

Knowledge Integration in Ocean Governance

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Abstract

The integration of diverse knowledges is considered essential in ocean governance to understand and address the complex and transboundary changes affecting oceans and societies. In this line, also the UN Decade of Ocean Science for Development (2021–2030) calls for “the science we need for the ocean we want” (UNESCO, n.d.) and the 5th International Polar Year (2032–2033) evolves around “the urgent need for coordinated international research to tackle the biggest challenges of polar research, for both the Polar Regions themselves and for the world as a whole” (International Polar Year, n.d.). This thematic issue derives from the notion that the coordination and integration of diverse knowledges to develop advanced understandings is a political process shaped by, amongst other things, societal inequalities and different forms of governance. To assess the implication of this notion for the governance of the oceans—the “common heritage of humankind” (United Nations Law of the Sea)—this thematic issue explores knowledge integration processes in ocean governance. It sheds light on different governance formats, the role of participatory and co-creative approaches to knowledge integration, their potentials, limitations, and related micropolitics.

Keywords

5th International Polar Year; co-creation; knowledge integration; ocean and coastal governance; participation; United Nations Decade of Ocean Science for Development

1. Introduction

As the narratives driving the UN Decade of Ocean Science and the upcoming International Polar Year exemplify there is broad scientific and political consensus that the integration of diverse knowledges in ocean governance is crucial for preserving and restoring sustainable marine ecosystems (see Grip, 2017;

Poto et al., 2021; van Tatenhove, 2011). In this way, ideally knowledge integration shall advance a sophisticated understanding of the challenges and opportunities associated with human (mis-)use and management of the oceans (a), help to map scenarios and identify entry points for political action (b), and to strengthen global justice and avoid policy decisions that perpetuate inequality and domination by some at the expense of others (c). However, knowledge about the actual experiences, formats, and processes of knowledge integration in ocean governance is limited. To concretize demands for policies facilitating knowledge integration, the 13 contributions in this thematic issue introduce new evidence from knowledge integration processes across regions and scales.

2. Knowledge Integration Processes in Ocean Governance

Following Dale and Armitage (2011), we understand knowledge integration processes as part of knowledge co-production processes, which include knowledge integration between different scientific disciplines (interdisciplinarity) but also the integration of scientific knowledge and other knowledge systems (transdisciplinarity). Another dimension of knowledge integration relates to the transfer of knowledges in political processes, which may also imply the effective political participation of knowledge holders as a necessary element of knowledge integration (see Neddersen et al., 2025). Despite the potential ascribed to knowledge integration, its actual impact depends crucially on the socio-political and socio-economic context (see Champion & Strand, 2025). Following Mondré and Kuhn (2022, p. 6), we understand ocean governance as “all rules, policies, laws and institutions designed by either governmental and/or non-governmental actors—on all levels of decision-making—that regulate any human activities with regard to the ocean.” Accordingly, the contributions to this thematic issue highlight different governance formats and institutions as well as participatory and co-creative approaches.

2.1. Governance Formats and Institutions

Various contributions investigate how knowledges are considered in ocean governance and emphasize the need to broaden knowledge perspectives. In this way, Rafliana (2025) points out that narratives around tsunamis become more reductionist, with interpretations that are used for tsunami risk reduction measures being prone to contestation. To understand complex human and non-human entanglements, Rafliana introduces epistemic oscillation as a conceptual lens and argues for “alternative ways to unfold the multiplicities of social and geological realities and epistemic mobilities” (Rafliana, 2025, p. 2). Also, Schüpff et al. (2025, p. 1) understand “coastal adaptation as a geophysical and socially intertwined process.” By focusing specifically on ocean sand, they demand that future adaptation strategies engage “with the materialities of ocean sand and the social implications of sediment loss for artisanal fishers” (Schüpff et al., 2025, p. 1) to reduce maladaptation. The authors thereby build on the literature on “geosocialities” and understand ocean sand as a non-human actor, whose fluid materiality “provides a lens through which to analyse the hidden complexities of different coastal actors in managing coastal risk” (Schüpff et al., 2025, p. 18). Chávez-Páez and Hornidge (2025) call for governments’ approaches to ocean governance to be more holistic. In the context of fisheries management in Ecuador, they show how illegal activities and organised crime shape the ecological and socio-economic dynamics of a region and affect fisheries in nearby communities. This interconnectedness, however, only comes into light if community struggles are understood “as part of a broader tapestry of relational dynamics” (Chávez-Páez & Hornidge, 2025, p. 18) and not viewed in isolation.

Other contributions focus on more general measures for integrating alternative knowledges in ocean governance. For example, Neddersen et al. (2025) point out weak legal provisions which often provide no guidance on how knowledge should be integrated into planning. The authors emphasize that knowledge integration “requires more than just participation,” especially in cases with unequal power distribution when dominant actors are able to influence decisions in their favour, as in the case of marine protected area management plans in the German Baltic Sea. The authors suggest advancing legal frameworks and considering “broader and more inclusive participation tools, earlier stakeholder engagement, and [putting] stronger emphasis on social and economic considerations” (Neddersen et al., 2025, p. 16). In a similar vein, Duggan et al. (2025) emphasized meaningful stakeholder engagement and trust. They present a heuristic (“seven rules of thumb”) to enable researchers and practitioners to incorporate “sense of place” into ocean governance as a relational tool that they believe can advance knowledge integration, without neglecting broader systemic issues. Gricius (2025), however, reminds us, that whether or not institutional arrangements and mechanisms encourage or hinder the integration of knowledges and perspectives in ocean governance also depends on their mandates. In this way, the Arctic Council, for example, does not consider military security. The distinction between types of security has implications for cooperation under the auspices of the Arctic Council. While Gricius (2025) traces the discourse from the Cold War to the present and finds that Arctic security knowledge is following global security trends such as increasing geo-political competition, impacting the topical issues addressed in ocean governance institutions, Ittner and Hornidge’s (2025) contribution brings into focus how administrative fragmentation and knowledge politics by a diverse set of actors affect biodiversity protection. By focusing on the mapping of marine protected areas in the transboundary Borkum Reef Ground, their analysis raises awareness of “undone science” by showing how transboundary research and knowledge production are shaped by administrative requirements and funding priorities. Also, Le Meur and Muni Toke (2025) relate to administrative struggles and the role that historical pathways may play in knowledge politics by analysing how the relationship between France’s three non-sovereign Pacific territories and the French state shapes their intra-regional position towards deep-sea mining.

2.2. Participatory and Co-Creative Approaches

The discussion of the role, potentials, limitations, and micropolitics related to participatory and co-creative research approaches in ocean governance is central to various contributions. By focusing explicitly on the UN Second World Ocean Assessment Report (2021), Toupin et al. (2025) investigate how international reports integrate diverse knowledges in assessments guiding ocean governance. They show how the report relies mostly on research published in high-impact journals, and less on specialized sources or a broader dataset of ocean research. In line with the targets of the UN Decade for Ocean Science they see “room for improvement” and introduce a methodological framework for improving knowledge integration in reports informing ocean governance. Also, Schoderer et al. (2025) illuminate systemic vulnerabilities in knowledge integration processes that inform the IPCC report. They emphasize that the large coordination effort, which includes data collection, data provision, and data management, is mostly being taken care of “by entities at the bottom of the value chain” (Schoderer et al., 2025, p. 16) and is vulnerable to fluctuations in funding and staff shortages, weakening coordination platforms and programs.

By relating explicitly to Indigenous and local knowledge systems, Champion and Strand (2025) argue that it is necessary to unpack the colonial, imperial, and othering underpinnings of ocean science and governance

at national and global levels. They draw attention to the “Western” scientific and legal frameworks on which the International Seabed Authority and national ocean governance in South Africa are based, and demand to decolonize both. Sacedon et al. (2025) address the question of unpacking and integrating knowledge by drawing attention to the feeling of discomfort that academics may experience at the “cultural interface,” when engaging with diverse and alternate knowledges, including with First Nations and Indigenous Communities. They identify “fragility and guilt, helplessness, fear, ignorance, shame, challenged conceptions of time, and finally connection and relationality” (Sacedon et al., 2025, p. 1) as common themes and argue for more “reflection, learning, reckoning with historical wrongs and challenging hegemonic knowledge and politics” (Sacedon et al., 2025, p. 21) and respective time in the research process. From an institutional perspective, Brunnström et al. (2025) examine how universities can enhance their societal impact by developing new organizational models that integrate research, education, and collaboration with societal stakeholders. They compare two transdisciplinary centres—the Centre for Sea and Society at the University of Gothenburg, Sweden, and the Center for Ocean and Society at Kiel University, Germany—and suggest integrating “policy and institution-building activities” to the four societal interaction activities proposed by Hughes and Kitson (2012) to advance academic expertise on ocean issues and achieve the respective SDGs.

3. Conclusion

The oceans are spaces of exceptional relevance for humankind, but in these extraordinary times of polycrisis, environmental concerns receive less attention in policy-making. This also affects knowledge production in the field of ocean governance, which has already had to cope with limited financial resources, weak long-term planning, increasing polarization, and limited means to integrate diverse and alternative knowledges. While the contributions to this thematic issue often exemplify a weak status quo of how knowledge integration is practised in the context of ocean governance, they also provide novel insights on how this can be improved. Foremost, they stress that knowledge integration needs to be acknowledged as starting in the inner circles of science and political action is needed to address the substantial challenges related to complex coordination efforts but also funding issues. The insights presented show that the goal of advancing knowledge integration in ocean governance is not a sure-fire success, but requires much more effort, both scientifically and politically.

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Conflict of Interests

The authors declare no conflict of interests.

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