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Editorial: Social science perspectives on marine biodiversity governance

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Editorial on the Research Topic

Social science perspectives on marine biodiversity governance

A departure and a start point for critical marine biodiversity governance research

This Research Topic offers both a departure point, and a start point, for thinking about how the ever-growing field of marine social science (Bavinck and Verrips, 2020; Bennett, 2019; McKinley et al., 2020) attends more specifically to marine *biodiversity* as an area of examination. The escalating demand for marine social scientists to be integrated into large-scale research consortia—tasked with providing the “social science perspective” to contextualize or translate natural science knowledge for decision-makers—necessitates critical reflection on the actual scope and nature of this contribution.

The necessity of critically reflecting on *social science perspectives on marine biodiversity governance* – the title of our special section – is amplified by the expanding architecture of international marine biodiversity governance, encompassing evolving legal frameworks, institutional bodies, and diplomatic negotiations shaping the way life in the ocean is understood and governed, and will be in the decades to come. This is manifested in the recent adoption of the Agreement on the Conservation and Sustainable Use of Marine Biological Diversity of Areas beyond National Jurisdiction (BBNJ Agreement) on 19 June 2023, the 2022 Kunming-Montreal Global Biodiversity Framework with its target to conserve 30% of Land, Waters and Seas and the high-level dialogue at the United Nations Ocean Conferences, promoting ocean conservation and the implementation of Sustainable Development Goal 14 (Life Below Water) (e.g., Rabitz et al., 2025).

However, multilateral marine biodiversity governance is shaped and threatened by unilateral action, geopolitical struggle, territorial disputes, and new blue paradigms (Bueger and Mallin, 2023; Wilson Rowe, 2025). Moreover, marine biodiversity governance is not only threatened, but may pose a threat to the lived realities of the world’s ocean peoples

depending on its design, implementation and enforcement (Satizábal et al., 2024; Satizábal et al., 2025), as well as the financial dimensions driving it (Gruby et al., 2023; Havice et al., 2021; Mallin and Barbesgaard, 2020). This requires further critical questions to be asked about its inception, development and realization and who and what benefits, or suffers. Accordingly, then, current dynamics require deeper analytical engagement with the underlying complexities of human-ocean interactions, including the recognition that we cannot easily ‘fix’ environmental problems (Peters and Satizábal, 2022), by translating natural science findings into policy recommendations and readily available solutions for the “ocean we want” as announced by the United Nations Decade of Ocean Science for Sustainable Development (UNDOS). It is essential to ask who the ‘we’ is, that we are talking about (Gonçalves et al., 2022; Sammler and Peters, 2023) and how social scientists can contribute to a reflexive, policy-relevant and engaged ocean science (Vadrot et al., 2022b). Whose vision of the future ocean prevails?

It should be noted that a central theme running through marine biodiversity research, policy, and practice, is how to underpin ocean protection with knowledge and (scientific) data about the changing marine environment as a baseline for evidence-based policy-making (Lubchenco et al., 2019; Sullivan et al., 2017). From a natural science perspective, *marine biodiversity* constitutes a highly dynamic area of inquiry within both general environmental research and the specialized domain of ocean science (Pendleton et al., 2020). This field encompasses a wide spectrum of spatial and temporal scales aimed at assessing global patterns of change in marine biological variation (e.g., Cochrane et al., 2016; Hillebrand et al., 2023). Although the term “biodiversity” emerged in the mid-1980s (Wilson 1985), its substantial uptake and sustained increase in prominence occurred from the 1990s onward (Tolochko and Vadrot 2021a). Marine biodiversity research involves significant financial investment, large-scale research teams, ambitious objectives, and extensive international collaboration through longitudinal monitoring programs (Vermeulen, 2013). This necessitates a data-intensive scientific approach, requiring the integration of various disciplines and data collection methodologies including novel tools such as digital twins of the ocean to construct cohesive representations of marine systems and the monitoring of marine life (Vadrot and Wanneau, 2024). Natural scientists often emphasize that they have a societal responsibility to present data objectively and to participate in policy by developing indicators on the state of the marine environment (i.e. Flensburg et al., 2023), or by translating and sharing data for the purpose of preserving a common good (Sullivan et al., 2017). Social scientists urge consideration of the forces shaping data (rending the notion of objectivity as necessarily problematic), as well as questioning the concept of a “common good” (good for whom?). Nonetheless, the need for “objective” information and the fact that the data are changing rapidly call for dynamic interaction between science, policy and society (Lubchenco 1995, 8, see also e.g. Cvitanovic et al., 2021; Karcher et al., 2024) and the continuous availability of “basic information about the system and people’s choices for altering future system states” (Lubchenco et al., 2019: 107).

Yet whilst there is a growing call for societally-relevant research, and it may be imagined to be new, the wider marine social sciences already have a decades long trajectory engaging with the complexities of human-ocean interactions in various ways. Their study has both intensified and grown in the past years with a renewed acknowledgement of the importance of understanding social dimensions of worlds at, in, under, and related to, the seas and oceans, and the planning, policy, legal and regulatory basis for governing such socio-ecological worlds (Bavinck and Verrips, 2020; Bennett, 2019; McKinley et al., 2020). As Bennett notes (2019), acknowledging that the seas are ‘peopled’ in a variety of ways is essential to any study of them. People (us), live (and die) at sea, work and play at sea, build worlds, routines, and rituals at sea. Their (our) actions on land impact the sea (environmentally through circuits of carbon production, agriculture run-off, or waste disposal, to the impacts of economic ordering that reshape oceanic networks and trade). Their (our) visions and advances transform the sea (through extraction, technological development, design of protection measures). In short, and a point long made by Pacific Island scholars who acknowledge deep human entanglements with ocean worlds (see Hau’Ofa, 2008), people and the sea are ever in relation. Yet people are also agents of governing and governance – of how the seas and oceans, their uses, impacts to/on them, and their possible futures, may be managed and controlled. However, social science perspectives remain marginal to the wider marine sciences, a point also reflected in funding patterns (Partelow et al., 2023). Science is politics by other means (Callon et al., 1986) and may contribute to selective world building (Tolochko and Vadrot 2021b).

One can only speculate for the reasons for the continued underrepresentation of critical social science approaches in studies of marine biodiversity, which could range from the dominance of the natural sciences and modes of knowledge formation (i.e. quantitative data analysis) that feeds into policy domains and their perceived import vis-à-vis the (qualitative) social sciences; to the apparent ‘cheapness’ of social science research vs. (at times) lab-intensive, expedition focused marine research. Or, perhaps more worryingly, there might be a desire to *lock out* social science research that asks critical questions of history, power, geopolitics, which offer the potential to *unlock* the political, economic, socio-cultural forces reshaping oceans, exposing the violent impacts of state action or private activity (or combinations of both), which shake the very foundations of global order (i.e. Campling, and Colás 2016; Mallin, 2025; Satizábal et al., 2024). Such knowledge presents hard truths.

Indeed, it is remarkable, in many ways, that whilst people are the agents for change – changing the climate and oceans, and to potentially changing them positively through protection, conservation and/or restoration – that social science research is not representing a greater percentage of the marine sciences more broadly – and especially marine *biodiversity* science. If ‘we’ want science to make change, we must understand better its peopled components, and then how people’s worlds intersect with marine biodiversity – its use and abuse, and its governance; from negotiating marine protected areas (Ruiz-Rodríguez and Vadrot,

2025) to the equitable sharing of benefits from marine genetic resource use (Dunshirn and Zhivkopljas, 2024, Blasiak et al., 2018). Critical work on the BBNJ (this Topic, De Santo et al., 2019; Campbell et al., 2022, Langlet and Vadrot, 2023, Tessnow-von Wysocki and Vadrot 2022, Vadrot et al., 2022a) demonstrates that asking these questions is crucial. This is because,

...[t]he BBNJ agreement has been shaped by historically embedded power relations and interests that are shaped by, reflect, and have the potential to remake or transform the intertwined global order of social, political, and economic relations. It is part of a complex web of international environmental agreements, diplomatic protocols, routines, and UN procedures that have the tendency to black-box the power struggles and global inequalities that perpetuate agreement-making, fostering global sustainability transformations and environmental justice (Vadrot et al., 2024; page 173-4).

Not exploring the socio-political dimensions of treaty formation could mean missing vital understandings critical to underpinning more successful modes of addressing marine biodiversity change, difficult as the findings of such research may be.

An agenda, and a call to go beyond the linear understanding of ocean governance

This Research Topic has aimed to provide a forum for scholarship interested in diverse material, geographical, political, ontological and epistemological aspects of marine biodiversity governance: to build an agenda for a more critical interrogation of marine biodiversity under the wider remit of the marine social sciences. The objective of the Topic has been to go beyond conventional views – to ask the aforementioned difficult questions – and encourage critical perspectives on how marine biodiversity is governed globally, regionally, at different policy-making levels, in various maritime zones and ocean areas, vertically, horizontally, and across boundaries. In doing so, it has been intended as a space for thinking on questions of power, inequality/inequity and justice. The Research Topic was also designed to challenge some of the (mis)conceptions that social science fulfils a role as a conduit for science communication (i.e. sharing science with policy makers) or is a straightforward channel towards solutions. Rather it showcases critical social science work on marine biodiversity as rather its *own science*, which examines, investigates, and scrutinizes governance, policy and planning realms to get to the very heart of biodiversity regulatory frameworks, their formation, operation, tendencies, problematics, and possibilities.

Indeed, in this Research Topic we call for a problematizing of linear understandings of ocean governance (where processes and practices of governing are understood to straightforwardly result in societal and environmental change) and by furthermore troubling the expectations that social science research should predominantly fix

environmental problems by translating natural science findings into policy recommendations and readily available solutions. We show there are no quick fixes, but that critical scholarship from marine social science disciplines – IR, Political Science, Human Geography, Planning, Law, Political Ecology, Sociology and beyond – can help to understand governance, towards ‘better’ (however that may be defined, and by whom), futures. Central to this is exploring marine biodiversity governance beyond ‘institutional fixes’ and to open up a debate on new emerging issues within the field of marine biodiversity governance that desperately need critical social science perspectives attentive to the issues previously mentioned.

Addressing pitfalls

Convening such a Research Topic is not without challenges, not least within the frameworks of marine science that journals such as *Frontiers*, operate within. There are expectations of what constitutes ‘science’, and also (as we have already intimated) the role of social science and the part it plays in marine (biodiversity) science. As convenors of this Topic, we have faced complexities in rationalizing and justifying the approaches, methods of the work that is done within this field, and its findings (which may not arrive, as previously noted, at a ‘fix’ or ‘solution’, or a definitive answer). Such dynamics seem to beg the question of the point of such work. But this Topic – and *Frontiers’* openness to it – shows its relevance and aim to stress its necessity, and stake its place, within biodiversity science. Indeed, as already argued, a critical perspective that problematizes the institutional, political, socio-economic, and legal frameworks within which marine biodiversity governance is taking shape is arguably much needed to avoid some of the pitfalls of how we have known and governed the ocean in the past. Indeed, it is worth reflecting on the fact that drives for policy, governance actions and new legal treaties, as well as fresh or up-dated conventions and target goals continue apace *because governance continually fails*. Only critical social science perspectives on the peopled aspects responsible for failures can help work towards futures where governance might work for multiple peoples, across multiple contexts.

Realizing promises

So how might such a study realize its promises? One important aspect is in making scholarship such as that which is contained in the papers of this Research Topic ever more prevalent on the marine science scene more broadly, within biodiversity science also, and in working to publish it within the mainstream interdisciplinary journals such as this. Indeed, the debates and discussions central to some of the papers in this Research Topic are very much ‘at home’ in critical social science journals, across disciplines. But they are less visible in the major marine science outlets. This Topic has aimed to take a step towards making critical scholarship evident in the landscape – or seascape – of work on marine biodiversity as an expanding highly dynamic area of inquiry within both general environmental research and the specialized domain of ocean science.

Part of cementing this shift is also understanding that critical social science scholarship is part of a wider ‘oceanic turn’ more broadly occurring across and within the social sciences and humanities (DeLoughrey, 2016; de Carvalho and Leira, 2022; Peters et al., 2022). This is part of theoretical – ontological – shifts, which have opened the potential to acknowledge spatial conditions that transcend boundaries of land and sea, taking scholars and scholarship seawards (Anderson and Peters, 2014; Steinberg 2001), away from the spaces more frequently associated with human life (on land), which have often dominated in social science research due to ‘easier’ access (Steinberg, 1999). Acknowledging linkages between coasts and oceans, shores and seas, interiors and exteriors, the sea – the majority feature of our planet – is now a core interest of (Western) social scientists who were previously prioritizing spaces where people *appeared* to be most present and impacted – spaces of “permanent sedentary habitation” (Steinberg, 1999, 367) – the cities, towns, streets, workplaces, homes, of human life and livelihoods. It is worth noting though, that the marginality of the sea is contextual, with non Western scholarship long recognizing the sea as a social space, where society and social worlds are entangled with water worlds (i.e. Hau’Ofa, 2008; George and Wiebe, 2020).

Also important to building critical marine biodiversity work has been a growing recognition of the import of interdisciplinary scholarship where natural and social sciences combine to address research questions that require a perspective that appreciates the deep entanglements of natural and social worlds (Markus et al., 2018). In such interdisciplinary work, space is potentially opening for more research that is about, with, and for people and how people relate to the marine realm: i.e. the governance of marine spaces, their planning, the lived experiences of coastal communities, uneven power relations (from both acts of dispossession or ‘grabbing’ to resistance and refusal (see Franco et al., 2014) and what is morally at stake in the biodiversity crisis (Armstrong, 2026)). It is vital that in such interdisciplinary work, genuine engagement with critical social sciences and social scientists occurs, which may also require opening space for discussing the epistemological and ontological assumptions of our research approaches.

As marine biodiversity research continues as a rapidly emerging field at the intersection between ocean science and environmental studies, dominated by the natural sciences, growing environmental concerns and expanding human interests in diverse aspects of marine biodiversity – including its protection and sustainable use – open new avenues for social science research. We must recognize and embrace this, but do so with care and – as the papers in this Research Topic make clear – a critical eye.

The papers: from the politics of data to the role of geopolitics and power

This Research Topic has fostered cross-disciplinary dialogue among social scientists, including sociologists, political scientists, anthropologists, political ecologists, human geographers, and scholars from science and technology studies (STS) to historical

studies of science to address emerging issues within the field of marine biodiversity governance to attend to a number of important themes: the politics of data; the place of infrastructure in biodiversity worlds; negotiations as they pertain to international organisations, agreements and conventions, science-policy relations, the role of geopolitics and power.

In ‘*Mapping for connection, a life beyond mapping for control: lessons from ‘mapping-as-performance’ with Empatheatre in South Africa*’, Whittingham and McGarry draw from postcolonial STS and decolonial approaches to explore how mapping practices have historically made the ocean a specific kind of governable object, by those with the power to measure and map the ocean. Their piece, richly drawing from archival records (a staple of social science and humanities research) shows how “maps framed the ocean as a controllable entity, obscuring socio-cultural dimensions of biodiversity”. Then, building from a South African case study they show counter-mapping processes that “challenge Western ontologies” using a “‘Call and Response’ approach” where local communities co-create maps reflecting their concerns and relationships with the ocean, empowering “communities as active agents in shaping their narratives” in contrast to the ‘top down’ mapping practices that dominate knowledge. They call this mapping process ‘Empatheatre’. As noted above, the paper brings into conversation the violences of traditional mapping practices and opens space for understanding equity-driven alternatives for working towards “inclusive governance structures” (ibid. 2024).

Following some similar themes of hierarchical knowledge structures in ocean governance, Niner et al., in ‘*Reflections on the past, present, and potential futures of knowledge hierarchies in ocean biodiversity governance research*’ explore how the “evolution of marine science... (can) reinforce knowledge hierarchies in ocean governance processes and associated research that set societal patterns of prioritization and exclusion”, not least via Western knowledge hierarchies. In this important, reflective piece on such hierarchies, they not only survey the underlying global dynamics of dominant processes, but challenge approaches which seek to embed and incorporate non-Western and traditional knowledge into power-laden frameworks that “reproduce knowledge hierarchies, do not benefit knowledge holders” (ibid. 2024). As crucial debates continue on the role of Indigenous rights, traditional knowledge, and non-Western ways of knowing the ocean, this paper highlights how “researchers must be aware of the history of knowledge extraction, impositions and assumptions within their fields” providing a call for marine scientists to think carefully on the power and politics shaping knowledge-making. Importantly, they do not offer easy solutions to such engrained challenges but note how change will require new methods, as well as researcher ‘discomfort’ in a “commitment to understanding where powers lie” to address or readdressing imbalances” (ibid. 2024).

Continuing to think on power imbalances, in ‘*The landlocked ocean: landlocked states in BBNJ negotiations and the impact of fixed land-sea relations in global ocean governance*’ Sebuliba writes of the role of landlocked nations in the making of global treaties – the recent Biodiversity in Areas Beyond National Jurisdiction treaty (BBNJ) – taking stock of their role in relation to ‘common’ space

and resources. Drawing from his own experience at the negotiations at the United Nations, to the document itself, shows the “intricate interplay of social, economic, cultural, geographical, and political factors in determining who has access to ocean space and resources and who does not” and what this means when writing a treaty, and whose interests come to count most. In the article, [Sebuliba](#) advocates for the place of landlocked nations and “more inclusive and adaptable approaches in international policy debates”. Only through his consideration, and study of, these nations, are we able to see how global policies – presented as consensus – have uneven dimensions that have shaped their formation and could, in principle then, hamper their implementation.

Also dealing with the BBNJ in ‘*The Voice of Science on Marine Biodiversity Negotiations: A Systematic Literature Review*’ [Tessnow-von Wysocki and Vadrot](#) offer a comprehensive overview and critical analysis of the academic debate concerning the BBNJ. In a systematic review that examines “the main priority topics and recommendations in a sample of 140 multidisciplinary, geographically diverse publications” they pick apart “the complex BBNJ negotiations” and the policy relevance of such work for connecting science, policy and practice. They demonstrate the value of reviews for highlighting the shape of debates and understanding how academic discussion is taking shape and where gaps in our knowledge might be. Indeed, they highlight the necessity for further work on science-policy interfaces and the need for transformative change as part of their analysis.

Taking a comprehensive view also in “*Configuring the field of global marine biodiversity conservation*” [Campbell et al.](#) look across the “emergence of the field of global marine biodiversity conservation over the past fifteen years”. Similar to [Sebuliba](#), [Tessnow-von Wysocki and Vadrot](#), they draw from negotiation spaces and international meetings (using Collaborative Event Ethnography (CEE)) to “describe the field of global marine biodiversity conservation, but more importantly ... how that field has been configured” through “orchestration, narrative, performance, alliance, social objects, devices, and technologies, formal outcomes, and formal procedures”. This critical approach does not take negotiation spaces as neutral or value free, but investigates the very materialities, practices and representations that come to frame global debate in how we manage biodiversity and project plans for conservation. Like all the previous papers, it focuses intently on acknowledging that marine biodiversity governance is *constructed* (or configured) in some ways, and not others. This allows us to interrogate those configurations and ask if there might be (better) alternatives.

Finally, in a more empirically specific case, ‘*Policy suggestions for tapping the potential of ocean carbon sinks in the context of “double carbon” goals in China*’ the Topic draws on one example by [Wei and Wang](#) of the development of oceanic carbon sinks and the complex dilemmas (in establishing technical systems, legislation and trading regulations) that go hand in hand. It shows again how marine governance is not simply existing but is made, and that there are always compromises and complexities in doing so, and which shape outcomes in use and in sustainable futures. The Research

Topic urges further work that puts to work the deep ontological questions of papers 1–5 together with empirical examples to really expose the workings of governance to critique and scrutiny, with the aim of forging – not fixes – but better understandings of the dynamics shaping the management, regulation and governance of marine biodiversity.

Looking into oceanic (research) futures

The different papers in this special section illustrate the need to critically reflect the political, socio-economic, and legal frameworks within which marine biodiversity governance is taking shape. With this Research Topic we have attempted to reflect on the drivers of policy, governance actions and new international agreements, particularly as multilateral governance has become increasingly under threat. Plastics treaty negotiations failed this year in Geneva, and the International Seabed Authority struggles to fulfill its mandate to conserve the deep seabed for current and future generation as common heritage of humankind. At the same time, recent multilateral efforts to broaden the knowledge base and ontologies needed to address biodiversity loss may give hope. In 2024, more than 100 member states to the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services have approved the transformative change assessment calling for “fundamental, system-wide shifts in views, structures and practices” ([IPBES, 2024](#), p. 12) arguing that “[s]hifting dominant societal views and values to recognize and prioritize human-nature interconnectedness is a powerful strategy for transformative change.” ([IPBES, 2024](#), 16). However, marine biodiversity governance, just like marine biodiversity itself, is ever evolving. Accordingly, as noted earlier in this Topic introduction, there is a continual need, even with developments, to critically reflect on who is driving such change, under what auspices, for whom and also to question frameworks that universalize ‘human’ experience, and may lead to further inequalities when ‘solutions’ are sought. It is thus critical social science perspectives on the peopled aspects of biodiversity governance that can have value in working towards the most ‘transformative’ futures of all. It is hoped that the keen emphasis on knowledge production, construction, configuration – and on alternatives that are not conceived as ‘other’ but should be on equal footing – will assist towards ‘better’ governance. This Research Topic starts this project, and we urge others to take it forward, with social science approaches to biodiversity taking as much of the centre stage in the marine sciences as natural science disciplines.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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