TRANSEATION

BLUE IS THE NEW GREY · NATURE-BASED SOLUTIONS

Advancing Ecosystem-Based Management through Hybrid Blue-Grey Infrastructures in Marine and Coastal Areas

D12.1 Roadmap for stakeholder engagement

Document information

Deliverable number	12.1
Deliverable title	Roadmap for stakeholder engagement
Deliverable version	1
Work Package	WP12 Stakeholder engagement and upscaling I
Date	30 October 2024

Dissemination level

PU: Public	X
SEN: Sensitive, limited under the conditions of the Grant Agreement	

History

Version	Date	Reason	Revised by
1	28.05.2024	Initial draft	Anne Gaspers
2	07.08.2024	Second draft	Sigurd Hilmo Lundheim
3	16.09.2024	Final draft	Anne Gaspers

Author List

Organization	Name	RoI [1]
SINTEF Ocean	Sigurd Hilmo Lundheim	Author
SINTEF Ocean	Anne Gaspers	Author
SINTEF Ocean	Marta Pujol	Author

[1] Author, editor, contributor, reviewer

Disclaimer

Copyright

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

List of pictures

Symbols, abbreviations and acronyms

D	Deliverable
EU	European Union
T	Task
WP	Work Package
NbS	Nature-based solution
GEROA	Green Energy Research for Offshore Atlantic
BiMEP	Biscay Marine Energy Platform
SRU	Saitec Regeneration Unit
SATH	Swing Around Twin Hull

1. INTRODUCTION

To better understand the premise of this deliverable, it is helpful to get an understanding of why stakeholder engagement is important and what it is. Stakeholder engagement can be a key to the successful implementation of a wide variety of interventions both in the ocean space and in other areas of society. Stakeholder engagement is important because stakeholders can influence the success of a project. Stakeholder engagement allows us to see shared and mutually beneficial values (Franklin, 2020).

While important, stakeholder engagement is a vague concept. A review of the stakeholder engagement literature found a lack of a unified understanding of the essentials of stakeholder engagement (Kujala et al., 2022). In TRANSEATION, we define stakeholders as any person or group who influences or is influenced by the objectives of the research or organization, and we define engagement as the active involvement and participation of others in some aspect of the project (Carney et al., 2008; Durham et al., 2014). This definition of stakeholder engagement illustrates critical aspects of the concept, namely influence and participation.

Stakeholder engagement in the TRANSEATION project will follow a series of steps, which are presented in Figure 1. These steps are inspired by the BiodivERsA Stakeholder Engagement Handbook (Durham et al., 2014), and they help to structure the engagement process, ensuring that all demonstrators approach stakeholder engagement systematically.

In this deliverable, we focus on Steps 1 and 2, defining the context and scope of stakeholder engagement in each TRANSEATION demonstrator:

1. Coastal Protection Infrastructure Demonstrator I
2. Coastal Protection Infrastructure Demonstrator II
3. Offshore Wind Infrastructure Demonstrator
4. Low-trophic Aquaculture Infrastructure Demonstrator

Data on context and scope were generated through semi-structured interviews with the TRANSEATION project partner(s) responsible for the respective demonstrator.

The following sections provide information about each demonstrator (i.e., their objectives, the technology, and their locations) before providing information about the context and scope of stakeholder engagement. Finally, we provide some suggested actions for next steps based on the context and scope of engagement.

Figure 1: Stepwise process of stakeholder engagement (Source: Designed in collaboration with the authors by Think Things)

2. COASTAL PROTECTION INFRASTRUCTURE DEMONSTRATOR I

The main objective of Coastal Protection Infrastructure Demonstrator I is to test and validate coastal protection infrastructure as a Nature-based Solution (NbS). To achieve this main objective, there are several sub-objectives, namely: (1) performing pre-deployment measurements and modelling for a selected deployment site, (2) designing and constructing artificial reef infrastructure, and (3) deploying the artificial reef in the chosen site.

Figure 2: Approximate location of Coastal Protection Infrastructure Demonstrator 1 (Netanya) Source: Transeation - Snazzy Maps - Free Styles for Google Maps

The technology used in this demonstrator is artificial reefs. These reefs are created using metal mesh attached to low-current electric power. The appropriate size, shape and configuration of the reefs are determined based on modelling results to achieve the desired level of wave attenuation and erosion control. The reef structure will consist of several units with a length of about 2,3 m, a width of about 2,2 m and a height of about 1,2 m. The structure weighs around 70 kg and will be placed parallel to the coast. The shape allows sediments to pass above and below the reef. These reefs will not disturb currents parallel to the coast but will reduce the energy of waves passing over them and allow a natural accumulation of sand between the shoreline and the reef. This reduces erosion caused by waves (see Figure 3).

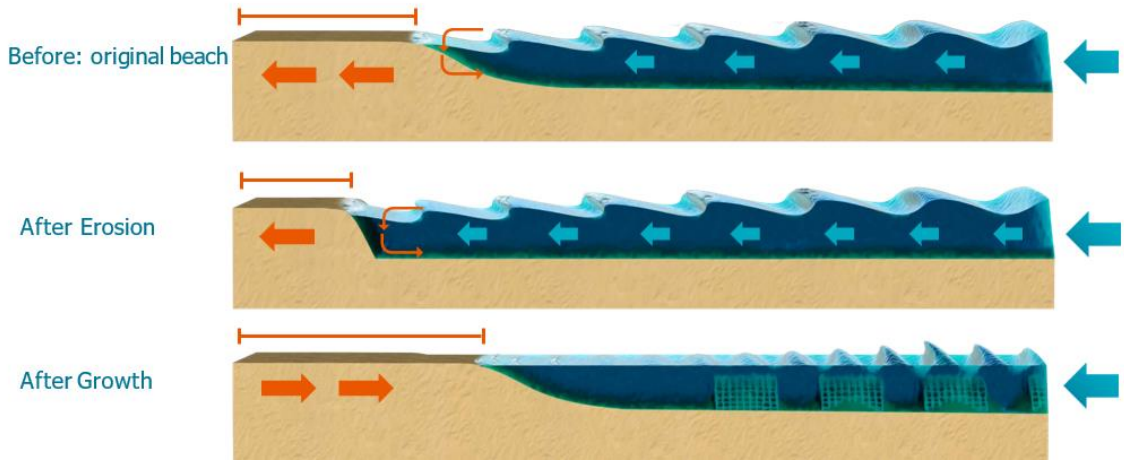

Figure 3: The effects of the reef structures on erosion and restoration (Avishay, 2024)

2.1. CONTEXT OF STAKEHOLDER ENGAGEMENT

Figure 4: Description of step 1, context (Source: Designed in collaboration with the authors by Think Things)

To meet the overarching objective of the demonstrator, stakeholder engagement will be integral. As the interviewee stated, "*I think it [stakeholder engagement] is essential to the project in different aspects.*"

Seeing the value of stakeholder engagement, the demonstrator team has already started working with stakeholders and conducted an initial stakeholder mapping. *"We need partners from local universities, partners from the coastal protection agency, and the ministry of environmental protection,"* the interviewee stated.

While the demonstrator team sees the value of stakeholder engagement, they also identify several potential challenges with engaging stakeholders, namely (1) bureaucracy, (2) gaining consensus on proposed plans, and (3) the ongoing conflict in Israel.

Several broader decision-making processes have affected the project and can continue to affect the project in the coming months. For example, attaining the necessary permits has proved challenging. Additionally, the current conflict in Israel makes the future more uncertain and can shift the priorities of politicians and committees.

2.2. SCOPE OF STAKEHOLDER ENGAGEMENT

Figure 5: Description of step 2, scope (Source: Designed in collaboration with the authors by Think Things)

The demonstrator team will work towards achieving the aims of engagement presented in Table 1.

Table 1: Aims of engagement for Coastal Protection Infrastructure Demonstrator I

Aims of engagement
1. To raise public awareness of coastal erosion
2. To help with monitoring of the demonstrator
3. To inspire others to create softer, environmentally friendly solutions for coastal protection

The demonstrator team identified several factors that will be essential to achieving the aims of engagement, as listed above. These factors include (1) knowing your audience, (2) having clear objectives for engagement, and (3) giving local people a voice. These factors highlight the importance of designing engagement strategies that are purposeful, tailored, and provide those involved with some degree of power.

The interviewee said, *"You need to involve people, you can never do things alone in Israel."* As shown in Table 2, the demonstrator team identified several categories of stakeholders that are potentially relevant to engage in the TRANSEATION project.

Table 2: Initial stakeholder categories identified by Coastal Protection Infrastructure Demonstrator I

Stakeholder categories
Local divers or diving groups
Local residents
Local government
National government
Nature and park reserve authorities
Academics working on or within similar topics
Engineering companies
Modelling companies

The demonstrator team foresees engaging stakeholders at different levels – primarily 'inform', 'consult', and 'involve' (see Figure 6). For instance, the team may 'inform' the public, 'consult' with public authorities, and 'involve' divers in monitoring. However, the level of engagement will be specified after the team conducts a more detailed stakeholder analysis and starts preparing engagement strategies.

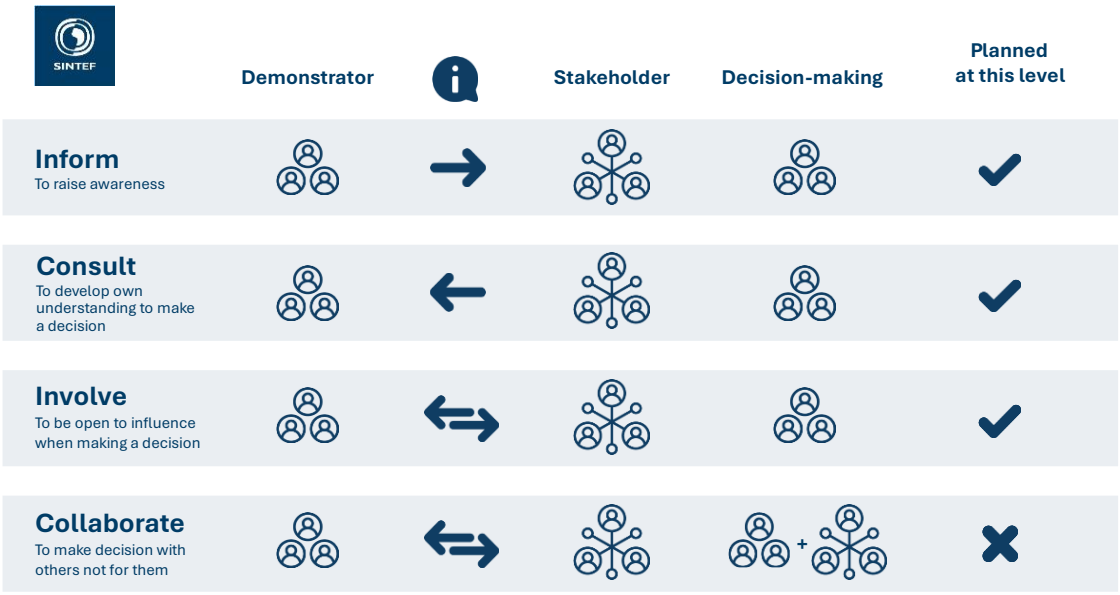

Figure 6: Planned level of engagement in Coastal Protection Infrastructure Demonstrator I (Source: Designed in collaboration with the authors by Think Things)

There are both benefits and costs for the stakeholders, as shown in Table 3. As the interviewee said, *"Each stakeholder will have different reasons to join."*

Table 3: Benefits and costs for stakeholders in Coastal Protection Infrastructure Demonstrator I

Benefits for stakeholders	Costs for stakeholders
Local government supports environmentally friendly actions	Time and effort
The Environmental Protection Agency can show that they promote novel strategies for innovation	Resources related to diving
Divers get to do something they like	Permit applications

The demonstrator team plans to continue engagement after the end of the TRANSEATION project. As the interviewee said, they *"… believe in these types of solutions*."

2.3. SUGGESTED ACTIONS BASED ON CONTEXT AND SCOPE

Based on the aim of engagement, we suggest the following actions:

Conduct a thorough stakeholder analysis. As the demonstrator team plans to engage different stakeholders at different levels, this should be documented and justified.

Support material: Template(s) to support stakeholder identification, prioritization, etc.

Based on the goals of engagement, i.e., awareness raising, monitoring, and development of environmentally friendly solutions for coastal protection, below we identify potential next steps.

Awareness raising: Define 1-3 ways to raise awareness of the demonstrator (e.g., stand at events, meetings, beach walks, etc.).

Potential support materials: Suggestions for engagement activities and guidelines for completing them in accordance with the principles of stakeholder engagement.

Monitoring: Record the number of stakeholders participating and lessons learned that can be shared with others.

Potential support materials: Guidelines for creating a citizen science data collection plan.

Development of environmentally friendly solutions for coastal protection: Define how to share the knowledge gleaned in the project (e.g., through meetings or workshops with Coastal Protection Infrastructure Demonstrator II, other projects working on the topic outside of the consortium, etc.).

Potential support materials: Workshop guidelines, meeting guidelines, and recommendations for collaboration.

3. COASTAL PROTECTION INFRASTRUCTURE DEMONSTRATOR II

The main object of this demonstrator is to test and validate the coastal protection infrastructure as a NbS. To achieve this, Seacure has identified three sub-objectives (1) to perform pre-deployment measurements and technical specifications, (2) to design and validate preliminary prototypes, and (3) to deploy and install of coastal protection infrastructure in selected sites.

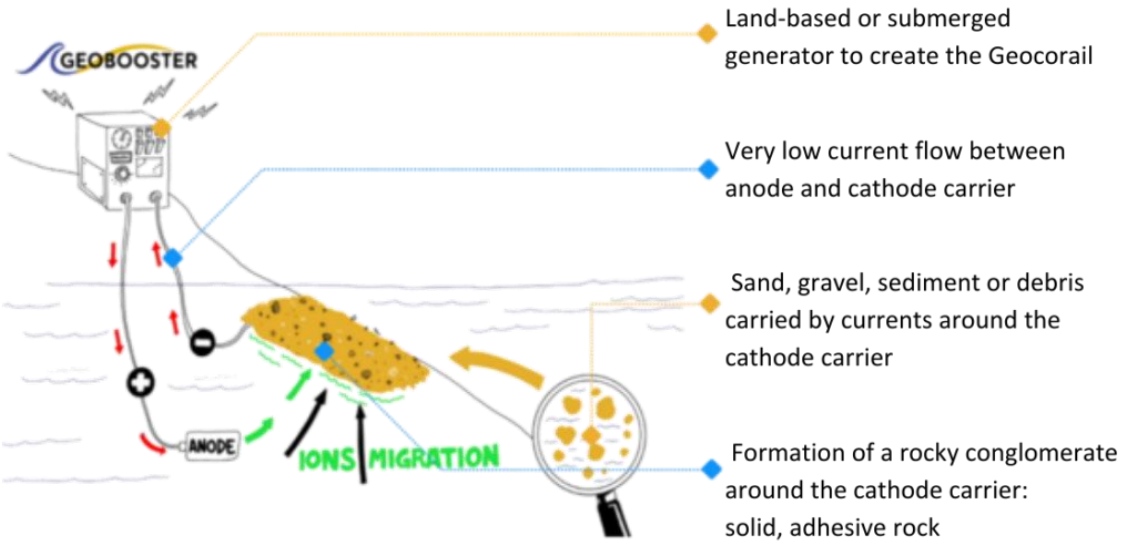

Figure 7: How the artificial reefs are created Illustration (Source: GEOCORAIL – Seacure)

Different reefs will be tested to see which are most appropriate for the selected sites. The reef is created on a mesh using a low current flow (Figure 7). The sites are not yet decided but will be located in coastal areas of France.

3.1. CONTEXT OF STAKEHOLDER ENGAGEMENT

Figure 8: Description of step 1, context (Source: Designed in collaboration with the authors by Think Things)

Within the TRANSEATION project, Seacure will focus on developing submersible wave breakers and solving the technical challenges related to this innovation. All stakeholder engagement will, therefore, take place within this context.

A wider stakeholder engagement process related to the innovation is being conducted by the municipality, but this process will take place outside the TRANSEATION project. Even though the demonstrator is not leading the wider stakeholder engagement process, they see the importance of it.

The demonstrator team highlighted several general challenges related to stakeholder engagement, namely (1) the permitting process, (2) staffing, (3) difficulties explaining the demonstrator technology to lay people, (4) lack of acceptance for new technology, and (5) people's preconceived notions about constraints related to coastal erosion protection.

In addition to these challenges related to stakeholder engagement, there have been several wider decision-making processes that have impacted the demonstrator. Specifically, new French policies and politicians. This wider decision-making process, for instance, has impacted permitting and budgeting.

3.2. SCOPE OF STAKEHOLDER ENGAGEMENT

Figure 9: Description of step 2, scope (Source: Designed in collaboration with the authors by Think Things)

The demonstrator's aims for engagement are outlined in Table 4.

Table 4: Aims of engagement in Coastal Protection Infrastructure Demonstrator II

Aims of engagement
1. To get project permits
2. Finalize the budget
3. Solve technical challenges in the demonstrator
4. Get technical partners on board with the project

According to the demonstrator team, one key factor that will help the stakeholder engagement process within TRANSEATION run smoothly is good timing.

Given their focus, the demonstrator team only plans to involve one category of stakeholders – scientists. The stakeholders engaged by the demonstrator will be engaged at the "involve" level. Making the final decision will be left up to the demonstrator team, but, as the interviewee said, *"Essentially, we want to make a decision together"*. The demonstrator team does not plan to directly engage with any other stakeholders at this point so there is only one level of engagement.

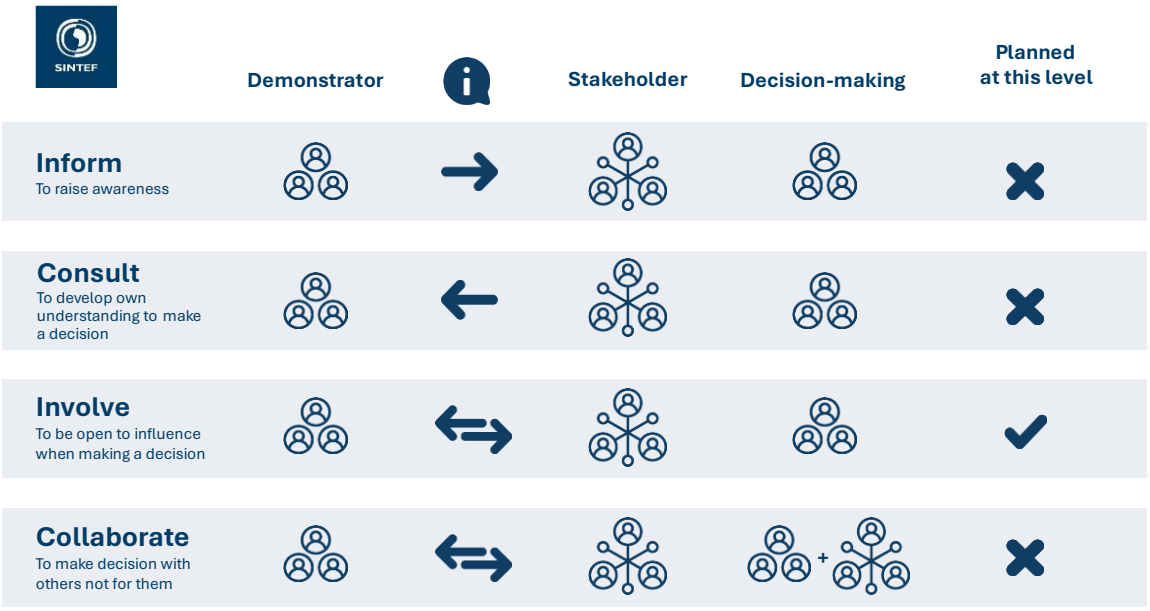

Figure 10: Planned level of engagement in Coastal Protection Infrastructure Demonstrator II (Source: Designed in collaboration with the authors by Think Things)

Table 5 shows the benefits and costs for the stakeholders.

Table 5: Benefits and costs for stakeholders in Coastal Protection Infrastructure Demonstrator II

Benefits for stakeholders	Costs for stakeholders
Participation in developing new technology	Financial costs
Working differently	Time
Potential for new PhD. positions	
Work on technically challenging tasks	

The project is the first of its kind. Regarding future engagement activities, they want to complete the project and have regulatory bodies take over engagement and project specifications that allow the demonstrator team to upscale the innovation. However, this engagement is more relevant when they install the technology. For the current scope and context, engagement activities will be targeted towards key scientists.

3.3. SUGGESTED ACTIONS BASED ON CONTEXT AND SCOPE

Based on the aim of engagement, we suggest the following actions:

Conduct a thorough stakeholder analysis. The demonstrator team plans to engage only one category of stakeholders. However, it is still important to properly document and justify selected stakeholders.

Support material: Template(s) to support stakeholder identification, prioritization, etc.

Further support materials will be discussed together with the demonstrator team when plans are more concrete.

4. OFFSHORE WIND FARM DEMONSTRATOR

The DemoSATH (swing around twin hull) project consists of a 2 MW floating offshore wind platform that is part of the test infrastructure that demonstrates the functionality and efficiency of the SATH technology developed by the SAITEC group. The platform was installed in September 2023 in BiMEP (Biscay Marine Energy Platform), an open sea testing area with a grid connection to demonstrate and validate wave energy converters and floating wind platforms. The main objective of this project is to lay the foundations and acquire the necessary knowledge for the development of future pre-commercial parks, as is the case of GEROA (Green Energy Research for Offshore Atlantic), which is a 3-turbine and 50 MW pre-commercial floating offshore wind project that will be located 10 km from the Basque coast.

In the TRANSEATION project context, SAITEC has installed the SRU, a structure made of wind turbine blade sections joined together and covered by mollusk shells. This structure is placed on the sea floor between two of the platform's six mooring lines. The goal is to test and validate offshore wind farm infrastructure as a Nature-based Solution (NbS). To achieve this objective, SAITEC has (1) identified possible locations to place the NbS infrastructure, (2) adapted the design of the infrastructure, (3) manufactured the infrastructure, and (4) installed the infrastructure. Once the monitoring phase is completed and the project is coming to an end, SAITEC will apply the knowledge to similar projects, such as GEROA.

Picture 1: Picture showing the test wind turbine at the demo site (DemoSATH). Picture from: https://saitec-offshore.com/en/projects/demosath/

Figure 11: The approximate location of Demonstrator 3 (DemoSATH) Source: [Transeation - Snazzy Maps - Free Styles for Google Maps]

4.1. CONTEXT OF STAKEHOLDER ENGAGEMENT

Figure 12: Description of step 1, context (Source: Designed in collaboration with the authors by Think Things)

SATH technology is new. Therefore, the demonstrator team identified stakeholder engagement as especially important. *"… it's [stakeholder engagement] the most important thing to do … involving everyone affected by the project to say something about it."*

As SAITEC Group has done considerable work developing the innovation before starting the TRANSEATION project, considerable effort has also been put into stakeholder engagement,

especially with the fishing industry. Currently, the team is working to prepare future engagement activities.

The demonstrator team highlights several potential challenges with stakeholder engagement, namely (1) tailoring engagement to different stakeholder groups, (2) gaining access to data, (3), building trust, and (4) gaining political and organizational support. Some of these challenges they have already encountered in the work with stakeholders prior to the start of the TRANSEATION project.

Concerning the wider decision-making process that may impact the demonstrator, the team members highlight that political uncertainty of offshore wind power could impact the willingness of certain stakeholders to join the engagement activities.

4.2. SCOPE OF STAKEHOLDER ENGAGEMENT

Figure 13: Description of step 2, scope (Source: Designed in collaboration with the authors by Think Things)

Table 6 lists the three aims of engagement identified by the demonstrator.

Table 6: Aims of engagement for Offshore Wind Farm Infrastructure Demonstrator

Aims of engagement
1. To develop ways to co-exist with different sea users (especially fishers) and collaborate with academic entities
2. To increase the trust of stakeholders and address doubts and uncertainties regarding floating offshore wind energy and SATH technology
3. To develop technology that can be upscaled and replicated in future projects and that serves as an example and lays the foundations for responsible development of wind energy

The demonstrator team identified several factors that will be essential to achieving the aims of engagement, as listed above. These factors include (1) engagement in each phase of the project, (2) transparency, (3) listening to (and considering) stakeholders' concerns, and (4) communicating information in a manner stakeholders can understand. These factors highlight the importance of communication with stakeholders and should be considered when planning engagement. As shown below in Table 7, the demonstration team identified several categories of stakeholders to potentially engage in the TRANSEATION project.

Table 7: Stakeholders identified by Offshore Wind Farm Infrastructure Demonstrator.

Category of stakeholder
Interest organization
Researchers
Other interested entities
Infrastructure managers (i.e., port managers)
Public regulators / public administration
Fishers
Other sea users

With regards to the level of engagement, the demonstrator team noted that (1) the aim is to be transparent about stakeholders' influence in the process, as there are constraints on what stakeholders can decide and (2) stakeholders should have decision-making power where relevant (e.g., where they have the necessary technical expertise). "*On specific matters that the stakeholders are experts, the team is eager to be more open and try to take a decision together, if possible,"* one team member said.

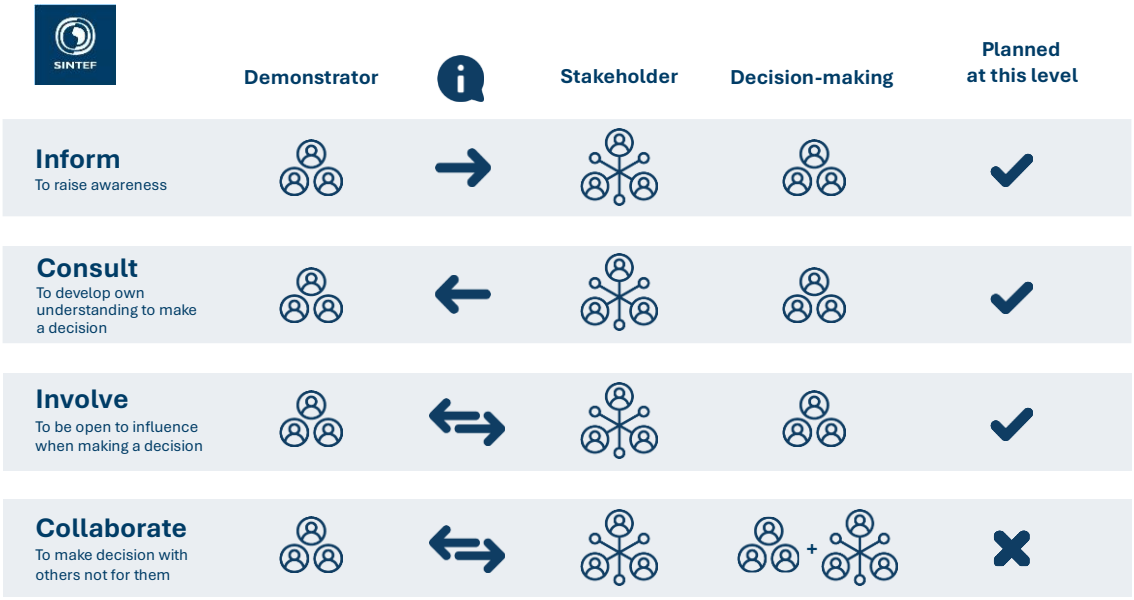

Figure 14: Planned level of engagement in Offshore Wind Farm Infrastructure Demonstrator (Source: Designed in collaboration with the authors by Think Things)

Stakeholders will likely be engaged at the levels shown in Figure 14Figure 14. For example, the public and researchers may be 'informed' through presentations and sea users may be 'involved' in workshops.

There are both benefits and costs for the stakeholders, as shown in Table 8.

Table 8: Benefits and costs for stakeholders in Offshore Wind Farm Infrastructure Demonstrator

Benefits for stakeholders	Costs for stakeholders
Access to data	Time
Added showcase or educational element for leisure and educational entities	Uncertainty
Increased marine resources (benefits to aquaculture and fisheries)	Money
Collaborative networks	Potential social cost in supporting a project with prejudices and uncertainties
Funding opportunities	
Sense of ownership	
Decisions that have the least possible negative impacts on local communities	
Technological development	
Scientific research opportunities	
Increase administration control and management (due to the increase of information)	

Stakeholder engagement in this demonstrator is planned to continue through the decommissioning phase and future related projects, such as pre-commercial parks.

4.3. SUGGESTED ACTIONS BASED ON THE CONTEXT AND SCOPE

Based on the aim of engagement, we suggest the following actions:

Conduct a thorough stakeholder analysis. As the demonstrator team plans to engage different stakeholders at different levels, this should be documented and justified.

> Support material: Support material: Template(s) to support stakeholder identification, prioritization, etc.

Based on the demonstrator team's goals of engagement, i.e., developing ways to co-exist with the fishing industry, increasing trust, and developing technology that can be upscaled and replicated, we identify potential next steps.

Developing a way to co-exist with the fishing industry: Narrow this goal by defining 1-3 ways to increase collaboration with the fishing industry (e.g., a workshop/workshop series to identify shared benefits/voice concerns).

- Potential support materials: Workshop scripts and record-keeping documents (i.e., what the demonstrator team should record to document an inclusive process).

Develop technology that can be upscaled and replicated: Hold workshops or meetings where stakeholders can suggest improvements or report issues with the technology. Additionally, it could be relevant to reach out to other innovation projects that are working on the same topic.

- Potential support materials: Workshop scripts and record-keeping documents.

Increase trust: We can provide support with structuring the engagement process so that it follows basic principles for stakeholder engagement. Being aware of and utilizing principles for stakeholder engagement can increase the trust and legitimacy of the process.

5. LOW TROPHIC AQUACULTURE DEMONSTRATOR

AZTI aims to test and validate a low-trophic aquaculture infrastructure as a NbS. To achieve this, they plan to (1) design, develop and implement a low-trophic aquaculture infrastructure (biobased ropes), (2) design experimental aquaculture trials and (3) improve the design and production of the biobased ropes for mussels and seaweed production in longline and raft demonstrators.

Picture 2: Shows the production of the first prototype of the new rope type (BIOGEARS). From https://www.azti.es/en/biogears-biodegradable-ropes/

These ropes aim to be durable and appropriate for use in mussels and seaweed farming. They are biodegradable in industrial composting conditions unlike fossil-based ropes, which are not biodegradable and, as such, landfilling or incineration are their most frequent end-of-life options.

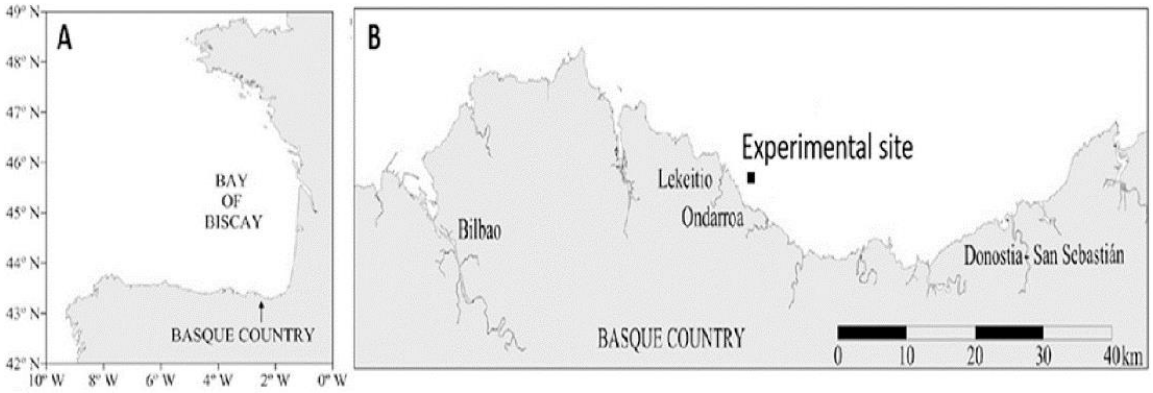

Figure 15: Location of (A) the region for the stakeholder engagement and (B) the experimental site (Source: Arantzamendi et al., 2024).

Recently, Arantzamendi et al., (2024) conducted a technical assessment of the biobased ropes and validated their functionality and durability for a one-year production cycle of mussels in an offshore longline system. The longline system is in the southeast (SE) of the Bay of Biscay (see Figure 15Figure 15), and the same longline demonstrator will be used in the TRANSEATION project. In the TRANSEATION project, the biobased ropes will be improved, especially in terms of durability. The improved ropes will be deployed in two different locations.

Figure 16: Mussel offshore culture: A) ropes suspended from the longline at 2 m depth from the sea surface. B–C) ropes lifted to the vessel by a hydraulic arm, and D) on the vessel one linear meter of rope is measured and cut to be taken as a mussel replicate sample per rope type (Source: (Arantzamendi et al., 2024)).

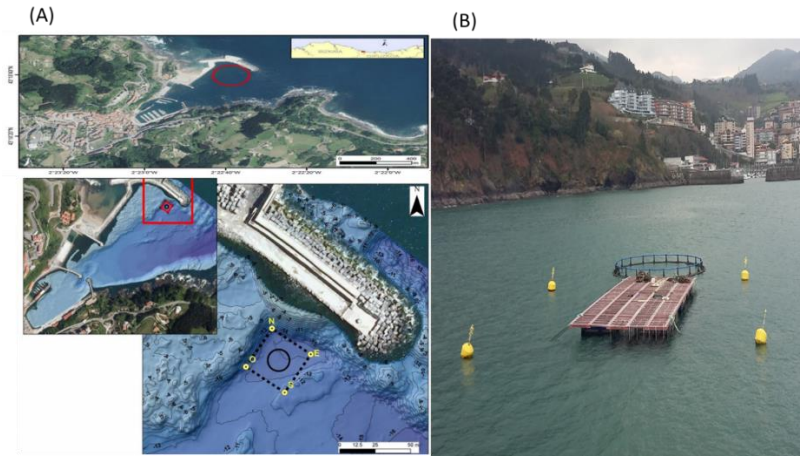

Figure 17: Location of (A) the port of Mutriku (Southeast of Bay of Biscay) and the raft installed in the port (red and black squares), and (B) detail of the raft (Source: AZTI).

5.1. CONTEXT OF STAKEHOLDER ENGAGEMENT

Figure 18: Description of step 1, context (Source: Designed in collaboration with the authors by Think Things)

This demonstrator aims to develop a product for the commercial market within the aquaculture industry. Stakeholder engagement will play an important role as the team takes the product to the commercial market. As one interviewee said, "*In our case it's important. The project is focused on having a business plan. So, it's important to engage stakeholders who could be interested in the business.*"

In the pre-project to TRANSEATION, the BIOGEARS[2] project, the demonstrator team engaged stakeholders. For instance, the demonstrator team participated in several conferences and held events. Several deliverables and other documents are available on their website (Home - BIOGEARS), including a video. However, while the demonstrator team has worked with stakeholders previously, a specific stakeholder analysis will need to be conducted for the TRANSEATION project.

The demonstrator team identified several challenges related to stakeholder engagement in their case. Firstly, there may be issues collecting enough data from stakeholder surveys. Secondly, the geographical scope of the demonstrator is very large, which can be challenging (e.g., due to language barriers, lack of networks, scheduling in-person events). Finally, because of the commercial interest in the project, it may also be difficult to share detailed information about the results of the project.

The demonstrator identified two facets of the broader decision-making process that could influence the project. The first is the potential regulatory challenges related to using biobased/degradable materials in marine use. The second is a possible disruption of the supply chain because of global events and the availability and volatility of the price of the raw materials.

[2] BIOGEARS: www.biogears.eu

5.2. SCOPE OF STAKEHOLDER ENGAGEMENT

Figure 19: Description of step 2, scope (Source: Designed in collaboration with the authors by Think Things)

The demonstrator identified aims for engagement (see Table 9).

Table 9: Aims of engagement for Low-trophic Aquaculture Infrastructure Demonstrator

Aims of engagement
1. Improve the product
2. Identify the acceptance of the product
3. Raise awareness and commercial interest in the product

The team also identified several factors that will be essential to achieving the aims of engagement, as listed above. These factors include (1) increasing stakeholder awareness of coming or proposed regulations that might impact the use of older rope types in aquaculture, (2) increasing awareness of environmental issues related to the use of older rope types, and (3) fostering collaboration with stakeholders interested in digitalization.

As shown below in Table 10, the demonstration team identified several categories of stakeholders who could potentially be engaged in the TRANSEATION project.

Table 10: Stakeholders identified by the Low-trophic Aquaculture Infrastructure Demonstrator

Category of stakeholder
Aquaculture (farmers, scientists equipment providers)
Policymakers
General public
Digital sector
People who are using or aim to use digital tools in aquaculture
Partners from other projects

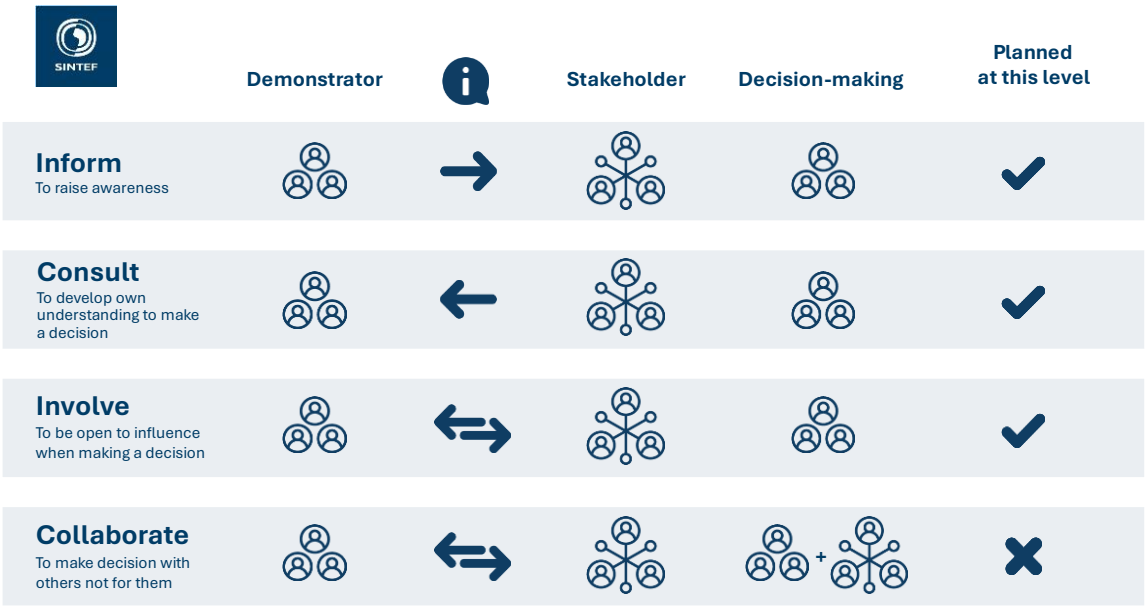

Figure 20: Planned level of engagement in Low-trophic Aquaculture Infrastructure Demonstrator (Source: Designed in collaboration with the authors by Think Things)

The demonstrator team aims to engage stakeholders at three different levels. These are 'inform', 'consult', and 'involve'. These levels are appropriate in the context of the aims of engagement and the overall project. The commercial nature of the demonstrator makes involvement at a level of 'collaborate' challenging as the demonstrator needs to retain control over the project. Despite this challenge, the team also stresses, "*The interaction should be in both directions…".* This shows that even though engaging stakeholders at the 'collaborate' level is not possible in this demonstrator, there is planned engagement at the level of 'involve'.

There are several benefits and costs of engagement for stakeholders in this demonstrator, as shown in Table 11.

Table 11: Benefits and costs for stakeholders in Low-trophic Aquaculture Infrastructure Demonstrator

Benefits for stakeholders	Costs for stakeholders
Stakeholders are prepared for future legislation targeting plastic-based ropes	Stakeholders must take time out of their day to participate in engagement
Stakeholders can meet new regulations	The results of the stakeholder engagement might not be publicly shared

Regarding the duration of stakeholder engagement in this demonstrator, as one interviewee stated, "*This you never know."* Nonetheless, the team wants to continue to engage stakeholders around this important product.

5.3. SUGGESTED ACTIONS BASED ON CONTEXT AND SCOPE

Based on the aim of engagement, we suggest the following actions:

Conduct a thorough stakeholder analysis. As the demonstrator team plans to engage different stakeholders at different levels, this should be documented and justified.

> Support material: Support material: Template(s) to support stakeholder identification, prioritization, etc.

Based on the demonstrator team's goals of engagement, i.e., improving the product, identifying the acceptance of the product, and raising awareness of the product, we identify potential next steps.

Improving the product: Determine a form of engagement (e.g., workshop with different user groups).

> Potential support material: Script for workshop, workshop guidelines.

Identifying the acceptance of the product: Consider designing an expert survey.

> Potential support materials: Co-design or review of the survey.

Raising awareness of the product: Determine 1+ activities (i.e., presentations at conferences/other relevant venues, reaching out to new potential customers)

> Assistance with networking to reach new potential customers or people who can "open doors".

6. NEXT STEPS

Understanding the context and scope of stakeholder engagement lays the foundation for the next steps in the process: stakeholder analysis, engagement preparation, engagement, and engagement evaluation. Stakeholder analysis is all about finding out who your stakeholders are and categorizing and prioritizing the stakeholders. When analyzing stakeholders, it is helpful to keep these four practices in mind: have a clear reasoning behind who is involved and why, record this reasoning, integrate local and scientific knowledge, and work to integrate people (if relevant) who are outside your network. Much of this will hinge on the goals and aims for stakeholder engagement, which is why we stress the importance of setting clear goals and aims for the engagement process. After analyzing stakeholders, the demonstrators will work to engage stakeholders, understanding that different stakeholders can be engaged at different levels, with different degrees of influence over decision-making. Once the demonstrators have engaged stakeholders, they will evaluate the value and impact of engagement. The different demonstrators are currently at varying levels of technological readiness, which impacts the stakeholder engagement process. This means that the demonstrators will engage different types of stakeholders, and engagement will take place in many different forms, using different methods. The next step is to provide the demonstrators with support materials to guide them through analyzing stakeholders, preparing for engagement, engaging stakeholders, and analyzing that engagement process.

7. REFERENCES

Arantzamendi, L., Andrés, M., Suárez, M. J., van Der Schueren, L., & Aguinaga, M. (2024). Assessing the mechanical properties of biobased versus fossil-based ropes and their impact on the productivity and quality of mussel (Mytilus galloprovincialis) in longline aquaculture: Toward decarbonization. *Aquaculture*, *588*, 740919. https://doi.org/10.1016/j.aquaculture.2024.740919

Avishay, I. (2024, July 31). *TRANSEATION Consortium meeting*. TRANSEATION Consortium meeting, Microsoft Teams.

Carney, S., Whitmarsh, L., Nicholson-Cole, S. A., & Shackley, S. (2008). *A Dynamic Typology of Stakeholder Engagement within Climate Change Research:Tyndall Working paper 128*. https://www.semanticscholar.org/paper/A-Dynamic-Typology-of-Stakeholder-Engagement-within-Carney-Whitmarsh/4edcd5f680c248509063c67427c048115d873bd9

Durham, E., Baker, H., Smith, M., Moore, E., & Morgan, E. (2014). *BiodivErsA, STAKEHOLDER ENGAGEMENT Handbook* [Book]. https://www.biodiversa.eu/wp-content/uploads/2022/12/stakeholder-engagement-handbook.pdf

Franklin, A. L. (2020). Introduction to Stakeholder Engagement. In A. L. Franklin, *Stakeholder Engagement* (pp. 1–17). Springer International Publishing. https://doi.org/10.1007/978-3-030-47519-2_1

Kujala, J., Sachs, S., Leinonen, H., Heikkinen, A., & Laude, D. (2022). Stakeholder Engagement: Past, Present, and Future. *Business & Society*, *61*(5), 1136–1196. https://doi.org/10.1177/00076503211066595