



Facing marine industrialization: Challenges of participatory and inclusive governance in the Southern North Sea and the Baltic Sea - Editorial

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Abstract

The Baltic Sea and the North Sea face severe ecological challenges including historic pollution from wars, nutrient input as well as pressures from offshore energy, shipping, and fishing, leaving marine ecosystems highly degraded. Marine industrial expansion furthermore undermines conservation goals. Against this backdrop, more inclusive governance is increasingly gaining attention. Public and stakeholder participation, along with stronger science-policy interfaces, may offer innovative solutions, though outcomes vary widely across political, socio-economic and cultural contexts. This collection of seven empirical studies from various social science disciplines explores how participation, communication, and multi-level institutional frameworks shape existing marine governance towards the protection of marine biodiversity and sustainable ocean uses – and what are major challenges including the proliferation of intensified user conflicts.

Keywords: Marine industrialization · Marine conservation · Stakeholder participation · Multi-level governance

Introduction

Despite increased efforts for marine conservation, the Baltic Sea and the North Sea remain in poor ecological condition. Riparian countries struggle to address the legacy of marine pollution from the World Wars (Pechmann & Hinkel, in this collection), industrial agriculture (Kuhn, in this collection), and carbon-intensive economic systems. At the same time, industrial pilot projects and new initiatives—such as proposed energy islands (Dyremose, in this collection) and the European offshore grid—are emerging (Meeus 2025;

Valerio et al. 2025). This collection of seven empirical studies critically reflects on both the claimed potential and the tangible outcomes of stakeholder participation and science-policy interfaces in ocean governance.

The North Sea and southern Baltic Sea and their coastal areas have undergone a process of growing industrialization since the 1960s, expressed through industrial fishing fleets, hundreds of offshore platforms, dense networks of underwater cables and pipelines, intensively used shipping routes, and hundreds of wind turbines (Couling and Hein 2020; HELCOM 2023). Land-based industrialization in agriculture and manufacturing has further contributed to marine pollution through eutrophication, chemical contaminants, and microplastics (HELCOM 2021).

The industrialization of the seas has also resulted in environmentally degrading infrastructure development and the impairment of marine species. Today's dominant vision for reconciling industrial activity with biodiversity conservation relies on spatial segregation between Marine Protected Areas (MPAs) and industrial zones. While competition for space has encouraged multi-use approaches, industrial pressures in and around MPAs risk undermining their ability to ensure conservation and restoration.

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Accelerated by the European Green Deal, which aims for decarbonization by 2050, offshore wind energy targets have increased significantly (Ostend Declaration 2023). Carbon Capture and Storage beneath the seabed is gaining political support but is contested by marine conservation groups (e.g., Yao et al. 2025). The prospect of sustainably produced offshore hydrogen has raised expectations within energy-intensive industries (Farahmand et al. 2024). European Union member states and neighboring countries increasingly recognize the need for multilateral cooperation. However, progress toward a post-fossil-fuel future remains difficult due to hesitant policy implementation and the strong influence of industrial lobbies (Ittner, in this collection).

Participation and inclusive marine governance

Governance approaches that emphasize the inclusion of stakeholders, citizens, and scientists offer potential for innovative marine governance and effective protection (UNDP & IDOS 2023; Poto et al. 2022). Research shows, however, that public and stakeholder inclusion can produce highly variable outcomes depending on how involvement is structured (e.g., Runhaar & van Nieuwaal 2010; Gilek et al. 2016; Kuhn & Wehrmann, 2025), as well as on country-specific social-ecological histories, political cultures, and societal values (e.g., Schmitt 2015; Walsh 2021). Stahl and Hinkel (in this collection), for example, examine the public controversy surrounding the proposed Baltic Sea National Park in Schleswig-Holstein (Germany) and show how participatory mechanisms were used by specific stakeholder groups to mobilize opposition to a proposed MPA.

All contributions in this collection examine political and social frictions emerging around marine and coastal industrialization and the resulting competition between marine sectors. Several authors emphasize visions of multi-use marine space and the role of public and political narratives (Stahl & Hinkel; Pechmann & Hinkel, in this collection). Ocean governance is shaped not only by institutions and instruments but also by implementation processes and the ways multiple actors construct meaning (Partelow et al. 2023). The success of conservation and policy initiatives partly depends on how problems are framed.

Many stakeholders—including industrial actors, riparian municipalities, and coastal lobby groups—have divergent visions for and interests in marine environments, which require discussion and negotiation. Debates are frequently framed as contests over marine space, spatial planning, and governance responsibility for particular areas (Giebels; Stahl & Hinkel; Walsh et al.; Ittner, in this collection). These contests can prompt collaborative, multi-level governance

processes. Participatory approaches prescribed in industrial and political governance frameworks can, however, also be challenged by activism, litigation, and the unexpected influence of actors outside formal governance arenas (Kuhn; Stahl & Hinkel; Ittner, in this collection). As such, empirical research within this collection shows that inclusion is not merely procedural but relational—an ongoing negotiation among actors, institutions, and governance levels. While extensive public participation can lengthen decision-making processes, a lack of participation can foster non-compliance.

Most contributions reveal that contestation and non-acceptance are inherent features of marine industrialization and its governance. Addressing these challenges requires attention not only to formal governance instruments but also to the underlying social contracts and value systems that sustain—or undermine—marine policy (Kuhn, in this collection).

Together, these contributions illuminate both the potential and the major challenges of participatory, collaborative, and inclusive governance in addressing the environmental, political, and spatial complexities of marine industrialization. They collectively show that marine industrialization reshapes not only ecological systems but also governance structures, political processes, and social narratives surrounding the sea and marine uses.

By bringing together case studies from the Southern North Sea and Southern Baltic Sea, with a particular focus on German waters, this collection deepens our understanding of how contestation, narratives, and collaboration shape contemporary ocean governance. We argue that inclusive governance should be understood not as a static solution but as a dynamic, evolving process—one that embraces complexity, negotiation, and diversity as essential conditions for governing the oceans in an era of rapid marine industrialization and environmental change. The authors in this collection approach participation and inclusive governance from a variety of empirical perspectives.

The empirical studies in this collection

Diana Giebels (2026) examines invasive species management in the German Wadden Sea, an issue gaining importance amid growing marine industrialization. She explores how network governance and latent governance capacity can improve management effectiveness in the face of fragmented responsibilities and conflicting interests. The concept of latent governance capacity highlights the untapped potential within informal or underutilized social networks.

Annegret Kuhn (2026) investigates non-acceptance of environmental policy by studying the limited effectiveness of agricultural nutrient-reduction measures aimed at

mitigating Baltic Sea eutrophication. Based on interviews with farmers and local authorities in Northern Germany, she identifies economic constraints, political mistrust, perceived fairness, and specific policy design as key barriers to policy acceptance.

Irit Ittner (2025) analyzes national path dependencies in marine fossil fuel extraction, the effects of multilevel governance, and the role of climate activism in shaping marine conservation. While Dutch North Sea gas extraction supported German consumption for decades without major controversy, a more recent transboundary project was legally challenged for conflicting with climate objectives. Cross-border activism delayed the project and triggered intense political debate about fossil fuel extraction in German waters.

Stahl and Hinkel (2025) analyze the public controversy surrounding the proposed—and ultimately abandoned—Baltic Sea National Park in Schleswig–Holstein. Using the Narrative Policy Framework, they show how competing storylines, portraying the sea or local communities as “victims” and politicians as “villains,” transformed a conservation initiative into a polarized public debate. The dominance of anthropocentric narratives over ecological arguments highlights the difficulty of developing compelling conservation discourses in industrialized seascapes.

Walsh et al. (2025) examine place-based governance on small North Sea islands such as the Hallings of Northern Friesland, Schiermonnikoog and the Koster Islands, which are affected by marine industrialization. They show how local actors navigate tensions between isolation and integration, developing adaptive and context-sensitive strategies within national governance systems. The authors call for greater recognition to the situated nature of governance practices on small islands.

Seeberg Dyremose (2025) analyzes the Danish North Sea Energy Island, a flagship initiative under the EU Green Deal. The study illustrates how its ambitious design requires new forms of transboundary cooperation and stakeholder engagement. At the same time, mismatches between political vision and implementation reveal that successful development of energy islands requires clarity in responsibilities, expectations, and agreements among national and international stakeholders.

Pechmann and Hinkel (2025) investigate policy debates surrounding sea-dumped munitions from World War II in German marine waters, whose removal requires new industrial facilities. Their study shows how evolving scientific knowledge is strategically used by lobbyists, with both uncertainty and certainty mobilized to build narratives of urgency and credibility. Their findings highlight how narratives that link science, risk, and precaution shape political decisions and policy outcomes.

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Declarations

Conflict of interest The authors state that there is no conflict of interest.

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