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RESEARCH

Institutional barriers constraining marine governance: A diagnostic approach

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Abstract
A growing body of literature has documented institutional barriers that constrain marine governance. However, research on institutional barriers is characterised by theoretical, conceptual and disciplinary fragmentation. This impairs case specific analysis and the development of cumulative insights. To address this challenge, we present a diagnostic approach to diagnose institutional barriers in marine governance. The approach takes a starting point in an earlier taxonomy of "institutional attributes", which represent different but not distinct functional aspects of institutions. Indicators of institutional dysfunction were defined for each attribute, and the list of indicators was subsequently grounded and extended through a systematic scoping review. The scoping review followed PRISMA guidelines and encompassed peer-reviewed articles reporting on institutional barriers in a marine policy context. Institutional problems were often associated with indicators of dysfunction within multiple institutional attributes, with indicators reflecting different aspects of the same problem complex. This motivated the development of a method to examine linkages between problems across different attributes. In a sample of 62 analysed articles, the most frequently reported barriers were associated with the attributes *Scale of Institutions*, *Development and Use of Knowledge* and *Actor Control*. These barriers were frequently characterized by specific indicators. For instance, "fragmentation" commonly appeared as an indicator for *Scale of Institutions*, while "data fragmentation" was common for *Development and Use of Knowledge*. The developed approach support identification of institutional barriers in new cases and provides a basis for further systematic reviews. To end, we identify avenues for further research.

Keywords Institutional barriers · Institutional attributes · Marine governance · Systematic scoping review · Europe

Introduction

Marine ecosystems are under increasing stress caused by a range of pressures such as accelerating biodiversity loss, impacts from human activities like fishing and sand extraction, widespread plastic pollution, and rising sea temperatures and acidification driven by climate change (van Noort et al. 2025). A transformative approach across governance levels, national boundaries, and policy domains is needed to reverse the current path of marine environmental deterioration (Schutter et al. 2025; van Leeuwen et al. 2025). In Europe, this imperative is evident in the European Union (EU), with regional and national policies being mobilized in recent decades to enable sustainability transformations. The European Green Deal (EC, 2019) integrates climate

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and environmental objectives across major EU policy areas and has directly driven the development of domain specific strategies and policies to support its goals. However, despite the ambitious aims of this policy, progress towards sustainability has been insufficient. Recognising the need to place further emphasis on marine spaces, the EU Commission launched the Ocean Pact (EC, 2025a) to support sustainability transitions for the European seas.

Institutions are critical to achieve the goals of policy initiatives such as the Green Deal and the Ocean Pact (van Noort et al. 2025). Institutions are key components of theoretical frameworks that provide for the analysis of environmental governance, including those of socioecological systems (Ostrom 2009), interactive governance (Kooiman et al., 2008), as well as "governance arrangements", which refer to the temporary organization and substance of a policy domain (Van Tatenhove 2013; van Noort et al. 2025). Institutions can be generally defined as "a relatively stable collection of practices and rules defining appropriate behavior for specific groups of actors in specific situations" (March and Olsen 1998, 948). Institutions can be formal, such as legal frameworks and regulations. They can also be informal, involving highly routinised, but not formally codified, practices. Following Hodgson (2006), organizations are special types of institutions, which include criteria that separate members from non-members, and provide for a division of responsibility and authority. In the marine context, institutions refer to the formal and informal rules and organizations that shape how humans use, manage, protect and restore the seas and their resources (Jentoft 2004). Institutions provide the social structure that determines who makes decisions, how they are made, and what behaviors are allowed, expected or required, or prohibited at sea or at land-sea interfaces. The institutional perspective we present in this paper is thus embedded in a broader governance perspective. The notion of governance arrangements provides a focus on discourses, actors, processes of power (resources), and how interactions are formed through institutions. This focus makes it evident that the analysis of institutions is complex and subjected to limitations, as institutions cannot readily be analyzed in abstraction from their governance contexts. The embeddedness of institutions in a governance context also contributes to explaining why institutional reform may be challenging and subjected to constraints.

Institutions may function sub-optimally for solving the problems they were established to address. For example, an institution may be limited by its design. This is the case when a policy framework or a legal framework is understood to be subjected to gaps or inconsistencies, such as overlaps in institutional roles. The suitability of institutions may also be negatively affected by contextual changes. Hence, institutional barriers can stem from inadequacies of the institutional design (Ostrom 2005c), from changes in the governance system that the institutions are part of, or from changes in the system to be governed that undermines institutional functioning. As an illustration of the latter challenge, climate change may affect the distribution of fish stocks, which in turn may undermine the suitability of institutionalized resource allocation arrangements (Harte et al. 2019). Relevant to the focus of this work, institutional barriers are understood as distinct from other barriers that may prevent policy achievement, such as barriers that concern human or monetary resource limitations, technical barriers, and physical barriers.

Institutional barriers are described and analysed in diverse scientific fields, with the common aim of addressing how institutions constrain the achievement of policy goals. However, research on institutional barriers is fragmented in different ways. First, the research on institutional barriers is characterized by theoretical diversity (Koning 2016). Differences in theoretical grounding can lead to differences in research focus and levels of analysis. For example, Elinor Ostrom's school of thought focuses on design principles and the ways in which communities can co-govern common resources without relying fully on state and/or market-based governance. In turn, Jan Kooiman's theory emphasises governance interactions between actors from state, industry, and civil society at multiple levels. Second, and linked to the first point, research on institutional barriers is characterized by conceptual diversity. For instance, what one author terms "institutional arthritis" (Young 2010) may appear closely related to what others refer to in terms of "path dependence" and "lock-in" (Mahoney 2000; Liebowitz and Margolis 1995) or institutional "stickiness" (Young 2001) or "inertia" (Aksom 2022). Third, the research literature on institutional barriers is dispersed over several scientific fields (Oberlack 2017), which impairs the potential for cross-case learning. On the background of this fragmentation, research on institutional barriers may benefit from the development of a focused approach.

This work aims to support systematic exploration and analysis of the presence and characteristics of institutional barriers in marine governance. This aim is addressed through two research objectives. Our primary objective is to present an analytical approach for diagnosing institutional barriers in diverse marine governance systems and governance arrangements. An important starting point for this work is the taxonomy of "institutional attributes" developed by Oberlack (2017) which we adapt, extend, and empirically ground through a systematic review of marine governance literature. Institutional attributes are understood as different, but not distinct, functional dimensions of institutions within which institutional barriers may arise and can be diagnosed. As our secondary research objective, the diagnostic

approach provides a basis for mapping of institutional barriers based on research literature. The mapping can serve to identify prevalent patterns and thus provide an improved basis for understanding important aspects of institutional barriers in marine governance. We note that the mapping of institutional barriers provided here is provisional.

The following sections present our theoretical point of departure, our methods, and the proposed diagnostic approach. We outline how the approach can be used and illustrate types of cumulative insights that may be generated from mapping institutional barriers reported in research literature. In the discussion and conclusions, we reflect on our findings and identify avenues for future research.

Understanding institutions: stability and change

Institutional barriers are here broadly conceived as manifestations of dysfunction that limit the problem-solving capacity of governance systems or governance arrangements. This involves a broad concept of institutions, such as the above quoted concept by March and Olsen (1998). Crawford and Ostrom (2005a) developed a syntax for "institutional statements", which is comprehensive as it includes "rules", "norms" and "shared strategies". The syntax is of relevance here, as it provides a starting point for identifying institutional attributes, to which impediments may apply. The types of institutional statements differ in terms of their functional properties. "Rules" are the most complex form of institutional statements and include specifications of the institutions in terms of the actors for whom the rules apply, the normative imperatives it utilizes (shall, ought to etc.), the mechanics of how it guides an action situation, the conditions that determine when it applies, and the consequences of noncompliance. "Norms" are simpler, as they do not specify consequences of noncompliance, and " shared strategies" are simpler than "norms", as they do not specify the conditions that determine when the institutions apply. Institutions, whether these are formal rules or informal norms, emerge and persist because they structure human behaviour and guide social interactions by providing clarity and predictability about who takes what role and responsibility in what situation, social practice, or context. To do this, institutions must be stable and robust but also need to adapt to external changes. While institutional stability therefore is a basic requirement for institutions to function, it may also limit the possibility for institutional change and adaptation.

Institutional theory seeks to explain how institutions shape the ways in which societal goals and policy outcomes are achieved, focusing on the critical factors which enable or constrain change, but the different schools of institutional thinking approach these issues differently (Koning 2016). Hall and Taylor (1996) provide an overview of the three 'new institutionalisms' (historical, rational choice and sociological). While sociological/normative institutionalists already emphasize shared meanings, norms and beliefs as key in shaping organisations (DiMaggio and Powell 1983), the explanatory power of ideas and discourses in forming institutions is further elaborated in discursive institutionalism (Schmidt 2008). Rational choice institutionalists argue that actors seek to maximize their benefits through the constraints and opportunities provided to them through institutions (North 1990), and historical institutionalists study how institutions evolve over time and how this shapes political outcomes, stressing path dependency and the importance of unintended outcomes (Wolfgang et al. 2019). In general, historical, rational choice and sociological institutionalism emphasize processes of stability (the forming of institutions), while facing problems to explain institutional change (Mahoney and Thelen, 2009; Van Tatenhove 2022).

Governance scholars also consider institutional stability and change but consider that state and market institutions may not always dominate. A key argument is that institutions can and should be designed to serve the needs and challenges faced by the people that they apply to. Elinor Ostrom's school of thought emphasizes polycentric governance, and is notably concerned with self-governance through local institutions, addressing how communities manage common-pool resources. Ostrom (2005a, b, c) developed a well-known set of design principles for institutions that are central to the governance of such resources. While governance scholars like Jan Kooiman, Svein Jentoft and Jan van Tatenhove also aim to go beyond governance dominated by state and market institutions, their focus is on studying interdependencies between state, market, and civil society actors at multiple levels. They provide understanding of the processes of institutionalization through a broad range of interactions between these actors, giving attention to how they communicate, negotiate, collaborate, contest, and decide. This scholarship is more conceptual and interpretative, emphasizing the need to understand how governance arrangements are enabled or constrained in delivering societal goals and policy outcomes, and how they evolve (Liefferink 2006; Van Tatenhove 2013; see also van Noort et al. 2025).

A vast and growing body of literature building on these schools has identified and described institutional barriers. We proceed from the assumption that it is possible and valuable to provide an overview of institutional barriers in the context of marine governance, and that such an overview can be provided despite the conceptual and theoretical diversity of the works that report on institutional barriers.

Table 1 Taxonomy of institutional attributes based on Oberlack (2017) and Ostrom (2005b,c). The attributes are listed to reflect a continuum from attributes that predominantly concern agency to attributes that predominantly concern structure

Attribute	Attribute description	References
Actor eligibility (A)	The set of eligible actors in action situations	Oberlack 2017; "Boundary rules" in Ostrom (2005b)
Actor roles and responsibilities (B)	The positions available to participants and the set of required, prohibited and allowed actions assigned to positions	Oberlack (2017); "Position rules" in Ostrom (2005b)
Actor control (C)	The control actors have over outcomes of action situations	Oberlack (2017). Combines "aggregation rules" and "control rules" in Ostrom (2005b)
Actor accountability (D)	The monitoring, evaluation, enforcement of responsibilities	Oberlack (2017)
Actor connectivity (E)	The connection of actors within and across multiple tiers of social organization	Oberlack (2017)
Conflict mechanisms (F)	The regulation, prevention or resolution of conflicting values and preferences	Oberlack (2017); "Conflict resolution mechanism" is a design principle for robust socio-ecological systems in Ostrom (2005c)
Development and use of knowledge (G)	The construction, communication, acceptance, communication and use of knowledge claims	Oberlack (2017). "Information rules" in Ostrom (2005c)
Scale of institutions (H)	The spatial and temporal implications of institutions	Relates to "scope rules" in Ostrom (2005b) and to design principles about "clearly defined boundaries" and "nested systems"
Rigidity of institutions (I)	The institutional constraint exerted by higher-order rules, transaction costs and path dependence	Oberlack (2017)
Formality of institutions (J)	The embeddedness of institutional statements in written laws, plans, or other official documents	Oberlack (2017)
Institutionalized incentives ($K^{\#}$)	The provision for institutionalized incentives for actors	"Payoff rules" in Ostrom (2005b)

To progress towards this goal, and proceeding from related work (Oberlack 2017; Ostrom 2005c), we develop a systematic approach to map and diagnose institutional barriers, by assigning them to functional aspects of institutions, and by developing a set of indicators for the barriers.

A taxonomy of institutional attributes

Ostrom (2005c) developed a comprehensive framework for Institutional Analysis and Development (IAD). As an element of that, Ostrom and Crawford (Ostrom 2005b) proposed a classification system for institutions based on how they apply to action situations, which are the social arenas where actors interact to address shared problems. This system classifies rules according to the following functional aspects: the positions actors take, the conditions for them to entering or leave the positions, and the choices available to them. Other types of rules determine how decisions are made, how information is developed and used, costs and benefits of actions, and the scope of outcomes of decisions.

The IAD framework comprised an important starting point for Oberlack (2017) when he developed an approach to diagnose institutional barriers in the context of climate change adaptation. As a component of his approach, Oberlack proposed a taxonomy of 10 institutional attributes, representing functional aspects of institutions.[1] The attributes do not constitute institutional barriers themselves but provide useful analytical categories for identifying and diagnosing barriers. To enhance its suitability for the present work, we adapted Oberlack's list of attributes, combining it with insights from the work of Ostrom (2005c) (Table 1).

With inspiration from Paavola's (2007) identification of generic functions in environmental governance, Oberlack (2017) included institutional attributes that are not part of Ostrom's rule classification approach. These attributes represent additional functional aspects of institutions that could impair governance systems and thus be relevant to mapping and diagnosing institutional barriers in marine governance. For instance, this includes two attributes, "rigidity of institutions" and "formality of institutions", which capture aspects of stability and change of institutions. Conversely, Ostrom's rule classification includes "pay-off rules" as a type, which is not included in Oberlack's list of attributes. In line with Ostrom's rationale, we added a new attribute

[1] We note that Ostrom (2005c) used the term "attribute" in a narrower sense than Oberlack (2017), as she used it to characterize the determinants of the actors that are affected by an institutional statement, a meaning which is closely related to first listed attribute "actor eligibility" in Oberlack's list of attributes. In this work, we follow Oberlack's broader use of the term "institutional attribute".

to capture institutional barriers related to institutionalized incentives, allowing barriers associated with incentives and policy objectives to be analysed more systematically. For instance, we anticipated that such a category would be required to account for barriers resulting from insufficient specification of policy objectives, a well-known challenge in the marine policy context (e.g. Brennan et al. 2014; Bastardie et al., 2021).

Indicators of institutional barriers

Oberlack (2017) identified 31 types of institutional barriers, which he organised according to his taxonomy of institutional attributes. We follow this approach with some adaptations.

As Oberlack pointed out, multiple institutional barriers can apply to a given institutional context at a given time. Barriers associated with different attributes may be linked with each other in the sense that they represent different aspects of the same problem complex. This entails the possibility of institutional barriers exerting reinforcing effects on governance performance, such that problems within one attribute deepens the effect of problems within other attributes. This opens for more complex forms of institutional barriers than what can be readily represented by Oberlack's list of institutional barriers. With this in mind, we took a different approach, which focused on identifying indicators of institutional barriers for each of the institutional attributes listed in Table 1. Indicators provide a flexible approach to mapping and diagnosing institutional barriers, since one or more indicators of barriers relating to one or more attributes can be assigned to characterize a given problem complex.

As a different point, the use of indicators may support systematic integration of insights from studies which individually may be characterized by uncertainty and interpretative flexibility. This may be important as institutional analysis is challenged by high complexity and/or may reflect normative dispositions of researchers. For instance, some researchers may emphasize institutional problems that others would interpret differently or consider less significant. Against this background, indicators are suited to the systematic compilation and analysis of *prima facie* evidence of institutional barriers and diagnostic patterns.

We first established a tentative list of indicators of institutional barriers based on our knowledge of institutional challenges marine governance and on targeted searches for articles describing well-established types of institutional barriers. This provided an initial idea of the aspects it would be relevant to include. We examined how our initial list of institutional barriers could be mapped onto institutional attributes. Subsequently, drawing on Oberlack's description of the institutional attributes and the institutional barriers that he listed under them, we developed a list of indicators of barriers for each attribute. We refined the formulation of indicators to improve internal consistency and to minimize overlaps. The resulting list of indicators was extended with additional indicators being identified through the literature review and is therefore presented in the results section (Table 2).

Methods

Systematic review

We conducted a systematic scoping review (Tricco et al 2018) to ground the presented approach to map and diagnose barriers, and to provide an overview of institutional barriers in a marine governance. A systematic scoping review is better suited than a systematic review of studies of institutional barriers studies because of the terminological and conceptual diversity of research on institutional barriers. To address this, we designed a search in Web of Science[2] with search terms to capture terms with similar meanings to "institutional" and "barriers" and "marine" (Fig. 1). The search returned articles that simultaneously provided least one listed alternative for "institutional" AND "barriers" AND "marine".

The scope of the research was restricted to a "public policy context" and to a "European marine and maritime context". This screening and selection was done manually by applying the following selection criterion:

To be included in the analysis, articles must describe or identify the evidenced impact of at least one institutional barrier within a European marine or maritime public policy context.

Each of the key terms were defined explicitly to operationalize the selection criterion (Online Resource 1: Annex 1). For instance, the term "public policy context" was operationalized with Jenkin's (1978) definition of policy as"… a set of interrelated decisions […] concerning the selection of goals and the means of achieving them within a specific situation'. "Public policy" was defined in contrast with "private policy", such as the internal "policy" of a commercial company. "European marine or maritime" was defined to refer to a marine or maritime phenomenon that is partly or fully located in the EEZ of at least one European country.

Figure 2 below presents a flow diagram of the selection process from Page et al. (2021). The list of articles included in the analysis is available (Online Resource 1: Annex 2).

[2] See query link for details: https://www.webofscience.com/wos/woscc/summary/138549d2-0ccd-4c2c-bf87-11a02de0ab95-82f8d85a/relevance/1

Table 2 List of institutional attributes and indicators of institutional barriers. The list was developed with a basis in Oberlack (2017) as explained in Section. 2.1 (Table 1) and Sect. 2.2. Four new indicators (*) were identified inductively based on the systematic review. #IB: The number of times institutional barriers were identified for an attribute. #IND: the number of times indicators of institutional barriers were identified for an attribute

ATTRIBUTE	#IB	INDICATORS OF INSTITUTIONAL BARRIERS	#IND
Actor Eligibility	*5*	▪ Lack of clarity about actor eligibility	2
		▪ Key actors excluded	4
		▪ Too many non-key actors involved	1
Actor roles and responsibilities	*13*	▪ Lack of clarity about positions and roles of actors	11
		▪ Limits on actors' capacity to act in specific times, or to specific issues	7
		▪ Competence creep (actors taking an institutional role for which they are not authorized)	0
Actor control	*25*	▪ Powerful actors (or coalitions) inappropriately control action situations	14
			15
		▪ Weak actors cannot influence institutions or policy outcomes	6
		▪ Tokenistic participation	1
		▪ Weak institutional provisions for leadership*	1
		▪ Unclear distribution of power and responsibilities*	
Actor accountability	*6*	▪ Lack of transparency in decision making processes	1
		▪ Absence of feedback mechanisms	0
		▪ Ineffective compliance and enforcement mechanisms (i.e. institutions not facing consequences when not fulfilling responsibilities)	5
Actor connectivity	*8*	▪ Poorly networked actors within and/or across tiers of social organization	8
Conflict mechanisms	*6*	▪ Conflicts among actors	4
		▪ Disputes over rules-in-use	4
		▪ Dispute settlement mechanisms lacking or ineffective	1
Development and use of knowledge	*29*	▪ Weak process(es) for reflexivity and institutional learning	9
		▪ Inappropriate science-policy interfaces	8
		▪ Exclusion or marginalization of relevant knowledge providers	10
		▪ Too many, too diverse, or not sufficiently relevant knowledge providers	4
			11
		▪ Data fragmentation: lack of coordination and organization of data processes resulting in a lack of harmonization and interoperability of data causing inefficiencies and gaps in knowledge production and use*	
Scale of institutions	*33*	▪ Mismatch between temporal and/or spatial scale of issue and institution	8
			32
		▪ Fragmentation: Disintegration or lack of coordination among different institutions or levels of governance, leading to inefficiencies and gaps	5
		▪ Insufficient division of institutions into manageable problem areas, leading to inefficiencies	
Rigidity of institutions	*14*	▪ Stickiness of institutions	7
		▪ Path dependency	13
		▪ Institutional drift	0
Formality of institutions	*7*	▪ Over-formalized institutions	1
		▪ Under-formalized institutions	6
Institutionalized incentives	*16*	▪ A lack of incentives of actors to engage in governance processes	5
		▪ Mis-alignment between incentives and objectives	11
		▪ Over-ambitious policy goals*	2
		▪ Poorly specified objectives*	8

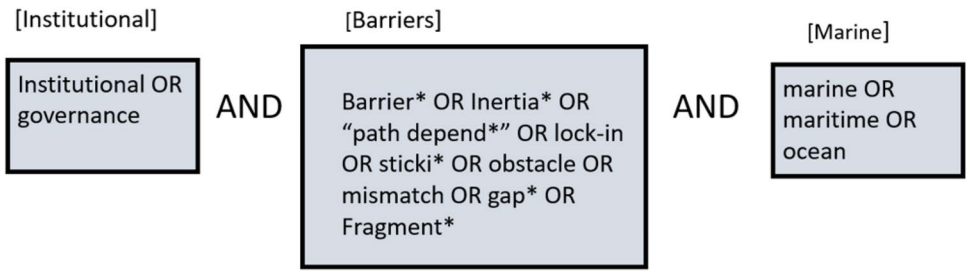


Fig. 1 Overview of Web of Science Search terms

The following general eligibility requirements were also applied in the selection of articles:

- Published in English in peer-reviewed journals
- Peer-reviewed standard articles and review articles, excluding data papers and conference proceedings

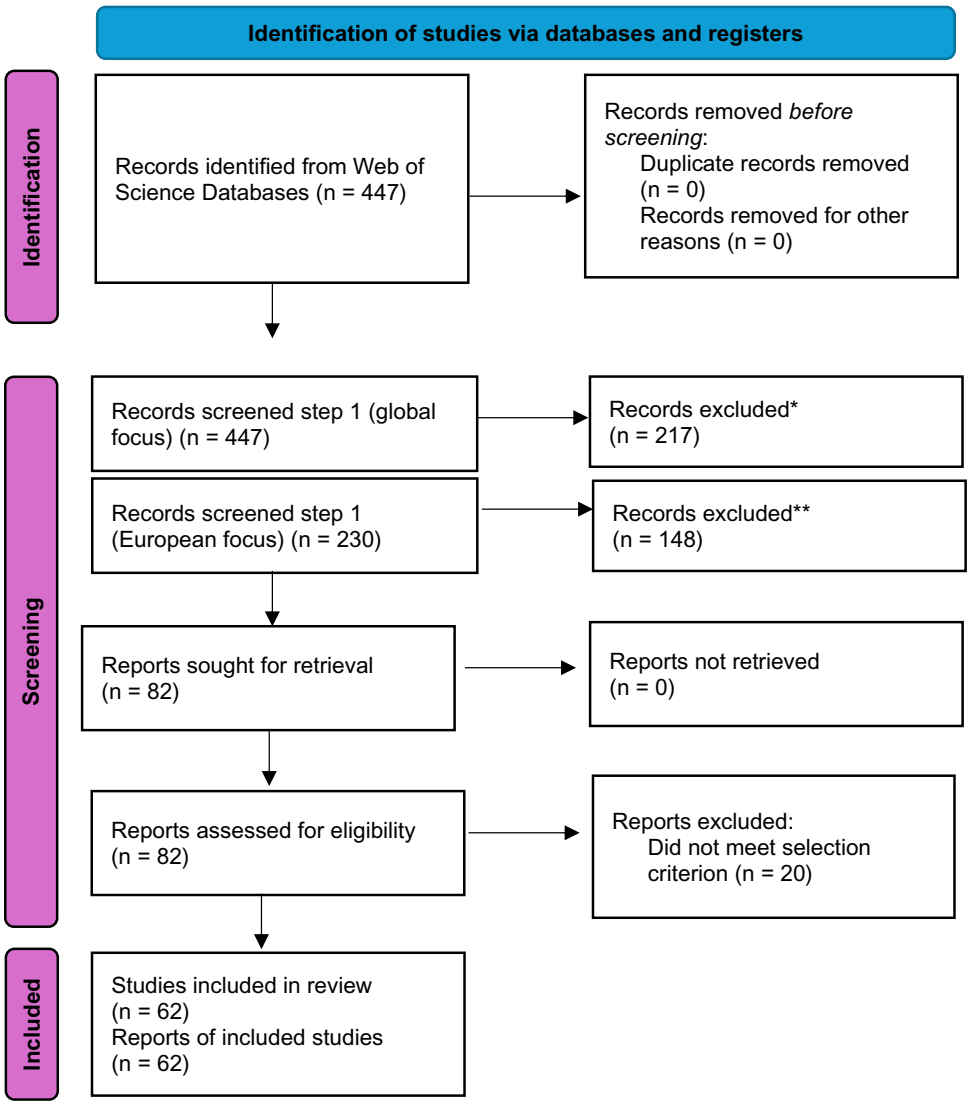


Fig. 2 Flow diagram of the selection process. *First step of screening of abstracts, titles and keywords. **Second step of screening abstracts, titles and keywords based on an additional geographical constraint, by which only articles that satisfy the selection criterion in terms in empirical cases from a European marine or maritime context were retained. The list of articles included in the analysis is available (Online Resource 1: Annex 2)

- Published in the period 2014–2022
- Open access publications

The eligibility requirements served to make the study feasible within the resource constraints for this study. The additional constraints for the scoping review are justified since the main purpose of this work is conceptual and methodological. We needed a sample of literature that was sufficient to probe the suitability of a taxonomy of institutional attributes and to ground and extend the list of indicators of institutional barriers. The sample of analysed articles (n = 62) is of a similar size to the sample analysed by Oberlack (n = 52) and was therefore found to be sufficient for the present purposes. The starting year for the literature sample was set to include the potential for articles addressing the thematically relevant European Maritime Spatial Planning Directive, which was adopted in 2014. The developed review protocol, the attributes, and the indicators provide a basis for further systematic reviews of institutional barriers in a European policy context and elsewhere, but this is beyond the scope of this work.

The articles were screened (title, abstract, keywords) in relation to the selection criterion. Each article was screened by at least two researchers using the Covidence platform.[3] which is developed to assist systematic review processes.

The analysed articles were assigned to the following "regimes": Aquaculture, Energy (renewable and non-renewable), Environment (biodiversity, ecosystem, climate change, pollution), Fisheries, Transport, Tourism, and Other. In many cases, the focus of the analysed articles involved two or more of these regimes. These were recorded as pertaining to "more than one" regime, and this category represented 42% of the analysed articles (Fig. 3). Among the articles for which the problem context was

[3] https://www.covidence.org/ (last visited 19.10.2026).

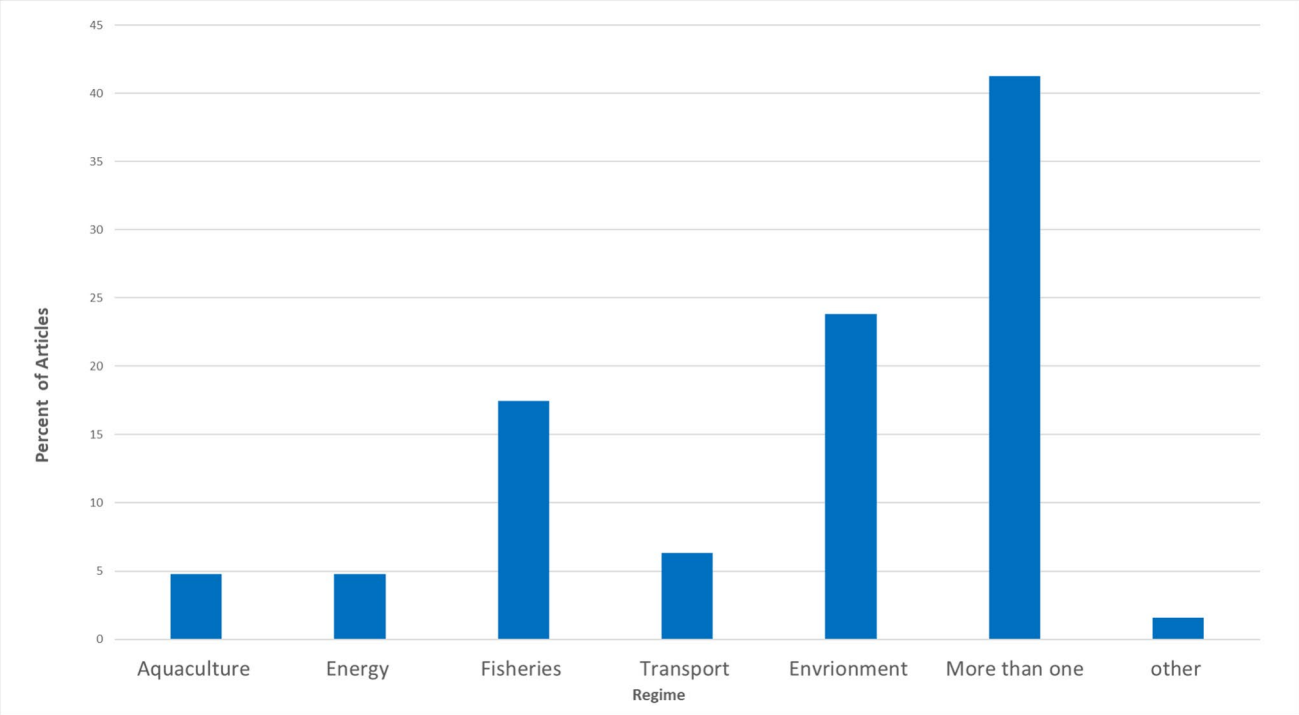


Fig. 3 Percentage of analysed articles (y-axis) by regime (x-axis)

assigned to a single regime, articles that addressed the Environment regime were most frequent (24%), followed by Fisheries (17%). No article was assigned to tourism alone. Articles reporting institutional problems relating to Transport, Aquaculture, Energy or Other issues were less frequent (7% or less).

Analysis of articles

The overall analytical approach involved describing and assigning institutional barriers to attributes (Table 1) and to associated indicators (Table 2). Following an analysis template (Online Resource: Annex 3), each article was systematically analysed and coded by two researchers. The researchers compared their analysis and resolved differences through discussion, or in some cases by arbitration from a third analyst.

Given resource constraints, we decided to analyse up to three barriers from each article, provided that the information for each barrier independently met all aspects of the selection criterion. A few articles reported on more than three institutional barriers that were judged to meet the selection criterion. For these, we selected and analysed the three barriers that were judged to best supported with evidence (Online Resource: Annex 3). This decision implies that the number of analysed barriers and assigned indicators is somewhat smaller than if this constraint had not been put in place, with implications for the secondary research objective of summarising insight from the structured review. However, the decision does not affect outcomes related to the primary research objective of presenting and grounding the diagnostic approach.

The quality of the evidence was assigned to four levels according to predefined criteria (Online Resource: Annex 3, Table 1). The levels of evidence were defined in terms of availability of empirical evidence or other types of support for the analysed institutional barriers. Institutional barriers that are judged to be supported by the lowest level of evidence were excluded from the analysis. The decision to limit the analysis to a maximum of three institutional barriers was motivated by resource constraints, as initial analysis of articles proved to be time consuming.

Reported institutional barriers are often not independent, but rather represent different dimensions of a problem. While this complicates the categorization of institutional barriers, it also provides an opportunity to develop insights about frequently co-occurring barriers. We accounted for this by developing an analytical approach to describe and analyse linkages between barriers.

Each barrier was analysed and described in detail, and linkages between barriers were identified and described when relevant. The following information was recorded: iInstitutional attribute; indicators; linkages between barriers; methods and quality of evidence of the barriers.

New indicators of institutional barriers were identified whenever the institutional barriers described in articles could not be attributed to the existing list of indicators. The geographical context of the described institutional barrier was

identified in terms of ICES' ecoregions (ICES 2023). If the relevant information was available, analysts also identified enabling factors and approaches to overcome the institutional barriers. Examples of the analysis of institutional barriers and their interlinkages are available (Online Resource 1: Annex 4).

Results

Institutional attributes and indicators of barriers

The central outcome of this work is a taxonomy of 11 institutional attributes and associated indicators of institutional dysfunction (Table 2). The attributes are not institutional barriers in themselves, but analytical categories that provide a basis for identifying and diagnosing institutional barriers. For each attribute, one or more indicators represent observable manifestations of institutional dysfunction. Institutional barriers are understood as governance problems arising from dysfunction within one or more attributes and are diagnosed through these indicators. Accordingly, the indicators provide a practical basis for identifying, analysing, and comparing institutional barriers within and across different marine governance contexts.

Some of the attributes involve the balancing of opposing concerns. For instance, an institutional barrier regarding Actor Eligibility can arise when too many (non-key) actors are involved in governance processes, or when important actors are excluded. Similarly, institutions can either be over formalised or under formalised, and they can be too flexible or too rigid. For other attributes, institutional barriers represent a perception of an insufficiently developed institutional feature, for instance regarding mechanisms for dealing with conflict, clarity about roles and responsibilites, provisions that provide for accountability, and connectivity between actors.

Aggregated analysis of institutional barriers

62 articles were analysed systematically, resulting in a detailed analysis of 162 institutional barriers, and with 2.5 barriers analysed per article on average. A structured summary of the information is available (Online Resource 2).

The sample of analysed literature was sufficient to cover all institutional attributes and most indicators of barriers, but not sufficient for supporting a comprehensive quantitative analysis of relationships, e.g. between type of regime and certain types of institutional barriers or geographical contexts. Nevertheless, the analysed material permits tentative observations to be made.

Figure 4 displays the number of barriers analysed within each institutional attribute and the regimes that the barriers were reported for. Institutional barriers were most frequently analysed under the attribute Scale of Institutions

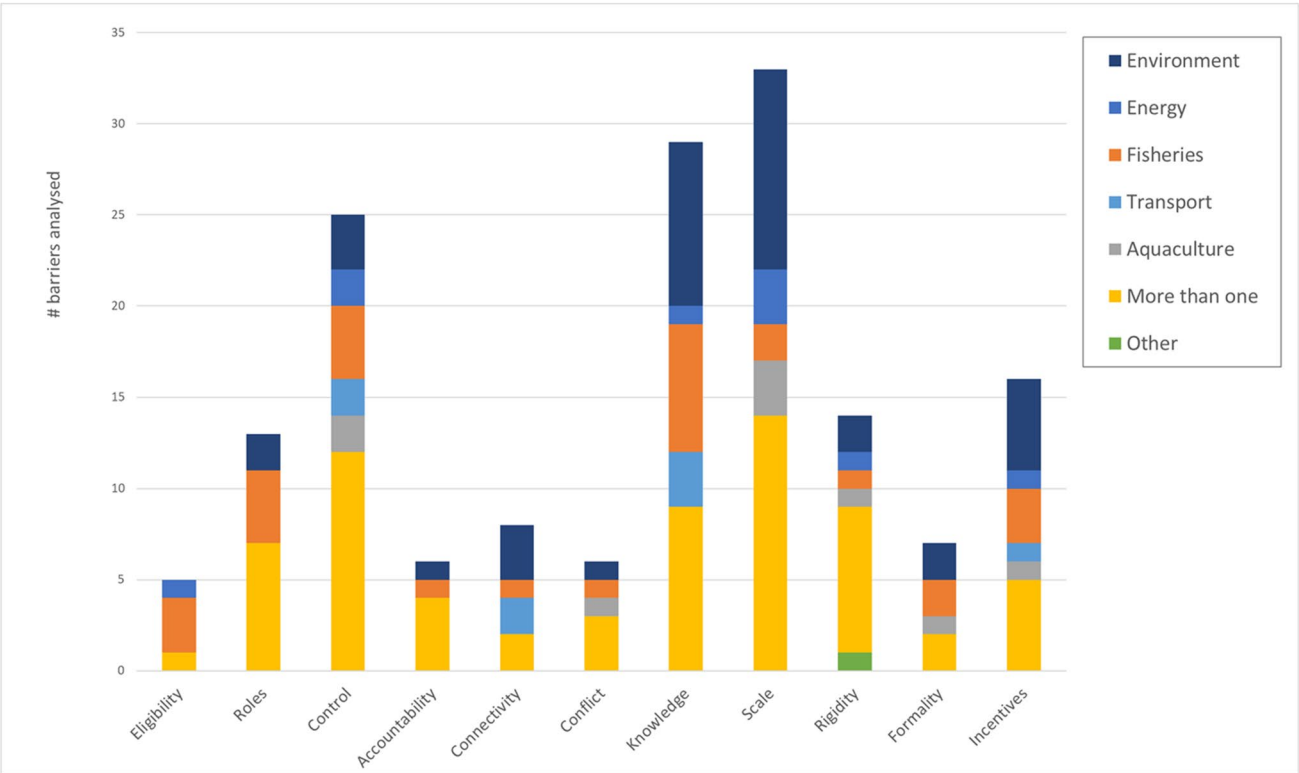


Fig. 4 The number of barriers analysed for each attribute, with colours representing the regime they were assigned to. Descriptions of the institutional attributes are presented in Table 1

(n = 33), Development and Use of Knowledge (n = 29), and Actor Control (n = 25). Barriers within Scale of Institutions represented about 20% of the analysed barriers. It would be expected that barriers linked to Scale of Institutions are especially frequent in more than one regime situations, but that is not what we observe (14/67 = 21%).

16 barriers were analysed under the attribute Institutionalized Incentives. This suggests that the inclusion of this attribute was relevant in the context of European marine governance. The most frequent indicator of barriers under this attribute was "Mis-alignment between incentives and objectives" (n = 11), followed by "Poorly specified objectives" (n = 8), "Lack of incentives of actors to engage in governance processes" (n = 5) and "Over-ambitious policy goals". 14 barriers were analysed under Rigidity of Institutions, 13 under Actor Roles and Responsibilities, whereas barriers under the remaining attributes were reported in 8 or less instances.

42% of the articles addressed a problem context that involves more than one of the listed marine regimes (Fig. 4), suggesting that this is a prevalent type of institutional problem context in marine settings.

The Mediterranean Sea was the single region for which most barriers were analysed, followed by the Greater North Sea, and the Baltic Sea (Fig. 5). About 38% of the analysed barriers involved more than one of the marine ecoregions defined by ICES. The Mediterranean Sea was the most frequently studied region in our sample, (10 articles), which explains why the highest number of barriers was reported for this region. In our sample, 45% of barriers analysed within Scale of Institution involved more than one ecoregion.

As mentioned, institutional barriers were most frequently identified under Scale of Institutions, Development and Use of Knowledge, and Actor Control. For these attributes, Table 3 provides information about the most frequent indicators of barriers and about the numbers of specific combinations of indicators encountered. In our sample, "fragmentation" is the most common indicator of barriers relating to Scale of Institutions. This indicator often appears together with other indicators of barriers relating to Scale of Institutions, namely "insufficient division into manageable problem areas", and "mismatch between temporal/or spatial scale of issue and institution".

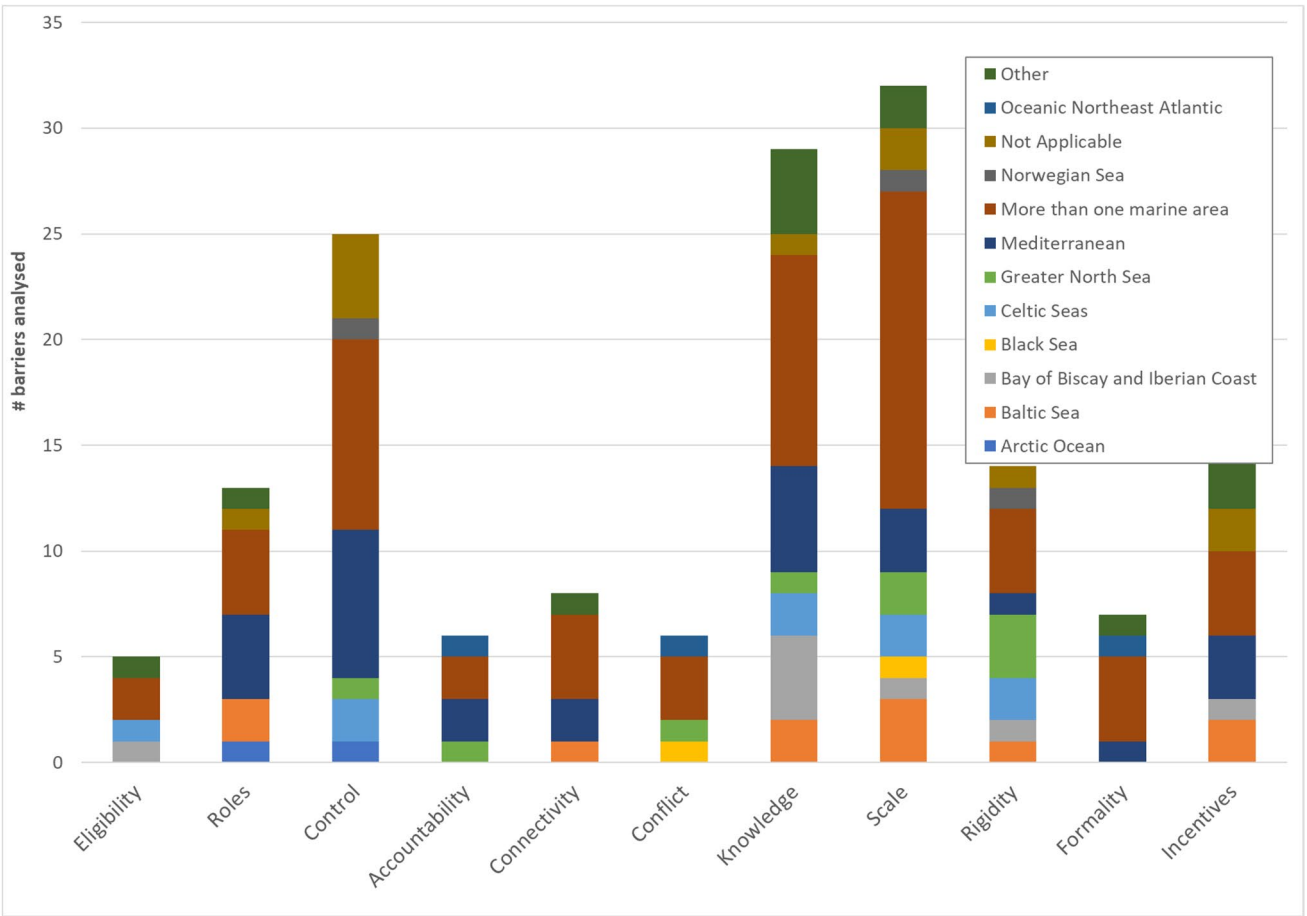


Fig. 5 The number of barriers analysed for each attribute, with colours representing their geographical affiliation in terms of ICES' ecoregions. Descriptions of the institutional attributes are presented in Table 1

Table 3 The three most frequent attributes for which barriers were analysed, with their three most common indicators, and their relative rate of appearance

Most Frequent Institutional Attributes	Most Frequent Indicators	Percent of Appearance
Scale of Institutions 33 barriers	Fragmentation	*58%*
	Fragmentation + Insufficient organisational division into manageable problem areas, leading to inefficiencies	*18%*
	Fragmentation + Mismatch between temporal/or spatial scale of issue and institution	*18%*
	Other Indicators	*6%*
Development and Use of Knowledge 29 barriers	Data Fragmentation	*27%*
	Exclusion or marginalisation of relevant knowledge providers	*14%*
	Inappropriate science-policy interfaces	*14%*
	Other Indicators	*45%*
Actor Control 25 barriers	Powerful actors (or coalitions) inappropriately control action situations + Weak actors cannot influence institutions or policy outcomes	*44%*
	Tokenistic participation	*16%*
	Weak actors cannot influence institutions or policy outcomes	*12%*
	Other Indicators	*28%*

"Data fragmentation" was the most frequent indicator of barriers under Development and Use of Knowledge, and the co-occurrence of specific indicators was less pronounced for this attribute. For barriers relating to the attribute Actor Control, the indicators "powerful actors (or coalitions) inappropriately control action situations" frequently co-occurred with "weak actors cannot influence institutions or policy outcomes" and "tokenistic participation". This makes sense as these indicators represent closely related dimensions of the same problem context.

It is interesting to analyse if the presence of certain institutional barriers tends to be frequently linked to other institutional barriers. The analysed linkages represent intricate relationships between two or three barriers, not just the co-occurrence of the barriers. An in illustration of how frequencies of linkages between barriers can be analysed is available (Online Resource 1, Annex 5), but is not addressed further here as the data set was judged to be insufficient to support this form of analysis.

Discussion

The discussion focuses on the diagnostic approach and how it can be used. Subsequently, it addresses the aggregated findings of the systematic review and limitations that apply to this outcome. Finally, we compare with recent related initiatives and identify avenues for further research.

The diagnostic approach

The diagnostic approach supports identification and analysis of institutional barriers that impair marine governance. Based on Ostrom (2005a, b, c) and Oberlack (2017), the approach consists of eleven institutional attributes and indicators of barriers associated with these. Institutional attributes provide analytical categories within which institutional barriers may arise. The indicators represent observable manifestations of dysfunction within the respective attributes and can therefore be used to identify and diagnose institutional barriers. The attributes and indicators provide for a flexible yet systematic approach to diagnose barriers, allowing for the situation that barriers can appear within multiple attributes, with reinforcing effects. The approach includes an analytical strategy for examining linkages between barriers, providing an improved basis for diagnosing institutional problems. Concretely, the attributes and indicators can serve as the starting point for gathering empirical information in new cases, for instance when developing interview guides and surveys.

An in-depth understanding of institutional barriers, applied to e.g. specific policy or institutional contexts, can provide a foundation for developing comprehensive governance strategies to overcome identified challenges in marine policy-making. The diagnostic approach has already been applied in case study research within maritime transport (Adjei et al. 2026) and within marine renewable energy (Dyremose et al. 2026; and West et al. 2026). These case studies demonstrate the analytic value of the approach to identify and explain structural constraints in collaborative marine governance. Whereas West et al (2026) finds the approach useful to support "an early diagnosis and understanding of the root causes" (p. 40), Adjei et al. (2026) note that it supported the identification of opportunities for overcoming institutional barriers. In their case, this led to recommendations on a need to reduce the dominant role of particular actors. Dyremose et al. (2026) show how the diagnostic approach is incorporated into a broader theoretical framework. In their case, institutional attributes are

included as one component in the Multi-layered Collaborative Marine Governance model (van Noort et al. 2025), in which the attributes are the locus of enablers and barriers to innovate and change marine governance arrangements in response to policy initiatives.

In developing the diagnostic approach, discussion with and feedback from stakeholders indicated that the attributes and indicators provide a common language for understanding challenges, thereby supporting knowledge exchange across researchers and stakeholders with different backgrounds and experiences. The diagnostic approach allows for establishing a comprehensive focus on institutional barriers, as distinct from other types of barriers that require different forms of intervention. The collaboration with stakeholders was supported by a "diagnostic tool". Building on the described approach, this tool included accessible descriptions of attributes and barriers (see Flannery et al. 2024) and served as a hands-on guide for prompting stakeholders to share their understandings, perspectives, and experiences on institutional barriers.

While the sample of literature proved sufficient for grounding the list of institutional attributes and indicators, the approach could be further refined. For example, additional indicators may be defined to substantiate understanding of the barriers, or to be more targeted for specific policy domains or applications. However, similarities between some of the indicators, e.g. "stickiness" and "path dependence", suggest that there may also be a scope to refine the specific indicators to reduce overlap. Moreover, exploring ways to capture synergies and trade-offs with other non-institutional barriers would be an interesting area for further development of the approach.

Systematic review of institutional barriers and aggregated insights

The diagnostic approach was developed with support from a systematic literature review. The review protocol involved can support further reviews on related topics. As such, Fobé et al., (2025) provided a review of institutional barriers and enablers in the context of land-sea interfaces, drawing inspiration from the presented review approach.

While our review cannot support any conclusive analysis of the relative prevalences of institutional barriers, the preliminary findings include interesting observations. In the 62 analysed articles, the most frequent institutional barriers were identified under the institutional attributes Scale of Institutions, Development and Use of Knowledge, and Actor Control. Also, 42% of the analysed barriers involved more than one of the listed marine regimes, and 38% addressed more than one of the marine ecoregions defined by ICES. These findings are not surprising as the European marine policy landscape is characterized by multiple and overlapping jurisdictions across different governance scales, and multiple interacting marine sectors and environmental dimensions (Van Tatenhove 2022). In problem contexts showing these temporal and spatial complexities, one can expect to encounter institutional barriers that relate to policy fragmentation (see also Adjei et al 2026; West et al 2026). The dynamic and opaque character of the marine environment renders the development and use of knowledge critical, but knowledge and informational processes are hampered by the harsh environment for data collection. Large uncertainties and persistent knowledge gaps in ocean science are known to problematize science – policy interactions (e.g. Wilson 2009; Knol 2010; Hauge et al. 2007). Moreover, oceans are increasingly seen as economic frontiers (Jouffray et al. 2020). In Europe, the so-called "Blue Economy," is promoted as an engine of economic growth (EC, 2025b). This implies high stakes for ocean actors, with powerful actors seeking to increase their influence and control, and with a risk of marginalising other actors and their concerns (De Vivero 2007; Cavallo et al 2023).

Reflections and avenues for further research

Our study reflects that integrating insights of institutional barriers through a systematic review raises a range of methodological challenges. Given the conceptual diversity involved, it is challenging to develop a search strategy that includes all terms with similar meanings as "institutional barrier". The deployed search strategy may therefore have led to the exclusion of relevant works. A more comprehensive analysis of indicators in different regimes or geographies, and of the linkages between barriers, will require that a wider net is cast. The systematic review could be extended by loosening constraints of the search strategy. A comprehensive analysis of institutional barriers literature could be supported by machine learning, as was done by Fobé et al. (2025). This might enable robust findings on the prevalence of institutional barriers in different contexts, provide a stronger basis for diagnosing barriers, and for identifying strategies to address them.

Limitations also apply to information about the institutional barriers provided in the analysed articles. Our analysis is entirely based on the information presented in the articles; this information was not cross-checked with other published work or relevant specialized expertise. This limitation was to some extent addressed by assigning levels of evidence to the analysed barriers. Further, information about institutional barriers might be outdated, especially in older articles, as governance initiatives may have addressed previous barriers. Nevertheless, we consider that it is also valuable to integrate historical insights on institutional barriers

systematically, with relevance for ongoing and future challenges within other marine governance cases.

A challenge with synthesising insights on institutional barriers from research literature concerns the interpretative flexibility involved in assigning complex social phenomena to specific types. The analysed studies were not designed to support classification of barriers in terms of the identified attributes and indicators. Consequently, reviewer interpretation played a role in the attribution process for each article. In many cases, the analysts differed on barrier identification due to vaguely described, overlapping or entangled barriers, reflecting the complex, interdependent nature of institutional constraints. This challenge was addressed, although not necessarily fully resolved, through discussions at plenary meetings and through arbitration of challenging cases by the lead authors.

It is relevant to compare with recent research initiatives with related purposes. Fobé et al. provide a systematic review of barriers and opportunities to the governance of European land sea-interfaces. This work is organized into a thematic focus on barriers and enablers respectively to policy coherence, to interactions among stakeholders, and to institutional change. Platjouw et al. (2026) provide a framework for assessing policy coherence across objectives and instruments. The framework supports investigation of explanatory factors relating to governmental organisations, stakeholder involvement, and science-policy-society interfaces (Platjouw et al. 2026). The framework is primarily focused on assessing coherence across policy domains such as offshore wind development and marine biodiversity protection.

Taken together, the work by Fobé et al. (2025), Platjouw et al. (2026), and the presented work reflect that it is timely and relevant to advance cumulative learning about institutional barriers and enablers to policy achievement in marine contexts. The approaches are complementary in terms of their scope and focus, but also indicate that research on institutional barriers could be strengthened through international cooperation.

While the obvious purpose of diagnosing institutional barriers is to provide insights in support of institutional adaptation, the focus on solutions to institutional barriers is beyond the scope of this work. Nevertheless, a few observations on the scope for solutions are in order.

It should be acknowledged that even if institutional barriers are diagnosed, they may not be easily addressed. There are several reasons why this is the case. First, institutions may be subjected to strong lock-in mechanisms, which may involve high transition costs. Further, the scope for institutional adaptation may in some cases be constrained by higher-order institutional arrangements, such as those that provide for rule of law, division of state powers, and political representation. Second, alternatives that are perceived to be represent clear improvements may not be available. An important aspect of this is that institutional arrangements, as mentioned previously, may often represent trade-offs between different features, such as between stability and change, between inclusivity and efficiency of governance processes, and so forth. Third, existing institutional arrangements may be perceived as adequate by powerful actors, which accordingly will oppose institutional change. The latter point embodies a methodological challenge regarding the positionality of institutional analysis: What one actor or researcher identifies as an institutional problem, may be seen to reflect appropriate arrangements by other actors or researchers.

While these factors constrain the scope for institutional adaptation, they do not undermine the importance of analysing institutional problems. Even the insight that institutional adaptation in certain context is untenable may be valuable, because it helps to redirect the search for solutions to more promising avenues. The challenge of finding solutions to identified institutional problems is a topic that also warrants a systematic approach that can support the integration of insights from published literature and conceptualize and present common possibilities for adaptation.

Conclusion

Based on Oberlack (2017) and Ostrom (2005c), we developed a systematic approach to diagnose and analyse institutional barriers in marine governance. The approach comprises a list of institutional attributes and indicators of barriers associated with these. In many cases it was difficult to determine which institutional attributes and indicators were most relevant for diagnosing a particular institutional problem. The presented use of indicators addresses this challenge, as it provides a systematic and flexible approach to diagnose problems, which may involve interlinked weaknesses in multiple attributes. The approach is included in a broader model of innovation and change in marine governance and has been used to diagnose institutional problems in recent case studies.

Following PRISMA guidelines, we developed a protocol for systematically reviewing institutional barriers in a European marine context. This involved defining a relevant search string, elaborating selection criteria, and clarifying terminology. The review provided the basis for aggregated findings about institutional barriers.

In a sample of 62 analysed articles, the most frequently reported barriers were associated with the attributes Scale of Institutions, Development and Use of Knowledge, and Actor Control, suggesting that institutional barriers for these attributes may be prevalent in marine governance.

These outcomes of the systematic review are tentative and should be supported by further research.

The scope for finding solutions to identified institutional problems may be limited by several factors and represents a topic in need of a complementary systematic approach.

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/s40152-026-00531-7.

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Declarations

Conflict of interest The authors have no conflict of interest to declare.

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