



Deliverable 6.5

Guide for Use of EA Wheel at Regional Policy Level



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Abstract	<p>The following deliverable discusses the role of the Ecosystem Approach (EA) Ladder in advancing sustainability within the blue bioeconomy. As marine industries face growing environmental and regulatory challenges, the EA provides a structured framework for balancing economic activities with ecosystem protection. The EA Ladder, an evolution of the EA Wheel, incentivises and rewards companies adopting nature-inclusive practices, aligning economic development with conservation goals. This deliverable outlines key initiatives to enhance EA adoption, including policy engagement, stakeholder workshops, awareness tools, and a policy framework. By integrating EA into decision-making, the approach supports ecosystem services, strengthens governance, and fosters sustainable blue growth, ensuring long-term resilience for marine and coastal economies.</p>

Keywords

BlueBioClusters, Blue Bioeconomy, Ecosystem Approach, Policy

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Acronyms

ASC	Aquaculture Stewardship Council
BBC	BlueBioClusters
CBD	Convention on Biological Diversity
CFP	Common Fisheries Policy
CINEA	Climate, Infrastructure and Environment Executive Agency
CSRD	Corporate Sustainability Reporting Directive
EA	Ecosystem Approach
EC	European Commission
ES	Ecosystem services
EU	European Union
EUCC	European Union Cybersecurity Certification
EUMOFA	European Market Observatory for Fisheries and Aquaculture products
FAO	Food and Agriculture Organisation
GEF	Global Environment Facility
HELCOM	Helsinki Commission
IMO	International Maritime Organisation
KPI	Key Performance Indicators
MSC	Marine Stewardship Council
MSFD	Marine Strategy Framework Directive
MSP	Marine Spatial Plans
NGO	Non-governmental organisation
OSPAR	Convention for the Protection of the Marine Environment of the North-East Atlantic
SKAO	Stichting Klimaatvriendelijk Aanbesteden & Ondernemen
TEEB	The Economics of Ecosystems and Biodiversity
UNCLOS	United Nations Convention on the Law of the Sea
UNEP	UNITED NATIONS ENVIRONMENT PROGRAMME
WFD	Water Framework Directive

Executive Summary

The **Ecosystem Approach (EA) Wheel** was conceptualised in 2021 by the Blue Cluster to support emerging blue growth sectors, such as offshore energy (mainly the addition of nature-inclusive design and nature restoration) and aquaculture. This concept, [published in a whitepaper](#), comprises three key elements:

1. A classification framework for marine ecosystems, segmenting them into domains or aspects that can be positively or negatively impacted by economic activities.
2. A five-level performance ladder to measure EA engagement.
3. A posteriori assessment of societal and policy impacts to evaluate the socioeconomic benefits of ecosystem-focused efforts.

Challenges in Development

Despite its promise, the EA Wheel's development encountered hurdles related to policy alignment, the complexities of EU taxonomy, the need for comprehensive data and specific monitoring requirements. These obstacles hindered the project's ability to operationalise the EA Wheel as a practical decision-making tool. In fact, early interactions with project partners revealed that many regional stakeholders were unfamiliar with the EA. The work done for BlueBioClusters [Deliverable 3.2](#) already revealed a limited evidence base for valuation strategies and great variation in methodologies for ecosystem service assessments. Consequently, the project had to shift its focus from immediate implementation to raising awareness about the EA while continuing efforts to develop a functional EA Wheel.

To address these challenges, the Blue Cluster decided to collaborate with Mantis Consulting to advance the **Ecosystem Approach Ladder**, a practical evolution of the EA Wheel. This framework incentivises and rewards companies for adopting nature-inclusive practices, aligning economic growth with environmental stewardship. "Through the setup of a policy process for the Ecosystem Approach, the BBC project developed a tool that policymakers can apply to support EA implementation in their region. The EA Ladder can then serve as a practical framework for encouraging or requiring companies to demonstrate their commitment to ecosystem principles and track their progress toward environmental responsibility.

Key Activities

To enhance awareness and facilitate adoption of the EA, the following initiatives were undertaken:

- **Workshops:** During the initial phase of the project, several partners introduced the EA Wheel to their stakeholders through regional workshops. A local workshop with Belgian stakeholders (Blue Session on Ecosystem Approach, February 2024) explored tools and strategies for advancing the EA in the Blue

Economy. Insights from this workshop informed a subsequent session with project partners in Tartu, Estonia, to guide them in reenacting the process in their local workshops.

- **Conference Engagement:** A poster presentation, “Can blue bio production be stimulated by the use of ecosystem approach?” at the World Aquaculture Society Congress “Aqua 2024” (Annex 1), highlighted the benefits and challenges of implementing the EA for Blue bioeconomy.
- **Policy Maker Survey:** A survey targeted policymakers across Europe, from city level to national levels, to assess the integration of the EA into existing policies.
- **Policy Framework Design:** Based on desk studies and stakeholder input (survey results, workshop conclusions, conference interactions...), a circular, iterative **Ecosystem Approach Policy Process Concept** was developed as a guidance tool for policymakers.
- **Webinar:** A dedicated webinar highlighted how the EA can support the development of the blue bioeconomy and how it will play a pivotal role in enhancing regional policymaking and driving sustainable development. This webinar, especially oriented to policymakers, discussed the EA policy process concept and the EA Ladder.
- **Policy Brief:** The policy brief “The further development of sustainable blue bioeconomy through Ecosystem Approach” (Annex 2) concerning EA’s benefits for blue bioeconomy was produced to be sent out to policymakers and made available in different communication channels.
- **Online Awareness Tools:** The BlueBioClusters website (<https://bluebioclusters.eu/ecosystem-approach-tool/>) and the BlueBioMatch platform will feature an **online awareness tool** for policymakers outlining actionable steps to implement the EA. Section 3 of this deliverable explains these steps and discusses how challenges in EA policy and implementation can be effectively addressed and how emerging opportunities can be leveraged. The website and support for continuous awareness creation will continue even when the BBC project ends.

This project has given direction for integrating the EA into regional policies and strengthening blue bioeconomy initiatives. Through targeted awareness campaigns, hands-on tools like the EA Ladder, and direct engagement with policymakers, it aims to ensure the EA's lasting adoption beyond the project's duration.

Introduction

The European Sea regions hold strong potential for developing a sustainable Blue Bioeconomy, yet rising environmental pressures and fragmented governance structures create challenges for long-term ecosystem resilience. To achieve both economic and ecological goals, regions need coordinated policy frameworks that align innovation, marine spatial planning, and sustainable resource management.

The Ecosystem Approach (EA) could provide a framework to guide this transition, helping policymakers assess and balance environmental impacts, economic benefits, and social outcomes. Integrating ecosystem services into regional decision-making not only safeguards biodiversity but also strengthens local economies through nature-based and resource-efficient solutions.

This document explores how the EA can be applied at regional or national levels to structure policymaking around continuous improvement, stakeholder engagement, and measurable outcomes. It provides, through the EA policy process, a tool for designing governance systems that support companies in adopting the EA, ensuring that Blue Bioeconomy activities contribute to a more resilient, nature-inclusive, and economically viable regional development. The Ecosystem Approach Ladder described in this deliverable could be an adequate tool for applying the EA in regional policy, as it aims to incentivize and reward companies that effectively integrate nature-inclusive and ecosystem-positive practices into their business activities

As this document focuses on how policymakers can implement the Ecosystem Approach (EA), the BlueBioClusters project also produced a handbook (Deliverable D3.3) aimed at supporting companies in doing the same¹. D3.3 explores the current state of EA implementation in business, emphasizing the role of available tools such as ecosystem service assessment methods and the EA Ladder. Both documents begin with a shared introductory chapter that establishes a common understanding of the Ecosystem Approach, ensuring that companies and policymakers speak the same language when interacting and collaborating on EA-related efforts. Our interactions across the different regions showed that even the terminology surrounding the Ecosystem Approach can be a complex challenge for stakeholders.

¹ Retrievable from: <https://bluebioclusters.eu/outcomes/>

1. The Ecosystem Approach

The Ecosystem Approach is defined by the Convention on Biological Diversity (CBD) as “A strategy for the integrated management of land, water, and living resources that promotes conservation and sustainable use in an equitable way.” (decision V/6 of the Conference of the Parties to the CBD, 2000). It was introduced to balance the objectives of the CBD: conservation, sustainable use, and the fair and equitable sharing of benefits arising from the utilisation of genetic resources. The EA recognises the complex interrelationships within ecosystems and aims to maintain their health, productivity, and resilience. Rather than adopting a narrow focus on a single species or environmental concern, EA emphasises a holistic view of the entire ecosystem that includes human impacts and the interconnections among various ecosystem components (Smith and Maltby, 2003; Hassler et al., 2013). Centred initially on minimising human impact, the approach has evolved to incorporate regenerative practices that actively restore and enhance natural ecosystems and benefits provided by ecosystem services, with the understanding that economic activities can also positively impact nature (FAO, 2021).

Implementing an EA requires balancing positive and negative impacts, valuing ecosystem services beyond immediate economic gains, and learning how to handle the complexity of cumulative impacts. In essence, the EA tries to find a balance between ecological well-being and human well-being, ensuring that development sustains the natural resources upon which it depends without overprotecting resources to the point of hindering necessary economic growth. To achieve this balance, good governance is essential (Figure 1).



Figure 1. Main components of the EA (FAO, 2021)

Ecological well-being comprises many aspects. For aquatic systems, for example, this involves supporting biodiversity for ecosystem resilience, maintaining healthy habitats and food webs for maximising goods and services, and keeping critical ocean and coastal areas stable and functional. **Human well-being**, in turn, reflects the quality of life directly or indirectly tied to ecosystem health, encompassing material

living standards (income, food and wealth), health, education, social connections, governance, economic security, safety, etc. **Good governance** involves effective institutions and policies that ensure sustainable stewardship of ecosystems, with collaboration between individuals, organisations, communities and societies fostering resilience for present and future generations (FAO, 2021).

The EA is not a substitution for sectoral management but aims to integrate management across different interests within a sector and across sectors while accounting for externalities such as climate change.

1.2 EA and the Blue Bioeconomy

1.2.1 Ecosystem Services for Blue Bioeconomy

Ecosystem services (ES) are an important part of the EA and provide a wide array of benefits to humans, which are essential for human survival, well-being, and economic activities. They are typically classified into four categories:








































1. **Provisioning Services:** Tangible products derived from ecosystems, such as food, water, timber, and medicinal resources.
2. **Regulating Services:** Natural processes like climate regulation, water purification, and flood control that help sustain stable environmental conditions.
3. **Cultural Services:** Non-material benefits, including recreation, aesthetic inspiration, educational opportunities, and cultural heritage values.
4. **Supporting Services:** These are foundational processes, such as soil formation and nutrient cycling, that underpin the other ecosystem services.

Living aquatic resources deliver a wide variety of products, processes and services.

Table 1 provides a summary of ES relevant to the Blue Bioeconomy biomass value chains linked to the North and Baltic Sea regions, generated by deliverable 3.2 of the BBC project. Historically, services the ecosystem provides have been undervalued in policy and decision-making, as the focus has often been limited to market-traded goods and services (e.g., harvest yields), ignoring the indirect but potentially extensive benefits. This trend is now shifting towards the recognition that ES are key to sustainable development and conservation efforts. The economic valuation of ES is increasingly considered essential to capture their non-market contributions.

This is especially relevant for the Blue Bioeconomy, where certain activities can enhance several non-provisioning ES, including water filtration, coastal protection, and carbon storage. By recognising and assigning economic value to these services, such as through carbon, biodiversity, and nutrient credits, companies can generate additional revenue streams, providing incentives to adopt a wider EA (de Groot et al., 2012; Gowdy et al., 2010).

Table 1. List of ecosystem services provided by the Blue Bioeconomy from the BBC biomass value chains identified in the BBC project (Billing et al., 2024).

Ecosystem Services	BBC value chain					
	Bivalves	Crustaceans	Fish	Macroalgae	Marine bacteria	Microalgae
Provisioning						
Food						
Raw materials						
Medicinal resources						
Regulating						
Water filtration and nutrient assimilation						
Coastal protection						
Carbon sequestration and storage						
Biochemical cycling						
Biological control						
Supporting						
Habitat protection and maintenance						
Maintenance of genetic diversity						
Sediment creation						
Water cycling						
Oxygen production						
Cultural						
Recreational activities and mental and physical health						
Tourism and ecotourism						
Sense of place and spiritual connection						
Aesthetic and spiritual appreciation and inspiration for culture, art, and design						

Despite its potential, integrating ES into the blue bioeconomy faces several challenges. Although the concept of ES has gained traction within research and development, there is still minimal awareness in the business sector. Many companies do not recognise or evaluate ecosystem services within their operations, resulting in missed opportunities to integrate sustainable practices that could benefit both the environment and the economic sustainability of their activities. This limited awareness hinders the implementation of ES assessments and the integration of ES into business activities, often causing it to be overlooked in cost-benefit analyses and corporate decision-making. In this way, companies may disregard practices that could support ES, such as habitat restoration or sustainable aquaculture, simply because the potential economic or ecological benefits are not fully understood or quantified (EC, 2020; EUMOFA, 2022).

Additionally, several knowledge gaps linked to the potential ES are relevant to the Blue Bioeconomy (Table 2). These knowledge gaps and the lack of valuation tools, however, should not prevent the adoption of the EA, as companies can still benefit from integrating ES considerations, even with incomplete valuation methods.

Another challenge is the limited presence of market mechanisms, such as carbon, biodiversity, or nutrient credits, that reward companies for supporting ecosystem services. Without established payment systems, companies have little financial motivation to invest in practices that enhance ES (GEF, 2023). Additionally, while some companies may assess their impact on ecosystem services, there is little evidence that these assessments have led to substantial behavioural changes, further underscoring the need for policies and incentives to encourage tangible commitments to ES stewardship (Billing et al., 2024).

To address these challenges and scale the benefits provided by Blue Bioeconomy activities, economic incentives and supportive frameworks are needed to encourage companies across sectors to adopt the EA and provide guidance on actions that can be taken despite existing knowledge gaps. For instance, non-bioeconomy industries, like offshore wind, could incorporate blue bioactivities (e.g., oyster or seaweed farming) to boost biodiversity and water quality in their operational zones. The Horizon Europe project [ULTFARMS](#) has pilots on the combinations of Low-Trophic Aquaculture in Offshore wind farms. Government-backed incentives, tender opportunities, and regulatory support can motivate these sectors to invest in sustainable practices, thereby integrating blue bioactivities into broader economic activities for mutual ecological and economic gain.

Table 2. Knowledge gaps on ecosystem services were identified as relevant to the BBC value chains and obtained through an online survey (Billing et al., 2024).

Blue Bioeconomy knowledge gaps
Biosecurity of seeded lines/spat/inoculum/smolt
Assessment of services/processes
Impacts on local environment
Interactions between introduced/wild-caught species and biodiversity
Influence of climate change on food webs and habitats
Patterns of marine sediment carbon formation and stock
Stakeholder involvement and participation
Valuation of nature-based tourism, recreation, spiritual interactions
Linking cultural ecosystem services of the value chain to human wellbeing
Valuation strategies for specific products
Integration of valuation approaches/strategies
Heavy metal analysis for certain species for food
Life-cycle analysis of the value chain

1.2.2 EA for the Blue Bioeconomy

Companies can implement an EA to address some of the challenges surrounding ES in the blue bioeconomy, while others can be handled through effective EA policy. In this section, we will elaborate on what the EA comprises for the blue bioeconomy and what the potential benefits can entail. Afterwards, we will provide more insights into how policy can support companies in adopting an EA.

The FAO (2021) defines three principles for the EA for aquaculture management that can be generalised for the Blue Bioeconomy:

- **Principle 1:** Blue Bioeconomy activities should be developed in the context of ecosystem functions and services with no degradation of these beyond their resilience capacity.
- **Principle 2:** Blue Bioeconomy activities should improve human well-being and equity for all relevant stakeholders.
- **Principle 3:** Blue Bioeconomy activities should be developed in the context of other sectors, policies and goals.

The first two principles highlight the balance between ecological and human well-being, while the third emphasises the need for cross-sector collaboration and synergy. In addition to these principles, active stakeholder participation and integration are

essential elements of the EA, as it does not offer direct solutions but rather aids stakeholders in identifying them.

An EA builds upon conventional management elements but enhances them through systems thinking and inclusive stakeholder participation. Traditional management tends to follow a top-down structure, usually focusing only on production as its primary objective. Decision-making is often limited to a single sector or on the scale of a single organisation (e.g. farm scale for aquaculture). This approach typically operates at a local or individual scale, uses prescriptive management tactics, and relies solely on scientific knowledge (FAO, 2024).

In contrast, the EA emphasises participation, encouraging collaboration with a wide range of stakeholders. Rather than pursuing a single objective, EA integrates multiple goals, such as biodiversity preservation, ecosystem health, and human well-being. It operates at multiple scales, from local sites to regional ecosystems, and encourages adaptive management, allowing for adjustments as new information becomes available. The EA also values diverse sources of knowledge, including traditional and community-based insights, moving away from rigid, prescriptive methods toward incentive-based management that motivates sustainable practices. The emphasis shifts from a primarily corporate focus to one that is transparent and publicly accountable, benefiting the broader community and environment (Hassler et al., 2013; FAO, 2024).

1.2.3 Benefits of EA for the Blue Economy

The EA offers substantial benefits to the Blue Bioeconomy by supporting sustainable and balanced resource management. EA facilitates trade-offs necessary to maintain both human and ecological well-being, allowing the integration of diverse stakeholder priorities while balancing production goals with the conservation of biodiversity and habitat protection. This approach enhances collaboration, enabling the Blue Bioeconomy to address resource-use conflicts and coordinate across different sectors (fisheries, aquaculture, coastal development, etc.).

EA's adaptability allows it to be applied even in data-limited situations, supporting more resilient and efficient resource planning. Adopting an adaptive management approach enables the Blue Bioeconomy to address long-term challenges, such as climate change, with the flexibility to adjust practices in response to environmental changes.

EA also prioritises increased equity and transparency, encouraging fair access to aquatic resources and recognising cultural values tied to marine ecosystems. It strengthens political and financial support for Blue Bioeconomy initiatives, often unlocking new funding streams and fostering active participation among stakeholders, including local communities, policymakers, and financial donors. Finally, the EA helps Blue Bioeconomy activities to promote multifunctionality, as aquatic ecosystems can serve numerous purposes, such as food production, waste reuse, and habitat

provision, resulting in a more efficient, holistic use of marine resources for both human and environmental benefit.

In addition to these overarching advantages, adopting an EA can benefit individual Blue Bioeconomy producers directly. By identifying and addressing threats from climate change and local environmental factors, producers can implement targeted measures to enhance resilience against future challenges. Simultaneously, reducing their own environmental impact helps mitigate their contribution to these changes. The greatest direct advantage, however, arises when producers positively influence the environment. Supportive economic frameworks, such as credit systems, certification programs, or subsidies, can reward these beneficial impacts, creating incentives for sustainable practices while improving economic returns.

2. The link between the Ecosystem Approach and Policy

2.1 The Potential Role of Policy within EA for the Blue Bioeconomy

To assist Blue Bioeconomy companies in adopting an EA and addressing the challenges of its implementation (discussed in section 1.2.1), governments can implement policies and provide incentives and frameworks that encourage sustainable practices. Below, we provide several examples of how governments and policymakers can support business.

2.1.1 Regulatory Frameworks and Standards

Governments can establish mandatory regulations that require industries to assess and mitigate their environmental impact, facilitating a responsible approach to ecosystem management. Standardised protocols for ES assessments can ensure consistent implementation, measurement, and reporting, helping industries to integrate EA in measurable ways. Note, however, that such protocols should also be adaptable to improved data and new insights.

2.1.2 Economic Incentives, Subsidies, and Market Mechanisms

Financial incentives, such as tax breaks, subsidies, or grants, can encourage companies to adopt EA practices, particularly those that invest in sustainable activities that enhance ES. Payment systems for ES, like carbon, biodiversity, or nutrient credits, further incentivise companies by creating revenue streams for environmentally positive actions. Additionally, certification schemes can recognise EA-compliant companies, increasing consumer demand for products from environmentally responsible sources.

Additionally, policy measures can support the review and gradual elimination of harmful incentives that promote non-sustainable activities, replacing them with policies that align with ecological goals.

2.1.3 Research and Development Support

Public funding for research into ES valuation tools and methodologies helps industries quantify and report their environmental contributions effectively. Partnerships between companies and research institutions can also boost innovation, promoting new technologies and practices that enhance sustainability.

2.1.4 Capacity Building and Education

Training programs and resources equip companies with the knowledge and skills needed to implement EA. Public awareness campaigns can raise the industry and general public's understanding of ES and their value, fostering a supportive environment for sustainable development. Additionally, this can generate consumer and stakeholder demand for EA-aligned practices.

2.1.5 Public-Private Partnerships

Partnerships between industries, government, and conservation organisations can facilitate the co-development of EA practices. These collaborations also allow for integrated solutions, such as using aquaculture for carbon sequestration alongside offshore energy projects, creating shared benefits across sectors.

2.1.6 Long-term Monitoring and Evaluation

Long-term monitoring systems can provide regular evaluations to track industry progress and ensure compliance. Adaptive management policies allow these regulations to evolve in response to environmental data and advancements within the industry, ensuring that EA practices remain effective over time.

2.2 Current Status of EA Policy

Over recent decades, sustainability has gained increasing attention, leading to the establishment of sustainability-related legislation at international, EU, and national levels. These laws and frameworks aim to promote sustainable practices, particularly in marine environments like the North and Baltic Seas and are crucial for advancing the Blue Bioeconomy. Key international and EU sustainability legislation includes:

- **Marine Strategy Framework Directive (MSFD):** Focuses on achieving Good Environmental Status (GES) in EU waters by adopting ecosystem-based management.
- **Common Fisheries Policy (CFP):** Regulates fisheries to prevent overexploitation and ensure sustainable fish stocks.
- **European Green Deal:** Aims to make Europe climate-neutral by 2050, integrating sustainability into all sectors, including marine industries.
- **Water Framework Directive (WFD):** Addresses water quality, impacting both marine and freshwater ecosystems.
- **EU Regulation on Organic Aquaculture:** Governs organic standards for aquaculture production.
- **United Nations Convention on the Law of the Sea (UNCLOS):** Provides the legal framework for marine resource use and conservation.
- **Convention on Biological Diversity (CBD):** Aims to conserve biodiversity, use resources sustainably, and share benefits equitably.
- **Paris Agreement:** Commits nations to limit global warming through emission reductions, with implications for marine and coastal activities.
- **International Maritime Organisation (IMO) MARPOL Convention:** Addresses pollution from ships to protect marine environments.
- **OSPAR Convention:** Focuses on protecting and conserving the North-East Atlantic, including the North Sea.

- **Nature restoration law:** The law initiates a continuous recovery of nature across the EU's land and sea, supporting sustainable economic development, agriculture, and renewable energy growth.

While these frameworks enforce sustainability practices, their rigidity can sometimes stifle innovation. For example, under EU organic legislation, circular systems like aquaponics and vertical farming cannot currently be classified as "organic."

Policy, as a more flexible instrument, complements legislation by identifying opportunities for sustainability and economic growth in alignment with environmental goals and can be adapted to upcoming technologies and innovation. Together with EU legislation, high-level policies, including the EU Blue Growth Strategy, the FAO Code of Conduct for Responsible Fisheries, the EU Biodiversity Strategy for 2030, and the EU Climate Adaptation Strategy, have been translated into national strategies and management plans to promote sustainable practices and identify priorities. Examples of national and regional policies reflecting sustainability goals within the Blue Bioeconomy can be found in Table 3.

Table 3. Examples of national and regional sustainability policies of North and Baltic Sea countries with implications towards the blue bioeconomy.

Policy	Country/region	Objective
Marine Spatial Plans (MSP)	EU countries	Used by EU member states to organise maritime space for multiple uses while protecting ecosystems.
North Sea 2030 Agenda	The Netherlands	Balances marine conservation and sustainable economic activities.
Aquaculture Development Plan	Denmark	Promotes low-impact aquaculture systems and nutrient recycling.
National Bioeconomy Strategy	Germany	Supports bio-based innovations, including marine resources.
Bioeconomy Strategy and Integrated Ocean Management Plans	Norway	Aligns resource use with ecosystem preservation.
National Strategy for Sustainable Aquaculture	Sweden	Aims to triple production sustainably.
Blue Economy Vision	Scotland	Emphasises low-impact marine industries.
Blue Economy Roadmap	France	Advances in decarbonisation and marine bio-based technologies.

Roadmap for Circular Economy	Estonia	Implement transition towards a more sustainable and resource-efficient economy
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Although sustainability is firmly integrated into national policies, the explicit adoption of the EA remains limited. At the same time, the EA is embedded in various EU frameworks and legislation—such as the Marine Strategy Framework Directive (MSFD), the Maritime Spatial Planning (MSP) Directive, and the OSPAR and HELCOM Conventions—few national or regional policies directly reference or centre on an EA. Notable exceptions include Norway's Integrated Ocean Management Plan (Norwegian Ministry of Fisheries and Coastal Affairs, 2013) and Scotland's National Marine Plan (Scottish Government, 2015). The latter particularly emphasises EA principles and integrates several of its core elements.

When looking at economic incentives, several mechanisms are already in place, but their development in marine environments is lagging. Existing payment systems like credit markets are predominantly terrestrial and focused mainly on carbon. While marine-based credits are under investigation in some regions, comprehensive systems have yet to be established. Efforts are beginning to explore nutrient and biodiversity credits in the marine sector. For example, Sweden is looking into the concept of nutrient credits in aquaculture to mitigate eutrophication, creating potential revenue streams for seaweed and mussel farms that absorb excess nutrients (Gustavsson and Boström, 2018; Interreg Baltic Sea Region, n.d.). Similarly, Finland and Denmark have introduced small-scale subsidies for mussel farming as a nitrogen removal tool (Food Nation Denmark, n.d.; EUCC, 2019).

Certification systems like the Marine Stewardship Council (MSC) provide economic and reputational benefits for Blue Bioeconomy companies, but often remain siloed in single sectors. Emerging initiatives, like the Dutch initiative “Aquaculture Stewardship Council (ASC)”, aim to expand such certification to other industries (ASC, n.d.). Despite their potential, these programs are in the early stages and require further development to achieve scalability and robust enforcement. It is essential to prevent issues like greenwashing or malpractice in certification to maintain credibility and trust.

To better understand the awareness and integration of the EA in policies within the North Sea and Baltic regions, an inquiry (Annex 3) was distributed to policymakers active on different policy levels, ranging from cities to the national scale (see Table 4 for an overview of questions and responses). Despite having a limited number of respondents (10), several Blue Bioeconomy sectors were represented, including both harvesting and farming activities, but with a strong focus on species that have the most significant market shares (fish, bivalves, and macroalgae). While the findings cannot be generalised due to the restricted number of respondents, they provide some valuable insights into the current state of EA incorporation in regional policies. These insights were also presented and discussed in the webinar organised by BlueBioClusters (Figure 2) on how the EA can support the development of the blue

bioeconomy and how it will play a pivotal role in enhancing regional policymaking and driving sustainable development.



Figure 2. Invitation to the Webinar on EA for policy (50 registrations)

According to respondents of the inquiry, several elements of sustainability and EA are often included in policy frameworks. Most respondents indicated that policies usually address the three pillars of sustainability—environmental, social, and economic considerations—and emphasise stakeholder engagement during the policy development process. There also tends to be alignment of policies with high-level international frameworks such as the Marine Strategy Framework Directive and the EU Green Deal, as well as coordination between national and regional authorities. Additionally, respondents demonstrated an understanding of the concept of ES and their benefits.

However, the integration of certain critical aspects of EA appears less consistent or fully realised. Policies sometimes lack clear and measurable sustainability goals, which are essential for tracking progress and evaluating success. Moreover, the inclusion of ES in regional planning and development projects remains limited despite the established awareness and understanding of ES benefits, signalling a gap in applying EA comprehensively. Collaboration between industry and government to implement EA also seems inadequate, with no or limited structured mechanisms evident in many cases.





Similar results were obtained for the questions specifically related to the Blue Bioeconomy. While some regions consult actors from the Blue Bioeconomy sectors

for environmental decision-making, the extent of their involvement varies, and often, their engagement is unclear. Respondents were uncertain or unaware of structured frameworks for assessing long-term sustainability in the Blue Bioeconomy industries. Furthermore, the adaptation or development of regulations to promote sustainable practices in these industries is seen as largely ambiguous, leaving significant room for improvement in aligning Blue Bioeconomic activities with EA principles.

These findings underline the need for more consistent integration of EA principles into policy, particularly in the context of the Blue Bioeconomy. Strengthening collaboration between stakeholders, developing clear sustainability goals, and embedding ES more deeply into planning and regulatory frameworks are essential steps toward enhancing sustainability in the North Sea and Baltic regions.

Table 4. Overview of the questions and results of the questionnaire on EA awareness. The values of the coloured bars indicate the number of responses obtained for each possible answer (Yes, Not sure, No).

Question	Yes	Not sure	No
Are policies in your region developed with due consideration for environmental, social, and economic impacts?	7	2	1
Is the Blue Bio sector (e.g. aquaculture, fisheries & processing) in your region consulted when decisions are made that affect the environment?	5	5	0
Does your region have a structured framework to assess long-term sustainability in regional development of Blue Bio producers?	4	4	2
Does your region engage relevant stakeholders (e.g. local businesses, citizens, NGOs & researchers) in policy development and decision-making processes?	8	0	2
Does your region have clear, measurable sustainability goals (e.g. carbon neutrality, resource conservation & biodiversity protection)?	4	6	0
Are your policies aligned with national or international sustainability frameworks (e.g. EU Green Deal & UN Sustainable Development Goals)?	7	3	0
Do you understand the concept of ecosystem services and how they benefit your region (e.g. food provisioning, water filtration and nutrient assimilation & carbon sequestration)?	9	0	1

Are ecosystem services explicitly considered in your regional economic planning and development projects?	
Has your region developed or adapted regulations to encourage sustainable practices in Blue Bio industries?	
Do you coordinate with national and regional authorities to align policies and avoid conflicts between environmental and economic priorities?	
Are there mechanisms for industries in your region to collaborate with the government on sustainability initiatives (e.g. incentives for green practices)?	

Besides obtaining a notion of policymakers' awareness of EA and the current level of EA integration in policy, the questionnaire also sought to understand whether respondents perceived their regional or national policies as applying EA for Blue Bio activities. The majority indicated that they did not believe EA was being implemented. However, responses to follow-up questions revealed significant insights into attitudes, requirements, and challenges surrounding EA integration.

Respondents identified the primary motivations for adopting an EA framework as ensuring a sustainable future and stimulating regional economic development. The main requirement for effective implementation was collaboration among key stakeholders, particularly governmental organisations and representatives from specific Blue Bio sectors. Local community leaders and university branches specialising in marine technologies were also highlighted as potentially important partners in driving EA initiatives.

Several critical actions were noted as necessary for advancing EA implementation. These included establishing clear guidelines for measuring impacts, developing robust legal frameworks, providing financial and policy support across scales (from EU to national levels), and fostering structured methodologies for application.

Respondents mainly pointed to economic incentives to encourage EA practices within companies, but also mentioned obligatory measures and criteria embedded in concession agreements. The main challenges hampering EA implementation included the inherent complexity of EA, a lack of understanding or knowledge of EA, insufficient support from economic actors, unpreparedness within certain sectors, gaps in supportive tools and methodologies, weak public interest, and the absence of relevant legislation.

2.3 Opportunities for EA Policy in the Regional Blue Bioeconomy

Insights into the role of policy in supporting EA implementation (see Section 2.1), along with findings from the questionnaire on EA awareness and the current state of policy implementation in the Blue Bioeconomy (see Section 2.2), highlight significant opportunities to enhance the integration of the EA into regional and national Blue Bioeconomy policies. The following sections present two examples that illustrate how challenges in EA policy and implementation can be effectively addressed and how emerging opportunities can be leveraged. The first example outlines an iterative step-by-step policy process for establishing a regional Blue Bioeconomy policy and support framework. The second example focuses on one aspect of this process – the incentive program – and illustrates how tools like the EA Performance Ladder can encourage companies to adopt EA practices. The EA Ladder can serve as the guiding framework for steps 4 and 5 of the policy process. The main benefits of applying the EA Ladder for regional policymakers, as detailed in Section 3.2, are summarised below.

- Policy alignment with regional, national, and EU sustainability goals.
- Monitoring framework to track company and regional progress over time.
- Economic incentives rewarding nature-positive business performance.
- Low entry barriers encouraging SME participation and gradual learning.
- Collaboration tool strengthening public–private partnerships and innovation.

2.4 EA Policy Process Concept

A conceptualised policy process (Figure 3) is proposed to guide policymakers. This process is designed as a circular framework that can be iteratively refined to enhance the effectiveness of EA plans over time. It consists of five main steps, preceded by a preparation phase.

2.4.1 Preparation Phase

The preparation phase is critical for structuring the subsequent stages of the policy process. Its purpose is to establish an organisational foundation that includes setting clear targets for EA policy, creating an initial work plan, and forming a stakeholder group to provide support and ensure active participation. This phase is intended to align stakeholders, clarify the scope of the process, and build the necessary basis for collaboration and planning.

Once there is sufficient stakeholder engagement and agreement on the scope, the EA policy process can commence. Importantly, a lack of complete data or information should not prevent or delay the process. In such cases, the precautionary approach, which emphasises taking preventive measures to avoid harm even in the face of scientific uncertainty, can be employed instead.

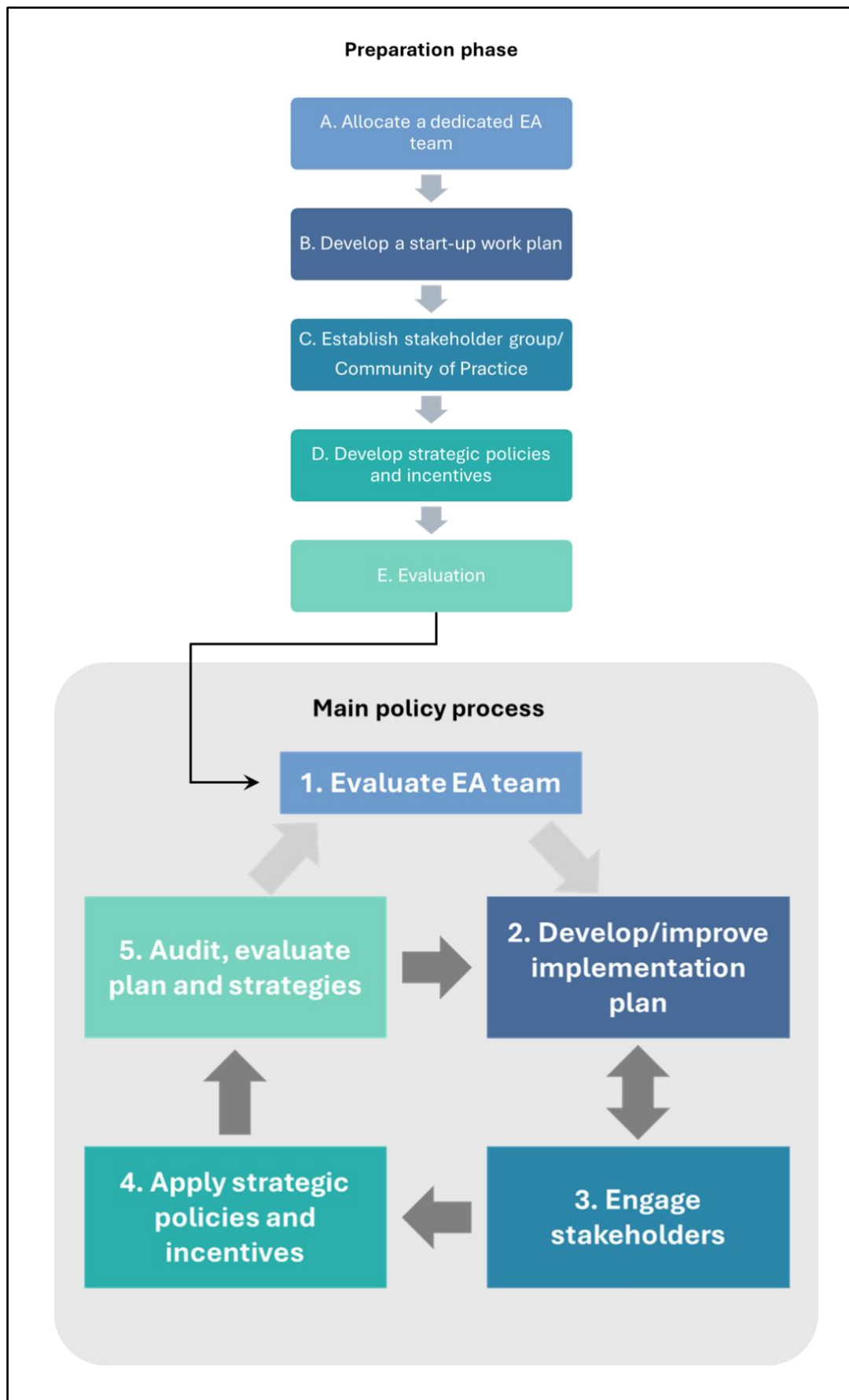


Figure 3. Schematic of the EA policy process concept.

A. Allocate a Dedicated EA Team

The team should be established through a promoting organisation closely linked to the Blue Bioeconomy sectors; this can be a government agency but also a blue economy cluster, aquaculture network, or regional North Sea/Baltic Sea-focused organisation.

To address the complexity of EA effectively, a combination of expertise, knowledge, and skills is required:

- Expertise in ecology and sustainability, encompassing both environmental and socio-economic dimensions.
- Knowledge of policy and legal frameworks to navigate governance systems and regulatory landscapes.
- Skills in communication and stakeholder management to foster collaboration and resolve potential stakeholder conflicts.

To ensure successful EA implementation and minimise any risks of conflict, the team should prioritise fair representation of all stakeholder groups, maintain a clear two-way communication and establish a transparent and fair decision-making environment.

B. Develop a Start-up Work Plan

The start-up work plan establishes the foundation for the EA policy process and outlines the strategic direction for achieving its goals. Within this plan, the following aspects need to be identified:

- EA policy scope: determine if the focus will be at the regional or national level, which specific sectors are targeted, etc.
- Alignment with national or regional sustainable development plans, providing a baseline for developing and refining a policy framework.
- Potential strategies for rolling out EA, considering how best to integrate the approach within existing governance structures and sectoral priorities.
- Relevant stakeholders to consult in the policy creation process.
- Allocation of responsibilities within the EA team for clarity of roles and accountability for specific tasks.
- Budget required for the policy process, potential support mechanisms for business in EA implementation, and potential funding opportunities to sustain these efforts.
- Timeline for the preparation phase and first iteration of the policy process specifies when the EA policy is expected to be in place.

C. Establish a Stakeholder Group or Community of Practice

Support from stakeholders can be a decisive element for the success or failure of an EA. To ensure robust stakeholder engagement, representatives from Blue Bioeconomy sectors should be included. Additionally, other sectors that interact with or influence the Blue Bioeconomy or stand to benefit from synergies with Blue Bioeconomy activities should be engaged (e.g. agriculture, land management,

environmental and water agencies, energy, tourism, transport, etc.). The size of the stakeholder group should be determined by balancing the need for sufficient representation with a manageable number of participants. Priority should be given to representatives of blue bio businesses, government officers at various levels, NGOs, research groups, and inspection agencies.

Among all stakeholders, government agencies play an essential role in ensuring coordination and cooperation. Blue Bioeconomy institutions and government bodies at all levels need to be informed and involved from the outset to harmonise policies and objectives across governance levels. Their involvement provides institutional support, facilitates collaboration among ministries and departments, and ensures synergies are developed. Early and consistent governmental engagement ensures that complementary goals and overlapping issues can be addressed collaboratively, sharing resources where possible. A review of the existing legal basis for EA can also be conducted with government cooperation to identify supportive or conflicting policies. Ideally, the process should operate within a legislative or policy mandate, although the absence of such should not delay the start of EA efforts.

To streamline decision-making and maintain focus, a subgroup consisting of key stakeholders can be established. This group ensures active participation and representation, empowering and handing proportional accountability to community members. Its roles include fostering dialogue, identifying problems and opportunities in stakeholder engagement, assisting in decision-making, and disseminating information.

The process of engaging stakeholders begins with the formal introduction of EA, which can be effectively implemented through Communities of Practice (CoP). Building relationships and raising awareness are essential initial steps. Activities such as courtesy calls, formal meetings, and public awareness campaigns lay the groundwork for collaboration. These efforts should focus on presenting the EA framework, answering questions, fostering rapport, organising training sessions, collecting baseline data, and obtaining necessary approvals from local leaders and government officials. This approach not only familiarises stakeholders with the EA process but also builds a cooperative foundation for its successful implementation.

D. Develop Strategic Policies and Incentives

To advance EA within a region, strategic policies and incentives must be developed to create opportunities, establish frameworks, and encourage participation from businesses and other stakeholders. This begins by identifying opportunities for EA implementation for the region and sectors within the scope identified in step A, emphasising areas or sectors where its application could yield significant benefits.

Guidelines should be developed for government agencies at various levels to ensure cooperation. These guidelines can help achieve efficient coordination between sectors and provide actionable advice for implementing EA in other contexts. Additionally, this guidance can be shared with other regions interested in

implementing an EA. Guidelines should also be provided for businesses to clarify how they can align their operations with EA principles.

Establishing an EA framework is essential to formalising engagement with businesses and monitoring the approach's effectiveness. This framework should outline measurable goals, provide tools for assessing implementation, and encourage businesses to adopt EA principles. A crucial component of the framework is the incorporation of economic incentives for businesses. Coupling financial motivators with the EA framework ensures both accountability and interest in participation.

Finally, a support programme should be developed for EA pilot projects. Pilot projects play an important role in demonstrating EA's potential benefits. However, early adoption of EA can be risky. A support programme offers financial and technical assistance to reduce these risks. Targeted pilot initiatives should aim to showcase the immediate economic advantages of EA implementation while emphasising long-term sustainability outcomes. Through tangible successes, pilot projects can build trust among stakeholders and inspire market leaders to pioneer EA implementation, leading to a more widespread adoption of EA.

E. Evaluation

The final step of the preparation phase consists of an evaluation step to ensure that the proposed strategy and process align with environmental, societal, and economic goals. This step serves as a checkpoint to confirm that the envisioned policies will yield beneficial effects while minimising potential adverse impacts. Key questions to guide this evaluation include:

- Are adverse environmental impacts mitigated, and does the strategy avoid introducing new negative effects?
- Are beneficial environmental impacts identified, enhanced, and valorised effectively?
- Does the policy provide clear economic incentives for Blue Bioeconomy companies?
- Are economic returns for other sectors safeguarded and not compromised by the proposed strategy?
- Are social aspects, such as employment opportunities, sufficiently considered? If potential threats exist, are they adequately addressed?

If these criteria are not met, the strategy or planning process must be revisited and adjusted to fulfil these requirements. Ensuring this alignment from the outset is crucial for the long-term success of the policy process.

The choice of evaluation methods depends on available budgets, tools, and resources. Various approaches can be employed, including:

- **Future Projections:** Scenario-building to anticipate potential outcomes of the policy.

- **Modelling:** Utilising computational tools to simulate the effects of policy on the environment, economy, and society.
- **Expert Validation:** Consulting with a group of experts to assess the feasibility and alignment of the strategy with overarching goals.

2.4.2 Policy Process

Building on the preparation phase, the policy process itself comprises five iterative steps. This process focuses on the actual implementation of policies and the continual improvement of plans and strategies.

2.4.2.1 Evaluate EA team (optional)

This step should only be undertaken if there is a recognised need to assess and potentially update the composition or capabilities of the EA team. The goal is to ensure that the team possesses the necessary expertise, knowledge, and skills to implement and guide EA policies effectively.

Regularly revisiting the composition and competencies of the EA team ensures that it is well-equipped to address emerging challenges and capitalise on new opportunities within the Blue Bioeconomy.

2.4.2.2 Develop or Improve the Implementation Plan

This step involves creating or refining an EA implementation plan to align with evolving conditions, objectives, and available resources. Building on the findings of the previous evaluation step, adjustments may be necessary to various elements of the start-up work plan or the existing implementation plan. This includes redefining the scope, such as refining geographic or sectoral coverage or incorporating newly identified challenges. It also entails ensuring alignment with updated national and regional development plans to reflect any recent changes in these frameworks.

Additional aspects for this step include:

- Identifying and prioritising the **threats, issues, and opportunities** relevant to the Blue Bioeconomy. Based on these insights, clear and achievable goals for the EA implementation plan are established.
- Identifying and developing robust **Key Performance Indicators (KPIs) and benchmarks for monitoring and evaluation** to track progress and ensure accountability. These metrics provide a mechanism for assessing the effectiveness of EA strategies and ensuring that objectives are met.
- Developing a **finance plan**. This involves reassessing the budget to ensure it meets the needs of both the policy process and associated EA projects. Identifying additional funding opportunities may also be necessary to secure the resources required for sustainable implementation.
- Reviewing and updating the **timeline** for the policy process and EA projects, taking into account any adjustments made to the scope, goals, or available resources. This ensures a realistic and actionable roadmap for achieving sustainability objectives.

2.4.2.3 Engage Stakeholders

The stakeholder engagement step ensures effective collaboration, alignment, and feedback on the EA implementation plan. This process begins by evaluating whether any key stakeholders are missing from the existing group, particularly focusing on new or underrepresented actors that might play a critical role in the implementation of the policy.

Once the stakeholder group is confirmed, the specific needs of each stakeholder are identified. This involves understanding their priorities, concerns, and perceptions of their roles within the EA framework. This information helps ensure that the implementation plan aligns with the interests and capacities of all stakeholders involved.

Following this evaluation, the implementation plan should be communicated to stakeholders to solicit their feedback. This can be done through workshops, public consultations, or direct meetings, which provide a platform for stakeholders to voice their perspectives and offer suggestions. Feedback from these sessions can lead to further refinements of the implementation plan to enhance its effectiveness and alignment with stakeholder expectations.

Finally, coordination with relevant agencies and government levels is essential. Established cooperation in the preparation phase should be continued and intensified to ensure that the roles and responsibilities of various agencies at different levels are clearly defined and that there is consistent communication and collaboration across all involved parties.

2.4.2.4 Apply Strategic Policies and Incentives

In this step, we focus on applying strategic policies and incentives to support the implementation of the EA framework and ensure the successful adoption of EA practices.

The main action here is to activate or update the EA framework, which serves as the foundation for creating awareness about EA principles and practices. This involves disseminating information about EA's benefits, methodologies, and importance across relevant sectors and stakeholders, raising awareness about how EA can lead to sustainable development in the Blue Bioeconomy.

Two programmes should be activated that can be linked to the EA framework: (1) an **incentive program** and (2) a **support programme** developed in the preparation phase.

The **incentive programme** identifies and allocates financial incentives or regulatory support that encourage businesses and sectors to adopt EA practices. By linking these incentives to the EA framework, businesses are motivated to engage in the process and align with sustainability goals. These incentives might be in the form of credits, grants, tax breaks, or access to resources like funding for research and development.

The **support programme** provides both financial support and technical assistance to businesses and stakeholders involved in the EA process. The support program should offer guidance on best practices and progressive insights into EA, helping businesses navigate the complexities of its implementation. Offering technical assistance, such as workshops, training, and access to expert advice, will enhance the capacity of stakeholders to adopt EA effectively.

Finally, launching EA pilot projects is essential to demonstrate the real-world benefits and feasibility of EA. These projects showcase how EA can be integrated into Blue Bioeconomy activities, providing insights into its effectiveness. Pilot projects should be designed to tackle real-world challenges, build capacity, and refine the EA framework based on hands-on experience.

2.4.2.5 Audit and Evaluate Plans and Strategies

The final step involves **auditing and evaluating** the implementation of the policies and strategies established during the previous stages of the EA process. The goal is to assess whether the implemented strategies have been effective in achieving the set objectives and whether they are contributing to the desired environmental, societal, and economic outcomes.

The **evaluation** should address the same critical questions as in the preparation phase:

- Are the adverse environmental impacts mitigated, and are no new negative impacts introduced?
- Are the beneficial impacts of the EA process enhanced and adequately valorised?
- Do economic incentives remain effective for Blue Bioeconomy companies?
- Are the economic returns for other sectors safeguarded?
- Have social aspects like employment and local community well-being been considered, and are potential threats to these aspects sufficiently addressed?

Additionally, an **internal audit** is carried out, which includes a gap assessment to identify any shortcomings in implementing and monitoring the EA framework. The audit evaluates the effectiveness of the policies, tracks the progress of KPIs, and evaluates the success of the pilot projects. Based on this evaluation, areas where adjustments or improvements are needed for the next cycle of the policy process are identified.

In the later stages, the audit process can evolve into an external audit if a formal auditing process is put in place. This external review could bring in additional perspectives and expertise to assess the policy's impact more comprehensively and provide an independent evaluation of the process.

The audit results, combined with the evaluation of pilot projects, offer valuable insights for refining the implementation plan and stakeholder engagement strategies for the next iteration of the policy process. This continuous feedback loop ensures that the

EA process remains dynamic, adaptable, and responsive to evolving conditions, leading to improved outcomes in future cycles.

3. The EA Ladder

This section introduces the "EA Ladder," a conceptual framework designed to engage companies in implementing the EA. The framework draws inspiration from the Blue Cluster's white paper on the Ecosystem Approach (Blue Cluster, 2023) and the CO₂-Performance ladder, a tool from the Foundation for Climate Friendly Procurement and Business (SKAO) for carbon management and sustainable procurement that supports organisations in reducing their carbon footprint (SKAO, n.d.).

3.1 EA Ladder Concept

The EA Ladder is a management tool designed to assess and improve an organisation's EA implementation through measurable progress and commitment. Unlike traditional impact assessment tools, this framework focuses on guiding businesses in their ES journey by fostering accountability, transparency, and ongoing improvement. It provides a structured method for organisations to evaluate their own operations and extend their sustainability practices to the broader value chain. The basic structure is shown in Figure 4.

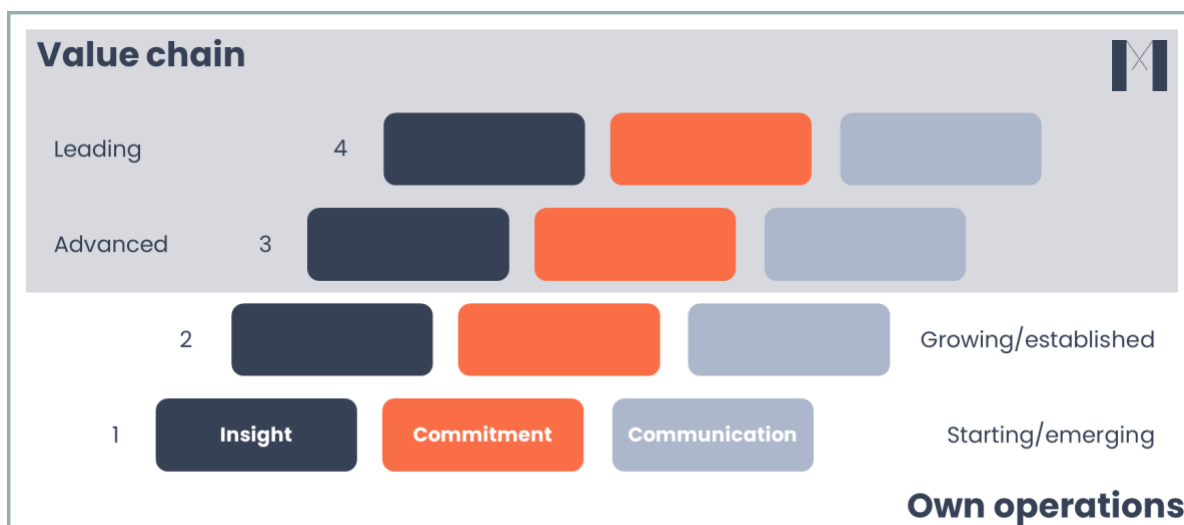


Figure 4. Schematic of the EA Ladder concept.

The ladder operates across four progressive levels, with each stage requiring increasingly stringent ES commitments.

1. **Starting/Emerging:** Focus on gaining basic ES insight through pilot projects and defining qualitative goals, primarily for internal use.
2. **Growing/Established:** Expansion to quantitative insights and targets, introducing monitoring systems and external reporting to ensure accountability.
3. **Advanced:** Incorporation of value chain impacts, establishment of science-based targets and robust collaboration with stakeholders

4. **Leading:** Achieving full integration of ES into business models with comprehensive and transparent communication.

The first two levels focus on building a foundational understanding and addressing ES issues within the organisation's operations, while levels three and four expand the scope to include value chain impacts. Each level builds on the previous one, ensuring continuous improvement in three key areas: **insight, commitment, and communication**. Insight involves assessing ES performance, risks, and opportunities, with initial levels focusing on fundamental understanding and later levels requiring comprehensive, quantitative evaluations. Commitment entails defining and achieving ambitious ES objectives, including science-based targets, while communication emphasises transparency, accountability, and knowledge sharing internally and externally.

The tool is independent of ES qualification or quantification methods and can be adapted to changing industry standards. It seeks to maximally integrate with other sustainability frameworks to enhance its effectiveness, encouraging organisations to align their EA implementation strategy with broader initiatives and preventing additional administrative workloads related to disclosure obligations through the Corporate Sustainability Reporting Directive (CSRD) or other voluntary or obligatory initiatives. The framework also ensures continuous improvement by progressively expanding the scope of insights, refining data collection and analysis, and setting increasingly efficient and impactful targets.

The EA Ladder serves not merely as a static evaluation tool but as a dynamic system that compels businesses to adapt and enhance their EA commitments. By gradually deepening their insights, improving measures, and engaging stakeholders, organisations can enhance their environmental responsibility in a structured and measurable way. A region can apply the EA Ladder as a strategic framework to guide and evaluate how companies entering an industrial zone or port area align with sustainability principles. By requiring or encouraging companies to position themselves on the EA Ladder, authorities can assess their level of ecosystem commitment — from basic awareness to active ecosystem enhancement. This staged approach allows flexibility while ensuring that all participants progressively improve their performance. Over time, the region can set minimum EA levels as entry conditions, offer incentives or recognition for higher levels, and integrate the Ladder into planning or permitting processes. In this context, the EA Ladder functions as a procurement instrument where organisations higher on the Ladder get more benefits (e.g. fictitious discount). This would help phase out companies with significant negative impacts while fostering a resilient, ecosystem-aware industrial community, ultimately reflecting a more sustainable regional economy and society. Knowing that many Blue Bioeconomy value chains inherently provide ecosystem services, and that the EA Ladder recognises and aims to strengthen these, regions would be particularly keen to stimulate Blue Bio activities in their ports and coastal zones.

3.2 Benefits of EA Ladder for EA Policy

The EA Ladder offers several benefits that directly address some of the challenges related to EA policy (see introduction of section 2) and support the policy options discussed in section 2.1. By functioning as a regulatory and performance framework, it motivates companies to adopt EA practices and can be tailored to their specific needs and challenges. The EA Ladder concept directly integrates economic incentives, such as certifications that provide reputational and competitive advantages, fictive tender discounts, or higher credit allocations within existing credit systems. These mechanisms provide tangible rewards, incentivising companies to climb higher on the Ladder and further implement EA in their business operations.

The EA Ladder also serves as a training and capacity-building tool, where knowledge of ES and EA practices is gradually improved. To encourage companies to use the framework, the first levels of the Ladder have low requirements, allowing companies to enter the framework without significant barriers while gradually handling the complexity of EA. With communication as a core focus, the Ladder aids in awareness creation, supports collaboration, and builds networks for sharing best practices and knowledge, potentially leading to partnerships between the public and private sectors. The "insight" criterion incorporates long-term monitoring and evaluation, ensuring consistent progress and alignment with evolving standards.

Additionally, the framework harmonises with other regulatory obligations, such as the CSRD and EU Taxonomy. For instance, companies that meet CSRD disclosure requirements could automatically achieve high scores on the Ladder's communication criteria. Other policy relevance of the Ladder includes its ability to align with national sustainability goals by filling in criteria for insight and commitment accordingly, and its potential to monitor impact and improvement at sectoral, industrial, or regional levels when used as a standardised framework.

The EA Ladder can be used both as a self-assessment tool for businesses and as a management tool for policymakers. Ideally, frameworks like the EA Ladder are supported and managed jointly by companies and policy actors. A strong example is the CO₂ Performance Ladder, which is governed through a public-private collaboration involving policymakers, companies, the scientific community, and social organisations. Unlike existing frameworks that typically focus on a single challenge assessed by one metric, the EA Ladder addresses multiple, interconnected challenges simultaneously—making it inherently more complex. The EA ladder can incentivise companies to engage in EA by offering benefits for higher scores, be used to allocate funding or financial support, and monitor the effectiveness of EA implementation across regions, industries, and Blue Bio sectors. This monitoring also enables continuous improvement by evaluating whether adaptations to the Ladder framework are needed.

Finally, the Ladder can be equipped with a practical toolbox offering state-of-the-art tools, sectoral advice, and best practices to guide companies in selecting the most relevant tools. This is particularly valuable given the growing number of environmental, social, and governance tools developed in recent years, enabling businesses to more easily make informed decisions tailored to their operations.

Conclusions

An inquiry among European policymakers (See *table 4*) revealed that many regions are implementing different types of environmental assessments or policy encouragements that align with the principles of the Ecosystem Approach. Feedback gathered through the survey and webinar on the EA highlighted the pressing need for more consistent integration of EA principles into policy, particularly within the Blue Bioeconomy context. Key priorities include strengthening stakeholder collaboration, establishing clear sustainability goals, and embedding ecosystem services (ES) more deeply into planning and regulatory frameworks. However, the complexity of establishing a comprehensive EA framework often deters progress. Policymakers cite limited technical capacity and insufficient funding as major barriers to implementation. Additionally, the wide variability in monitoring and scoring tools makes it difficult to establish a fair and consistent control system for evaluating company performance. This mismatch—between companies needing incentives or mandates to adopt EA practices and the lack of policy structures to provide that guidance—slows down the rollout of the Ecosystem Approach. To support the transition, the BlueBioClusters project developed the Ecosystem Approach Policy Process concept—a step-by-step resource designed to help policymakers implement the EA effectively. While the EA Wheel concept was not fully realized and was regarded as too complex, the EA Ladder has emerged as a more accessible and scalable alternative. It offers a progressive model with self-assessment levels that allow companies to gradually increase their internal and external commitments. For regional policymakers, this tool could provide a practical starting point for encouraging companies to engage with EA principles and can serve as a foundation for stepping up toward more rigorous compliance. *The Municipality of Peniche expressed strong interest in applying the framework and is taking up the EA Approach as a whole (including EA Ladder as an intermediary step) for their regional strategy and vision for the sea and companies in Peniche dedicated to fish (aquaculture, fisheries, fish processing, canning industry, etc) or in general companies that use marine bio resources. This action can serve as an example for other coastal regions to integrate the Ecosystem Approach into their regional policy.*

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Annex 1

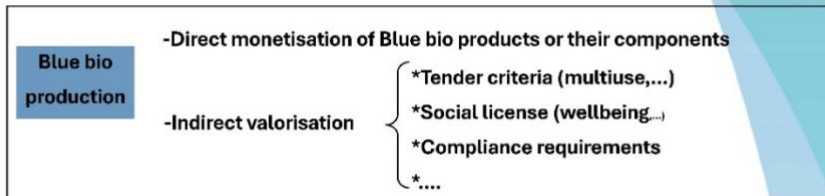
Poster presentation “Can blue bio production be stimulated by the use of ecosystem approach?” at the World Aquaculture Society Congress “Aqua 2024.”



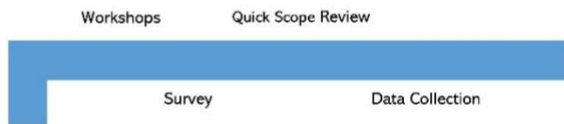
Jurgen Adriaen, Kristien Veys (Blue Cluster)
 Suzi Billing (SAMS)
 Liisi Lees (UTartu)

Can Blue bio production be stimulated by the use of Ecosystem Approach ?

Living aquatic resources deliver a wide variety of products and processes. These **ecosystem services** can be provided **directly or indirectly** by Blue bio economic activities and are essential for human survival and well-being, and they encompass a wide range of natural processes and functions for which it is of utmost importance to consider the entire ecosystem, including human impacts, rather than focusing on a single species or environmental issue. The ecosystem approach is a **strategy** for the integrated management of land, water, and living resources that promotes conservation and sustainable use in an equitable way (CBD, 2000¹). It recognizes the complex interrelationships within ecosystems and aims to maintain their health, productivity, and resilience. Within the BlueBio-Cluster project, the aim is to develop tools for supporting businesses in **integrating ecosystem services** into novel ecology-driven business models and induce cross-sector collaborations along the value chain. This should give Blue bio producers **more production area** (Multi-Use) as well as a **larger return** for their activity due to the ecosystem services they provide.



WORK FLOW



Blue Bio Value Chains



CURRENT STATUS

- Significant knowledge gaps in ecosystem services of certain Blue Bio value chains
- Tools exist to help valuing certain ecosystem services
- Opportunity for non-blue bio companies to engage with blue bio companies to positively impact ecosystem services by combining them in the primary activity of the non-blue bio company
 (Ex. macroalgae cultivation between offshore windmills)

NEXT STEPS:

- Set up of an Ecosystem Approach performance ladder, in analogy with CO₂ Performance Ladder², as a procurement tool, tender obligation or other instrument to incentivizes companies to apply Ecosystem approach
- Increased Ecosystem Approach Awareness through workshops
- Find the drivers (big companies, innovative technology, government,...)

Join the discussion on the BlueBioMatch platform →



Annex 2

Policy brief “The further development of sustainable blue bioeconomy through Ecosystem Approach.”

POLICY BRIEF:

THE FURTHER DEVELOPMENT OF SUSTAINABLE BLUE BIO ECONOMY THROUGH ECOSYSTEM APPROACH

When managed accordingly, Blue Bioeconomy activities can have a significant beneficial impact on the natural environment through sustainable practices and strengthening ecosystem services. Ecosystem services are the numerous benefits that society derives from the natural environment. These services form the foundations of our economies, health, and general well-being. Within the Blue Bioeconomy, these services are critical. For example, mussels not only serve as a food source but also contribute to nutrient recovery and coastal protection. Similarly, oyster reefs provide coastal protection and serve as nurseries for marine life. Integrating ecosystem services into business models and regional planning offer both economic and environmental advantages. Locally-produced, sustainably-managed resources support regional economies, while nature-based solutions – such as oyster reefs for erosion control, macroalgae cultivation for enhancing biodiversity around offshore wind farms or microalgae production on industry side streams – illustrate how Blue Bio can align economic development with conservation.

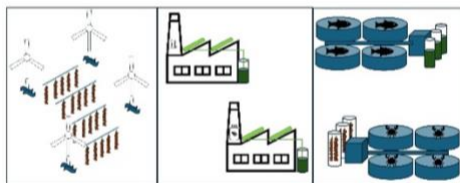


Figure 1: Examples of integration of bluebio production in different industries

This economic and environmental alignment can create positive impacts that resonate

across sectors, creating value for tourism, retail, and other industries.



Figure 2: Benefits for BlueBio production through Ecosystem Approach

To maximize these benefits, an ecosystem approach (EA) is essential, providing a framework that both assesses and mitigates the environmental impacts of activities while enhancing positive contributions to ecosystem services. Key elements of an EA include the evaluation of ecosystem services in both economic and social terms, raising awareness about the value of these services, and fostering a willingness to protect them. Quantifying these services enables industry and policymakers to weigh trade-offs and make informed decisions. Adopting an EA can also significantly enhance public support, granting businesses and other stakeholders the social license to operate.

Awareness creation, robust tools and regulative frameworks are indispensable to ensure effective valuation and management within EA.

Although sustainability is firmly integrated into national policies, the explicit adoption of the Ecosystem Approach (EA) remains limited. The main challenges hampering EA implementation include the inherent complexity of EA, a lack of understanding or knowledge of EA, insufficient support from economic actors, unpreparedness

within certain sectors, gaps in supportive tools and methodologies, weak public interest, and the absence of relevant legislation.

As guidance for policy makers, a conceptualized policy process is proposed (Figure 3). This process is designed as a circular framework that can be iteratively refined to enhance the effectiveness of EA plans over time.



Figure 3: Policy process for Ecosystem Approach

Policymakers are invited to check the status of Ecosystem Approach in their regional policies on the online platform <https://bluebioclusters.eu/ecosystem->

[approach-tool/](#), which also provides next steps to be taken for implementation of the Ecosystem Approach in their region.

The BlueBioclusters project explored the concept of an Ecosystem Approach Ladder as a supporting framework for application of an EA in Blue Bio and to address several of the existing challenges within the Blue Bioeconomy. The Ladder aims to incentivize and reward companies that are effectively adopting nature-inclusive practices within their business activities. By improving their ecosystem impact, companies are placed higher on the ladder, resulting in better financial and reputational rewards.



Figure 4: The Ecosystem Approach Ladder management tool

To assist Blue Bio companies in adopting an EA and addressing the challenges of its implementation, governments can implement policies, provide incentives, and install frameworks that encourage sustainable practices.

References:

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Buck, Bela & Langan, Richard. (2017). Aquaculture Perspective of Multi-Use Sites in the Open Ocean: The Untapped Potential for Marine Resources in the Anthropocene. 10.1007/978-3-319-51159-7

Liquete C, Piroddi C, Drakou EG, Gurney L, Katsanevakis S, Charef A, Ego B. Current status and future prospects for the assessment of marine and coastal ecosystem services: a systematic review. PLoS One. 2013 Jul 3;8(7):e67737

Ruckelshaus, M., et al. (2013). Notes from the field: Lessons learned from using ecosystem service approaches to inform real-world decisions. Ecological Economics, 86, 249-260.

Annex 3

Inquiry on Ecosystem Approach for policymakers



General infor...

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Ecosystem A...

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First name

Last name

Email address

What is your job title and the corresponding geographical zone? (e.g. Blue Economy Coordinator for the City of Ostend)

Please select the most important blue bio production in your region

- Bivalves Crustaceans Fish Marine bacteria Microalgae
 Macroalgae Other

Is this a farming or harvesting activity?

- Farming Harvesting Both

Can you point out which ecosystem services are delivered by this blue bio production activity (maximum 3)?

- Provisioning: FOOD Provisioning: Raw Materials
 Provisioning: Medicinal resources



- Regulating: Water filtration and nutrient assimilation
- Regulating: Coastal protection
- Regulating: Carbon sequestration and storage
- Regulating: Biochemical cycling Supporting: Biological control
- Supporting: Habitat protection and maintenance
- Supporting: Maintenance of genetic diversity
- Supporting: Sediments creation Supporting: Water cycling
- Supporting: Oxygen production
- Cultural: Recreational activities and mental and physical health
- Cultural: Tourism and ecotourism
- Cultural: Sense of place and spiritual connection
- Cultural: Aesthetic and spiritual appreciation and inspiration for culture, art, and design
- Other:

Please select the 2nd most important blue bio production in your region? (if none, please skip)

- Bivalves Crustaceans Fish Marine bacteria Microalgae
- Macroalgae Other

Is this a farming or harvesting activity?

- Farming Harvesting Both



Please select the 3rd most important blue bio production in your region? (if none, please skip)

- Bivalves Crustaceans Fish Marine bacteria Microalgae
 Macroalgae Other

Is this a farming or harvesting activity?

- Farming Harvesting Both

Define in 5 key words what you understand by Ecosystem Approach

Do you think the blue bio production in your region is of a sustainable nature? Motivate your answer.

Policy



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Please answer the following questions from the perspective of the geographical level of your policy making (regional/national/international).

Are policies in your region developed with due consideration for environmental, social, and economic impacts?

Yes No I am not sure

Is the Blue Bio sector (e.g. aquaculture, fisheries & processing) in your region consulted when decisions are made that affect the environment?

Yes No I am not sure

Does your region has a structured framework to assess long-term sustainability in regional development of Blue Bio producers?

Yes No I am not sure

Does your region engage relevant stakeholders (e.g. local businesses, citizens, NGOs & researchers) in policy development and decision-making processes?

Yes No I am not sure

Does your region has clear, measurable sustainability goals (e.g. carbon neutrality, resource conservation & biodiversity protection)?

Yes No I am not sure



Are your policies aligned with national or international sustainability frameworks (e.g. EU Green Deal & UN Sustainable Development Goals)?

Yes No I am not sure

Do you understand the concept of ecosystem services and how they benefit your region (e.g. food provisioning, water filtration and nutrient assimilation & carbon sequestration)?

Yes No I am not sure

Are ecosystem services explicitly considered in your regional economic planning and development projects?

Yes No I am not sure

Has your region developed or adapted regulations to encourage sustainable practices in Blue Bio industries?

Yes No I am not sure

Do you coordinate with national and regional authorities to align policies and avoid conflicts between environmental and economic priorities?

Yes No I am not sure

Are there mechanisms for industries in your region to collaborate with the government on sustainability initiatives (e.g. incentives for green practices)?

Yes No I am not sure

Do you have any comments or specific remarks concerning your answers on certain of the above questions?



Would you consider that you are applying Ecosystem Approach for Blue Bio activities in your regional/national policy?

We define Ecosystem Approach as follows: "An ecosystem approach for a region focuses on managing natural resources by considering the entire ecosystem, including human and environmental interactions, to promote sustainable development. This method aims to balance ecological health with economic and social needs, ensuring long-term resilience. It involves collaboration across sectors, local communities and stakeholders to maintain biodiversity, support livelihoods and mitigate environmental impacts."

If you answered Yes at least 7 times, we advise you to answer Yes; otherwise select No.

Yes No

General information

Ecosystem Approach



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We do not apply Ecosystem approach

Why do you not apply Ecosystem Approach, or why do you think you cannot apply it?

- Lack of knowledge
- Missing legislation
- Sector not prepared for it
- Complexity
- Lack of supportive tools/methodology
- Clash with national policy
- Insufficient support from economic actors
- Clash with (inter)national policy
- Current methodology to implement EA is not user-friendly or lacks concrete action steps
- Lack of public support or interest
- other

Why would you start with Ecosystem Approach for blue bio production?

- To secure a sustainable future
- To boost the regional economy
- To preserve the regional character of the region
- To create a framework for local companies
- Legal impositions
- Other



Who are the key partners you would involve in rolling out the Ecosystem Approach for blue bio production?

- governmental organisations a large company
- a specific Blue Bio sector representative of the community Other

Which actions would be needed for your region to include and push for Ecosystem Approach in your policies?

- Clear impact measure guidelines Financial support
- Higher policy support (EU, national,...) Legal framework
- Finetuning stakeholders other

How would you stimulate Blue Bio companies in your region to engage with Ecosystem Approach?

- economical incentives concessions criteria obligation
- other

Would you include and push for Ecosystem Approach in your electoral campaigns?

Do you have any comments or specific remarks concerning your answers on certain of the above questions?

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As you considered you are applying an Ecosystem Approach for your region you have below questions regarding your Ecosystem Approach. In case you have doubts that you are applying an Ecosystem Approach, you can always go back and answer with NO in the last question of the previous section. This will direct you to another question list.

Which kind of Ecosystem Approach framework/tool/platform do you use for your blue bio production activities?

Why did you start with Ecosystem Approach for blue bio production?

- To secure a sustainable future To boost the regional economy
- To preserve the local character of the region
- To create a framework for local companies Legal impositions
- Other

Who are the key partners who were involved in rolling out the Ecosystem Approach for your blue bio production activities?

- Governmental organisations A large company
- A specific Blue Bio sector Representative of the local community
- Other



How do you stimulate Blue Bio companies in your region to engage with Ecosystem Approach?

- By providing economic incentives By introducing concession criteria
- By imposing obligations Other

What aspect or action of your current Ecosystem Approach would you like to highlight?

How much time was needed to go from the idea of implementing Ecosystem Approach for Blue Bio to having it commonly applied by the Blue Bio sector?

What shortcomings do you see in your current Ecosystem Approach for Blue Bio?

Do you include and push for Ecosystem Approach in your electoral campaign?

Do you have any comments or specific remarks concerning your answers on certain of the above questions?

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