-economic systems ranked highest, followed by Principle #3 Embrace and leverage upon the natural dynamics of the system and Principle #2 Integrate management of multiple assets and functions within the landscape system context ranked slightly lower.
The average of the Muddy cases was nearly identical for each of the three principles, but the Sandy cases ranked principle #2 lower.

Formation of thematic groups

After the quantitative analysis of the Enabler ranking, four themes emerged which largely dealt with the physical aspects natural system and the need for knowledge and monitoring. These themes were working with NbS in sandy areas, and NbS in muddy areas, as well as the importance of monitoring and working with NbS in Natura 2000 areas. Thus four thematic groups were formed in 2023: Muddy, Sandy, Monitoring and Natura 2000.

Qualitative results – Enablers for mainstreaming

Six enablers and three systems

The qualitative analysis was performed by the analysis working group consisting of five partners representing WP1, WP2 and WP3. The goal of the qualitative analysis was to gain a holistic understanding the Baseline Assessments a deeper picture of where the pilots were at in implementing their pilots and in their mainstreaming activities. The focus was on what each pilot focused on, where wished to learn more, and where they could contribute with their experience. In analyzing the Baseline Assessments, the working group found that it was useful to group the six Enablers into three specific systems (figure 6).

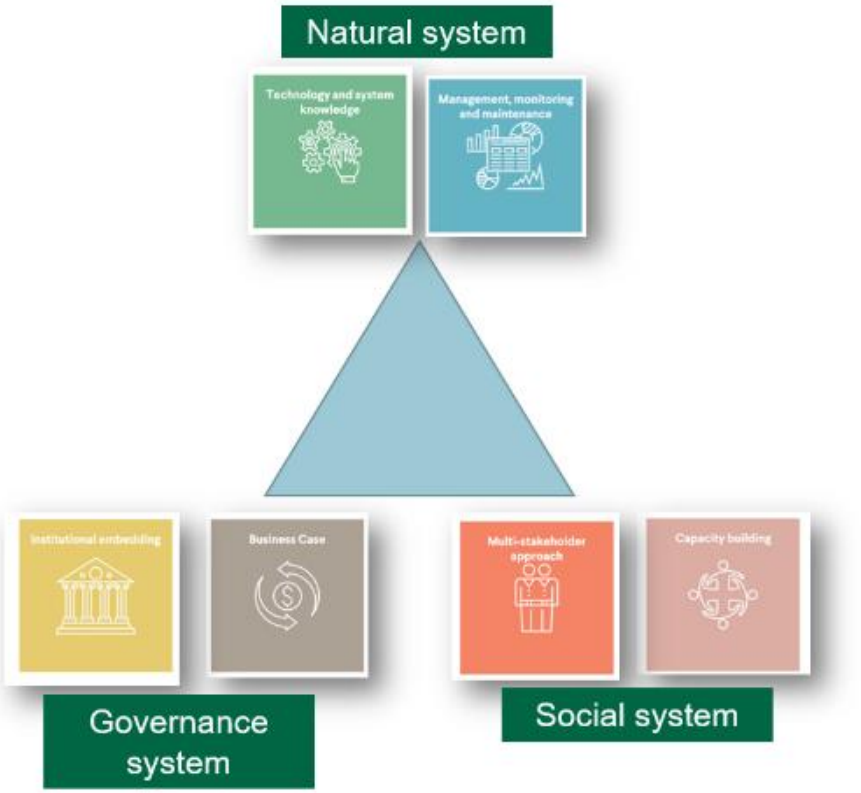

Figure 6. MANABAS COAST Enablers and Systems

Thus the Enablers Technology and system knowledge, and Management, monitoring and maintenance, were group into the Natural system to reflect their focus on the physical and natural processes that are inherent in every pilot, as well as how NbS were implemented and monitored in each pilot. The Enablers Institutional capacity and Business case were grouped into the Governance system as these enablers highlight the processes by which mainstreaming could be taken to a higher level and influence regulations and policy. The Enablers Multi-stakeholder approach and Capacity building were grouped into the social system for their focus on integration into society and exchange of knowledge on a more local level.

“How-to questions”

While the thematic working groups (Sandy, Muddy, Monitoring and Nature 2000) were formed after the quantitative analysis, the qualitative analysis showed the complexity of questions and concerns that the pilots had about how pilots could be implemented and how mainstreaming of NbS could be achieved. These were named the “how-to” questions and are shown below for each of the three systems.

Natural System

The qualitative analysis of the enablers in the Natural system expanded upon these themes in the analysis of all the Baseline Assessments and synthesized “how-to” topics what were expressed as areas to learn more about and to learn from about the Natural system.

- How to monitor an NBS? Including useful techniques & tips
- How to implement a sand nourishment project?
- How to implement a salt marsh project
- How to deal with uncertainty? --> Risk Management Plan
- How to bring across the benefits of NBS more adequately?
- How to optimize for added ecological value?
- How to balance short- and long-term benefits?
- How to implement a managed realignment project?

Specific contributions about the Natural system that pilots could make to other MANABAS COAST pilots that could help enable mainstreaming including (examples):

- Working to implement NbS with local materials (8 Fjords)
- Managed realignment from bottom-up (French cases)
- How mega nourishments work (Sand Motor)
- Sharing data on monitoring techniques (Raversijde)
- Ecological knowledge for monitoring/mainstreaming (Skåne, Western Scheldt cases, Afsluitdijk)
- Knowledge for a systems perspective (Halligen, Lodbjerg-Mymindegab, Jamaica Bay)
- Knowledge for integrated management plans (Salt marshes Dutch Wadden Sea, East Frisia Wadden Sea)
- Top-down knowledge in complex setting (Greater Copenhagen)

Governance System

The Governance system emerged in the analysis as an area where there was much to be learned from exchange among the partners. Taking the implementation of NbS within a pilot area and moving to the systems level needed to work with multi-level stakeholders/decisionmakers and existing spatial/land use regulations and contexts. The “how-to” questions that were common among many of the pilots with regard to the Governance system were:

- How to implement NbS in N2000 areas?
- How to roll out a top-down project?
- How can you implement NBS at a municipality level?
- How to start bottom-up projects?
- How to combine different functions in limited space?
- How to influence decision-making in NbS favor?
- How to get money for basic research?

Specific contributions about the Governance system that pilots could make to other MANABAS COAST pilots that could help enable mainstreaming including (examples):

- Working within Natura 2000 areas and nature regulations (8 Fjords, Skåne)
- How to work with multi-level governance (Sand Motor, Salt marshes Wadden Sea, Lodbjerg-Mymindegab, HHNK (across sectors), Jamaica Bay)

- How to work with or without a business case, coherence requirements (Afsluitdijk, French cases, Halligen)
- How to turn long-term policy into practice and visions (Raversijde, ”Kustvisie”, Greater Copenhagen)
- System-wide foreland management plan at landscape level (East Frisia)

Social System

The Enablers within the Social system was also an area where pilots expressed the need for more capacity to work with place-based values, stakeholders, and socio-economic contexts to facilitate communication of the benefits of NbS. The ”how-to” questions that pilots had could be synthesized into:

- How to develop a common vision?
- How to make an implementation strategy?
- How to communicate in an innovative and active way?
- How to bridge the gap between institutions and communities?
- How to appreciate the historical and cultural context of NBS?
- How to change mindsets and public perceptions?
- How to make the trade-off between different benefits and interests?
- How to enable NBS capacity building?

Specific contributions about the Social system that pilots could make to other MANABAS COAST pilots that could help enable mainstreaming including (examples):

- Outreach and Communication with stakeholders (8 Fjords, Raversijde, Skåne, Western Scheldt cases)
- Embedding NbS in communities (Sand Motor, Afsluitdijk)
- Innovative engagement, communication with stakeholders (French cases, Jamaica Bay)
- Translating top-down methods to stakeholders (Greater Copenhagen, Halligen)
- Dealing with goal conflicts (Salt marshes Wadden Sea, Lodbjerg-Mymindegab. East Frisia)
- Using local data (HHNK)

Qualitative results: MANABAS COAST principles for mainstreaming

In the Baseline Assessment (BA) survey we wanted understand what MANABAS COAST principles for mainstreaming would mean per organization and per pilot. These principles are: 1) Act at a landscape (system) scale, including both the natural and socio-economic system/context, 2) Integrate management of multiple assets and functions within the landscape system context, and 3) Embrace and leverage upon the natural dynamics of the system.
The quantitative analysis of these principles based on how well the pilots felt the principle is applicable to their organization is seen in Figure 6. Responses from the pilots varied and many pilots could not answer some of the specific questions in the MANABAS COAST principles section, and thus we have chosen to make an integrated, qualitative analysis based on the response to the principles section and the additional specific questions on mainstreaming posed at the end of the principles section. The responses highlight the importance of not only developing nature-based solutions but also ensuring their effective implementation, stakeholder collaboration, and communication in accessible language to drive mainstream adoption.
The analytical and specific questions asked in the BA (Part 3) were analyzed in an integrated manner. To ensure we interpret the outcomes of the Baseline Assessment as accurately as possible, this section is divided into two main sections: 1) what mainstreaming means for the partner organizations (including level of commitment and actions on behalf of the organization that already facilitate mainstreaming of NbS), and 2) what mainstreaming means for the pilots (including insights, barriers, need for capacity building, lessons learned and promoting mainstreaming of NbS) . Based on this analysis, we can develop further activities for WP3 on capacity building for NbS within the MANABAS COAST project.

What does mainstreaming mean for your organization?

To find an answer to this question we will look at the main questions on Mainstreaming, but we will approach them in a different order starting with:

How committed is your organization to mainstreaming NbS within MANABAS COAST and after the project ends?

When we look at the outcomes of the BA survey we can see that there is clear commitment from most of the pilots in promoting various climate adaptation solutions at regional levels. Within several pilots we can see long-standing involvement and strategic incorporation by promoting NBS through INTERREG projects, but also integrated NBS into strategic documents such as Masterplans for coastal protection and Climate change adaptation strategy.
We also noticed some uncertainty within several pilot partners. While committed to sustainable solutions, there is an acknowledgment of uncertainty in implementation. This includes challenges related to ecological impacts and the spatial requirements of NbS. However, there is a commitment to navigating these challenges with a collaborative effort involving local and regional authorities.
The principle of "soft where possible, hard where needed" from our Belgium partners, reflects a pragmatic approach to environmental management of the pilots. This approach suggests a willingness to adapt strategies based on specific environmental contexts and needs.
We can see the willingness to actively incorporated lessons learned from NbS projects into both operational practices and national policy decisions concerning coastal management. Also the initiatives such as developing guidelines for integrating climate adaptation into protected areas demonstrate leadership in environmental planning. Learning from other pilot projects underscores a commitment from several partners within the MANABAS COAST project to continuous learning and improvement in implementing climate resilience strategies.

How do current institutional arrangements already facilitate mainstreaming of NbS?

In the BA we can see that the facilitation of NbS mainstreaming is already supported by collaborative efforts among national and regional agencies, strategic policy frameworks, academic partnerships, and local government involvement. While funding and guidance mechanisms are in place, overcoming legal and regulatory challenges remains essential for the widespread adoption of NbS. These insights underline the

importance of a multi-faceted and cooperative approach to effectively integrate NbS into climate adaptation and environmental management strategies.
Analyzing the responses to the question about how current institutional arrangements facilitate the mainstreaming of NbS, several learning points can be seen:
Collaboration with national agencies: From our Swedish partners we can learn that institutional arrangements leverage collaboration with major national agencies responsible for climate adaptation and environmental management. In Sweden for example the Swedish Geotechnical Institute (SGI) works closely together with the Swedish Environmental Protection Agency (SEPA) and the Swedish Agency for Marine and Water Management (SwAM) in Sweden.
In Lower Saxony we can see that the NLWKN (Lower Saxony Water Management, Coastal Defence, and Nature Conservation Agency) and the National Park Authority play crucial roles in integrating NbS into their management plans.
Strategic and Policy Frameworks: Strategic documents and master plans, such as the Lower Saxony Climate Change Adaptation Strategy and the Master Plans Coastal Protection, explicitly include NbS, ensuring that these solutions are part of broader climate adaptation and coastal protection strategies. Also working on long-standing policies, like the Netherlands' dynamic coastal preservation policy initiated in 1990, demonstrate a commitment to using natural processes (e.g., sand nourishment) to mitigate coastal erosion.
Another lesson we can learn is about the *Inter-governmental and Cross-sectoral Cooperation.* These are programs like the Deltaprogramma Waddengebied. These programs show how national and regional governments can collaborate on NbS projects to enhance flood safety and fresh water supply. Also the Trilateral Wadden Sea Cooperation promotes NbS across borders, though its non-binding nature highlights the need for stronger legal frameworks to support these initiatives.
Besides the governmental support it is also important to include *academics and researchers*. That the partners already work together with academic institutions can be seen in Sweden where a scientist with a Ph.D. in NbS from the University of Lund, ensures that projects benefit from cutting-edge research and expertise. Besides that, we can also see that Universities in Denmark and the Netherlands further support the integration of scientific research into practical NbS projects.
In regions like Flanders, *local governments and coastal communities* actively promote NbS by managing spatial co-use and advocating for the creation of dunes on beaches. Local initiatives and collaborations, such as those between coastal communities and regional governments, are crucial for the successful implementation of NbS.
The Swedish Environmental Protection Agency provides *guidance* for implementing NbS, while the Swedish Civil Contingencies Agency offers grants for natural disaster protection, although some requirements can pose challenges to implementation. Financial and technical support from governmental agencies could be a nice way for municipalities to adopt and maintain NbS.

Mainstreaming within the pilots- What does mainstreaming mean for your pilot?

Insights into mainstreaming in the pilots

Our baseline assessment also revealed critical insights into what mainstreaming NbS means for our pilot projects. The feedback shows the importance of practical demonstration through successful examples, the necessity for straightforward and accessible guidance, and the use of cost-effective and easily obtainable materials. Clear communication in plain language was highlighted as essential for broader understanding and adoption. Furthermore, the involvement and promotion of NbS by local and regional authorities emerged as a significant factor in their integration into policy and practice. Proactive implementation, facilitated through stakeholder collaboration and knowledge sharing, is crucial for overcoming current limitations in system knowledge and social acceptance. Our findings also show the need for a strategic approach that balances flood safety with ecological and socio-economic benefits. These insights will guide our efforts in embedding NbS within the coastal management framework, ensuring their sustainable and effective use across the MANABAS COAST Project.
The results of the Baseline Assessment are summarized in the table below, where we have arranged the answers into categories that were inductively assessed in the answers to the Baseline Assessment survey:

Key catagories		Insights
Demonstration and practical examples	Good examples	Successful, functional examples of NbS are crucial. They serve as proof of concept and inspire confidence in the feasibility and effectiveness of these solutions.
	Step-by-stepg guidance	Comprehensive guides with clear instructions, visuals, and examples are essential. These guides should cover practical aspects like financing, obtaining permits, and contacts for further information.
Simplicity and accessibility	Ease of construction and materials	NbS should be easy and cost-effective to build using readily available materials.
	Plain and simple language	Documentation and reports should be straightforward and easy to understand, avoiding unnecessary complexity.
Local and regional authority involvement	Promotion by authorities	Local and regional authorities need to actively promote and use NbS as a natural choice for various projects.
	Integration into policies	Incorporating NbS into regional and local management plans ensures their sustained application and acceptance.
Knowledge sharing and stakeholder engagement	System knowledge and social acceptance	Building system knowledge and increasing social acceptance are necessary for proactive NbS implementation. This involves addressing current limitations in understanding and practical application.
	Stakeholder collaboration	Connecting with stakeholders (e.g., research groups, policy makers, local communities) who have overlapping goals fosters collaboration and enhances NbS implementation.
Proactive vs. reactive implementation	Proactive approach	Moving from reactive implementation (in response to legislation) to proactive integration (as part of strategic flood defense) requires addressing current system knowledge limitations and gaining social acceptance.
	Debate facilitation	Facilitating ongoing debates on integrating flood safety and nature improvements is crucial. This includes providing guidance on suitable locations and conditions for NbS.
Specific goals and conditions	Goal elaboration	Projects should clearly articulate goals for NbS, such as ecological values and flood safety. This involves detailed communication about conditions under which NbS can achieve these goal
	Monitoring and data sharing	Mainstreaming involves a shared view on monitoring, consistent language use, and shared data and experiences across different projects and pilots
Optimization and Long-term Strategy	Risk management strategy	Optimizing long-term risk management strategies that support biodiversity and socio-economic aspects of coastal areas is a key objective.
	Mega nourishments	Integrating large-scale sand nourishment into coastal preservation programs requires policies for monitoring and mitigating sand losses.
Budget and planning / Business case	Sufficient Budget	Ensuring that budgets are sufficient for implementing NbS in maintenance plans for protected areas is essential.
	Municipal Planning	Municipalities incorporating NbS in their coastal protection plans signify successful mainstreaming.

Table 3. Insights on mainstreaming from the BA survey in the pilots.

What do you experience as the main barriers to mainstreaming NbS in your pilot?

Our initial assessment, based on feedback from our partners, has identified significant challenges/ barriers in mainstreaming Nature-Based Solutions (NbS) within our pilot projects. These barriers reflect the need for better demonstration projects, simplified and accessible guidance, enhanced authority involvement, improved knowledge sharing, and stakeholder engagement. These findings will help us focus on overcoming these obstacles to better integrate NbS sustainably and effectively into our coastal management approach for the MANABAS COAST Project.

For better understanding we tried to categorize the barriers in overarching topics as shown in the table below.

Category	Main Barriers
Demonstration and practical examples	Lack of successful, functional examples to inspire confidence and serve as proof of concept.
Simplicity and accessibility	Complexity and lack of straightforward, easy-to-follow guidance with practical examples, clear instructions, and necessary contacts.
Local and regional authority involvement	Insufficient promotion and support by local and regional authorities to integrate NbS into policy and practice.
Knowledge sharing and stakeholder engagement	Current limitations in system knowledge and social acceptance. Insufficient collaboration and engagement with stakeholders who have overlapping goals, such as research groups, policy makers, and local communities.
Proactive vs. reactive implementation	The need to shift from reactive implementation (response to legislation) to proactive integration (strategic flood defense), which requires addressing current system knowledge limitations and gaining social acceptance.
Specific goals and conditions	Lack of clear articulation and communication of NbS goals, such as balancing flood safety with ecological and socio-economic benefits. Difficulties in monitoring and data sharing across projects and pilots.
Optimization and long-term strategy	Challenges in optimizing long-term risk management strategies that support biodiversity and socio-economic aspects of coastal areas. Lack of policies for monitoring and mitigating sand losses in large-scale nourishment projects.
Budget and planning	Insufficient budgets for implementing NbS in maintenance plans for protected areas. Municipalities' limited mandate to implement measures beneficial to individual landowners.
Implementation challenges	Doubts among landowners regarding the durability and effectiveness of NbS. Difficulty in getting nature reserve managers responsible for maintenance and potential disassembly of NbS.
Stakeholder coordination	Difficulty in coordinating with various stakeholders focused on the end result (e.g., storm surge prevention) rather than the process (e.g., product development). Limited stakeholder involvement, especially local residents and touristic entrepreneurs.
Technical and knowledge barriers	Knowledge gaps in coastal morphodynamics and associated biology and regulations. Short-term coastal protection agreements limiting opportunities for optimal use of NbS.
Legislation and policy	Fragmented legislation and the need for long-term planning instead of short-term solutions. Lack of clear policies for large-scale nourishments like the sand motor.
Spatial and resource constraints	NbS requiring more space compared to grey solutions. Uncertainties in climate scenarios and relevant time perspectives for spatial planning and measures. Difficulties in protecting sandy beaches due to limited sand resources and excavation restrictions in protected areas.
Funding transfer mechanisms	Challenges in funding transfer mechanisms among state and federal partners. Inability of restoration fund sources to support basic research for optimizing restoration techniques.

Table 4: Barriers to mainstreaming NbS in the pilots.

What types of capacity building would your pilot need in order to facilitate mainstreaming of NbS?

In the Baseline Assessment we can see some key areas where capacity building is essential for facilitating the widespread adoption of NbS across the pilot projects. Based on the responses gathered, the main lessons learned regarding the types of capacity building needed to facilitate the mainstreaming of Nature-Based Solutions include:

Key lessons learned	Insights
Development of a comprehensive handbook	Developing guides covering permission, placement, design, financing, and authority contacts for streamlined implementation.
Staff training	Ensuring new staff are proficient in NbS application to embed knowledge effectively within organizations.
Stakeholder engagement	Involving diverse stakeholders intensively to demonstrate NbS advantages over traditional coastal protection methods.
Proof of concept and awareness:	Establishing local and regional NbS effectiveness examples and promoting awareness across governance levels.
Systemic capacity building:	Strengthening collaboration among stakeholders to overcome legal and long-term agreement challenges.
Political support	Highlighting NbS benefits in political discourse to secure support and prioritization..
Community engagement	Educating local residents and entrepreneurs on coastal protection and biodiversity
Data Analysis and Research:	Building in capacity in data analysis and research for informed decision-making.
Policy Integration:	Integrating NbS into coastal policies and practices for sustainable implementation.

Table 5: Lessons learned regarding the types of capacity building needed to facilitate mainstreaming in the pilots

From these responses, we learn that successfully mainstreaming NbS requires a multifaceted approach. Essential actions should include developing comprehensive handbooks, providing staff training, and intensively engaging stakeholders. For broader acceptance it is important to establish proof of concepts and raise awareness across governance levels. Strengthening collaboration among stakeholders is crucial for overcoming challenges such as legal complexities and long-term agreements. Additionally, improving data analysis capabilities and integrating NbS into policies are essential for long-term sustainability. These lessons show us the need and the importance of capacity-building for integrating NbS in coastal management practices.

What is essential in the mindset or way of working of people (policy makers, managers, professionals, general audience) to promote mainstreaming of NBS? Do stakeholders need more information on mainstreaming?

Based on the responses from our partners to the question about the mindset or way of working necessary to promote the mainstreaming of NbS, we could filter the following key insights:

Categories	Insights
Demonstration of succes	Provide examples of NbS, where their effectiveness is evident. Step-by-step guidance helps illustrate these successes clearly.
Embracing change with effective communication	It's crucial to understand that coastal systems and society are always changing. We need to keep communicating how NbS work in these systems to a wide range of stakeholders, including policy makers with short tenures. Deepening our knowledge of coastal dynamics is also essential.
Engagement and awareness:	Involving policy makers from the start of pilot projects and sharing inspiring examples creates greater awareness and support for NbS. Additionally, stakeholders need more information on the benefits of NbS to recognize their value compared to traditional solutions. But also understanding the practical impacts of NbS.
Quantifying benefits and Multi-stakeholder approac	We need to show and measure the benefits of NbS. This means looking at both the environmental and social impacts and finding a balance between different interests. Working together with many different stakeholders and finding solutions that benefit everyone.
Common language and effective communication:	Making sure stakeholders understand each other and using clear communication and use for example our impact statement for clear and effective communication.
Effective decision making based on data	Focus on what NbS can do. Build a strong connections between data collectors and policymakers to support effective decision-making and policy development for NbS.

Table 6. Promoting the mainstreaming of NbS

These lessons show that our project needs good examples of successful NbS implementations for promoting the implementation of NbS. We need to involve our stakeholders from the start and keep them engaged throughout the project. Additionally, we should also focus on discussing the practical impacts of NbS in a clear and understanding way, to ensure that stakeholders and project partners are on the same page. To create more awareness it is also important to clearly communication about the pilot results and how this data could be used to support decision-making.

Take-away messages from the Baseline Assessments

- Pilots are at different stages, some are just starting out with implementing NbS and pursuing mainstreaming at the same time, other more mature cases are at the monitoring stages of NbS.
- The scale varies among the pilots – from small and low-tech measures in muddy areas to mega-scale nourishments.
- Variances in the social and governance systems. Pilots have different roles within mainstreaming actions.
- Variations in what mainstreaming means, and what mainstreaming needs. No one-size-fits all mainstreaming Enabler. We don't yet have a common language.
- Although we already have a strong evidence base, we need even more long-term evidence (from monitoring) about how NbS work and the values that they provide.
- Knowledge about the flood protection functions of NbS are more well-known than the biodiversity and ecological functions.
- There is still a need for a better system understanding of how NbS contribute to sustainability and resilience.
- Communication to convince a wide audience about NbS is an important, and sometimes neglected, aspect to enable mainstreaming.
- Common visions and clear goals with the NbS are important.
- There is clear commitment from most pilots in promoting various climate adaptation solutions (mostly at regional levels). Despite some uncertainty about implementation challenges, there is a collaborative effort involving local and regional authorities to navigate these issues.
- Mainstreaming NbS for this project means mostly practical demonstration through successful examples, straightforward and accessible guidance, and using cost-effective materials. Clear communication in plain/ simple language is key for broader understanding and adoption. Local and regional authorities play a crucial role in promoting NbS within policy and practice. Proactive implementation through stakeholder collaboration and knowledge sharing is important for overcoming system knowledge and social acceptance limitations.

The way forward:

The results of the Baseline Assessment survey have been used to form the Thematic Groups and groups around the “how-to” questions to share their experiences, discuss further particular challenges and opportunities in the pilots in smaller groups. The first “how-to” questions have been formed around the earlier Thematic groups and have been active since the Brugge consortium meeting in March 2024. They will present their work at the next live consortium meeting in autumn 2024. The first “how-to” Groups may continue to meet as long as they feel the need, but additional groups will be formed around other “how-to” questions in the autumn. These results and spin-off activities feed into creating a mainstreaming framework in WP1. They also constitute team-building and learning activities that contribute to WP3.

The Baseline Assessment has provided MANABAS COAST with a first picture of where the pilots are in the process of performing their pilots and how mainstreaming is being addressed and will be addressed during the project. As such it forms a baseline from which to evaluate progress on further activities. In spring 2025 a second survey will be developed and completed by the pilots to gauge their progress prior to the MANABAS COAST mid-term report.

Annexes