Policy Report on Institutional Barriers and Enablers

Blue Green Governance Project

Deliverable 1.1

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1. INTRODUCTION

1.1. Aims and scope

The focus of BlueGreen Governance (BGG) lies on transforming marine and coastal governance systems to develop frameworks that seamlessly integrate land and sea uses while considering societal preferences and addressing major global environmental challenges, such as biodiversity loss, water availability and quality, and climate change. To enhance the sustainability and resilience of coastal and marine governance, it is essential to streamline procedures, improve monitoring and enforcement, and align policy goals with local realities.

- This report offers **guidance and insights** into the most prevalent (sets of) **institutional barriers and enablers** for change in marine and coastal governance.
- It is based on a thorough **review** of the scientific and grey literature, complemented with insights from interviews on the BGG Case Studies.
- It synthesizes the insights gained through this review of the literature and the field, with a focus on **five key dimensions fundamental to achieve institutional change** within coastal governance.
- It builds on these insights to provide policy **recommendations for achieving change** and addressing crucial challenges for marine and coastal governance.
- This report is a synthesis. Its foundation lies in the review of the scientific and grey literature. The detailed results of this scientific review is presented in a **different output, i.e. the scientific review report**.

European coastal regions face many social and environmental challenges and problems, including biodiversity loss, pollution, vulnerability to extreme weather events, decline of natural resources, and poorly planned developments. Some of these issues have been on the agenda for decades, which suggests that finding and realizing solutions is anything but easy. **The need to achieve institutional change is essential for advancing coastal and marine governance in Europe.**

Marine and coastal challenges have become more urgent and salient due to climate change. Coastal areas are particularly vulnerable to the various impacts of climate change, such as sea level rise or increased frequency and intensity of extreme weather events that threaten livelihoods, natural resources, and protected ecosystems. These challenges have far-reaching impacts on societies. They can disrupt the quality of life of local environments and, beyond that, generate substantial negative economic impacts on society or health effects on the population – all in addition to the significant biodiversity and environmental losses. While solutions are equally salient and urgent, many actors have come to realize that **"business as usual" falls short** of achieving societal and policy ambitions. Several studies have shown that **current governance systems are ill-equipped** for dealing with the particularities of coastal conditions (e.g. Brown et al., 2017; Van Assche et al., 2020). Their functioning is hampered by territorial, administrative and sectoral fragmentation, inadequate coordination, and insufficient stakeholder involvement. More than half of the scientific publications reviewed for this report state that current governance structures regularly fail to integrate marine and terrestrial planning, to manage land-sea interactions effectively, and to harmonize regulatory frameworks. Integrated forms of planning and management have been called for, but

these prove difficult to realize and implement. Other challenges lie in the domain of stakeholder involvement, the science-policy interface and digitalization.

- It is widely recognized that **changes** in marine and coastal governance are needed.
- Change is not easily achievable and requires navigating the complexities of a **multi-actor; multi-level, and multi-sectoral policy setting.**

One of the complexities lies in the multi-actor setting of marine and coastal governance systems. These involve a wide range of actors who come with their own views and interests and bring in different types of knowledge and input for the design, implementation and evaluation of policies. Relevant knowledge ranges from scientific advice by academics or expert researchers, to more technical or experience-based expertise by stakeholders, including NGOs, businesses, local community actors or even individual citizens. The challenges for achieving change in marine and coastal governance are also linked to the fact that the governance of the oceans, seas and coasts involves multiple socio-economic related sectors and crosses territorial boundaries, and is framed by international commitments, defined by national policies, developed through national and subnational decision-making processes and complemented by concrete practices at the regional and local level. In all, the land and sea are governed by multiple overlapping or sometimes competing institutions, which frequently tend to overlook or ignore land-sea interactions. Another layer of complexity to achieve change lies in the unique national and local contexts within which governance arrangements have evolved over time. Viewing environmental governance through an evolutionary lens, we emphasize the crucial role of the temporal dimension and the impact of past policy interventions (Beunen et al., 2022; Beunen and Van Assche 2021). This implies the need for adopting a holistic approach to achieve change in the governance context. After all, governance systems and the institutions through which actors coordinate actions and interactions evolve over time. The current multi-level, multi-actor and multi-sector setting of marine and coastal governance is the result of cultural, political and economic patterns and events that have taken place in the past. It is also the starting point for transformations towards a more sustainable and inclusive future.

Change towards effective coastal governance can be achieved by optimizing coordination and coherence among actors and across institutions. Considering the complexities of the governance system, change should equally build on an adequate understanding of the underlying mechanisms and factors at the roots of these governance arrangements, including the dependencies flowing from cultural, economic and political traditions and developments. Barriers and enablers are present at these different levels and often arise from current and established rules, norms, and practices (Oberlack, 2017). Acknowledging, understanding and addressing these barriers and enablers is crucial for effective coastal governance, especially considering their diversity and interconnectedness (Nielsen et al., 2023).

1.2. Change through the lens of five governance dimensions

The BlueGreen Governance project focusses in this report on a systematic assessment of the barriers and enablers in marine governance, based on the results of a scientific literature review (presented in a separate scientific review report). We bring together the insights from the review in this report with the overall aim of achieving adaptive, innovative, integrated and informed forms of coastal and marine governance. To this end, we **identify which barriers and enablers impact five important dimensions that shape the capacity for change within governance systems**.

Figure 1 visualizes these dimensions and places them within a particular historical, societal, political context that denotes the unique character of local situations.

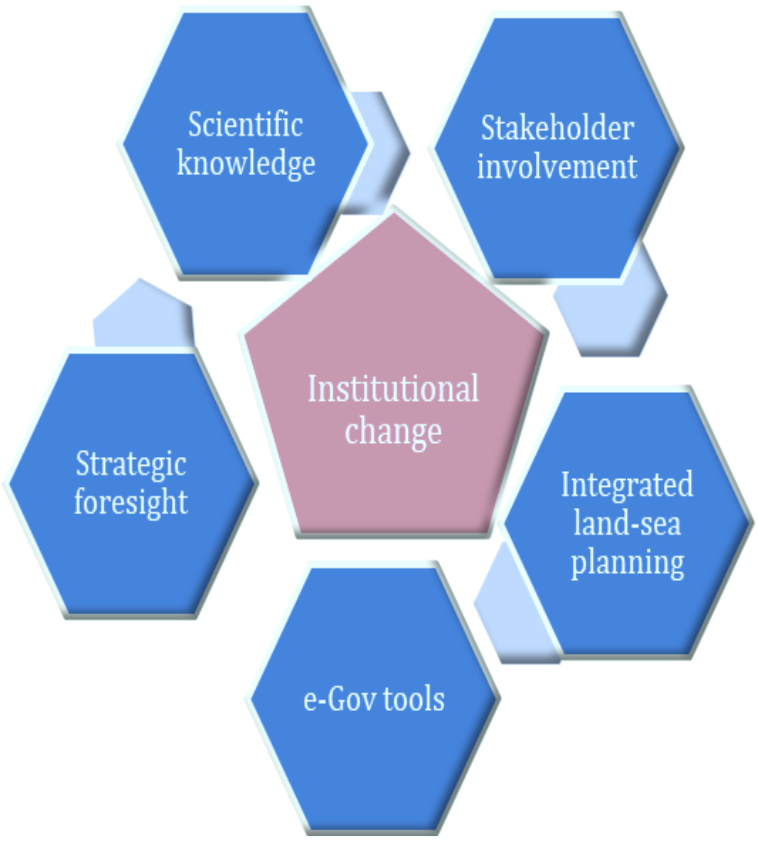

Figure 1 – Governance dimensions

- Taken together, these five dimensions **shape the capacity** of governance systems to respond to the challenges described above
- The dimensions focus on **adaptive, innovative, integrated and informed** forms of coastal and marine governance.
- Each dimension needs to be considered within a **broader context** for institutional change

The starting point is that governance systems are **currently not equipped** to tackle complex issues and align different levels of governance and the needs and inputs of different actors therein. In many countries, the characteristics of the current governance systems are not adapted to challenges they face and the intricacies of the contexts within which these occur. That context is moreover fast-changing, far-reaching and consists of inherently complex and interdependent issues. The five dimensions, then, are crucial to achieving institutional change within governance systems.

Various barriers or enablers within the dimensions can simultaneously affect the achievement of policy goals, lead to differences between policy intent and outcomes, or result in inefficiencies and inconsistencies in policy implementation, coordination and integration. In this sense, barriers and

enablers represent obstacles or facilitators within the structure and processes of organizations and governance systems that hamper or foster decision-making processes and policy implementation.

Thus, the five dimensions are interlocking elements within the same system. They represent important components of the regulatory context as well as the internal and external organization and collaboration processes. In all, these dimensions delineate a **specific learning environment** through which institutional change can be achieved.

This implies that there is **no 'one-size-fits-all' solution** to achieve successful change. Effective governance requires that the local context, historical developments and the current state of affairs in the dimensions are considered. Having said that, the issues (barriers and enablers) that merit attention within each of the dimensions can be identified and can be considered quite common across contexts.

1.3. Main findings and recommendations

Figure 2 on the next page summarizes the main recommendations in this report. They are synthesized from the literature review and structured along the five dimensions and broader aspects of institutional change. They are based on the assessment of the barriers and enablers in marine and coastal governance.

- The identification of the enablers facilitates their exploitation, which can be considered key to strengthening governance systems.
- Identifying the barriers to change in the five dimensions is equally of relevance because by knowing them one can also avoid them.

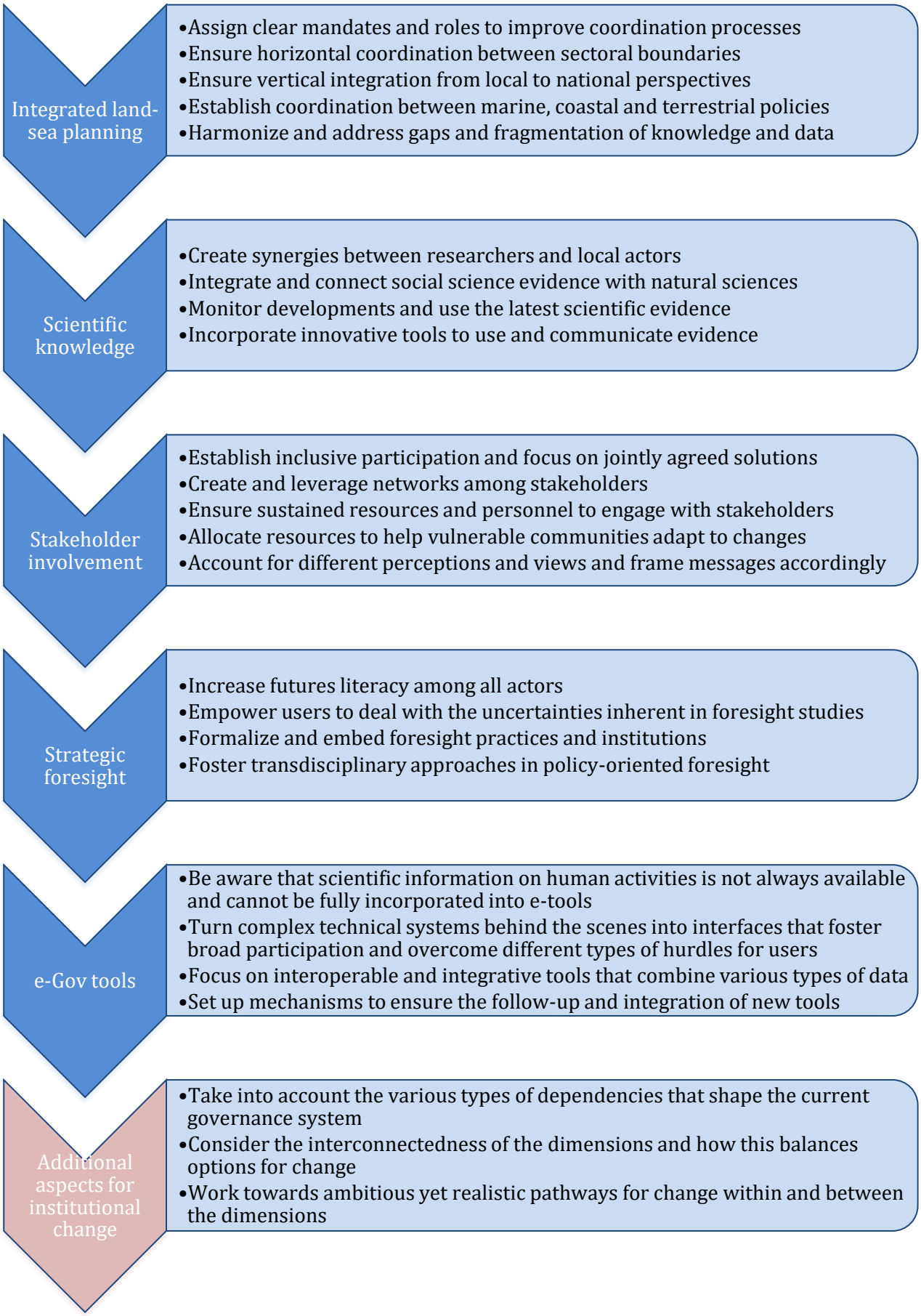

Figure 2 – Overview of recommendations

1.4. Structure of the report

In this introductory chapter we highlighted the main reasons for change and the complexities of the governance context that limit the opportunities for change. We also introduced the five dimensions along which change can be achieved and presented the main findings from the analysis. The remainder of this report is structured along the five dimensions required to respond to the challenges and complexities of marine and coastal governance systems. It also elaborates on broader challenges for institutional change:

- **Chapter 2** covers the main barriers and enablers for policy coherence and integrated land-sea planning.
- **Chapter 3** focuses on the input of a particular kind of actors in marine and coastal governance, and discusses the barriers and enablers for the incorporation of scientific knowledge
- **Chapter 4** identifies the barriers and enablers for the involvement of stakeholders as additional key actors in marine and coastal governance.
- **Chapter 5** provides insights into barriers and enablers for the development and use of strategic foresight to strengthen marine and coastal governance.
- **Chapter 6** deals with barriers and enablers regarding the use of e-governance tools.
- **Chapter 7** discusses additional challenges to achieve institutional change, i.e. barriers and enablers flowing from historical developments and dependencies.
- **Chapter 8** shortly summarizes the findings.

Chapters 2-6 cover the five dimensions and are structured in a similar way.
The first paragraph shortly introduces the relevance of the governance dimension by highlighting its main characteristics. Then, the chapter presents the state of play within the dimension, going through the most important barriers and enablers for change. These are complemented with illustrations from the case studies in BGG. The final section of each chapter suggests pathways towards change. Based on the integration of insights from the literature into the five dimensions, the report presents specific policy recommendations. We thereby consider the complexities of balancing the five dimensions, which are inter-connected after all. With this, we keep in mind that achieving institutional change is a complex endeavor that requires **adequate balancing while bringing together the five dimensions for change**.

This report is informed by the results of an in-depth scientific analysis under Work Package 1 of the BGG project.
The activities under WP1 consisted of a systematic literature review of the barriers and enablers to policy coherence, stakeholder involvement and institutional change in marine and coastal governance.
We present the details of these research activities in a separate output: *Scientific review report: Assessing barriers and enablers for policy coherence, stakeholder involvement and institutional change through a systematic literature review* (Fobé et al., 2024). The scientific review report explains the analytical framework, methodological approach and results of the in-depth scientific analysis.
The analytical framework for the systematic literature review was based on the 'policy coherence evaluation framework' developed under one of BGG's sister projects, the Horizon CrossGov project (Platjouw et al., 2024).

2. INTEGRATED LAND-SEA MANAGEMENT AND PLANNING

2.1. What is it, why is it important?

Integrated schemes for land-sea management and planning are especially relevant for coastal regions. In these places, the land and sea are governed by interactions between overlapping or sometimes competing institutions. These interactions involve international agreements, national policies, and regional or local decision-making processes, and within the European context, specific EU laws, directives and strategies. Importantly, the fragmentation within the various tiers and scales of governance has resulted in misaligned legal and policy frameworks (Platjouw et al., 2023). Policies addressing specific sectors or policy issues also often directly or indirectly affect other sectors or issues. As a result, various policies simultaneously influence specific (sector) activities or (parts of) environmental issues. Especially in the coastal and marine areas, policy landscapes are complex and can create challenges to integrated governance approaches.

Policy coherence refers to how well different policies work together. Coherence can be defined as the extent to which policies reinforce each other by promoting synergies or reducing conflicts between their objectives and measures in design and implementation (Platjouw et al., 2023). Policy coherence can be assessed within the same governance level (horizontal coherence) or across different governance levels (vertical coherence). It is crucial to identify recurring interactions within the multi-level governance framework that hinder or facilitate alignment across policies affecting marine and coastal governance (Platjouw et al., 2024).

2.2. Barriers and enablers

The literature review indicates that aspects relating to governmental organizational structures are among the most prominent barriers for integrated governance. This includes the absence of adequate vertical coordination mechanisms observed within the multi-level governance landscape that marks marine and coastal policies. Unclear articulation between different legal frameworks or management responsibilities at the EU level are being transferred to lower governance levels, causing overlaps or gaps in responsibilities between governmental organizations (Ferreira et al., 2014; Brennan et al., 2014). The devolution of governance responsibilities can enhance the integration of local perspectives but may also lead to fragmented responsibilities, complicating coordination efforts. At the transboundary level, integrated approaches such as marine spatial planning and environmental cooperation have no single supranational body and are marked by overlapping jurisdictions, causing unclarities and incoherent approaches.

The review equally points to horizontal coordination barriers, evident from siloed sectoral responsibilities and limited inter- and intra-organizational coordination. Due to misaligned spatial and temporal scales, policy interventions also often fail to address interconnected policy issues. For instance, the MSFD and the WFD have different geographical scopes and timelines and lack a unified coordination structure, limiting integrated management of water from catchment to sea (O'Hagan et al., 2020; Hammer, 2015; Black et al., 2019). Fragmented organizations and legal frameworks combined with limited coordination imply that interactions between land and sea are often ignored or overlooked (Brown et al., 2017; Lillebø et al., 2020; Sayers et al., 2021; Solomun et al., 2022; Văidianu et al., 2020). The structural re-organization or improved coordination necessary to overcome this barrier should go hand-in-hand with clearly assigned authority and responsibility

for the coordinating organization. Insufficient resource allocation or austerity measures pose additional barriers to integrated management approaches.

Effective Science-policy-society interfaces (SPSI) can in turn promote and support policy coherence, which relies on clear science and knowledge to provide a shared evidence base for consistent decisions. However, this is often found to be hampered by temporally misaligned, fragmentated or isolated data and monitoring, and knowledge advisory systems resulting from siloed policies or legal frameworks. Similarly, the literature indicates that stakeholder involvement mechanisms can also support better policy coherence, such as transboundary platforms for collaboration. Yet, specific geographical areas are often characterized by absent, limited or uneven participation practices and mechanisms, especially with regard to local stakeholders.

We provide a concise overview of barriers and enablers from the literature review in Table 1 below, and offer guidance on how to identify barriers and enablers, in order to avoid and optimize them.

Table 1 – Barriers and enablers for integrated land-sea management and planning

Barrier	**How to identify the barrier?**
Fragmentated or overlapping responsibilities	*How fragmented is the governance landscape and the legal framework?* *Do several organizations have responsibility for the same policy issue? How well do they coordinate?* *Is there a central leading authority and what is its capacity to govern (a coordination process)?*
Misaligned spatial and temporal scales	*What are the geographical and temporal scopes of management plans or policy interventions?* *To what extent do these address interconnected policy issues? Are interactions across the land-sea interface considered?*
Inadequate monitoring and assessments	*Are assessments coordinated (between countries; across legal frameworks; in terms of methods and focus) and conducted thoroughly (do they capture cumulative impacts)?*
Enabler	**How to optimize the enabler?**
Effective multi-level and horizontal coordination	*Is the local level integrated into regional and national strategies for coastal and marine management?* *Are there regular interactions across levels to achieve a shared-long term vision?* *Are there boundary spanning organizations or platforms or overarching plans and strategies in place to ensure better coordination?*
Shared and accessible data and knowledge	*Are data collection efforts effective and timely, and do they take into account existing sources? Is (all) (relevant) data available, shared and accessible?* *Is data shared across knowledge providers and integrated across scientific disciplines, and has there been an attempt to harmonize and standardize (cross-border) data?* *Do legal frameworks facilitate (or inhibit) integrated data sharing?*
Solid SPS interactions and stakeholder involvement	*Are knowledge platforms, partnerships or other mechanisms in place to facilitate knowledge transfer and dialogue, and to foster collaboration(s)?* *Are there formalized methods for stakeholder involvement, and are they transparent on expectations and outcomes?* *Do these mechanisms ensure even representation of all stakeholders and promote balanced power dynamics?*

The Oslofjord case study is used here to illustrate the importance of managing barriers and enablers for policy coherence. Integrated land-sea management and planning is not easily achieved, as different policy domains and policy problems generate cumulative impacts.

The Oslofjord: The need for a holistic approach

The Oslofjord is a large coastal area that faces severe ecosystem degradation, caused mainly by pollution and runoff from the whole catchment area, removal of top predators (fishing) with cascading effects on the food web as well as alteration of habitats due to developments along the coastline. The conservation of the Fjord and the management of activities in the catchment area and the fjord itself, are under the responsibility of different administrative authorities, including 118 municipalities in the entire catchment area. The existing governance structure mainly includes River Basin Management Plans (RBMPs), the Integrated Ocean Management Plan, Municipal Spatial Plans, as well as sectoral policies and strategies. They have not been effective in halting the ecological degradation. The governance system under the Water Framework Directive is the closest to cross-sectoral ecosystem-based management of the coastal zone in Norway. However, it mainly focuses on freshwater, excludes fish and other important ecosystem components in the coast, does not include all relevant sectors and has limited consideration of land-sea interactions.

In 2019, the national government adopted an Integrated Action Plan for the Oslofjord to reinforce and supplement the existing governance system and facilitate cross-sectoral and cross-level collaboration (https://www.oslofjorden.org/redd-fjorden/oslofjordplanen/). The plan aims to take a comprehensive approach by considering the entire ecosystem and engaging all relevant authorities and stakeholders within the catchment area. An Oslofjord Council has been established and has the potential to support and drive the implementation and coordination of the plan. A first weakness in the plan is its limited attention to a vision of the future as measures are largely based on existing planning instruments and addressing past issues. Another shortcoming is the plan's limited consideration of how climate change impacts the achievement of objectives and the prioritization of policy measures, an issue made even more salient by recent extreme floods in 2023. Lastly, the plan primarily relies on voluntary measures, and a key challenge is how effectively these suggested measures will be. The absence of clear indicators makes it difficult to evaluate the extent to which policy measures are linked to ecological improvements.

2.3. Policy recommendations

Addressing the challenges and exploiting enablers is difficult and requires sustained efforts from policy-makers and stakeholders alike. Evaluating horizontal coherence may help identify excessive burdens, overlaps, gaps, inconsistencies, implementation problems, and/or obsolete measures. Evaluations may also help identify potential synergies across policies and policy areas that could be strengthened. This can improve the overall performance of policies.

We formulate two sets of recommendations on policy coherence. Firstly, we focus on the most important barriers and enablers, which relate to the characteristics of governmental organizational structures. Secondly, we also indicate how other factors, i.e. those relating to the SPSI and stakeholder involvement, can support the development of policy coherence and integrated land-sea management and planning.

To achieve more effective, efficient and robust governmental organizational structures that promote policy coherence:

- ✓ Appoint clear roles, or mandate committees with a coordination responsibility.
- ✓ Consider (also on the long-term) the vertical and horizontal integration. This implies that lower levels of government are integrated into regional and national strategies for coastal and marine management, including regular interactions to achieve a shared-long-term visions. It also means strengthening horizontal coordination between sectoral and jurisdictional scales.

- ✓ Develop overarching strategies or management plans to support the integration process and foster a shared understanding between all stakeholders involved.
- ✓ Coordinate across ecological and administrative boundaries, especially for management frameworks spanning the land-sea interface, including coastal and marine spatial planning.

In addition, to establish well-designed science-policy-society interfaces and adequate stakeholder support required for coherent policies, it is suggested to:

- ✓ Address knowledge gaps about cumulative effects of human impacts on marine coastal environment.
- ✓ Facilitate shared and accessible data and knowledge, mitigating the risk of fragmented and non-harmonized data.
- ✓ Use knowledge platforms to facilitate and contribute to better informed and coordinated efforts, and ensure representation of all stakeholders, thereby promoting transparency and aligning expectations.

3. THE USE OF SCIENTIFIC KNOWLEDGE

3.1. What is it, why is it important?

The literature on marine and coastal governance indicates that a better use of scientific knowledge can strengthen the adaptive and integrated nature of the governance system. Scientific knowledge lies at the heart of evidence-informed policies (European Commission, 2022). It can be relied on to flag potential policy risks and put them on the policy agenda, to better understand policy problems, to develop alternative policy proposals, plans, and specific measures, to *ex ante* estimate their effects, risks and possible consequences or to evaluate these interventions *ex post* and provide learning opportunities within policy communities.

In the context of marine and coastal governance, scientific knowledge is essential for understanding the complex interactions within and between social-ecological systems. Observing such systems, monitoring them and estimating or even predicting possible changes can help protect and manage the land and the sea. Scientific evidence can also provide essential insights into longer-term future developments (see chapter 5).

3.2. Barriers and enablers

The review of the literature shows that relevant scientific knowledge is often dispersed, not always available, readily available or communicated clearly to policy-makers. In this case, the supply of scientific evidence is imperfectly organized (Elliott et al., 2023; Jetoo, 2018). At the demand side, evidence is not always used in the best way. Some publications argue that sound scientific evidence can be overlooked or ignored in certain cases, and political preferences and values crowd out other considerations. Other publications also point to aspects of contested knowledge, beyond the absence of a scientific consensus. Within the context of climate change, they indicate that political actors strategically create doubts about the value and validity of scientific knowledge. Similarly, the credibility and legitimacy of scientist providing objective, scientific knowledge can be questioned through populist politics by policy-makers and stakeholders alike (Piwowarczyk & Wróbel, 2016). These elements pose challenges to the inclusion or use of scientific evidence in the governance system. In contrast, the presence of a strong scientific consensus can facilitate the uptake of evidence. Similarly, convergence with dominant societal views or integration of scientific expertise within a broader science-policy-society ecosystem, thereby incorporating local knowledge, can increase the attention for and uptake of scientific insights (Neilson & São Marcos, 2019). To support this effort, researchers can deploy innovative tools such as foresight studies or e-tools. Strategic foresight can help define -together with stakeholders- a vision for the future based on scientific evidence. It can be key to establish a clear and shared sense of direction. In turn, digital tools such as data-sharing platforms can provide data to inform scenarios, through information sharing, and facilitate stakeholder engagement and interaction (Ramieri et al., 2024).

In addition, it needs to be noted that many publications in the literature review warn against overly technocratic forms of decision-making in which only scientific knowledge is relied upon in the policy process. In such instances, other forms of valuable knowledge such as experience-based expertise and technical insights from stakeholders and target groups are ignored or insufficiently appreciated. Furthermore, there is an imbalance between natural sciences and social sciences, the former dominating in defining and addressing climate change-related issues. The contributions and perspectives of humanities are rarely considered (Krauss, 2020). A main challenge therefore lies in integrating scientific knowledge in an inter- and transdisciplinary way, and balancing it with the input

from other actors in the policy process (Bruckmeier, 2014). Often actors bring different types of knowledge to the policy table and types of evidence compete with each other (Pattyn et al., 2022).

The short overview in Table 2 below presents important barriers and enablers flowing from the literature review. The guiding questions can help identify barriers and enablers, in order to avoid the barriers and optimize the enablers.

Table 2 – Barriers and enablers for the use of scientific knowledge

Barrier	**How to identify the barrier?**
Relevant and updated scientific evidence not (readily) available	*Is there a view on the actors who produce evidence, and are there (established or formal) connections in place to transfer or access knowledge?* *Does evidence exist or is there a need for more research, or research on methods, tools and approaches to collect (better) data?*
Evidence mismatch	*Is evidence communicated clearly to policy-makers, and translated from a science context to a policy context? Does this take into account the fundamental difference between scientific values and the orientation of policy-makers?* *Have diverging views between scientist and (local) communities or state institutions on (coastal and marine) resource management and implementation been discussed/considered?*
Evidence not used	*To what extent are users able and willing to rely on scientific evidence? Is there resistance, skepticism towards/are there doubts about the evidence or knowledge producers?* *Is there scientific consensus about the evidence or does it allow for interpretation and discussion?*
Competition and technocracy	*To what extent does scientific evidence correspond to or align with other types of knowledge, such as experience-based expertise or technical insights by stakeholders?* *Is the evidence from scientific research integrated with other knowledge types, and on platforms where (dominant) perceptions in the field are expressed?*
Enabler	**How to optimize the enabler?**
Integrated evidence	*Is there a balance between social science evidence and evidence from the natural sciences, and are insights from both sources available?* *Is the evidence interdisciplinary or even transdisciplinary?* *Are there initiatives to enhance social-ecological systems approaches and integrate social and ecological domains?*
Synergies with other types of evidence	*Are there connections (or attempts to establish linkages) between the scientific community and other types of stakeholders?* *To what extent is evidence visible to others, is it accepted and does it increase awareness or resistance among stakeholders? Is evidence communicated to stakeholders and are shared narratives created?* *Are innovative tools such as foresight or e-tools used to integrate scientific evidence with other types of knowledge?*

In some of the BGG cases, scientific evidence and expertise are only partially considered or integrated into the policy process, whereas in others scientific evidence is incorporated more strongly or systematically.

The text box illustrates the varying reliance on existing scientific knowledge in two Spanish case studies.

BGG Valencia and Canary Islands case studies: varying reliance on existing scientific knowledge
In the Case of the Canary Islands, the regional government surrounds itself with several advisory committees. The advisory bodies set up by the regional government are permanent or semi-permanent structures through which it receives input for policies to strengthen decisions. Some advisory committees in the Canarian regional government, such as the 'Climate Change Committee', are purely scientific in nature. They are composed only of scientists or academic researchers that provide scientific advice to the government. In contrast, the nature conservation committee and Agenda 2030 Committee a mixed type of advisory body. Next to scientists, it also counts other stakeholders among its members and as such it provides a different type of advice to the regional government. This exemplifies that scientific evidence often competes with other types of input (https://www.gobiernodecanarias.org/agendacanaria2030/).

Concerning the Albufera (one of the wetlands studied in the Case of the Valencian Community), the local and regional governments, together with the University of Valencia set up the Estación Biológica ICBIBE dedicated to conducting and communicating scientific research in the region, as well as a committee to follow-up its activities. One of its goals is to bring the two communities (scientists and policy-makers) closer together. Nevertheless, members from academia signal that, even when initiated and funded by the government, the results of scientific investigations are often not taken into account. In this case, it appears that scientific advice competes with other interest and inputs coming from different types of stakeholders. Another formal structure of coordination, similar to structures in other wetlands in the country, includes representatives from the main institutions (municipalities, regional governments) and large stakeholder organizations, such as agriculture, tourism and fishery industries. This formal structure fosters stakeholder engagement and leads to agreements about policies. It is unclear to what extent scientific evidence is incorporated into the discussions in this coordination structure and the degree to which it feeds into policy decisions. (https://www.uv.es/uvweb/instituto-universitario-cavanilles-biodiversidad-biologia-evolutiva/es/instituto-cavanilles-biodiversidad-biologia-evolutiva-1285893448913.html)

3.3. Policy recommendations

While it is assumed that policies will be better when informed by evidence from research, the connection between scientific evidence and policy-making is not self-evident and has in fact never been easy. Science-for-policy ecosystems rarely function optimally and the transfer of knowledge from one type of 'community' to the other is hampered by several factors. Some actors have even pointed to a large gap between science and policy communities.

Our recommendations relate to the supply and demand of scientific evidence in the governance system.

To achieve a better uptake and use of evidence in the governance system, it is relevant to:

- ✓ Promote cooperation between the natural and social sciences and connect experts with all types of relevant information (databases, local knowledge).
- ✓ Establish collaborations between researchers and local actors (e.g. via knowledge platforms where they interact on a regular basis) to facilitate the incorporation of the perceptions, values and knowledge of local communities.
- ✓ Invest in expertise on research approaches, methods and tools to effectively connect science with local communities, to create relevant new evidence and to keep existing data and knowledge updated.
- ✓ To support this effort, researchers can also deploy innovative tools such as foresight studies or e-tools.

In addition, we derive the following recommendations from the literature review relating to or targeting the supply side of scientific evidence in the governance system:

- ✓ Translate evidence from a science context into a policy context thereby taking into account the fundamental difference between scientific values and the orientation of policy-makers, or the diverging views on (coastal and marine) resource management and implementation.
- ✓ Strengthening connections in the science-policy interface to overcome resistance or skepticism among users about scientific evidence.
- ✓ Increase their receptiveness through dialogue and shared problem definitions. Rather than being seen as contrasting to political decisions, evidence can be used as the frame within which political decisions take place.

4. PARTICIPATORY PRACTICES AND STAKEHOLDER INVOLVEMENT

4.1. What is it, why is it important?

Inclusive and participatory approaches are widely considered as a necessary condition for effective plans and policies. Such approaches are therefore also strongly promoted and discussed in academic as well as applied works. Participation is important for normative reasons, but it also serves instrumental purposes. It ensures a diversity of insights and knowledge in the policy process with a view to creating support and mutual trust, and can therefore help set up more effective and robust governance systems.

The multi-actor nature of marine and coastal governance systems makes it challenging to design or set up sound participatory practices and stakeholder involvement. This is not only because of the varying locations of these actors (within the governance system, but also geographically) but challenges equally flow from the variegated nature of their views, interests, and ideas. As such stakeholder involvement and participation in (and influence on) policies can take different shapes and forms.

4.2. Barriers and enablers

Despite being strongly promoted, many studies have shown a gap between the rhetoric and reality of participation. They suggest that participation is often limited or does not bring forth the positive effects hoped for. Where a stakeholder involvement process formally exists, it may be established only on paper, or prove inconsistent (e.g., a committee that never meets in practice). In addition, processes can lead to discrepancies in stakeholder empowerment, and hence power imbalance, especially when not all categories of stakeholders are accounted for, or when a category of stakeholders is more heavily represented than other groups.

Studies highlight the importance of creating and leveraging networks, through multiple sectors and stakeholders, whether at local level or transboundary level. A holistic approach to stakeholder involvement can facilitate the integration of diverse values in marine and coastal governance. When stakeholders' views are not accounted for, it can lead to a lack of social acceptance of the measures they are adopted or likely to be adopted. Participatory approaches that are inclusive and lead to jointly agreed solutions can, on the other hand, be viewed as enablers, especially if they benefit the surrounding communities, taking into account the social and economic vulnerabilities of coastal communities (Day (née Nicholson-Cole) et al., 2015). Other aspects include the need to ensure appropriate resources (financial and human resources) to support governance initiatives and resulting solutions. Communication is also considered key, as its words have the power to alienate or, on the contrary, contribute to change, notably by changing the narratives and discourses. Nonetheless, stakeholders may be unwilling to get involved or unwilling to compromise. In that latter case, emphasizing similarities and ignoring dissimilarities can help achieve agreement (Aukes et al., 2020).

Table 3 provides a concise overview of barriers and enablers from the literature review, and offers guiding questions to identify them. In this way, barriers can be avoided and enablers exploited.

Table 3 – Barriers and enablers for stakeholder involvement

Barrier	**How to identify the barrier?**
Participation in practice is lacking	*Does participation only exist on paper? Are meetings held, are power imbalances mitigated, are all categories of stakeholders accounted for?*
Unwillingness to engage	*How do stakeholders perceive public institutions and science?* *To what extent is there trust, resistance, skepticism or wariness towards stakeholder involvement?* *Has the possibility of stakeholder fatigue been taken into account?*
Lack of knowledge about stakeholders	*How do stakeholders perceive risks in marine and coastal problems and what are their values and interests?* *Is there any research or are there any views on stakeholders' perceptions and interests?*
Insufficient resources	*Are there sufficient resources at the financial and personnel level to ensure sustained initiatives?* *Have resources been set aside to help vulnerable communities adapt to changes?*
Enabler	**How to optimize the enabler?**
Stakeholder networks	*Do networks of multi-sector and multi-stakeholders exist or have there been attempts to establish them?* *At which government level are these platforms located and how are they coordinated?* *What are the aims of these networks and do members share these goals?*
Holistic approach	*Are different types of stakeholders involved?* *Are vulnerable groups present and to what extent are actors that are difficult to reach or engage involved or considered?* *Are diverse values represented and taken up in discussions?*
Create shared understandings	*To what extent do participation processes (attempt to) lead to jointly agreed solutions?* *Are shared narratives created?* *To what extent are local communities' grievances and worries answered?* *And how is scientific evidence incorporated and presented in discussions?*

We present in more detail two case studies that highlight, each in their own way, the importance of stakeholder involvement.

The Isle of Wight UNESCO Biosphere was founded after the United Kingdom's departure from the European Union. The island's unique habitats and ecological heritage were at risk of a rollback of regulatory protections previously provided under EU frameworks. A key priority in the case study has been the inclusion of a diverse range of stakeholders in the decision-making process in response to the tension between environmental priorities, economic stability and community well-being.

Isle of Wight Case: A Journey to Harmonize Coastal Governance
One of the challenges relates to the implementation of sustainable coastal management policies. The island's evolving coastline increases the risks posed by sea level rise and coastal erosion, yet some stakeholders feel more need to protect vulnerable coastal developments and infrastructure whereas others prioritize long-term environmental sustainability. The diverging views of conservationists, local businesses, residents and government bodies results in fragmented governance. Moreover, the island's social fabric is fragile and the local community, still reeling from the effects of the COVID-19 pandemic and the ongoing "Cost of Living Crisis", harbors a deep mistrust toward local authorities, which has made it difficult to gain support for new initiatives related to the Biosphere (https://iwbiosphere.org/).

Despite the challenges for stakeholder involvement, there are also significant enablers that offer hope for institutional change. The case boasts proactive and engaged stakeholder groups, committed to positive change. These groups, often born out of grassroots efforts, have become vital allies in the push for more robust environmental protections and better management strategies. Conflict resolution mechanisms between different types of stakeholders have been developed to foster dialogue and collaboration. Such mechanisms help to build trust and reduce resistance to change.
In addition, there is a growing recognition that social challenges can be addressed via the Biosphere. Its framework is relied upon to (help) tackle issues such as youth outmigration, economic disparity, and the seasonal nature of employment on the island. Efforts to build and strengthen coalitions between land and sea stakeholders further ensure that voices are heard in the development of new policies. At the same time, research initiatives on the ecological condition and potential ecosystem services of the island's coastal habitats provide a scientific foundation for policy decisions and management strategies tailored to the needs of the Isle of Wight. Finally, by securing crucial long-term financial support, the Isle of Wight can continue to protect its natural environment while also addressing the social and economic needs of its community.

In addition, we focus in the Western Scheldt region on the political and administrative framework to exemplify the importance of broad stakeholder involvement. This case illustrates that the reach towards different types of actors including local and regional public institutions fits with a long-standing need and tradition to establish political and societal consensus.

Western Scheldt Case: Institutionalized stakeholder involved in consensus-based political systems
In the cross-border case of the Western Scheldt, the Flemish-Dutch Scheldt Commission (FDSC) plays a pivotal role in translating high-level political ambitions into administrative and technical measures (https://vnsc.eu/). Cooperation in this area between Flanders and the Netherlands has existed for several decades aimed at enhancing the safety, accessibility and natural diversity of the Scheldt estuary. In 2005, however, an official treaty between the two regions laid the foundations for the FDSC which was established in 2008. It is composed of high-level political and administrative representatives from authorities from both Flanders and the Netherlands who reach joint agreements on mutual or separate interests, for instance, on the deepening of the Western Scheldt by the Dutch to ensure the port of Antwerp in Belgium is accessible for all ships. Importantly, the FDSC includes a Scheldt Council which acts as a permanent advisory body to the commission. The Council is composed of various stakeholder groups: port authorities, environmental and agricultural organizations, as well as representatives from regional and local governments in Flanders and the Netherlands. Its composition and working procedures underscore the relevance of broad stakeholder involvement to increase the quality of decisions and simultaneously strengthen the support for and feasibility of cross-border policies.
In a similar way, the Flemish Sigmaplan has been set up and implemented in the Flemish Western Scheldt case. The plan integrates flood protection and risk management with nature conservation measures aligning with EU Birds and Habitats Directive regulations. Its implementation crosses sectoral boundaries. Two regional authorities in Flanders are responsible, i.e. the Flemish Waterway Authority and the Agency for Nature and Forest, although interactions with stakeholders are deemed crucial for policy success (https://www.sigmaplan.be/en). Of significance was the compensation mechanism for farmers included and expanded in a recent revision of the plan, so as to recover open space. This measure has mitigated much of the potential organized societal opposition to the controlled flood areas in the Sigmaplan. The (renewed) Sigmaplan and related measures was also part of a broader consultation round, in line with Flanders being a consensus democracy with neo-corporatist traits: Several Flemish institutionalized advisory bodies played a role in the case. Predominantly composed of societal stakeholders, these bodies have a formal mandate to advise on key policies. In a (joint) advice, the Flemish advisory bodies for Nature and Environment; Agriculture; and Socio-Economic policies pointed to several significant obstacles for the implementation of the plan. Most notably, the lack of a dedicated and structural fund for its implementation and the need to include updated scientific insights on climate change (Minaraad, 2019). Increased risks of droughts and extreme weather events, such as the devastating floods seen in Wallonia in 2021, raise fundamental questions about the future direction of flood risk management in the region. Should the focus remain on traditional measures like dike heightening and controlled flood areas, or is it time to reconsider more radical solutions, such as a storm surge barrier? This will not be a decision made by public institutions alone.

4.3. Policy recommendations

Despite being strongly promoted in the literature on marine and coastal governance, many studies still find stakeholder involvement lacking. Challenges arise from the large variety of stakeholders, who are located at various scales and bring different views, ideas, values, knowledge and capacities to the table. Taking into account that stakeholder involvement and participation in governance systems (and their subsequent influence on policies) comes in different shapes and forms, we formulate the following recommendations to address power-dynamics, levels of trust, consideration of scientific knowledge and robust connections with other actors.

- ✓ Mechanisms for inter-institutional cooperation and coordination between actors should be institutionalized and effectively deployed (not just existing on paper). They should be relied on in the governance process, especially where competencies are fragmented or overlapping.
- ✓ It is of relevance to create and leverage networks among various stakeholders at local or transboundary levels to address the diverse values of marine and coastal governance.
- ✓ Participatory approaches should in essence be inclusive (multi-stakeholder, multi-sector) and lead to jointly agreed solutions. Key elements include: establishing common (long-term) goals, incorporating the views of all stakeholders, and highlighting similarities rather than differences.
- ✓ Stakeholders' narratives, discourses and perceptions need to be accounted for. These are place-specific, yet they determine local priorities and preferences and can as such inform strategic planning and funding priorities.

On a more technical-operational level, the following additional recommendations can be made:

- ✓ Public institutions need to develop and strengthen their competencies to ensure robust engagement with stakeholders, to effectively implement solutions and follow-up these results and engagements.
- ✓ Resources need to be allocated to effectively support governance initiatives and help stakeholders address changes and impacts from adaptation measures. This goes in particular for vulnerable communities.
- ✓ Enhancing and adjusting communication and awareness efforts can increase the acceptance and legitimacy of policy initiatives. This includes paying attention to the terminology used, but also understanding and leveraging public perceptions to frame messages more adequately (taking into account the targeted audience).
- ✓ Ensuring sufficient financial resources is crucial to create sustained engagement and avoid that stakeholder involvement mechanisms are at the mercy of funding cycles.

5. THE DEVELOPMENT AND USE OF STRATEGIC FORESIGHT

5.1. What is it, why is it important?

The current literature on coastal and ocean governance clearly argues for adaptive governance systems. This implies that governance systems can respond adequately to social, physical and ecological changes. For that reason, adaptive governance can build on the development and use of strategic foresight. Foresight is a tool that fosters future-proof policies and visioning, and pro-active policy action. It can be distinguished from other types of evidence for policy as it explicitly incorporates a long-term view and policy horizons of twenty, fifty and, in some cases even a hundred years (Fobé & Brans, 2011). Accordingly, it is aimed at assessing *possible* future developments through the application of methods such as scenario analysis, expert panels, backcasting, trend analysis, and extrapolation. The evidence produced via these methods need not be based on scientific or highly quantitative insights alone but can equally draw on qualitative and creative assessments from stakeholders and actors with experience-based expertise (Ramieri et al., 2024).

The long-term and integrated perspective for policy is very relevant within the context of marine and coastal governance, particularly because of climate change with its impact on and interactions with biodiversity loss and water status. This necessitates a view on long-term changes and effects in marine and coastal areas and the development of visions, scenarios and policy alternatives on how to overcome them.

5.2. Barriers and enablers?

The expanding time horizon in foresight implies that scientific and policy uncertainties increase. The main challenge is to deal with the uncertainties that mark the future. This applies to both the *development* of foresight and *its use* in the policy-making process. Firstly, as to the development of foresight, one challenge stems from the fact that information about future developments and trends is not always available, or that it remains limited to sector-specific issues rather than focusing on integrated perspectives (Muccitelli et al., 2023). Another challenge to the development of foresight is its mixed methods approach, focusing on different aspects and their interrelations and involving a wide range of actors and stakeholders – including policy-makers themselves. Such approaches provide a more comprehensive and completer understanding of social-ecological systems (Blenckner et al., 2015; Ramieri et al., 2024). However, they are hard to set up and achieve even when they are to be preferred over approaches that focus on single issues and are mainly expert driven.

Secondly, as to its use, there is discordance between the time horizon of foresight on the one hand, and the time perspective applied in policy-making processes on the other hand. This tension merits further attention as a barrier to the development and use of foresight, especially considering that solutions that focus only on the short-term might create new path-dependencies and lock-ins that make changes towards the long-term perspective more difficult (Van Hoof et al., 2019). In addition, short-term solutions often tend to focus on (typical) technical solutions, while long-term perspectives might require the incorporation of social and institutional changes and considerations as well. For example, investments in flood-risk approaches that offer safety in the short-term, may not be adequate in the long-term and, moreover, can prove difficult and costly to adapt to sea-level rising that requires rigorous measures.

The development and use of strategic foresight can be facilitated through institutional changes, for example, by ensuring that foresight is indeed a part of formal planning and policy processes, or by setting up dedicated units, organizations or departments that develop foresight in relation to different domains and different challenges. Similarly, learning processes can familiarize stakeholders with foresight methods and results to facilitate use. Moreover, the gap between long-term perspectives of its results and the shorter-term within which policy-makers operate can be bridged through learning processes, backcasting and an exploration of the required measures, policies, regulations and so on, for a vision to occur (Krauss, 2020).

The overview in Table 4 highlights important barriers and enablers in the literature review. The guiding questions can help identify barriers and enablers. This can help avoid the former and exploit the latter.

Table 4 – Barriers and enablers for the development and use of strategic foresight

Barrier	**How to identify barrier**
Superficial forecasting	*Are the dynamics between the land and the sea included?* *To what extent are interconnections of land and marine systems included?*
Using incomplete information and methods	*To what extent are single issues covered, rather than integrative and comprehensive issues?* *To what extent are narratives being developed and scenarios for future development explored, in addition to scientific evidence being incorporated?*
Limited stakeholder involvement	*Which actors are involved in the foresight?* *How inclusive is foresight, and to what extent have different views from various stakeholders been considered?* *Have policy-makers been included in the exercise or are they aware of the initiative?*
No anticipation, no strategizing	*To what extent are the key steps and crucial milestones towards achieving goals and ambitions considered?*
Enabler	**Key question to exploit enabler**
Establish foresight practices and structures	*To what extent is foresight taken up in the formal policy process?* *Are there dedicated institutions within or outside government to conduct foresight?*
Facilitate learning and literacy	*Are policy-makers and stakeholders familiar with long-term visioning exercises and able to understand and deal with the uncertainties and complexities related to this?*
Bridging discordance in time horizon	*Which ways are explored to bridge the gap between short-term and long-term?* *Has backcasting been applied? Or have key steps and milestones been identified and defined?*

The Netherlands is internationally one of the forerunners in conducting and using foresight in policy-making. The Dutch case in the BGG project illustrates the relevance of foresight in marine and coastal governance.

Dutch Western Scheldt Case: A tradition of developing long-term visions for the future

Situated in the delta of major European rivers like the Rhine, Meuse, and Scheldt, the Netherlands has for a very long time had to anticipate and mitigate flood risks with a long-term view in mind. One of the main instruments through which this is achieved is the Dutch Delta Programme for the Twenty-first century (https://english.deltaprogramma.nl/).

The Delta Programme is updated at regular intervals on the basis of new insights and research results. The first programme was set up in 2011 following the recommendations in 2008 of the Delta Committee on how to make the Dutch flood protection system more resilient and maintain its freshwater supply in the following century. The third Delta Programme is expected for 2028-2033. Flood risk has from the start been one of the key issues in the Delta Programme. As climate change accelerates, sea levels rise and the frequency of extreme weather events increases, traditional methods of flood prevention, building dikes, dams, locks, and other technical infrastructures, are being put to the test. The inherent uncertainties about long-term future developments due to climate change require strategies different from traditional adaptation approaches. The Delta Programme is an attempt to move away from a purely responsive approach towards an anticipatory approach to possible future problems stemming from increasing flood risks. Central to this anticipatory approach is the development of scenarios. To be precise, the Delta Programme combines scenarios for geo-ecological change (climate change, sea level and subsidence) and socio-economic change (demography and economy) into four so-called delta scenarios for 2050 and 2100. The scenarios are made up of both qualitative narratives and quantitative data from indicators on the climate, water systems, water consumption and land use. The idea behind the scenario approach is that envisioning possible future outlooks can help identify necessary policy changes and assist in the development of differentiated flood risk management strategies. Thus, the scenario approach combines a long-term perspective with more short-term actions. In this way, foresight can help avoid that the Dutch will do too little too late to protect themselves from floods and maintain their freshwater supply.

5.3. Policy recommendations

Foresight can be an important stepping stone for effective longer-term governance of marine and coastal policies and a sustainable transformation of societies. It has both an instrumental and democratic function because it can strengthen policies and make governance systems more future proof, while at the same time increasing the support for these systems among policy actors and stakeholders. Although strategic foresight is regularly promoted, it is often characterized by limited approaches and not used in its full potential to inform coastal governance. Several issues remain relevant to achieve change in this dimension of the governance system.

In all, developing strategic foresight is only partly a matter of deploying available scientific expertise and establishing scientific knowledge and insights in the long-term. It is also a matter of mobilizing creativity and involving different stakeholders to ensure that various perspectives and views are accounted for, while considering the uncertainties and complexities of the policy environment.

Based on this, our recommendations are the following:

- ✓ Draw on foresight to apply a medium and long-term perspective in policy-making. Consider it a useful tool to establish an ambitious, comprehensive, yet operational and widely supported vision of the future based on clear perspectives, compact and believable information
- ✓ Create openness towards foresight studies and their results among all actors, and increase futures literacy through learning, so as to help actors deal with the uncertainties inherent to assessments with a long-term perspective.
- ✓ Apply mechanisms to bridge the gap between short- and long-term perspectives and (create more awareness of the need to) overcome the uncertainties in foresight. Drawing on backcasting and visualizing scenarios can be helpful in this regard.

- ✓ Foster inter- and transdisciplinary approaches and methods, and promote inclusiveness to develop robust scenarios of the future.
- ✓ Look for impactful changes at the structural level. This includes the establishment of formalized practices and institutions that can help achieve more interdisciplinary approaches and at the same time promote inclusiveness in a systematic and effective way.

6. THE USE OF E-GOVERNMENT TOOLS

6.1. What is it, why is it important?

A challenge for innovating marine and coastal governance lies in achieving digital transformation and adopting digital technologies. This includes initiatives to create digital platforms for better transparency and accessibility of environmental information, promoting the use of digital tools for monitoring and reporting on environmental policies. Similarly, digitalization can be sought to foster innovation in green technologies and support the integration of evidence and input from various stakeholders in decision-making processes (Casiano Flores & Crompvoets, 2023). Although the value of digitalization for the latter purpose is widely recognized, its practical application and implementation can vary greatly. For instance, digital tools are regularly integrated with participatory methods to engage with local or other stakeholders yet their nature and level of interaction can differ substantially.

In general, the European Commission emphasizes the need to ensure rapid connectivity, digital skills, privacy, safety, and the vulnerability and resilience of digital systems (European Commission, 2021). For marine and coastal governance, robust e-governance tools can help create innovative and at the same time more efficient, transparent, and participatory approaches that align with sustainability goals in key policies and the EU Green Deal.

6.2. Barriers and enablers?

E-governance progresses through several phases, including digitization where technological adoption and knowledge incorporation are key, transformation where changes to internal institutions and structures are central, engagement which is marked by enhancing stakeholder relationships, and contextualization which points to better alignment with public policies. Each phase has specific structural-technical and organizational barriers and enablers that shape the path and evolution to effective e-governance (Wilson & Mergel, 2022; Janowsky, 2015). However, setting up e-governance tools is not only dependent on purely technical or organizational aspects. An important barrier appears to be the inability to incorporate an ecological digital twin that fully models and predicts plausible consequences of human activities, since natural scientists are not as yet able to predict all aspects of the ecosystem and specific models still need to be developed. Furthermore, the use of e-governance tools faces barriers such as a lack of awareness and experience among end users and public institutions who have insufficient capacity to enforce regulation. Digital literacy and limited desire for online participation among users are equally mentioned as relevant barriers, as are very technical matters such as broken links, unfamiliarity with tools, bad internet connections. Furthermore, e-tools are not always the preferred option for users, for instance because they find them difficult to understand or cumbersome to use. This can lead to limited engagement and adoption, particularly from groups that are already difficult to reach (Schumacher et al., 2020).

Physical in-person meetings or face-to face interactions appear relevant spaces to engage with (local) actors, or to discuss the implementation of policy initiatives. This is also the case because digital technologies may not (always) be the most suitable tools to elicit emotions, have actors express their views openly and arrive at shared understandings about problems and solutions in marine and coastal governance. While integrated tools should enable information sharing, the literature further points to an overall lack of interoperability (Gómez-Ballesteros et al., 2021). It remains challenging to integrate data with different characteristics and provide a coherent picture under a multi-scalar approach (Ramieri et al., 2024). Nonetheless, shared data platforms and

Geographical Information System (GIS) models are considered crucial for effective governance (Li & Jay, 2023). The way data are published can influence perspectives, engagement and adoption of e-tools as well. It therefore remains a challenge to balance the full complexity of the natural environment with a user-friendly and easily comprehensible format. Linked to this is the additional challenge to bring together scientific data with stakeholder views. Even if stakeholder inputs differ from scientific data, the former do not invalidate the latter. Instead, scientific data can offer the frame within which discussion, visioning and societal choices can take place. Finally, it is noted that the successful development of e-tools on an experimental basis through scientific research is not always followed by broader implementation of the tool. The literature review suggests there may be more tools available that are not visible for policy-makers (Eynon & Margetts, 2007) because follow-up and broad integration of that tool is absent.

The overview in Table 5 presents the barriers and enablers in the literature review on e-governance tools. The questions can help identify barriers and enablers, which can assist to avoid the barriers and exploit the enablers.

Table 5 – Barriers and enablers for the use of e-government tools

Barrier	**How to identify the barrier?**
Digital incorporation of (scientific) data	*To what extent is evidence about the natural environment fully available and integrated into the concept of the e-tool?* *Is it possible to model and predict plausible consequences of human activities and incorporate this into a digital twin?*
Limited engagement	*To what extent were open collaboration concepts proposed or considered to facilitate digital stakeholder engagement?* *Is there political or administrative resistance to the development and adoption of e-tools?*
Digital divide	*Are e-tools designed to be user-friendly, inclusive and accessible to all?* *Are trust building criteria (i.e., integrity, transparency) effectively considered in the set-up of the e-tool and during its implementation?* *How do vulnerable stakeholders perceive the (use of) the tool?*
Technical issues and resources	*Are network connectivity, user friendly interfaces, and content in native languages considered?* *Was the implementation of middleware and technology standards considered, in terms of the time, resources and expertise necessary to achieve this?* *Were there considerations of reuse in the development of the tool?*
Enforcement Issues	*What are the challenges in enforcing legislation that supports e-governance instead of traditional governance tools?* *Is there sufficient capacity within the public sector to enforce legislation?*
Enabler	**How to identify the enabler?**
Lowering costs of stakeholder engagement	*Is the tool user-friendly and comprehensible while incorporating the full complexity of the natural environment behind the scenes?* *What initiatives were undertaken to motivate stakeholders (i.e., through convenience, information provision, and democratic dialogue etc.,) during the development of e-governance tools?* *Was the engagement of stakeholders through a physical interaction over a digital interface considered and is there a method and process in place to do so?*

Knowledge integration	*Are scientific data combined with stakeholder views? Have pitfalls in doing so been considered and can stakeholders interact with scientific data without invalidating it?* *Is integration of ecosystem models and e-tools considered and possible?* *Can AI be relied on to systematically assess and compile scientific knowledge into a database?*
Technical integration	*Is interoperability between e-tools and other data systems taken into account?* *Are integrated systems considered and possible, or do they already exist?*
Quick and easy to use in crises	*Are tools easily deployable during crisis situations (e.g. natural disasters, pandemics) to prioritize long-term policies over temporary solutions?*
Follow-up on developments	*Is there a network that coordinates or follows-up on e-gov developments?* *Are there connections between researchers and policy-makers to ensure take-up of e-tools in policy-making?*

The case study of the North Adriatic offers a good illustration on the usefulness and relevance of e-tools in various areas of the marine and coastal governance system.

North Adriatic Case: E-governance tools to foster efficiency, transparency and citizen engagement

The Adriatic-EUSAIR region, comprising Italy, Croatia, Bosnia and Herzegovina, Montenegro, Albania, and Greece, has been actively engaged in the implementation of e-governance tools to enhance administrative efficiency, transparency, and citizen engagement. One such tool in this region is the EUSAIR platform (https://esp.aimacroregion.eu/), directed at policymakers, stakeholders and organizations involved in regional development. Via the tool, actors can exchange ideas, plan joint initiatives and implement projects that benefit the region economically, socially, and environmentally. In particular, it fosters collaboration in the region within four main pillars: 'Blue Growth' to promote economic growth in marine and maritime sectors like fisheries, aquaculture, and tourism; 'Connecting the Region' to improve transport and energy networks; 'Environmental Quality' to protect the environment and ensuring sustainable development; and 'Sustainable Tourism' to foster tourism that preserves natural and cultural heritage.

Moving to the Italian experience, a range of innovative e-governance tools have been developed and applied, demonstrating the country's commitment to digital transformation and integrated governance. Italy's advancements in e-governance are exemplified by the implementation of GIS (Geographic Information System) tools for spatial planning, environmental management, and urban development. These tools enable local authorities to analyze geographic data, manage land use, and improve decision-making processes. Notable examples are SIT (Sistema Informativo Territoriale) and the National Geoportal. The former is a platform for regional coordination and planning via the integration of spatial data across sectors such as urban planning, transportation and environmental protection. The latter provides access to geospatial data to enhance the transparency of and public access to critical geographic information. In addition, numerous Italian municipalities and regions have adopted open data policies, making datasets available to the public to foster transparency, innovation, and civic engagement. Examples include the ARPA Veneto Geoportal (Geoportal of the Veneto Regional Agency for Environmental Prevention and Protection, https://gaia.arpa.veneto.it/) and the Geoportal of the Veneto Region (https://idt2.regione.veneto.it/). In the specific case of the Venice Lagoon, a Lagoon and Territorial Observatory was established in 2002 to collect and disseminate information on its environment, drainage basin, and surrounding coastal area. Partners can upload new content and layers of information into a website that serves as a collection of interactive maps enriched with text, tables, illustrations, and external databases, thereby covering various aspects of the lagoon environment, the territory, and the coastal area of Venice.

6.3. Policy recommendations

Digital technologies and the introduction of e-governance tools can be a crucial component of changing current governance systems and achieving systems that are more innovative, informed and adaptive in nature. In coastal and marine governance these tools can help achieve the sustainability goals in key policies areas and the EU Green Deal.

For this to happen, several recommendations can be derived from the insights offered by the literature.

- ✓ Take into account that scientific knowledge about human activities and their effects on the ecosystem is not fully available and therefore not be entirely incorporated into digital systems.
- ✓ Keep in mind that potential users of e-tools face various technical, administrative and psychological barriers to engage with and deploy digital tools on a sustained basis.
- ✓ Counter the digital divide via the practical setup of e-tools. Incorporate mechanisms and features to turn complex systems (behind the scenes) into interfaces that foster broad participation (including the involvement of vulnerable local communities).
- ✓ Take into account at the very start possible interoperability issues and look for ways to use and incorporate shared data platforms so as to integrate data with different characteristics in the most effective way.
- ✓ Build sufficient capacities and acquire adequate and sustained internal expertise to overcome enforcement issues.
- ✓ Create mechanisms and networks of experts that can follow-up the latest developments, flag potential useful e-tools and transfer the findings from scientific research into the governance system.

7. ACHIEVING INSTITUTIONAL CHANGE

In this paragraph we focus on *additional* barriers and enablers for institutional change as mentioned in the literature. These supplement the barriers and enablers identified along the five dimensions of the governance system. While the five dimensions above indicate the capacity of governance systems to respond to the complexities they face, achieving institutional change is challenging because **not all options for change are equally viable within and across these dimensions**. Different dependencies unique to each governance system influence their evolution. Taken together, these dependencies also create rigidities and flexibility for change that can be maintained or used as a lever for change.

It is relevant to emphasize these additional barriers and enablers to institutional change because they can help us **understand why it remains extremely challenging to change the governance system at a fundamental level**. Indeed, if change were easily achievable the steps towards change would have already been taken. To better understand the difficult trajectory towards institutional change, we rely on the evolution of governance as described by the Evolutionary Governance Theory - EGT (Beunen et al., 2022), the historical governance paths (Van Assche et al., 2024) and the specific "coastal condition" (Van Assche et al., 2020) as frameworks. They help delineate the overall narrative of how and why certain changes have occurred in certain governance systems and how they can hinder or foster future change in those systems. We first explain the context for change in governance systems beyond the five dimensions highlighted in the previous chapters and then identify the barriers and enablers for institutional change.

7.1. Why is it important? Institutional change within and beyond the five dimensions

Not all options for change in governance systems are equally viable.

- The first reason for this is that the current shape of the five dimensions results from past interactions and, in turn, defines possibilities for future courses of action.
- The second reason is that the five dimensions influence each other and that their interconnectedness also sets boundaries to change.

Figure 3 helps us to explain the first reason. The figure visualizes the current state of governance systems as the result of developments in that system over time, creating possibilities and impossibilities for change. The concept of a **governance path** is central to this evolution (Garud et al., 2010; Van Assche et al. 2021). The path is marked and stabilized by institutional changes (Pierson, 2010; Mahoney & Thelen, 2010). The figure suggests that the current situation within the five governance dimensions is the result of developments over time, defined by the legacy of interactions between institutions, organisational structures, forms of expertise, and other factors. It is important to **understand the current situation as it is the starting point for possible future changes** (Beunen & Patterson, 2021). The current shape of the five dimensions influences the development of new insights and ideas around them, thereby impacting future processes of planning, coordination, and decision-making and rendering some options or future courses of action more likely than others. For example, if a certain type of expertise in the scientific evidence dimension is already very prominent in a governance system (e.g. on coastal defense), it will be much more likely that this particular expertise is used. This means that decision-making will be directed towards solutions in line with that expertise, whereas newer forms of expertise might be overlooked or ignored, or expertise that is lacking might be difficult to be produced or brought in. Similar examples can be found in the other dimensions.

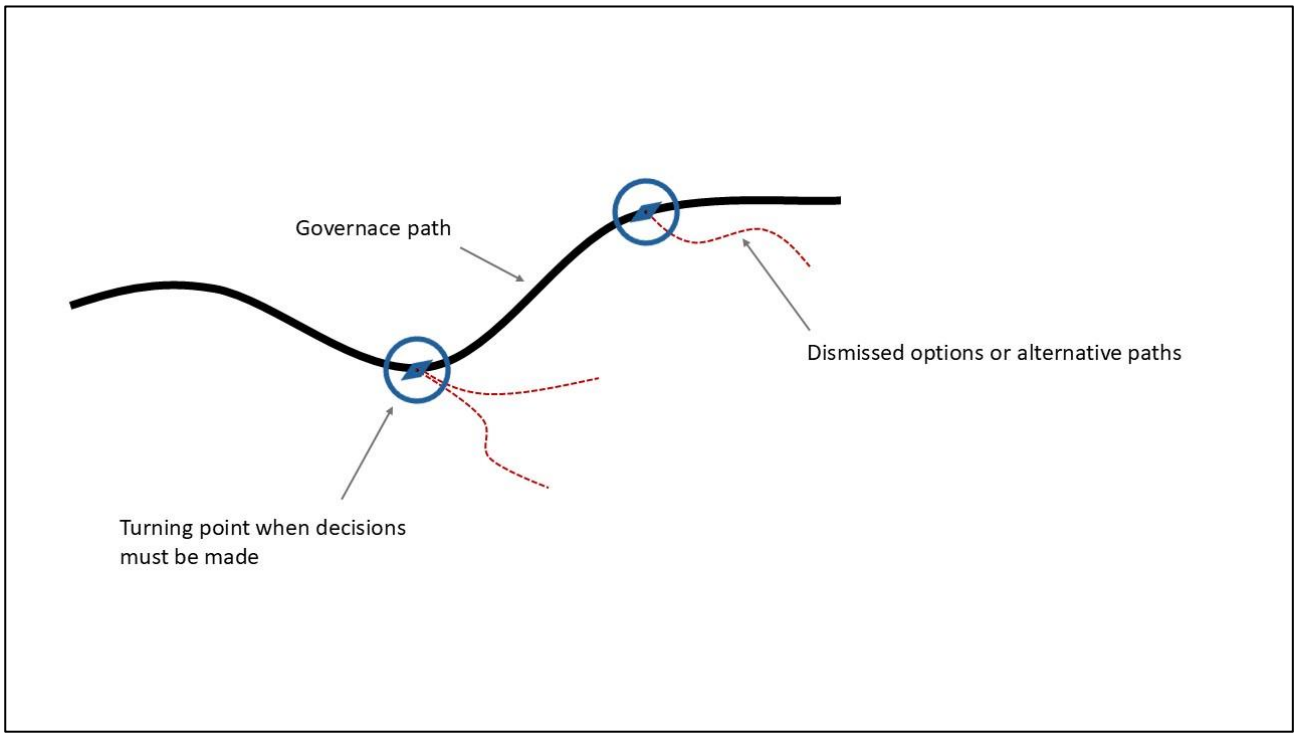

Figure 3 – Governance configurations and governance paths (Van Assche et al., 2024)

The viability of options for institutional change also varies for a second reason. The five dimensions are not stand-alone characteristics of governance systems, but they are inter-connected and likely impact each other. That is very clear from the conditions described in each chapter above. The **interconnected nature of the dimensions balances and delimits the possibilities for change**, so it is crucial to understand this context and take it into account. For instance, our report shows that forms of integration of land and sea are shaped by the forms of knowledge and expertise that are present in a governance system, while stakeholder interaction and participation depend on institutional arrangements or the fragmented and siloed nature of policies. The way strategic foresight is developed will also at least partly depend on available forms of expertise and integration. Similarly, governance systems that rely strongly on expert scientific knowledge as evidence for policy, might be challenged to, for instance, engage citizens in an active and meaningful way. A lack of scientific expertise and overreliance on stakeholder preferences may, in turn, lead to approaches that are ineffective because they fail to address the complexities of environmental systems and global challenges such as climate change.

7.2. Barriers and enablers flowing from dependencies

To better understand governance systems and the possibilities and limits for institutional change it is useful to get a good view of the different dependencies that shape them. In general, a distinction can be made between three types: path-dependencies, interdependencies and goal-dependencies (Van Assche et al., 2024). Although these dependencies will be unique for each governance system, some general findings can be distilled from the literature.

1. **Path dependencies** are legacies from the past which affect the functioning of governance in the present and the options for change. These dependencies tend to keep governance systems on a similar path.

Firstly, well-established **institutional frameworks** can resist reforms or adaptation, often because the status quo is preferred over uncertainties and shifts in costs and benefits as a result of change (Van Assche et al., 2021, Avid, 2007). These frameworks can be a barrier if they hamper sustainability transformation, but they are also important for keeping governance systems on a more sustainable path. **Economic interests and resource exploitation** can create lock-ins (Groen et al., 2023). This is a barrier when interests of specific industries or sectors are entrenched in governance structures, for instance, via dedicated departments that foster sectoral interests rather than the public good. Similarly, systems to allocate rights can form an obstacle to institutional change because they are considered a violation of these rights. Resistance to institutional change can come from politicians with tight relations to existing industries and vested interests. The **cultural and social norms of actors and key stakeholder** can be a barrier to change because of the expectations they create. Such expectations can be difficult to change, especially if they flow from economic or cultural identities of industries or local communities and are ingrained in past governance practices. In addition, **material dependencies** such as existing infrastructure and technological systems are often built on old paradigms, or to facilitate particular practices. Changing these systems can be costly and challenging. The same goes for the ecosystem itself which makes certain changes more likely than others. A final type of path-dependency stems from the **worldviews, knowledge and expertise** in and on coastal areas. Those views or the ways in which knowledge is organized and institutionalized can create barriers or opportunities for change. Strong traditions of integrative and long-term planning can enable the introduction of changes, whereas governance systems that are dominated by sectoral and disciplinary interests and views may resist change. Similarly, dominant types of expertise or engineering traditions can make it difficult to bring in new ideas and new perspectives. Data-collection and monitoring systems also create path-dependencies that hamper the integration of systems or the introduction of new ones. Some examples of these path dependencies are provided in Table 6.

Table 6 – Examples of path dependencies

Institutional frameworks	*European directives (such as the Birds and Habitats Directives, the Water Framework Directive, or the Marine Strategy Framework) have created path dependencies for important goals and strategies in coastal and marine governance (Bouwma et al., 2016).*
Economic interests; resource exploitation	*The historical emphasis on economic uses of coastal and marine resources has shaped governance systems. Their structures and institutions are strongly interwoven with important economic activities, like fishing or tourism (Van Tatenhove, 2011).*
Cultural and social norms; stakeholder expectations	*Deep-rooted cultural practices and social norms influence governance and resource use, as well as risk perceptions related to climate change impacts on coastal and marine governance.*
Material dependencies	*The ecosystem itself constitutes an important material dependency that makes certain changes more logic and easy than others.*
Worldviews, knowledge and expertise	*Knowledge and expertise about coastal systems is often fragmented, with experts and expert organizations often focusing on specific domains or sectors and either on land or on sea. This implies that new issues, such as climate change and land-sea interactions are considered and addressed in a particular way and from a specific perspective.*

2. The **interdependencies** in governance systems underscore the co-evolution and mutual influence of actors, institutions, and power/knowledge dynamics (Van Assche et al., 2017). In coastal and marine governance, the interdependencies between social and ecological

systems give rise to very specific challenges for policy integration and multi-level governance (Schlüter et al., 2020).

Regarding this type of dependence, we first find evidence in the literature on **institutional and organizational interdependencies** caused by the multiple policy domains, located at different levels of government in marine and coastal governance. There is a need for strong coordination, between a high number actors and with the involvement of relevant stakeholders. This often leads to a slow and resistant process of institutional change. There are also **dependencies between formal and informal institutions.** Institutional changes in policies and plans often depend on informal institutions, reflected in cultural and social practices. Changes to formal institutions are easier if they fit with the informal rules and norms in a community, whereas opposition is likely to occur if formal and informal institutions are seen as conflicting. The interconnected nature of marine and coastal ecosystems creates **environmental interdependencies** between different activities and between the various policies that govern these activities. All these interdependencies can be a reason to promote integrative approaches, but integration is often difficult because of various path-dependencies. Examples of interdependencies are given in Table 7.

Table 7 – Examples of interdependencies

Institutional and organizational interdependencies	*Governmental organizations thus depend on other departments or higher or lower levels of government in order to realize institutional change. Furthermore, they might depend on non-state actors for input, support, or means of implementation.*
Dependencies between formal -informal institutions	*Institutions that promote ecological protection and more sustainable forms of resource management might conflict with the views, norms and practices of local communities and their informal rules for managing the "their" coast.*
Environmental interdependencies	*Activities on land might impact the quality of coastal waters and related ecosystems. Sea-level rise poses challenges for activities on land. Policies promoting economic development might make it more difficult to achieve environmental goals, while environmental policy might imply restrictions for the use of land and sea.*

3. Various **goal dependencies** could be identified via the literature review. They concern the impact of visions, ambitions, and goals on the processes of institutional change (Van Assche et al, 2024).

Sustainability goals are often institutionalized and thus represent an important form of goal dependency. When goals are institutionalized in law, for example, in EU directives and national legislation, they can be a powerful driver for (national and local) governments to adapt existing institutions. Despite this power driver, the actual process of institutional change might unfold slowly and face many difficulties, because of other barriers mentioned above. There can also be a dependency resulting from **conflicting or misaligned goals** between or among public institutions and stakeholders, or following the disconnect between the overarching goals set by policymakers and the practical goals of implementing bodies. It becomes difficult to achieve institutional change when goals are not harmonized. **Outdated goals** may have been relevant at the time or their creation but are no longer appropriate. Institutions can set rigid, long-term goals that become locked in over time, leading to a reluctance or inability to adapt to new challenges or opportunities. Once specific goals are set and pursued, the success or partial success of those goals can create a dependency on continuing along the same path, even when it may no longer be the most effective approach. Competition between **short-term and long-term goals** creates a dependency too, because of the need to balance different objectives. This can impede institutional change if not managed properly.

International agreements, donor-driven projects, or external pressures can create a **dependence on external goals** for national or local institutions. This can limit the ability to pursue context-specific governance changes. Table 8 provides some illustrations of these goal dependencies.

Table 8 – Examples of goal dependencies

Sustainability goal dependencies	The Birds and Habitats Directives have been an important driver for better protection and management of coastal areas. The Marine Strategy Framework Directive promotes the development of national marine strategies and coordination between Member States (Trouwborst, & Dotinga, 2011).
Misaligned or conflicting goal dependencies	*Different stakeholders, such as government agencies, local communities, and industry stakeholders, often have conflicting goals which need to be resolved before any meaningful institutional change can occur.*
Outdated goal dependencies	*Many existing institutions have existed for a long time and were built around currently outdated goals. Changing these goals can be difficult and requires commitment from a broad range of actors in the longer term.*
Short-term versus long-term goal dependencies	*There is a tension between long-term goals (e.g. biodiversity conservation) on the one hand, and short-term economic policy goals (e.g. economic development) or political cycles (e.g. the need for short-term successes) on the other hand. This can lead to a focus on either narrow sectoral or immediate, visible outcomes rather than long-term sustainable governance changes. Such lock-ins hinder comprehensive reform.*
Dependence on external goals	*There is often a dependency on goals set by the EU or in international fora, such as those set by international treaties, which may differ from national perspective or not align with local needs or priorities, creating a challenge for institutional change.*

7.3. Policy recommendations to bring about institutional change

Taken together, the different dependencies create rigidities in governance systems. At the same time, they also create levels of flexibility for change. In that regard, it is important to mention that institutional stability can be useful to a certain degree to ensure effective and just forms of governance (Beunen & Patterson, 2019). Therefore, neither rigidity nor flexibility are necessarily positive or negative. Both should be assessed from the perspective of ambitions and goals that are pursued.

Since governance systems are shaped differently by the five dimensions and the various dependencies **a key step towards achieving change is to assess these dimensions,** and to take stock of the different positions that have emerged within them as the result of past interactions and the interrelations between the dimensions and their constitutive components. For example, the dimensions can vary in the degree to which they are tailored to integrated planning, equipped for conducting and using strategic foresight, relying on scientific analysis and advice, etc. In turn, this is shaped by the dependencies that are part of the historical development within the system.

Hence, understanding the dimensions and their context leads to useful **insights into the actual functioning of governance systems**. By knowing the main characteristics of each governance system, the barriers and enablers that are specifically tied to those systems can be unveiled and future courses of action decided upon.

Several elements need to be taken into account here:

- ✓ Processes of institutional change along the five dimensions are only partly driven by purposive actions. They can also result from ongoing patterns of interpretations and actions, and they are always shaped by various dependencies in the governance context.
- ✓ Reforms related to institutional change in any country, particularly those affecting the economy or environment, must thoroughly consider the nation's unique local and cultural contexts.
- ✓ While many linkages between the dimensions are possible, not much is known about how they interact and impact the overall capacity of governance systems to respond to social-ecological challenges.
- ✓ Changes in one dimension may negatively impact developments in another dimension. The balance between the dimensions is an essential consideration when assessing the state of affairs of governance systems and developing pathways towards future perspectives.

In addition, much of the reviewed literature starts from the assumption that more sustainable and integrative forms of governance are needed and that institutional changes are required to achieve this (Evans et al., 2023; Kelly et al., 2018; Gissi et al., 2019). The reported barriers and facilitators are identified from this perspective. This chapter in the report should however make it clear that **not all actors and stakeholders share the perspective for change.** Hence, the following considerations need to be made:

- ✓ Challenges and difficulties to achieve change emerge because views and interest on the need for and direction of change diverge among various stakeholders in the governance system.
- ✓ The multitude of perspectives, combined with the multi-layered and fragmented governance contexts makes coordination both necessary and difficult.

Nonetheless, we note that **change is already happening**. Over the decades, important EU policies have shown a **gradual shift** towards more ambitious environmental goals and more inclusive forms of governance. While these EU policies are important drivers for institutional change at national, regional and local level, their implementation remains a challenge.

- ✓ Developing long-term perspectives, working towards integrative plans, and bringing relevant actors and stakeholders together can all help in overcoming the different barriers.
- ✓ This requires political commitment, leadership, public support, knowledge, and sufficient resources.

8. GENERAL SUMMARY AND REFLECTION ON RECOMMENDATIONS

This report, with its structure along the five dimensions and the barriers and enablers therein, **aims to enrich existing frameworks for analyzing coastal governance**. Assessing the different dimensions that shape governance systems' capacity to respond to complex challenges is key to achieving change. Taking stock of the dimensions, the different positions that have emerged in different governance systems, as well as assessing the interrelations between the dimensions and their constitutive components, leads to useful insights into the actual functioning of governance systems. By knowing the main characteristics of each governance system, the specific barriers and enablers that are present in those systems can be unveiled and future courses of action decided upon.

- ✓ **Overall, our analysis of the literature reveals common aspects for institutional change across the five dimensions**.

These strongly relate to the challenges for sustainable and effective coastal and marine governance. Institutional change is particularly difficult because of coordination issues, unclear roles and mandates, fragmented data and knowledge, and power dynamics. One of the main challenges comes from the impossibility of having all beliefs, values, and interests reflected in institutions or taken up in platforms or other structures. Various studies show tensions between sustainability aims and economic interests and between perspectives embedded in national and international policies and those present in local communities. The literature also indicates that institutional change is not always needed and that implementation and enforcement of existing institutions can be an important focus of attention as well. This is particularly true for the various EU directives that set clear goals and frameworks but can only sort their intended effects if their implementation is improved.

- ✓ **While we have presented an overall view on barriers and enablers it should nonetheless be clear that each governance system is unique.**

The uniqueness of governance systems was elaborated upon in chapter 7. They are shaped differently by the five dimensions and positioned in various ways along them. Governance systems can, for example, be more or less tailored to integrated planning, or they can be equipped to a stronger or lesser degree for conducting and using strategic foresight, or scientific analysis and advice.

This implies that there are no one-size-fits-all solutions. Instead, achieving institutional change necessitates **tailored solutions and a context-specific approach**. Such an approach also needs to take into account that governance systems are legacies from the past, rendering institutional change difficult because of path dependencies, lock-ins, and vested interests of parties that do not see the benefits of proposed changes. Although for example, climate change and its impact urges changes in the ways coastal systems are managed, it is not easy to adjust institutions for this challenge. It requires openness to new perspectives and broad support for institutional changes.

- ✓ **We conclude that our policy recommendations need to be interpreted within the unique context of each governance system and tailored to the needs of that system.**

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