



D5.5

Valorization potential

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Acronyms

BCS	Belgian Continental Shelf
CSR	Corporate Social Responsibility
ES	Ecosystem Services
LCA	Life Cycle Assessment
SAB	Strategic Advisory Board
MSP	Marine Spatial Planning
OWF	Offshore Wind Farm
SDES	Supply-Demand Ecosystem Services

1. Introduction

The growth of the Blue economy and the increase in the diverse human activities offshore have raised a major challenge, that is the sustainable management and use of the marine environment. The seas provide a unique set of goods and services to society; fish, shellfish and seaweed for food, raw materials, algae and minerals for industrial applications; regulating services such as coastal protection; cultural services including the non-material benefits derived from nature such as recreation and tourism, beauty, as well as spiritual, intellectual and cultural benefits. If we want to further expand our blue economy activities respecting the ecosystems and their services, a specific approach is needed from the companies and policy makers in their decision making, the 'Ecosystem Approach':

"The comprehensive integrated management of human activities based on the best available scientific knowledge about the ecosystem and its dynamics, in order to identify and take action on influences which are critical to the health of marine ecosystems" (HELCOM-OSPAR, 2003).

SUMES is the first project of the Blue Cluster aiming to develop a holistic sustainability impact assessment methodology as outlined in Taelman et al. (2023) where local, regional and global impacts of (socio-) economic activities are evaluated.

This science driven approach of the research institutes was combined with input from industrial stakeholders and governmental representatives before and during the project time through a Strategic Advisory Board (SAB). The interaction with the SAB and with some industrial stakeholders in one-on-one interviews must pave the way for the SUMES-model to be implemented by industrial stakeholders.

2. Outreach activities

2.1. Strategic Advisory Board

As the initial idea for the SUMES project was developed during a meeting between project researchers and industrial companies, a SAB was formed which had the task to monitor the implementation of the project and functions as a focus group for the possibilities of industrial and/or social implementation of the project results.

Asides companies operating or supporting activities on the North Sea, the SAB also included the Federal government and the Provincial Development Agency. Table 1 lists up the members of the SAB and the domain they are active in. The SAB meetings were held annually to give insight on the development of the projects. Table 2 gives an overview of the meetings held during the project.

Table 1: Members of the Strategic advisory board (SAB)

Name of company/organization	Contact person	Domain
Flemish Fish Auction	Sylvie Becaus	Seafood
Colruyt Group	Steven Van Hemelryck	Seafood, Energy
DEME	Marc Huygens	Coastal protection/Energy
Maritec	Yves Peeters	Marine Services
Port of Bruges	Paul Schroé	Shipping
eBO	Christophe Dhaene	Smart sea
Arcadis	Annemie Volckaert	Industrial engineering
IMDC	Annelies Boerema	Marine, Dredging & Port Engineering
POM West-Flanders	Hannelore Malfait	Regional government
FPS Health, Food chain Safety and Environment	Saskia Van Gaever	Federal government

Table 2: Overview SAB meetings

21/10/2020	1 st SAB Meeting
23/11/2021	2 nd SAB Meeting
15/03/2022	3 rd SAB Meeting
December 2022 /June2023	Bilateral consultations
01/02/2024	4 th SAB Meeting (last)

2.1.1. Kick off and intermediate SAB meetings

In the first SAB meeting the members raised their expectations and potential concerns with regard to the purpose of the project to develop an extensive model that assesses 1) the impact of marine activities on its surroundings, i.e. the ability to deliver certain products and services and 2) the impact more globally such as climate change. Below you will find a selection of some of the inquiries presented by the SAB members at the first SAB meeting:

- How will model limitations, different time scales of various processes and various uncertainties and assumptions be dealt with?
- Model as a means to expand knowledge around impacts of activities at sea. Need to know the impact of different marine activities of itself on the ecosystem, but also on other marine activities.

- How to take sufficiently into account the interaction between land and sea?
- Can the model be applied in marine policy?

In the following SAB meetings, the project partners have explained the steps they have taken in their methodology and research activities and the elaboration of the showcase which is an Offshore Wind Farm (OWF). A collaboration with a concession holder was established to receive primary data. Remarks and input from the SAB were discussed during the meetings and if needed taken into account for further finetuning the models. Also the identification and selection of an advanced case study was discussed with a specific inquiry to make it a cross-sectoral case study. The combination of an OWF and offshore mussel farm (OMF) was chosen as this combination showed lots of potential to thrive in Belgian waters (cfr literature). There is however no commercial OMF available, so the design was based on pilot scale projects in the BCS such as EDULIS in combination with expert interviews.

2.1.2. Bilateral consultations

Halfway through the project, members of the SAB were invited to participate in a bilateral consultation, focussing on the identification of valorisation pathways. During these sessions, project researchers and the Blue Cluster posed specific questions concerning sustainability measures taken within their respective company or organization. Discussions also focussed on exploring how the SUMES methodology or datasets could provide added value for their businesses and contribute to future growth. Table 3 gives an overview of the different interviews. Arcadis and Maritec were not available for an interview.

Table 3: Overview Bilateral meetings

Date	Interviewee	Name of company/organization
5/12/2022	Sylvie Because	Flemish Fish Auction
5/12/2022	Paul Schroé	Port of Bruges
07/12/2022	Saskia Van Gaever	FPS Health, Food chain Safety and Environment
09/12/2022	Marc Huygens	DEME
09/12/2022	Steven Van Hemelryck	Colruyt Group
19/12/2022	Christophe Dhaene	e-BO
09/06/2023	Tom Bauer	POM West-Flanders
26/06/2023	Annelies Boerema, Nathalie Van Caster	IMDC

In preparation of the bilateral consultations, all interviewees were sent the same questionnaire. The reports of the consultations can be found in Annex 1. An overall resume of the answers is given below per question:

1. How is sustainability integrated and evaluated for your current operations?

Most companies don't have a real strategy for integrating sustainability into their offshore operations. The efforts that are being made are mainly aimed at being "compliant" with legally imposed (EIA, LCA,..) measures.

There are several offshore activities (fisheries, offshore wind energy, etc.) that each have their own specific evaluation tools in the context of sustainability, but these are usually very activity-specific and therefore the holistic approach is not included in their evaluation. Broadening that framework makes the evaluation more comparable and holistic but probably also more complex.

Most of the time, the results of the available tools are only used internally, or the tools have been developed within the company itself and are not yet used for external communication. They can, however, be part of a larger report such as the Corporate Social Responsibility (CSR) reports.

2. What are the current shortcomings in these evaluations and/or reporting on sustainability?

Below you will find a list of comments selected out of the consultations:

- Need for more objective assessment.
- Use of assumptions can be dangerous.
- Companies will not force themselves to do certain evaluations or reporting if not made mandatory to avoid extra financial efforts. Even LCA's are very expensive.
- Marine ecosystems are not yet well known
- For multi-use we see that currently rather practical/economic considerations are used and the possible negative effects on the environment are not well evaluated.
- Monitoring focused on MSFD mainly focusses on ecosystem elements
- The use of a standardized monetization technique is relevant, but this should be very well substantiated

3. Is there a need for the development of new products/services/knowledge?

There is a need for adaptation or further development of current products/services or completely new ones. Important guidelines to take into account are:

- Baseline measurements are very important
- More data is needed
- Broaden to a holistic approach
- More embedded in society
- Integration in concession granting
- Pricing for customer, insurance, investors: monetary value of ES
- Avoid complexity, but definitely include ecological aspects in projects (can you couple LCA to Eco-design)?
- Working with different scale levels (local, regional, global...): Overview table of the products/services that clearly shows what tool can do and for whom/what may be suitable
- Integration of LCA/ES in Ecosystem impact assessments

4. Which products might be of interest to you, e.g. services, user interface, software license, etc.)?

Below some comments of the interview on what they are looking for in the SUMES tool or what they would like to get out of it:

- Need for data from other sectors (through SUMES)
- Use of the tool for managing the Belgian Part of the North Sea (BPNS) together with other stakeholders
- Impact on ecosystem in OWF
- Possibility to incorporate the ecosystem parameters in dashboard to customers
- Possibility to make recommendations to clients based on SUMES tool
- Be able to showcase to the outside world (e.g. impact of OWF)
- Use the tool to communicate results internally and the possibility to supplement their environmental and CSR reports

5. Are you willing to help designing and preparing the translation of the results into concrete applications or tools for companies?

Some of the interviewees can provide data, but these are rather general and not company-specific data as there are some concerns towards competitors. Also there could be support to retrieve this data (e.g. connectivity).

6. Who are key partners/companies/stakeholders that need to be involved in the further development? (cf workshop)

- Consumers
- Public authorities
- Persons and organizations working on the Marine Spatial Planning,
- Owners of the offshore windfarms
- Financial world: Can they assess today the sustainability of the activities they are investing in?
- Design agency/consultants: From the interviews we also sense that companies are more likely to outsource these types of evaluations due to the complexity and the inherent specialization of these evaluations. However, consultants are still lacking knowledge.

7. Are you aware of other initiatives (e.g. projects, data sources, platforms) where we can obtain useful information for SUMES and its possible follow-up processes?

- A main suggestion is that these evaluations should be data-driven and therefore interviewees have pointed out that there are some international projects where data could be found, especially as some projects are specific for a certain activity and have more insight on the value of certain data.
- Take into account the EU legislation on monitoring (as these are data-driven evaluations)
- Along the SUMES project two other separate projects started with the help of the Blue Cluster for which there should be possibility to engage interactions and search for possible integration between them.

8. Do you have concrete ideas for follow-up projects? Other questions or suggestions?

Below are listed some suggestions on the tool from the interviewees:

- Better monitoring strategy: Data collection from different stakeholders with synergy in the manner of collection
- More case studies needed, also expand them to other offshore activities
- Can LCA be included in MSP? Further workshops necessary. Including consultants
- Still missing economic part in the tool (labor, income,..)
- What is the current status on the Ecosystem Approach and how is it taken up at the international level?
- Companies are looking in the SUMES tool for the possibility to: 1) link operational parameters to ecosystem impacts and make adjustments if necessary, 2) valorize Nature Based solutions

2.1.3. Final SAB meeting

At the end of the project a final SAB meeting was held with a presentation on the approach taken during the project, emphasizing the key aspects of quantifying both local and global environmental impacts and addressing both positive and negative effects in the process. More insights were given on the SDES-model and the LCA and its advances and the results of the Environmental Risk Assessment. Most relevant discussion points are listed below:

- Current models are linear, and scaling up to cover the entire North Sea would require a reassessment of the models, potential adjustments, and the availability of comprehensive data. In the entire North Sea, there are a lot more feedback loops in the ecosystem and this is challenging to quantify.
- Water does not stay confined within national boundaries, emphasizing the importance of taking spatial dynamics into account for a more comprehensive understanding. For working on this larger geographical scales, possible adjustments could be needed.
- Identify through the potential beneficial tool synergisms for offshore multi use

The SAB meeting was concluded with an overview slide (Table 4), highlighting the three separate models that were integrated into SUMES, making it a powerful tool to address the global and local impacts of human activities, while actively addressing weaknesses of the separate models.

Table 4: Overview of strengths and weaknesses of Ecosystem Services Assessment, Life Cycle Assessment and Risk Assessment and the overarching SUMES methodology.

	Strengths	Weaknesses
Ecosystem Services (ES)	<ul style="list-style-type: none"> • Local marine and terrestrial environmental quantification • Positive and negative impacts 	<ul style="list-style-type: none"> • Does not take entire value chain into account • Linkage with a human activity (product) can be absent
Life Cycle Assessment	<ul style="list-style-type: none"> • Global value chain quantification • Positive (avoided products) and negative impacts • Benchmarking 	<ul style="list-style-type: none"> • Not well developed to account for local impacts
Risk Assessment	<ul style="list-style-type: none"> • Compare design scenarios • Accounts for environmental limits • Quantify ES risk and benefit • Evaluation of local ES trade-offs 	<ul style="list-style-type: none"> • Does not take the entire value chain into account • Do not account for global effects
SUMES model	<ul style="list-style-type: none"> • Local and global impacts of the value chain • Benchmarking with alternative sources • Hand & footprint to compare projects/design ideas • Monetary Valuation • Data-driven (increase robustness and accuracy) • Transferability to other regions/activities (not for all parts of the methodology) 	<ul style="list-style-type: none"> • Data-driven (increase resources such as time, expert skills) • Cause-and-effect chain modelling difficult in ES • Lacking feedback loops in ES • Full integration still needs further development • No user-friendly tool yet

This reflection of the models was discussed with the SAB members to foresee possible future actions. Below are listed some of the comments of the SAB members and their rebuttal:

- The strength of monetization was acknowledged, albeit with the caveat of increased uncertainty attributed to the variety/incompleteness of scientific methods or lack of accurate data.
- The acknowledgement and reporting of error margins proves transparency of the tool as well as the possibility to work on these shortcomings.
- The project's data-driven nature was both a strength and a weakness, offering more accurate results yet requiring significant expertise and time.
- The intention was never to create a fully integrated, user-friendly tool. It could be that such a tool might never materialize due to the need for specific expertise/paid database licenses and software/etc.
- If consultancy agencies would be end-users, they probably already have the database licenses for the LCA's. The developed characterisations factors for terrestrial ES are applicable when using the

Ecoinvent Database. For marine ES this is not as straightforward as every ES needs to be calculated through a different approach, handling different indicators.

- Despite the various scientific challenges, integrating the social dimension may take precedence as the foremost priority following transparency on error margins and robustness of the methods.
- Companies highlighted that the EU is expanding sustainability reporting towards a Double Materiality assessment. These are more complex and comprehensive than Single Materiality assessments as they extend beyond an organization's internal operations to include its influence on society, the environment, and the broader climate agenda. With that in mind, the SUMES –tool could already help companies to report on this.
- The uniqueness of the project was underscored, particularly in the publication of the windmill case. Companies could use these studies and the tool's potential to debunk misinformation, serving as a valuable communication tool.

From the SAB interactions three valorisation pathways were outlined, focusing on scientific refinement, effective communication of uncertainties, and integration of Ecosystem Services into societal discussions. The importance of showcasing the tool's capability and the need for both fundamental research and practical application were highlighted. The project aligns with the Green Deal's reporting requirements, with potential for collaboration through data collection, dissemination efforts, and further research.

The importance of continued collaboration was stressed and new projects proposals with incorporation of SUMES methodology are not only being discussed but also have been submitted. The SAB also underlined the need for further dissemination, emphasizing the significance of the project's approach. The SUMES Website and the video (see 2.3.) are tools that will help visualising SUMES and reaching out to new potential users or project partners.

2.2. Blue session Ecosystem Approach

In 2021, the Blue Cluster published a whitepaper with input from both academics and industry regarding ecosystem services and an ecosystem approach within the blue economy. This came about by entrepreneurs who wanted to commit to sustainability, using the ecosystem approach as an interesting methodology within marine operations in order to consider the impact of their activities on the whole marine environment. However, tools and sufficient data to support this approach were lacking, and the concept of 'ecosystem approach' was not well spread and accredited yet. The Blue cluster has therefore supported companies and knowledge institutions to address these gaps. Since the white paper was launched, three projects (SUMES, MEsP and WABESCO) facilitated by the Blue Cluster have conducted research to deal with this challenge.

On 1 February 2024, the Blue Cluster organised the *Blue Session on Ecosystem Approach* showing a brief overview and current status of these projects (SUMES, MEsP and WABESCO) as well as the development of the Ecosystem Approach awareness in the Blue bioeconomy withing the framework of the European project BlueBioClusters.

This event marked the debut presentation of the three Blue Cluster-supported projects to both the general public and amongst themselves. Aside from the companies already members of the SAB, other stakeholders also attended and got an insight in the possible use of the SUMES methodology and datasets for their activities.

In contrast to SUMES which is a research project led by academia and research institutes, MEsP and WABESCO are carried out by companies. This is reflected in the more data driven approach and more in depth scientific methodology applied to SUMES. MEsP is considered to be a first try out for a user-friendly Ecosystem Approach tool mainly based on spatial data, but as mentioned by their developers, still needs further research

in order to evolve towards a more data driven and ready to use and all-encompassing tool. The MESAT-tool developed within WABESCO is based on the EU taxonomy and is in the process of fine tuning this tool for an application across different marine activities.

The audience response on the SUMES presentation was encouraging because the methodology was found clear and transparent. Some of the results obtained with the SUMES methodology were a bit surprising for the audience, such as the additional positive effect of the OMF when not taking into account the renewable energy it provides. Additionally, nuclear energy (selected benchmark for Belgium) came out more positive than the OWF but the end of life phase could not be taken into account because of lack of data regarding dismantling and treatment of nuclear power plants (if data was available, this may shift the balance to favour the OWF). The results for the multi-use case (OWF with mussel farming) will be compared with nuclear energy-pig farming, but are still in progress. The SUMES methodology is considered a valuable step towards support of decision-making between activities producing similar products and/or the integration of certain activities (multi-use) in the Belgian North Sea as the methodology can give a better insight in the positive or negative effect for those activities and their potential interactions.

After the presentations of the different projects, a panel discussion was held with representatives of the Industry (Marc Huygens, DEME), the financial sector (Iwan Barrez, KBC), Research (Jan Staes, UAntwerpen) and Marine permit administration (Jan Vanaverbeke, KBIN). The focus of the panel discussion was less on the projects themselves, but on where we currently stand with the Ecosystem Approach and how the Ecosystem Approach can become more widely known and accepted within the blue economy. Also internationally the Ecosystem Approach is still an untravelled road and therefore Flanders is pioneering to implement the Ecosystem Approach when assessing the impact of marine activities. Most notable remarks of the panel discussion are given below:

The marine ecosystem is one of the largest with an important function as climate regulator, for which it is very important to enlarge the awareness of the services this ecosystem provides. There is a need to work with the natural processes and not against it as the latter will eventually come at a great cost. Therefore there are, aside the operational, also commercial reasons to act in favour of the marine ecosystem. However, to fully explore this, we need to know more on the impacts of our activities and the necessary mitigation. Sustainability in our marine business activities, supported by the Ecosystem Approach, should be a condition to deploy these activities. If we would need to impose conditions, governments have an important role to play in offering a framework with clear guidelines on the Ecosystem Approach. Especially the need for a proactive vision on the marine landscape and their possible ecosystem services. This could then lead to a framework in which there can be a choice on which blue activities to focus on and avoid a battle between the different blue activities. This can be achieved through applying the Ecosystem Approach within an ambitious marine spatial planning.

A poll held during the Blue Session showed we need all parties involved to take action and responsibility, but suggested slightly that companies could be the drivers of the implementation and that role was not immediately rejected by the companies present at the Blue Session. In contrary, the financial sector notices that companies today are more aware of the problems and their responsibility. In that corporate transition there is an important role for banks and investment organisation as they can help companies in transition to sustainable business as for companies it is challenging to bear the investments. Financial institutions have the self-interest to invest in sustainable and resilient activities to protect their revenue model.

An important note was to not forget the consumers, which could support the transition as most of them will also perform or have a link with an economic activity in which the Ecosystem Approach can be of influence. Therefore there should be more communication towards the general public to sensitize the Ecosystem Approach for their activities and their investments creating awareness to protect their livelihood and their environment.

2.3. SUMES Website and Video

The website <https://sumesproject.be/en> has been developed to provide comprehensive information about the SUMES project (cfr D5.4). Given SUMES' focus on data, a dedicated database has been established, with details accessible through this website. Additionally, the website hosts a wealth of scientific output generated within SUMES, which can be found in the Dissemination section. While brief descriptions (metadata) of non-public deliverables are provided on the website, access to these materials requires a formal request. It is important to note that the website will continue to be operational even after the conclusion of the project, with regular updates planned for ongoing maintenance.

A short video explaining the SUMES methodology was produced with input from all partners and will be used at different events. Not only can it be used as a teaser in thematic conferences, but due to its explanatory nature, it will also be used to broadcast to the general public. For the general public, this will sensitize the Ecosystem Approach to their activities and investments and make them aware of protecting their livelihoods and environment. The video is also available on the SUMES website and the [Youtube channel of Blue Cluster](#).

3. Conclusion

From all the interactions with potential users of the SUMES-tool we can conclude that the Ecosystem Approach is needed and highlights the significant role that SUMES can play in its implementation at different levels. Companies have expressed keen interest in utilizing the tool, not only to assess the impacts of their marine activities but also to integrate the results into their sustainability reports. Furthermore, there is a growing awareness among companies regarding the importance of minimizing negative impacts on the marine environment and maximizing positive contributions, indicating a shift towards prioritizing sustainability in marine business activities.

Governmental bodies are recognized as key stakeholders in promoting sustainability in marine activities, yet they also require access to scientific tools and knowledge to effectively fulfil this role. To address this need, the SUMES consortium is preparing a policy-oriented paper that could serve as a foundation for Belgian and/or European governments to develop specific incentives or regulations based on the Ecosystem Approach.

In terms of further valorisation of SUMES, consultancy agencies emerge as potential partners for the implementation of the tool, as companies tend to outsource sustainability assessments due to its complexity. However, there are identified knowledge gaps within these agencies, highlighting the importance of continued collaboration with the SUMES consortium to address these gaps and ensure effective utilization of the tool.

The Blue Session revealed potential synergies between SUMES and other projects, particularly in combining communication strategies. This integration could not only enhance the implementation of the Ecosystem Approach in Belgium but also holds potential for broader adoption across Europe. By fostering standardization, it can bolster credibility and acceptance among stakeholders who will ultimately utilize the tools and data generated.

Moreover, synergies between economic activities and the marine environment, underscore the interconnected and mutually beneficial relationships that are crucial for ensuring the health and sustainability of marine ecosystems.

Looking ahead, the Blue Cluster remains committed to actively support further development of the Ecosystem Approach. This includes stimulating interactions between different stakeholders and seeking opportunities to implement/advance the SUMES methodology in follow-up projects or for internal/external communication of the sustainability impacts at company level. Business developers active within the

partners' institutes, such as EnerGhentIC at UGent, also fulfill this role of supporting the commercialization of innovative knowledge/models, and are committed to taking the SUMES methodology to the next level by stimulating the development of new projects led by companies.

As a Work Package leader on Ecosystem Approach in the BlueBioCluster-project, the Blue Cluster aims to raise awareness of the Ecosystem Approach within the Blue bioeconomy sector through initiatives such as workshops in participating project regions, enabling a possible way to introduce the methodology to a variety of stakeholders. Additionally, the Blue Cluster serves as a contact for “Ecosystem services and Valorization “ on the BlueBioMatch platform, facilitating the dissemination of information and publications on the Ecosystem Approach and fostering stakeholders interactions.