Ocean and Coastal Management 269 (2025) 107787

Contents lists available at ScienceDirect

Ocean and Coastal Management

journal homepage: www.elsevier.com/locate/ocecoaman

Governance challenges and opportunities for multifunctional marine and coastal landscapes: A comparative case study of Nämdö national park and Nämdö biosphere reserve in Sweden

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ARTICLE INFO

Keywords:
Marine governance
Institutional analysis and development framework
Biosphere reserves
Marine protected areas
Qualitative systems analysis

ABSTRACT

Against a backdrop of increasing pressures from biodiversity loss, climate change and competing stakeholder interests, this paper examines factors influencing the implementation of marine and coastal governance approaches and their implications for achieving multifunctional marine and coastal landscapes. Based on a comparative case study of the temporally and spatially overlapping implementation of a state-driven National Park (NP) and a community-led Biosphere Reserve (BR) in the Nämdö Archipelago, Sweden, we conducted semi-structured interviews with differently positioned stakeholders to explore the dynamics shaping these initiatives. Deploying the Institutional Analysis and Development framework as an analytical framework in conjunction with a complex systems approach, the study identifies the interplay of key institutional and socio-ecological factors driving implementation processes and influencing outcomes. Results concerning the NP implementation reveal persistent disagreements between local residents and authorities, due to rigid institutional structures, limited integration of local knowledge, poor communication and competing priorities. In contrast, the BR approach is generally viewed more positively, attributed to its flexible governance and proactive integration of local socioeconomic and cultural values. This study highlights the importance of adaptive, inclusive governance that can address the trade-offs and synergies inherent in multifunctional sustainability efforts in coastal regions. By combining the stability and enforcement capabilities of the NP model with the flexibility and inclusivity of the BR approach, the paper suggests that a hybrid governance model could better balance ecological, social and economic objectives. It advocates for marine governance structures that prioritise inclusive decision-making and the integration of diverse values to better align ecological and community goals.

1. Introduction

The world's marine and coastal ecosystems are in peril due to biodiversity loss, eutrophication, pollution, the accelerating impacts of anthropogenic climate change and the exponential growth of maritime activities (He and Silliman, 2019; Martínez-Vázquez et al., 2021). In response, numerous formal global frameworks (e.g., Agenda 2030, Aichi Biodiversity Targets, United Nations Convention on the Law of the Sea, Global Biodiversity Framework) have emerged with the ambition to safeguard marine and coastal resources. Area-based conservation has emerged as a key strategy, with a global commitment to protect 30 % of marine waters by 2030 (Convention on Biological Diversity [CBD], 2022). This commitment is being realised through the development of Marine Protected Areas (MPAs) of different categories. These include strict no-take zones and national parks and less restricted marine reserves and community conservation areas, which together cover around 8 % of global marine regions (United Nations Environmental Programme-World Conservation Monitoring Centre & International Union for Conservation of Nature [UNEP-WCMC & IUCN], 2024).

In Europe, instruments such as the Marine Strategy Framework Directive and the Birds and Habitats Directives have driven the designation of MPAs under the Natura 2000 framework, expanding MPA coverage to over 12 % of Europe's marine regions, including 17 % of the Baltic Sea (Aminian-Biquet et al., 2024). In many cases, MPAs have effectively protected biodiversity and sensitive ecosystems by restricting harmful activities such as fishing, dredging, mining and coastal

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https://doi.org/10.1016/j.ocecoaman.2025.107787
Received 19 December 2024; Received in revised form 23 April 2025; Accepted 2 June 2025
Available online 12 June 2025

development, thereby supporting the recovery of fish stocks and critical habitats (Chirico et al., 2017; Laffoley et al., 2019; McClanahan et al., 2006). Under certain favourable conditions, MPAs can also improve fish biomass, species richness and ecosystem functioning (Grorud-Colvert et al., 2021). MPAs can also contribute to climate mitigation by protecting blue carbon habitats, enhancing resilience to ocean stressors and supporting spillover effects into adjacent fisheries areas (ibid.). When well-managed, MPAs can also offer economic opportunities through tourism and serve as valuable sites for scientific research (Laffoley et al., 2019; Marcos et al., 2021; Pascal et al., 2018).

Despite these promising outcomes, the majority of European MPAs offer minimal regulation of harmful activities—classified as minimally protected or even incompatible with conservation objectives—and fall short of IUCN standards for effective protection, with only 0.2 % qualifying as fully or highly protected (Aminian-Biquet et al., 2024). Further, the declining trend in key indicators concerning marine habitats and species biodiversity in Europe has continued to accelerate (EUROSTAT, 2024a, b). MPA implementation has also been criticised for its eco-centric orientation, neglect of local knowledge and livelihoods and limited public engagement, often generating conflicts with marine-based sectors and local communities (Cánovas-Molina and García-Frapolli, 2020; Franco et al., 2020; Grip and Blomqvist, 2020; Laffoley et al., 2019). Scientific debate increasingly revolves around the need to improve governance and stakeholder participation, with MPAs more likely to succeed when characterised by strong local engagement, adequate staffing and financial resources (Gill et al., 2017) and adaptive management practices (Giakoumi et al., 2018). Moreover, the strict regulatory procedures governing protected areas often do not allow sufficient managerial flexibility to adjust to economic, ecological and sociocultural changes (Batisse, 1997).

These challenges have prompted interest in governance approaches that integrate biodiversity conservation with social and cultural priorities relating to human well-being and sustainable livelihoods (Bridgewater, 2002; Fors et al., 2024). Such multifunctional approaches are called for in international frameworks like the Aarhus Convention, Agenda 2030 and the European Green Deal (Hansen and Pauleit, 2014; Hölting et al., 2020) and are increasingly applied to diverse landscapes and seascapes (Brandt and Vejre, 2004; Duncan et al., 2020; O'Farrell and Anderson, 2010). Evidence from Europe suggests that such strategies can improve alignment between local priorities and national environmental goals, mitigate conflicts of interest and enhance perceived benefits among stakeholders (Fagerholm et al., 2020). These approaches are especially relevant in dynamic and contested settings like coastal zones, where they can help ease social tensions, broaden participation and reinforce the credibility and durability of conservation initiatives (Bennett et al., 2019; Cánovas-Molina and García-Frapolli, 2020; Campbell et al., 2016; Duncan et al., 2020; Gilek et al., 2016; Jouffray et al., 2020; Russel and Kirsop-Taylor, 2022).

Embodying this sentiment is the UNESCO (United Nations Educational, Scientific and Cultural Organisation) Biosphere Reserve (BR) concept, introduced in the 1970s to balance conservation with socio-economic development and cultural values (UNESCO, 2022). BRs were originally conceived to complement conservation measures by enabling sustainable human use around protected areas. Each BR is thus structured into three zones: core areas for protection, buffer zones for compatible use and transition areas for broader sustainable development (International Union for Conservation of Nature [IUCN], 1979; UNESCO, 2022). When properly designed and managed, BRs constitute a useful tool for reconciling the many functions of coastal regions (Price and Humphrey, 1993) and are well-positioned to develop "context-specific conservation and development relationships in land and seascapes" (Ishwaran et al., 2008 p.1). Their multifunctional mandate is further underpinned by a strong emphasis on participatory governance, which seeks to include a broad range of stakeholders in collaborative decision-making (Hedden-Dunkhorst and Schmitt, 2020).

Empirical studies indicate that BRs can strengthen stakeholder collaboration, build long-term local commitment and align biodiversity objectives with socio-economic and cultural priorities (Eliasson et al., 2023; Schultz et al., 2011; Van Cuong et al., 2017). They can also contribute to more legitimate and adaptive governance by fostering inclusive, place-based decision-making and enabling the mobilisation of diverse local actors (Reed, 2016; Van Cuong et al., 2017). In addition, BRs have been shown to facilitate community learning, empower marginalised stakeholders and provide space for innovation, particularly in remote or contested contexts (Barraclough et al., 2023; Ferreira et al., 2020). Through these mechanisms, BRs may offer critical support in dynamic and sensitive coastal and marine areas (Fortnam et al., 2022; Ishwaran et al., 2008; Hoffman, 2014). BRs are therefore well positioned to operationalise governance principles widely regarded as critical for sustainability transitions in complex coastal settings (Kelly et al., 2019).

However, the realisation of these positive BR outcomes hinges on several enabling conditions. These include strong stakeholder participation, effective communication, adequate financial and human resources, committed governmental authorities and alignment between local priorities and institutional mandates (Coetzer et al., 2014; Schliep and Stoll-Kleemann, 2010; Schultz et al., 2011; Van Cuong et al., 2017). Systematic evaluation also remains limited, with many BRs lacking robust frameworks for monitoring effectiveness, particularly in terms of governance performance and biodiversity outcomes (Ferreira et al., 2018). Some BRs tend to allow development in all three zones, leading to the overdevelopment of reserves and ecological decline (Ma et al., 2009). As BRs lack regulatory authority and rely on voluntary cooperation, they also remain vulnerable to governance fragmentation, uneven stakeholder engagement and resource constraints—challenges compounded by weak institutionalisation and low public awareness, which can undermine legitimacy and long-term sustainability (Coetzer et al., 2014; Stoll-Kleemann et al., 2010; Stoll-Kleemann and Welp, 2008).

Despite increasing attention to place-based approaches such as MPAs and BRs, their role in advancing multifunctional marine and coastal governance remains underexplored. While existing research has identified both opportunities and challenges with these approaches, empirical studies of how they contribute to multifunctional outcomes are still limited. This is particularly significant in dynamic coastal and marine contexts where governance processes are shaped by fragmented jurisdictional authority, competing policy goals and diverging stakeholder interests (O'Hagan et al., 2020; Kelly et al., 2019). Current scholarship often treats MPAs and BRs in isolation, offering little insight into the potential synergies, frictions or trade-offs between them. Moreover, there is a lack of attention to how institutional and socio-ecological factors co-evolve over time, shaping implementation outcomes in complex ways. As Kelly et al. (2019) argue, a more holistic and interdisciplinary perspective is essential to identify and address the persistent structural challenges that inhibit meaningful governance transformation. It has further been argued that marine governance often lacks the integrative mechanisms needed to align ecological realities with institutional frameworks, leading to persistent gaps between strategy and implementation (Degger et al., 2021). Addressing these gaps requires a more relational and systems-oriented understanding of governance—one that considers how diverse actors, policies and governance approaches intersect, evolve and co-produce outcomes within specific socio-ecological contexts.

This study explores two different area-based governance approaches and the extent to which they support multifunctional outcomes in marine/coastal landscapes. Our aim is to identify and understand how the interplay between key institutional and socio-ecological factors shapes the implementation of MPAs and BRs. Methodologically, we address this aim through a comparative case study of two co-located area-based governance approaches in the Stockholm archipelago, Sweden: the state-led Nämdö National Park and the association-driven Nämdö Biosphere Reserve. Both are currently at various stages of implementation, offering a timely and valuable basis for comparative analysis. To expose and explore the complexity of interacting factors and stakeholder

perceptions we gather in-depth qualitative data (stakeholder interviews, document analysis) and analyse these using the Institutional Analysis and Development (IAD) framework in conjunction with a complex systems approach (see e.g. Elbakidze et al., 2022). The study addresses two overarching research questions: (1) What are the key endogenous and exogenous factors influencing the implementation of Nämdö National Park and Nämdö Biosphere Reserve? (2) What are the main causal interactions between these factors and how do these interactions shape implementation processes and outcomes?

Insights from this study contribute to a broader understanding of how various area-based governance approaches can support multiple sustainability objectives in marine and coastal areas, how they may be strategically combined, as well as how key challenges such as participation and integration of multiple governance approaches can be addressed. This is of crucial importance to researchers in coastal/marine governance and institutional analysis, as well as decision-makers and practitioners involved in conservation and spatial planning. Ultimately, the study offers insights that may inform ongoing efforts to design more integrated and context-sensitive governance approaches.

2. Methods

2.1. Analytical framework

Following Elbakidze et al. (2022), this study utilises the Institutional Analysis and Development (IAD) framework (Ostrom, 2005) combined with a qualitative complex systems approach using Causal Loop Diagrams (CLDs) to investigate the emergent processes of the Nämdö NP and Nämdö BR initiatives. The IAD framework focuses on how institutions shape human behaviour and resource use, where institutions are defined as "prescriptions that humans use to organise all forms of repetitive and structured interactions" (Ostrom, 2005 p. 3). It is adaptable across various disciplines and offers a structured method for analysing institutional arrangements and their roles in managing common-pool resources, such as marine ecosystems (ibid.).

In the context of marine and coastal governance, the IAD framework has been applied to diverse issues, including the governance of protected areas, maritime goods and coastal ecosystem services (Debelić, 2018; Li et al., 2016; Morf et al., 2022; Nyaupane et al., 2022). It has been used to identify institutional factors that influence decisions and interactions in marine and coastal governance, while also highlighting how external forces shape the formation and reform of institutions. Applications include analysing governance challenges linked to maritime common goods (Debelić, 2018) and examining how ecosystem service-specific rules—such as those governing actor roles, information and payoffs—affect legitimacy and effectiveness (Li et al., 2016).

Governance is central to the IAD framework, which presupposes that authorities and citizens collaborate to address shared problems or to realise common goals. By identifying key actors and the rules governing their actions, the IAD framework facilitates understanding of the interactions between institutional arrangements, stakeholders and the broader socio-ecological contexts. This is particularly relevant for addressing governance challenges associated with area-based approaches such as MPAs and BRs, where varying degrees of 'top-down' and 'bottom-up' processes in institutional arrangements and common challenges to meaningfully engage local stakeholders, create a complex governance landscape that may challenge or enable implementation (Franco et al., 2020; Muccitelli et al., 2023).

We focus on three core components of the IAD: **Action Situation, Exogenous Factors** and **Outcomes** as outlined in Fig. 1 and exemplified and described in Table 1.

Given the interrelated and emergent nature of environmental governance and management (e.g., Dawson, 2019), there is a need for robust analytical tools capable of investigating a large number of interdependent phenomena and the complex causal relationships between these. The aim is to identify key factors and understand how they contribute to emergent governance solutions in highly contested environments. Our study utilises a complex systems approach in three main ways. Firstly, as Table 1 illustrates, our analysis considers a wide range of factors potentially influencing the emergence of Nämdö NP and BR. Second, we identify and analyse the main direct and indirect causal relationships between these factors, both within and between IAD framework components. Third, we use CLDs (e.g., Checkland, 1981;

Table 1
Explanation of the components of the IAD framework used in this study and their relation to the studied cases.

IAD Component	Description
Action Situation	Setting in which operational and collective decisions are made. In this study, it encompasses the key actors and implementation processes associated with the Nämdö National Park (NP) and Nämdö Biosphere Reserve (BR).
Exogenous Factors	External elements that shape the action situation, including the sociocultural, institutional and physical context in which it operates. In the case of the Nämdö archipelago, exogenous factors include its unique biodiversity and geographic location; community attributes such as local demographics and resident attitudes; and overarching rules, including national legislation and relevant regional or international agreements that establish the legal and procedural frameworks guiding both initiatives.
Outcomes	The interaction between exogenous factors and the action situation produces outcomes. In this study, these include tangible results—such as the establishment of the national park or biosphere reserve—and intangible outcomes, like the level of community engagement and support surrounding each initiative.

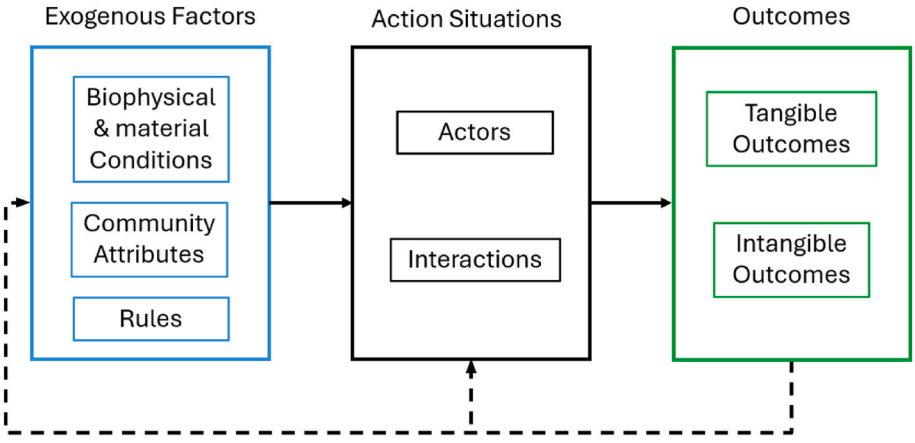

Fig. 1. The components and relationships of the Institutional Analysis and Development (IAD) framework used in this study (adapted from Ostrom, 2005).

Wolstenholme and Coyle, 1983) as a concise way to visualise these causal relationships as integrated networks of causality. CLDs are effective for modelling complex systems by intuitively representing key components, causal relationships and dynamics (Liu et al., 2008). CLDs use arrows to indicate direct causal relationships between independent and dependent variables. These relationships can either be in the same causal direction (i.e., more leads to more, or less leads to less), represented by a positive (+) sign, or in the opposing direction (i.e., more leads to less, or less leads to more), represented by a negative (−) sign. This notation allowed us to visualise and better understand the causal pathways by which a large range of exogenous factors were identified to influence Action Situations, key endogenous processes and feedback loops within Action Situations and how Action Situations were perceived to lead to Outcomes. This approach makes the complex dynamics surrounding marine and coastal governance (e.g., Kelly et al., 2019) more amenable to analysis, facilitates interdisciplinary knowledge integration and supports an understanding of feedback in social-ecological systems (Bureš, 2017; Lade et al., 2015). A key assumption underlying this approach is that the causal structure of a system shapes its dynamically evolving behaviour (Sterman, 2002).

We apply this framework to identify and analyse the key factors and causal dynamics shaping the implementation of the Nämdö NP and BR initiatives. As neither initiative is yet fully implemented at the time of this study, our analysis focuses mainly on the action situation and exogenous drivers, rather than outcomes.

2.2. Study area: Nämdö archipelago

This study focuses on the Nämdö archipelago, located in the Värmdö municipality about 40 km southeast of Stockholm, Sweden. The region supports diverse terrestrial and marine ecosystems with high levels of biodiversity and has since the 1980s been described as a key representative of the widerStockholm archipelago ecosystem by the Swedish Environmental Protection Agency (SEPA) (SEPA, 1989, 2008, 2015). While the outer islets remain largely undeveloped and protected as nature reserves, fish abundance in the Baltic Sea continues to decline, despite signs of local recovery (Holliland and Mustamäki, 2022; Stockholm County Administrative Board, 2023). The area is home to approximately 80 permanent residents, 500 part-time residents and 1500 summer residents. It attracts a significant number of tourists,

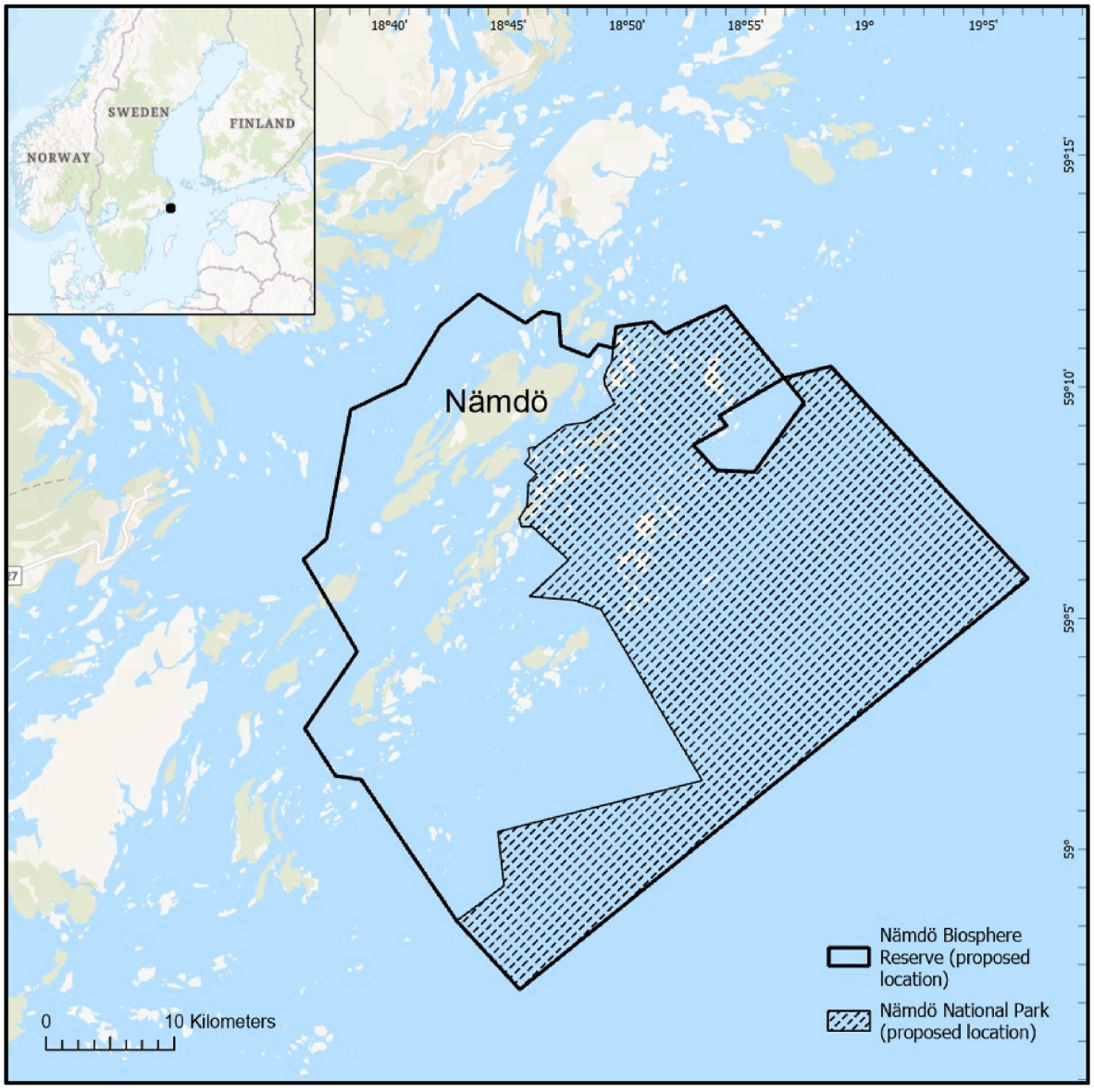

Fig. 2. Map of the Nämdö archipelago showing the proposed location for the Nämdö Biosphere Reserve (thick black line) and the Nämdö National Park (thin black line with dashed fill). The National Park will constitute the core area of the Biosphere Reserve.

mostly during the summer period (Pleijel and Cederlöf, 2022).

Nämdö archipelago is the site of two parallel conservation/sustainability initiatives: the Nämdö National Park (NP) and the Nämdö Biosphere Reserve (BR) (Fig. 2). First proposed in 1989 by SEPA, the NP faced delays due to protracted negotiations with landowners and a major conflict between the Stockholm County Administrative Board and the Archipelago Foundation over management rights (Sandström et al., 2021; SEPA, 1989). SEPA temporarily withdrew and Värmdö municipality later reactivated the process in 2016. In November 2023, a revised NP proposal was circulated for public input, receiving broad institutional support (37 of 38 responses) but much lower local acceptance (only 4 of 28 local responses were favourable or neutral) (SEPA, 2023, 2024a; 2024b). The updated proposal was submitted to the Minister for Climate and Environment in late 2024, with a final decision by the government scheduled for June 2025 (SEPA, 2024a).

The Nämdö BR process began in 2019 when the Swedish chapter of the World Wildlife Foundation (WWF) initiated discussions on turning the entire Stockholm archipelago into a UNESCO BR. After initial resistance, support grew for a smaller, locally focused BR centred on Nämdö (Tidningen Skärgården, 2019). The Nämdö Green Archipelago (NGA) was formed by local residents to lead the effort, hosting community events and coordinating with WWF and other actors (Tidningen Skärgården, 2020). In 2023, Värmdö Municipality formally endorsed the initiative (Värmdö, 2023). A pilot application was submitted to the Swedish Biosphere Committee in February 2024, revised in response to feedback and is currently undergoing further modification, including a suggested expansion of the BR area. If accepted, the Nämdö BR will enter a two-year trial phase, funded by the Swedish Agency for Marine and Water Management (SwAM). The BR's core area will comprise the designated NP area (Fig. 2).

2.3. Data collection: semi-structured interviews

Primary data was collected through semi-structured in-depth interviews with 28 relevant actors including residents (4), park monitors (2), researchers (2), NGO-representatives (3), local interest groups members (6), entrepreneurs (3), as well as government officials from the Swedish Environmental Protection Agency (3), Värmdö municipality (3) and the Stockholm County Administrative Board, CAB (2). Interviewees were included based on their involvement in or proximity to the Nämdö NP and BR processes, ensuring representation across relevant stakeholder groups and governance levels. Additional participants were identified through snowball sampling to capture diverse perspectives (Naderifar et al., 2017). Sampling continued iteratively until thematic saturation was reached and all key actor categories were adequately represented. Ethical approval was obtained from the Swedish Ethical Review Authority (decision 2023-01203-01).

The interviews were conducted in the period September 2023 to April 2024 either in person or through video calls and ranged from 38 min to 3 h. A total of 16 of the interviewees were female and 12 were male. All interviews were transcribed using the transcription software Amberscript and then checked for accuracy.

Interviewees were asked open-ended questions on their involvement and perception of the implementation of the Nämdö NP and BR, as well as wider experiences of living and operating in the Nämdö archipelago (see Appendix for interview guide). Responses were categorised into three themes aligned with the IAD framework components.

First, questions about Exogenous Factors focused on the interviewees' backgrounds, exploring their experiences and activities within the coastal zone, livelihoods and demographic characteristics. Additionally, interviewees reflected on their relationship to the broader environmental, societal and governance structures in Nämdö, including the local rules and regulations that shape their daily lives.

Second, the theme of Action Situations delved into the interviewees' involvement in the implementation procedures of both the Nämdö National Park and the Biosphere Reserve. These questions examined their participation in planning procedures, interactions with relevant actors such as SEPA, the CAB and local interest groups, as well as their perceptions of how these interactions influenced decision-making and outcomes.

Finally, interviewees were asked to consider the Outcomes of the Nämdö NP and BR initiatives, both tangible and intangible. They reflected on the effectiveness of the governance processes, the adequacy of local engagement and the broader impacts of these initiatives on community well-being and environmental conservation.

2.4. Data analysis: identification of factors and their causal relationships

Transcripts were analysed in NVivo 14 data analysis software using a reflexive thematic approach (Byrne, 2022). An open-coding technique was applied across the dataset. These initial codes were then organised using the main components of the IAD framework. Initial coding was conducted by one researcher, while theme development was a collaborative effort, acknowledging the active role of researchers in interpreting meaning from the data (Braun et al., 2019). Emerging codes and their interpretations were iteratively discussed with co-authors and compared to the interview data to test coherence, refine analytical decisions and enhance reflexivity. Closely related codes were iteratively aggregated into broader factors, ensuring comprehensive coverage of theoretical components.

We analysed coded interviewee responses to identify the main direct causal relationships attributed by interviewees to each identified code. For example, interviewees described how the *perceived legitimacy of vision and planning* influenced *community engagement* in both initiatives. We therefore identified a causal relationship linking the *perceived legitimacy of vision and planning* (independent factor) to *community engagement* (dependent factor). We followed this procedure for all identified codes before integrating identified causal relationships into CLDs to map the implementation processes of Nämdö NP and Nämdö BR (cf. Coyle, 2000; Eden, 2004). Aggregation of causal data was performed iteratively through a step-by-step process based on conceptual similarity, frequency of observation and number and type of causal relationships identified (Bureš, 2017) to refine understanding of factors and their interrelations. Conceptually, similar codes were aggregated within overarching concepts, while infrequently identified concepts were individually analysed for relevance. Codes with few responses that did not significantly influence the action situation were excluded at this stage, based on criteria such as relevance and impact on the action situations. This structured approach allowed for a robust identification of key factors and their causal relationships within their given context, adhering to best practices in qualitative research (Bryman, 2016; Corbin and Strauss, 2014).

3. Results

3.1. The five core processes of the Action Situations

At the overview level, our analysis revealed that the Action Situations of implementing the Nämdö NP and BR both comprised the same five core processes: *Adequacy of vision and plans,* concerned the development of overarching visions, strategic and operative plans throughout the lifetime of each initiative; Support *for initiative* concerned the varying levels of interest and endorsement from key actors for each initiative; *Resources available to initiative* concerned the degree to which each initiative was able to access and utilise a variety of financial and human resources; *Adequacy of implementation activities* concerned the what, how, when and where of actions and measures taken to implement visions and plans; *Learning and knowledge* referred to both the availability and accessibility of context-relevant knowledge and expertise necessary to plan and implement initiatives and also the various practices that were used to for gather and share new knowledge.

These core processes were highly interdependent, developing iteratively over time (Fig. 3). Each core process was shaped by several

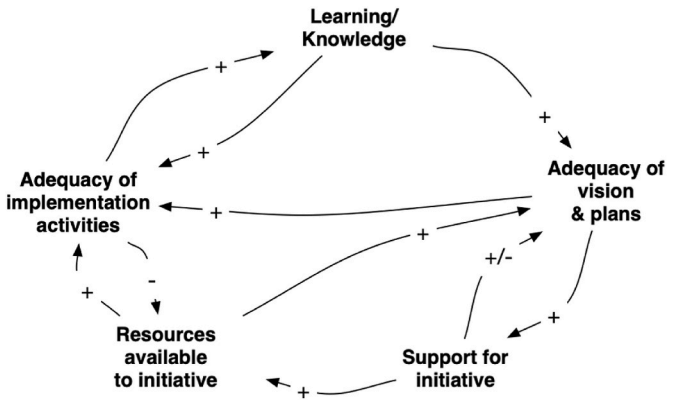

Fig. 3. At the overview level: Action Situations concerning the implementation of both the Nämdö BR and Nämdö NP initiatives comprised the same five interdependent core processes, shown here with the main causal interactions between them. The causal relationships in this figure are highly aggregated and may be comprised of several different relationships, including different polarities (e.g., +/−). These dynamics are unpacked further in Figs. 4–8.

Endogenous Factors (within *Action Situations*, black in Figs. 4–8) and *Exogenous Factors* (external, blue in Figs. 4–8). *Outcomes* (green in Figs. 4–8) were largely driven by support processes and implementation activities. In many cases, similar factors were identified as influencing both the BR and NP initiatives, albeit to differing degrees. The underlying causal structures of both initiatives were therefore mostly similar, even if the parameterisation of specific factors – e.g., the support of local residents – often differed. In Figs. 4–8 below, we unpack the causal structures influencing each core process and highlight any given factor or causal relationship that was not identified in both studied initiatives.

As neither initiative was fully implemented during the study, most Outcomes are yet to be observed. However, several intangible and desired outcomes were noted. The analysis identified a more complex interplay of factors concerning planning and support processes compared to resources, implementation and learning/knowledge processes.

3.2. Adequacy of vision and plans

Both the *Nämdö BR* and *Nämdö NP* were initiated due to the high *ecological functions and values* in the Nämdö Archipelago, with the NP also being motivated by its *representativeness of the wider archipelago* ecosystem. Following the initial proposal by the *WWF*, local *community engagement* spurred by *potential opportunities for local development* was an important driver of the early stages of the BR initiative. The adequacy of visions and plans (Fig. 4) was perceived to be shaped by the *scope and boundaries* of each respective initiative and the choice of specific *management approaches and considerations*. While both the Nämdö NP and BR initiatives aimed to address ecological and social aspects to various degrees, their scope and approaches differed significantly, for example, in the inclusion of stakeholders in the planning process.

The *rigidity of institutions* was widely perceived by stakeholders as a key factor affecting the adequacy of planning. Although several interviewed officials stated that collaboration among state agencies worked well, the *Nämdö NP initiative*—driven primarily by *formal institutions at national and international levels*—was perceived to leave little room for local adaptation and for integrating social dimensions into plans.

Building on this, the *adequacy and utility of the knowledge base*—particularly the incorporation of local knowledge—was identified as another critical factor influencing the quality of visioning and planning. However, stakeholders highlighted challenges with integrating local knowledge into the NP planning process. For example, a regional analysis that was commissioned by the municipality to assess the potential impacts of the NP on the surrounding environment and community was ultimately disregarded. Several municipal officials stated that they were told to ignore the analysis as it was not anchored with the municipality.

In contrast, the BR initiative seemingly adopted a more participatory approach, integrating local knowledge more meaningfully and iteratively. Initially met with scepticism, partly due to confusion with the NP, the BR initiative gained traction as the NGA actively connected BR-

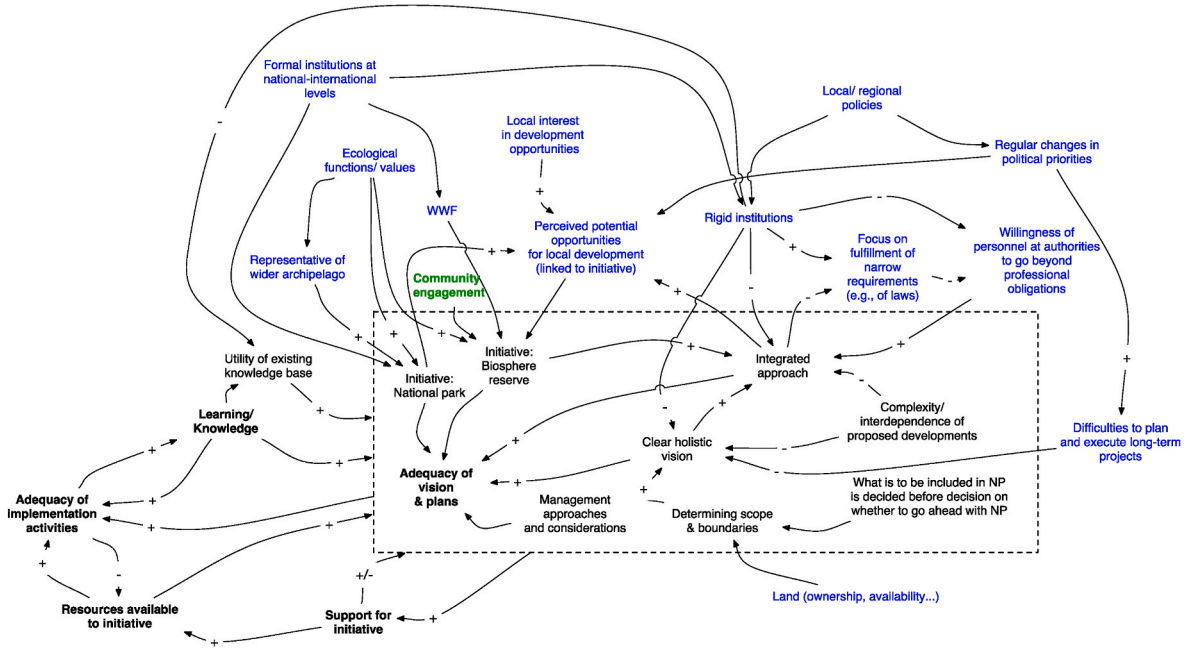

Fig. 4. Causal structure of the main factors influencing the iterative vision and planning processes for the Nämdö NP and Nämdö BR. Factors within the dashed box are sub-level factors that, taken together, determine the perceived adequacy of vision and plans. Interviewees identified several endogenous (black) and exogenous (blue) factors as directly and indirectly influencing vision and planning processes. One outcome (green) factor was also identified as an iterative driver of the Nämdö BR initiative (the complete feedback loop involving this factor is not represented in this figure). (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

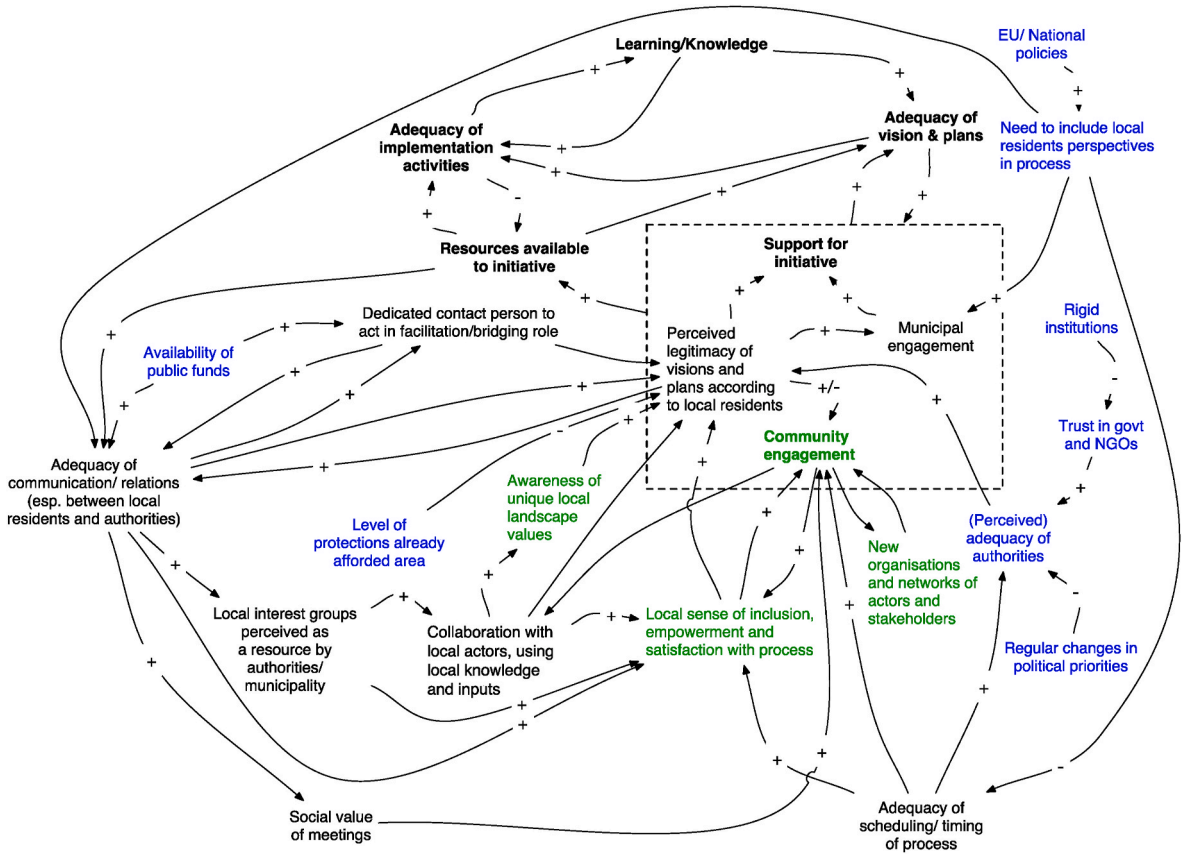

Fig. 5. Causal structure of the main factors influencing the support of local community actors for the Nämdö NP and the Nämdö BR. Factors within the dashed box are sub-level factors relating to local support. Interviewees identified several endogenous (black) and exogenous (blue) factors as directly and indirectly influencing local support processes, particularly in relation to the development of adequate communications and relations between stakeholders and concerning the perceived legitimacy of visions and plans according to local residents. Several desired outcomes (green) of the planned initiatives were related to local support, e.g., increased local community engagement and empowerment. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

related projects with existing local contexts and other proposed developments.

Regular changes in political priorities at the municipal level led to fluctuating support for the Nämdö BR, which increased the *difficulty of planning and executing long-term projects* and complicated the planning process due to shifting perspectives on local development proposals.

A *clear, holistic vision* and an *integrated approach* were perceived to be fundamental to the adequacy of visions and plans and were influenced by the relative *complexity and interdependence of proposed developments* and by the institutional rigidity surrounding each respective initiative. For example, Nämdö NP was perceived to lack both a clear, holistic vision and an integrated approach, whereas the BR was perceived to be more successful in developing both. Several interviewees voiced concerns about authorities' *focus on fulfilments of narrow requirements*, often neglecting broader considerations like long-term community benefits.

Some interviewees suggested that, due to the rigid institutions guiding the work of authorities, planning processes for the NP were forced to rely on the *willingness of individual officials to go beyond their obligations*, e.g., to engage with other agencies, to develop a more *integrated approach*.

In contrast, the NGA's flexible approach allowed the BR initiative to develop a vision that subtly integrated multiple local projects over time. While this approach fostered community support, it also created challenges in effectively conveying the BR concept, which many locals found difficult to grasp.

3.3. Support for initiatives

The second core process delves into the factors shaping support from both private and governmental actors for the Nämdö NP and Nämdö BR initiatives. The adequacy of vision and plans strongly influenced the degree to which key actors and stakeholders were willing to support these initiatives. *Municipal engagement, collaboration between and/or with relevant authorities*, the *perceived legitimacy of visions and plans according to local residents* and the level of *community engagement* in these initiatives were all identified as important factors for garnering sufficient support amongst both local community actors (Fig. 5) and institutional actors (Fig. 6).

Municipal engagement seemingly depended on *including local residents' perspectives* and the degree to which the planned initiatives were *perceived to present potential opportunities for local development*. For the Nämdö BR, *perceived synergies with municipal and government goals* initially encouraged support, as BR goals aligned with municipal priorities. However, concerns over resource demands later led to reluctance.

These *changes in political priorities* created challenges for the BR initiative in terms of securing consistent municipal support, although the situation improved after a shift in political leadership.

Community engagement was illustrated by the formation of at least two *new organisations and networks of actors and stakeholders* in response to the planned initiatives. The NGA and the Nämdö Archipelago Council (Nämdö Skärgårdsråd), which was created in 2021 to represent the community on NP-related issues. The council gathered 100 signatures calling for a halt to the NP process, reflecting ongoing tensions. The

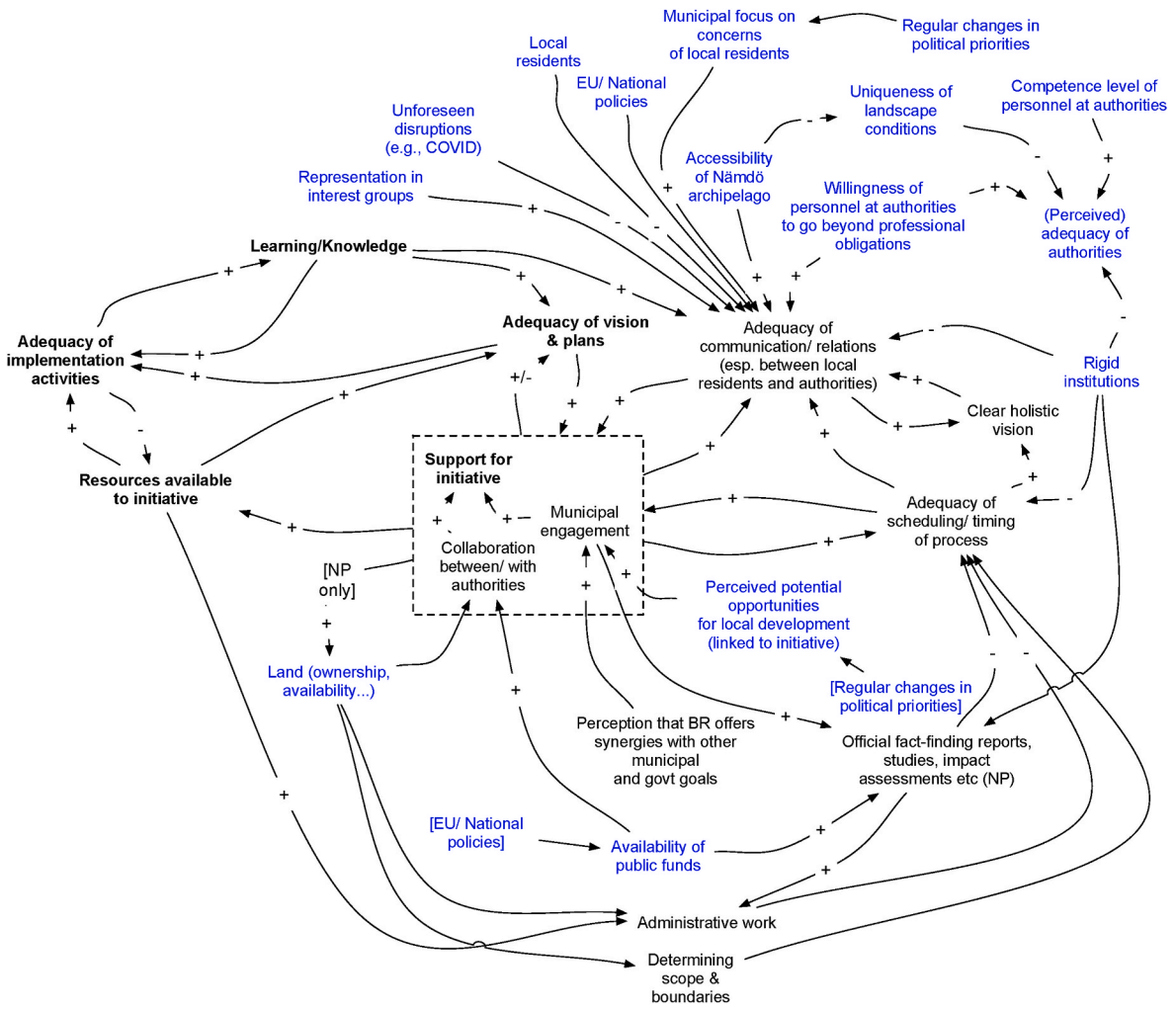

Fig. 6. Causal structure of the main factors influencing the support of institutional actors for the Nämdö NP and Nämdö BR. Factors within the dashed box are sub-level factors relating to institutional support. Interviewees identified several endogenous (black) and exogenous (blue) factors as directly and indirectly influencing support processes, particularly concerning the development of adequate communications and relations between stakeholders and concerning the adequacy of scheduling and timing of events in the initiative development process. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

petition was ultimately rejected.

The *adequacy of communication between authorities and local residents* was a crucial factor influencing support, underpinned by *EU and national-level policies* regarding the *need to include local residents' perspectives*. In the Nämdö NP process, communication efforts were hampered by the *inaccessibility of the Nämdö archipelago* and *unforeseen disruptions* such as Covid which made it more difficult to hold physical meetings. Additionally, interviewees stated that SEPA failed to sufficiently address community concerns, which contributed to the perception of them as a *rigid institution*. These factors added to growing mistrust and alienation.

The *adequacy of scheduling and timing* of certain activities, such as *determining scope and boundaries* and generating *official fact-finding reports and assessments* also influenced support. For example, several stakeholders believed the regional analysis was conducted either too early or too late in the process, leading to further confusion.

In contrast, the Nämdö BR benefited from holding public meetings and activities that gradually built trust and involvement among local actors. Although the BR faced initial resistance due to its vague concept, continuous communication and incremental integration of BR activities such as nature walks and biodiversity workshops helped turn public opinion in its favour.

The perceived *legitimacy of visions and plans according to local residents* was strongly interconnected with *community engagement* and both were linked by interviewees to many factors. For example, *awareness of the uniqueness of the local landscape* was said to increase the perceived legitimacy of both the NP and BR. In contrast, the *perceived (in)adequacy of authorities* (affected by the level of *trust in government*), as well as the *level of protections already afforded to the area* (with large parts of the proposed NP location already covered by nature reserves) were said to undercut the legitimacy and urgency of further protections.

Both the legitimacy of initiatives and community engagement depended on the extent to which *collaborations included local actors, local knowledge and inputs*, fostering a *local sense of inclusion, empowerment and satisfaction with the process*, a key desired outcome of both initiatives. This sense of inclusion was key to several feedback loops related to the support of local actors.

Further, the concept of "local anchoring" (stated in the National Park Plan) was debated among interviewees. Some believed it meant gaining acceptance from the local community for the Nämdö NP. Others, including a municipal official, argued that the municipal council, as publicly elected officials, represented the views of the entire municipality and that it was therefore sufficient to anchor any decisions with the council.

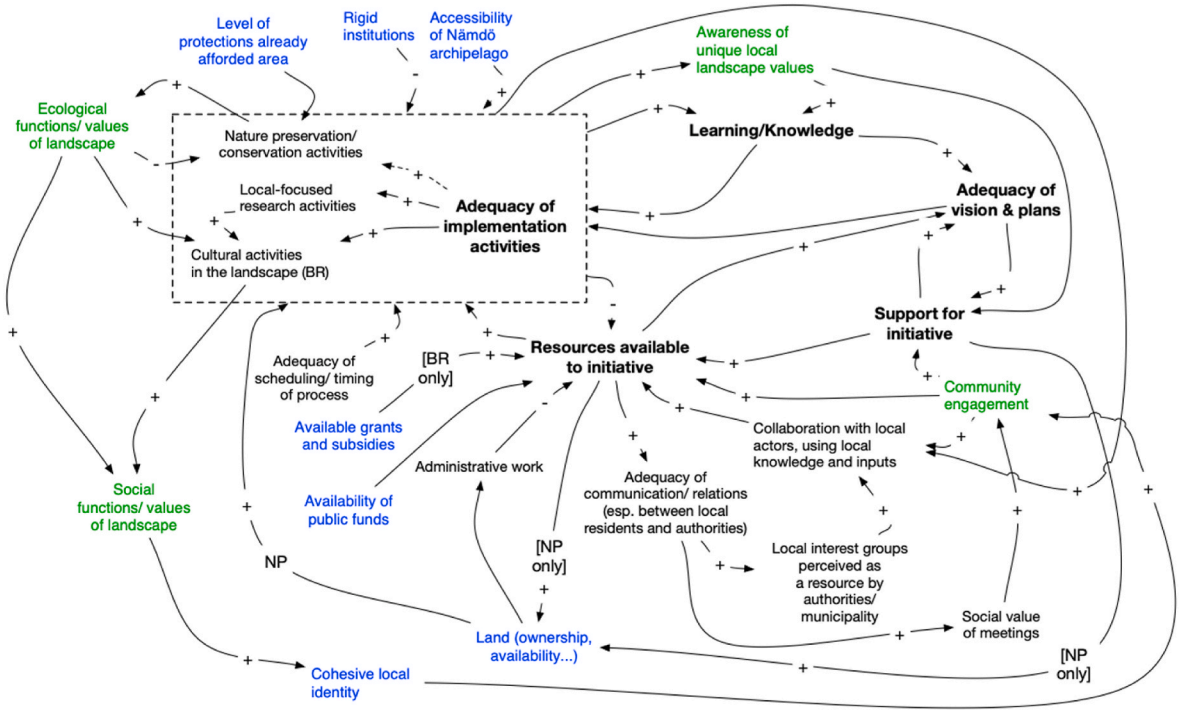

Fig. 7. Causal structure of the main factors influencing the resources available to the Nämdö NP and the Nämdö BR and the implementation activities within these initiatives. Resources concerned both financial, administrative and human resources available to initiatives. Key sources of economic resources came from public funds (Nämdö NP) and grants (Nämdö BR). Beyond implementing authorities, local community engagement and local collaborations were a source of additional human resources. Beyond community engagement, the main desired outcomes (green) of these initiatives included supporting ecological and social functions and values in the landscape and awareness-building. For this reason, initiatives aimed to implement a variety of local research, cultural and nature preservation and conservation activities. Dashed box in diagram shows factors influencing adequacy of implementation activities. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

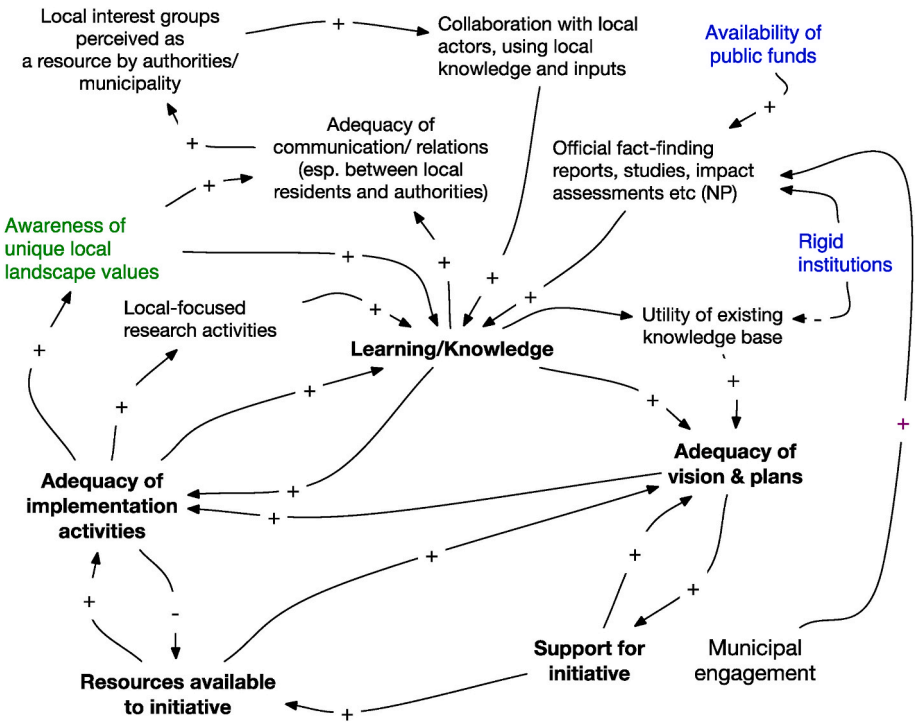

Fig. 8. Interviewees identified several endogenous (black) and exogenous (blue) factors influencing learning and knowledge management processes concerning the marine national park and biosphere reserve initiatives in Nämdö archipelago. One intangible outcome (green) was also identified. Aside from local research activities and awareness-building measures, official studies and local actors were important knowledge inputs for both iterative vision and planning processes and implementation activities. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

3.4. Resources available to initiative

The third core process focuses on the accessibility and adequacy of financial and human resources. The availability of which was highlighted by interviewees as an important factor influencing both planning processes and implementation activities (Fig. 7).

The availability of financial and human resources was crucial for both the Nämdö NP and BR, influencing their capacity to foster *adequate communication and relations between local residents and implementing authorities,* as well as contributing to *vision and plans* and *implementation activities*. The Nämdö NP relied on *public* funds, enabling *land* acquisition and planning activities, while the Nämdö BR secured grants from WWF to support operations and planning.

Interviewees highlighted how investments in communication efforts which recognised the *social value of stakeholder meetings* and which enabled *local interest groups to be perceived as a resource* were perceived to drive reinforcing feedback resulting in additional resource availability, e.g., invigorating *community engagement* and *collaborations with local actors*. The same applies the other way around, as state authorities reached out to local interest groups for information and assistance regarding the Nämdö NP but failed to effectively utilise their input, according to representatives.

The amount of *administrative work* impacted both initiatives. Officials overseeing the Nämdö NP cited difficulties dedicating time to community engagement due to resource constraints and bureaucratic responsibilities.

The Nämdö BR demonstrated greater success in activating local actors. Through partnerships with research institutions, the Nämdö BR organised workshops and scientific projects involving residents, fostering deeper investment and collaboration in the initiative's success.

3.5. Adequacy of implementation activities

The fourth core process evaluates the effectiveness of actions and measures taken to actualise the visions and plans for the Nämdö NP and Nämdö BR initiatives (see dashed box in Fig. 7). Many factors discussed in other processes also influenced implementation. Although neither initiative was fully implemented at the time of the study, several activities were underway.

For example, NGA organised *local research activities* and *cultural activities* such as art exhibitions and a butterfly research project focused on *ecological landscape values*. These activities aimed to foster *cohesive local identity* amongst Nämdö residents, which in turn was perceived to influence the level of *community engagement* in the initiatives.

The *adequacy of scheduling and timing,* as well as the relative *(in) accessibility of the archipelago* also impacted implementation. Implementation activities for the NP connected to *nature preservation* benefitted from *levels of protection already put in place* since park staff and most infrastructure already existed. However, issues connected to *land ownership* caused delays. This was less significant for the BR, as BRs do not require ownership of the land they cover. Additionally, *Rigid institutional* structures were perceived to contribute to these challenges. SEPA was described as overly bureaucratic, slow and resistant to flexibility, making it difficult to adapt to local needs and integrate broader stakeholder engagement.

In contrast, interviewees stated that the Nämdö BR's flexible structure and local presence coupled with a community-driven approach allowed it to adapt to local needs more readily. Smaller, well-timed initiatives created momentum and built trust among residents.

3.6. Learning and knowledge

Interviewees highlighted the importance of relevant knowledge inputs for the adequacy of planning and implementation processes, with some interviewees also identifying the importance of integrating ongoing learning processes into these initiatives (Fig. 8).

Knowledge-based inputs were perceived to provide an important base for improved *communication and relations between different actors and stakeholders* involved in each initiative. This was particularly the case concerning the generation and use of locally relevant knowledge, which in turn both raised the *perception of local interest groups as a useful resource* and also contributed to further *collaborations with local actors*, thereby also contributing to important support processes.

Both initiatives aimed at using implementation activities to raise *awareness of the unique local landscape values* available in the Nämdö archipelago. This was, for example, seen in a joint workshop between SEPA and WWF over NP-BR synergies where locals were asked to participate in providing data.

This awareness was seen as part of endogenous learning and knowledge processes within initiatives but was also perceived to be important to ensure support for current and future plans and measures. The importance of landscape-based learning as a result of implementation activities was identified more frequently in relation to the Nämdö BR compared to the NP. Aside from *awareness-building activities* and *local-focused research activities* connected to the initiatives, interviewees highlighted *official fact-finding reports, studies and other impact assessments* as knowledge inputs to the Nämdö NP.

The *utility of the existing knowledge base* differed between the initiatives, with the BR ostensibly better utilising local knowledge, while the NP struggled to fully integrate it. Collaborations with local actors were highlighted as a useful source of locally relevant knowledge for both initiatives. However, interviewees noted limited opportunities to contribute to social and environmental data collection, and local knowledge was often either overlooked or inadequately integrated into visions and plans. *Rigid institutions* were identified as hampering the production of such official knowledge inputs for the NP process as the current system does not support citizen research methods and instead relies on external observers. This is amplified by several respondents stating problems with the knowledge-generating initiatives put in place. For example, a digital survey was posted in the proposed NP area, with questions aimed at visitors and tourists. When locals stated they wanted a similar survey for residents, authorities first agreed but then stated that the visitor survey would work for residents as well.

Several NP-progress meetings were also advertised as dialogue meetings, but according to some respondents, these did not offer opportunities for dialogue and were merely informational. This led to a feeling of authorities doing the bare minimum of just checking things off a list. The neglect of the NP regional analysis results further added to this sentiment according to several interviewees.

4. Discussion

Our systematic analysis of the Nämdö NP and BR initiatives identified five core processes relating to planning, garnering support and resources, implementation and learning and knowledge management (Section 3.1). In the following sections, we identify and discuss key endogenous (i.e., within-action situations) and exogenous (i.e., external-to-action situations) factors influencing the perceived adequacy of these five processes and thus, the effective implementation of the initiatives themselves and their potential to deliver desired outcomes. Key factors were those that strongly influenced two or more core processes through direct or indirect causal relationships. Finally, we discuss some implications of our findings to support policy development and further research towards multifunctional marine and coastal landscapes.

4.1. Key endogenous factors

Supporting many previous studies (e.g., Duncan et al., 2020; Kelly et al., 2019; Osterblom and Folke, 2013; Van Cuong et al., 2017), our findings underline the importance of flexible, adaptive governance to support multifunctional marine and coastal landscapes. Rigid institutional structures at multiple levels were perceived to constrain the

implementation of the NP and its ability to adapt to local socio-economic conditions and incorporate stakeholder feedback (Sections 3.2, 3.3, 3.5, 3.6). This rigidity created a disconnect between governance objectives and community expectations and was perceived to limit SEPA's responsiveness to local needs, contributing to feelings of exclusion among local stakeholders (Section 3.2). These dynamics also reflect what Kelly et al. (2019) describe as the silo-thinking of government institutions, which inhibits cross-sectoral collaboration and limits the systemic change required for more integrated, multifunctional governance.

On the other hand, the Nämdö BR model was perceived by many stakeholders to be more flexible. This might be explained by the small size and local presence of the NGA, promoting greater flexibility to address community concerns as they emerge. This, in turn, appears to have fostered a more collaborative and resilient governance model. This flexibility not only allowed for quicker responses to community concerns but also enabled better integration of local knowledge into governance processes.

The limited integration of local knowledge in SEPA's framework contributed to a perceived gap between national conservation goals and local values and objectives in the vision and planning processes concerning Nämdö NP. The reliance on external knowledge inputs, rather than on local insights, weakened community engagement and led to resistance to the NP initiative among local residents (Section 3.3, 3.6). Conversely, the Nämdö BR model was seemingly more effective in facilitating the integration of local ecological knowledge with scientific data, enhancing community understanding of BR goals and better aligning conservation objectives with local values (Section 3.6). This supports previous findings concerning a need to carefully balance scientific and local knowledge to enhance adaptive management and ensure that interventions remain relevant and effective over time (Barraclough et al., 2023; Franco et al., 2020; Pérez-Romero et al., 2025). The Nämdö BR's structured, ongoing learning processes—including community-involved research and activities—further reinforced local support by aligning knowledge collection directly with community priorities and ecological goals. This inclusive approach bolstered the BR initiative's perceived legitimacy and fostered stronger trust within the community.

Collaboration with local actors was crucial in promoting the integration of local knowledge while strengthening community engagement and initiative legitimacy. The relatively low level of involvement of local stakeholders in the NP initiative contributed to perceptions that SEPA undervalued local perspectives. This appeared to foster distrust and local resistance, thereby negatively impacting the effectiveness of the NP initiative. In contrast, the Nämdö BR's approach was marked by closer coordination with residents, fostering a collaborative environment that seemed to encourage active local involvement (Section 3.6). Such collaborations, however, require clear and consistent communication to sustain trust and legitimacy (e.g. Van Cuong et al., 2017; Reed, 2016).

Adequate communication and relations, especially between local residents and government authorities, were key to the implementation of both the BR and NP, albeit in different ways (Section 3.3, 3.4, 3.6). SEPA's communication concerning the NP initiative was often perceived by locals as inadequate, contributing to feelings of exclusion among residents. These observations reinforce findings that communication and trust-building play a pivotal role in shaping support for both MPAs and BRs (e.g., Bennett et al., 2019; Schultz et al., 2011) and indicate that outcomes vary considerably depending on how participatory processes are structured and embedded within local contexts. Unfulfilled promises fostered perceptions among residents that their perspectives were undervalued and limited SEPA's ability to build community trust and respond to local concerns. In contrast, the BR initiative was characterised by more proactive engagement through workshops, educational events and community projects, which may have gradually fostered a sense of ownership and involvement among local residents. NGA's participatory approach strengthened support, implementation and learning processes as well as contributed to the growing legitimacy of the BR.

4.2. Key exogenous factors

Several policies and regulations influenced the NP and BR initiatives. Narrow requirements outlined in the National Park Plan and local/regional policies appeared to limit the consideration of broader socio-ecological factors in the NP initiative. Interviewees pointed to the restricted agency of SEPA personnel to exceed pro-forma obligations, limiting the adequacy of communication and ability to adopt an integrated approach, along with local support for the NP (Section 3.2). International agreements, such as the CBD target of 30 % marine protection by 2030, seemingly added external pressure on SEPA to prioritise the NP initiative despite local resistance, further exacerbating tensions with the local community. The decades-long development of Nämdö NP may have created additional pressure. These findings lend credence to existing criticisms that the regulatory rigidity of strict protected areas can lead to ineffective governance (e.g., Batisse, 1997) and that the inadequate focus of international agreements on local socio-economic realities can engender conflict and local resistance (Jouffray et al., 2020; Tafon et al., 2022). Further, the layering of global conservation targets onto existing policy frameworks may reinforce fragmentation and undermine the emergence of multifunctional, context-sensitive governance approaches (Kelly et al., 2019).

Support from outside actors and alignment with wider policy was crucial in both initiatives, though the level of local, regional and state support varied. For example, the alignment of Nämdö BR goals with broader sustainability goals at the EU, national and regional levels was important for facilitating municipal support for the BR (Section 3.3). Despite this, municipal support was also strongly shaped by shifts in local political leadership, which influenced available resources and the adequacy of communication, planning and implementation of the BR. Moreover, in line with previous studies (e.g., Bennett et al., 2019; Franco et al., 2020), our findings underline that local support for conservation is heavily influenced by perceptions of good governance and positive socio-economic impacts. Despite strong backing from state and regional authorities, whose funding facilitated its administrative structure, procedural constraints limited the Nämdö NP's adaptability and outreach efforts. This, in turn, diminished its perceived legitimacy among residents, with locals questioning the additional conservation and socio-economic benefits the NP would bring.

Finally, echoing Duncan et al. (2020), we found that logistical challenges relating to the remote location of the Nämdö Archipelago and the impact of the COVID-19 pandemic further complicated SEPA's engagement with the local community, particularly among elderly residents less familiar with digital communication. The NGA and the BR's flexible, community-centred model, on the other hand, appeared better suited to navigating these constraints, with concomitant benefits for securing local support and resources. For example, NGA helped establish partnerships with research institutions, enabling residents to participate in scientific workshops and projects, which in turn deepened local engagement and contributed to the initiative's momentum (Section 3.4). Our findings in this regard highlight the direct and indirect influence of locally embedded personnel, networks and infrastructure in developing marine and coastal governance initiatives in remote settings (e.g., Stoll-Kleemann et al., 2010; Van Cuong et al., 2017).

4.3. Implications

Our findings contribute to a more holistic and systems-oriented understanding of marine and coastal governance for multifunctional landscapes. By examining two concurrent governance initiatives through the lens of interdependent core processes, we show how planning, support, resource mobilisation, implementation and learning are

dynamically linked and shaped by both internal interactions and external pressures. Echoing broader calls for reflexive and context-sensitive approaches to multifunctional landscape governance (Fors et al., 2024), our approach advances current scholarship on MPA and BR governance in several ways.

First, our findings indicate that institutional rigidity, knowledge mobilisation and stakeholder engagement are not isolated governance challenges, but closely interlinked dynamics that shape legitimacy and outcomes over time. Taken together, these findings highlight the importance of recognising governance as a dynamic and interdependent process, where institutional conditions, actor engagement and systemic feedback interact in ways that can either enable or constrain multifunctional outcomes. By applying a systems perspective alongside the IAD framework, this study provides a practical approach for disentangling these relationships and identifying leverage points for more adaptive, inclusive and context-sensitive governance in marine and coastal landscapes.

Building on this, our findings reinforce earlier critiques of institutional rigidity in top-down marine governance, while clarifying how such rigidity constrains multiple governance processes — from planning and communication to learning and legitimacy-building. This is a well-known and persistent constraint linked to MPA development (e.g., Batisse, 1997; Cánovas-Molina and García-Frapolli, 2020; Franco et al., 2020; Grip and Blomqvist, 2020; Laffoley et al., 2019; Muccitelli et al., 2023) and other top-down environmental governance initiatives (e.g., Dawson et al., 2021). Moreover, institutional norms often prioritise stability and accountability, limiting the self-reflexivity and capacity of officials to adopt novel strategies (e.g., Campbell et al., 2016; Duncan et al., 2020; Weeks and Jupiter, 2013).

Nonetheless, our findings indicate that there is a degree, albeit limited, of interpretive freedom within NP regulations—for example, concerning local consultations or adaptive conservation activities—which, if leveraged and upscaled, could potentially mitigate distrust associated with MPAs and enhance legitimacy and social acceptance. Currently, the degree to which NP processes explore interpretive freedom within the legislation depends on the willingness and capacity of individual managers and their superiors. Of course, fears of legal ramifications might encourage managers to act according to the letter of the law rather than in the spirit of the law. Yet legal challenges are essential processes by which unclear rules and the requirements of government agencies become clarified and potentially transformed. For instance, in the context of an offshore wind conflict in Estonia, Tafon et al. (2023) show how local contestations of environmental impact assessment procedures resulted in the country's supreme court reversing marine planners' decision to develop coastal wind farms. The legal decision also fostered reflexive planning and set a legal precedent for how planning cases are handled in the country. A shift in management culture at, for example, government agencies is therefore called for in pursuit of multifunctional landscapes, to embrace exploration of greater institutional flexibility in the face of legal and socio-environmental uncertainty (e.g., Gilek et al., 2016).

Second, top-down initiatives such as NPs and MPAs typically rely heavily on formal, scientific knowledge to the exclusion of other ways of knowing, including local/indigenous knowledge (Franco et al., 2020). Our results indicate that the perceived exclusion of local knowledge from planning and implementation processes can stymie the strong community engagement that is vital for public acceptance and successful implementation (Section 3.6). This is particularly striking given that SEPA, in previous reports and National Park Plans (e.g., SEPA, 2003, 2004, 2008, 2015), repeatedly emphasises the importance of incorporating stakeholder knowledge into environmental governance, highlighting a disconnect between formal commitments and practical implementation. Because local knowledge is rooted in place and experience, its integration can increase the conservation and restoration of local ecosystems in peril (Newmaster et al., 2011). There is therefore a clear need to support iterative learning, public engagement and integration of diverse knowledge systems, including local knowledge, through more flexible, adaptive governance, conservation policies and multifunctional landscape planning (e.g., Fagerholm et al., 2020; Stoll-Kleemann et al., 2010; Pinto-Correia et al., 2019).

In this regard, our findings are largely consistent with many previous studies extolling the benefits of multi-actor collaborations to enhance effective information-sharing and decision-making across scales. Such collaborations have been shown to foster trust and legitimacy and to support biodiversity conservation and ecosystem restoration while strengthening community ties (Cadoret and Jones, 2024; Campbell et al., 2016; Stoll-Kleemann et al., 2010). In line with other studies (e.g., Franco et al., 2020; Hedden-Dunkhorst and Schmitt, 2020; Pinto-Correia et al., 2019), we found that BR investments in community engagement practices and integration of local perspectives helped to align conservation efforts with socio-economic priorities and to strengthen the perceived legitimacy of the initiative. Furthermore, increased focus on structured endogenous learning-by-doing approaches during the development and implementation of MPAs may also mitigate implementation risks and offer effective "safe-to-fail" strategies for managing complex and uncertain system dynamics, especially within rigid bureaucratic structures (Heifetz et al., 2009; Cilliers et al., 2013).

Third, our findings reinforce earlier research on the role of sustained funding as an enabling condition for long-term engagement, coordination and learning across stakeholder groups (Section 3.4). Sustained funding is vital to support both governance models effectively, not least to overcome logistical challenges associated with developing conservation initiatives in remote locations. For MPAs, adequate funding ensures critical outreach and stakeholder engagement, while BRs require stable resources for adaptive co-management practices that foster trust and participation. Securing continuous funding is a common and ongoing challenge for many BRs, and limited financial and human resources can significantly reduce their capacity to sustain stakeholder engagement and adaptive management efforts (Coetzer et al., 2014; Van Cuong et al., 2017). A strong reliance on external grants therefore increases the uncertainty surrounding BR initiatives and raises concerns about their long-term sustainability (Section 3.4). State-financed MPAs, on the other hand, are associated with considerable institutional and economic stability, but the availability of financial resources may nevertheless be subject to long-term economic trends and shifts in political preferences. Innovative approaches such as citizen science programs and NGO partnerships might therefore offer important ways to address current or future resource gaps, encouraging broader local ownership and more inclusive conservation (Stoll-Kleemann et al., 2010; Van Cuong et al., 2017). Without adequate financial and human resources, both models risk reduced effectiveness, as limitations in engagement and adaptive management may compromise conservation objectives (Schliep and Stoll-Kleemann, 2010).

Finally, our study offers a balanced perspective on the strengths and limitations of top-down and bottom-up approaches to area-based conservation. In the clamour towards more flexible, locally anchored marine conservation governance, it is important not to throw the baby out with the bathwater. MPAs, especially strict NPs, are well-established institutional responses to support biodiversity conservation and have provided benefits in terms of supporting fish stocks and restoring marine biodiversity (Chirico et al., 2017; Laffoley et al., 2019; McClanahan et al., 2006). The control orientation and bureaucracy of top-down MPA initiatives foster institutional stability, efficient monitoring and enforcement mechanisms, as well as accountability in the spending of public funds and the management of public resources. Bottom-up initiatives such as BRs, on the other hand, appear better able to engage local communities and avoid framing biodiversity conservation measures as a zero-sum game for which socio-cultural and economic values must necessarily be lost.

Taken together, our findings reinforce the idea that multifunctional landscapes benefit from context-sensitive governance models that combine structured mandates and public accountability with

community engagement and adaptability (Duncan et al., 2020; Österblom and Folke, 2013). Embedding biodiversity targets across policies at multiple levels is argued to foster more inclusive governance that better corresponds to ecological and social needs (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services [IPBES], 2018). This suggests the benefits of integrating the stability and enforcement capability of NP/MPA regulatory structures (e.g., Laffoley et al., 2019) with the BR's flexible, community-centred frameworks. This is not a novel proposition—BRs are intended as a complement to more strictly protected areas (IUCN, 1979). In Nämdö, for example, the BR could act as a "social buffer", helping to mitigate both the potential adverse socio-economic impacts associated with NP regulations and the distrust and resistance that top-down MPA processes often generate in local communities (e.g., Cánovas-Molina and García-Frapolli, 2020). Importantly, the BR model allows for better integration of local knowledge to improve the sensitivity of conservation measures to local contexts. It also fosters positive local engagement by allowing residents to design and implement projects where they actively contribute to conservation efforts whilst simultaneously serving other community needs (e.g., Bennett et al., 2019; Franco et al., 2020; Pinto-Correia et al., 2019). Such integration may yield a more balanced and adaptable area-based governance model capable of combining institutional and local support for biodiversity conservation efforts beyond protected areas (e.g., Coetzer et al., 2014).

4.4. Limitations

This study aims to provide valuable empirical, analytical and practical insights into the governance processes of the Nämdö NP and BR. However, it has certain limitations which are common to case study research and which may be relevant to the interpretation of its findings. Our case study focuses on the Nämdö archipelago was an intentional choice to allow a comparison of two concurrent top-down and bottom-up governance initiatives occurring in the same area. We argue that these two cases – concerning the implementation of a marine NP and BR respectively, i.e., two internationally recognised and commonly implemented governance forms – are broadly representative of marine/coastal governance initiatives in northern Europe and similar contexts. This is particularly true given the similar influence of higher-level institutional drivers such as global/international agreements and frameworks. Although this geographic delimitation may influence the generalisability of our results to other regions, especially those with vastly different socio-economic, ecological and political conditions, the in-depth understanding generated may still offer valuable insights. This is not least due to the use of previously developed theories, such as the IAD framework adopted in this study (Yin, 2017).

Additionally, since the studied initiatives in Nämdö are ongoing, their long-term impacts remain uncertain. Further research tracking their outcomes over time is, therefore, necessary to understand the ultimate utility of these initiatives to support multifunctional landscapes. However, the main focus of our study was on key factors and system dynamics influencing the planning and initial implementation phases of these two initiatives. Although we show that planning and implementation are iterative processes, our findings concerning initial conditions should not be strongly affected by future developments in Nämdö.

5. Concluding remarks

Based on semi-structured interviews and qualitative document analysis, this study used a complex systems approach in combination with the IAD framework. This allowed us to examine how a broad range of institutional and socio-ecological factors influenced the implementation of temporally and spatially overlapping marine national park (NP) and biosphere reserve (BR) initiatives in Nämdö archipelago, Sweden. The study contributes to a more holistic understanding of what influences the emergence, implementation and development of MPAs and BRs, which are increasingly adopted in response to growing challenges to marine and coastal ecosystems. By identifying key endogenous and exogenous factors, we reveal how five interdependent processes – visioning and planning, garnering support, mobilising resources, implementation and fostering learning and knowledge-sharing – shaped each initiative as well as how these initiatives interacted with each other. The iterative development of these processes influenced local engagement, the integration of diverse knowledge systems and the ability of governance structures to adapt to local contexts, impacting both perceived legitimacy and governance effectiveness. Our findings highlight that governance success in multifunctional marine and coastal landscapes hinges on achieving balanced, inclusive, adaptive and resourceful governance frameworks.

Our findings suggest that hybrid approaches combining the stability, enforcement and institutionalised mechanisms of top-down models with the flexible and inclusive nature of community-driven, bottom-up initiatives may offer a pathway towards bridging global conservation objectives with local values and priorities. Future research is needed to examine the viability and scalability of such hybrid models in diverse landscape contexts, exploring trade-offs and synergies that influence governance outcomes in coastal and marine conservation. Key questions include: How can governance approaches strike the right balance between the accountability and institutional stability of top-down models and the adaptability and inclusivity of bottom-up frameworks? What mechanisms are required to introduce more flexibility within rigid legal frameworks without compromising accountability and what role can natural resource authorities play as bricoleurs in ever-changing institutional arrangements? How can national-level institutions better support local initiatives, transitioning from command-and-control approaches to dynamic partnerships or polycentric governance systems? Finally, how can community-led initiatives ensure responsible management and long-term quality control?

As the need for more resilient, multifunctional marine and coastal landscapes increases on a global scale, answering these questions becomes increasingly important. It is essential for fostering governance systems that are not only effective in terms of environmental and sustainability goal achievement but also equitable, innovative, institutionally viable and capable of addressing current and future challenges. Ultimately, this requires embracing governance models that are as dynamic and multifunctional as the landscapes they are meant to protect.

CRediT authorship contribution statement

Charles Westerberg: Writing – original draft, Visualization, Methodology, Formal analysis. **Michael Gilek:** Writing – review & editing, Supervision, Methodology. **Ralph Tafon:** Writing – review & editing, Supervision, Methodology. **Lucas Dawson:** Writing – review & editing, Methodology, Formal analysis.

Data availability

To the extent it is sanctioned by research ethical regulations and permits, data will be made available on request.

Declaration of generative AI and AI-assisted technologies in the writing process

During the preparation of this work, the author(s) used ChatGPT 4o (https://chatgpt.com) to refine the language. After using this tool, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the publication.

Declaration of competing interest

The authors declare that they have no known competing financial

interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgements

This study is part of the Landpaths project financed by the Swedish Environmental Protection Agency. Project number: (2021-00040). Funding for the research time of Michael Gilek was provided by the Foundation for Baltic and East European Studies.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ocecoaman.2025.107787.

Data availability

The data that has been used is confidential.

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