Ocean and Society
2025 • Volume 2 • Article 11340
https://doi.org/10.17645/oas.11340

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EDITORIAL

Open Access Journal

Ocean Literacy as a Mechanism for Change Across and Beyond the UN Ocean Decade

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Submitted: 12 September 2025 **Published:** 25 September 2025

Issue: This editorial is part of the issue "Ocean Literacy as a Mechanism for Change Across and Beyond the UN Ocean Decade" edited by Emma McKinley (Cardiff University), Benedict McAteer (Queen's University Belfast), Berit Charlotte Kaae (University of Copenhagen), and Brice Trouillet (Nantes Université), fully open access at https://doi.org/10.17645/oas.i463

Abstract

Understanding the complexity of human–ocean relationships has been increasingly recognized as being central to addressing the triple crises currently facing the ocean and the communities that depend on it—climate change, biodiversity loss, and social inequities. Since the early 2000s, the concept of ocean literacy (OL) has evolved as a framework to explore and critically assess this relationship. Defined as having an understanding of "your influence" on the ocean and its "influence on you," OL has moved beyond its original education and knowledge roots to recognize at least 10 dimensions. These dimensions—which include themes of knowledge, emotions, attitudes and communication, and the frameworks associated with them—are increasingly being adopted, and indeed adapted, to help to further understand human–ocean relationships and to support the co-development of solutions to address ocean challenges. With the positioning of OL as a key mechanism for change within the UN Decade of Ocean Science for Sustainable Development, it is both timely and necessary to continue to examine and expand the concept of OL beyond its existing boundaries. This thematic issue demonstrates the interdisciplinarity of OL research, presenting a range of studies that critically explore how the dimensions, drivers, and impacts of OL can vary in different socio-cultural, economic, political, and geographic contexts. These studies provide crucial insight into the developing role of OL within wider ocean governance and sustainability processes. Collectively, the articles highlight the diversity of ocean literacy research emerging from the community, insights into how to further develop OL initiatives and how to maximise the potential of OL as a mechansim for change across the Ocean Decade and beyond.

Keywords
Challenge 10; coastal communities; marine citizenship; ocean connections; ocean–human relationships; ocean identity; ocean literacy; UN Ocean Decade

1. Introduction

Although not a new concept, ocean literacy (OL) has gained significant momentum in recent years, not least as a result of its positioning as a mechanism for change within the UN Decade of Ocean Science for Sustainable Development (hereafter the UN Ocean Decade), launched in 2021. At this mid-way point of this global decadal initiative, this thematic issue is an opportunity to take stock and to build on the two decades of OL research and practice that have gone before it. Initially grounded in formal education, OL has long been defined simply as "having an understanding of your influence on the ocean and the ocean's influence on you" (Cava et al., 2005, p. 5). Early applications of OL drew heavily on the seven OL principles, largely adopting a knowledge deficit approach to fostering and improving OL. In recent years, however, researchers have proposed and explored a series of more complex models of OL (e.g., Brennan et al., 2019; Fauville et al., 2024; McKinley et al., 2023), encompassing a broader range of dimensions. While these contemporary models of OL continue to recognise the importance of ocean knowledge, communication and behaviour, they encourage a move away from the historical emphasis on knowledge within OL literature (Shellock et al., 2024) to one that is inclusive of attitudes, emoceans (McKinley et al., 2023), access and experience, adaptive capacity and more.

The growth in research effort to understand OL, and to adopt it as a lens through which the complexities of human–ocean relationships are explored, is in part driven by an increased emphasis on the role of society in addressing global ocean challenges (Bennett, 2019; McAteer & Flannery, 2022; Spalding & McKinley, 2025; Wisz et al., 2020). The UN's Ocean Decade Challenge 10 "Restoring Society's Relationship with the Ocean" (Glithero et al., 2024) explicitly highlights this, further pushing the boundaries of the original conceptualisation of OL and positioning it as more than an individual process, and as a societal outcome. These calls have been echoed throughout the ocean community through the Barcelona Statement, the Venice Declaration, and most recently through the Nice Declaration following the UN Ocean Conference in 2025.

During its more than 20-year history, OL has often found itself on the periphery of ocean sustainability discourse, a situation compounded by the concept's formal education roots. However, with a vibrant global marine social science community gaining momentum in recent years (Bennett, 2019; McAteer & Flannery, 2025; McKinley et al., 2022), the integral role of human–ocean relationships as key to delivering international and regional obligations and objectives is more evidenced than ever. Through the contributions to this thematic issue, we seek to continue to champion the expansion and critical reflection on the conceptualisation, and crucially, the application of OL. Each article engages with OL from distinct and diverse perspectives—including technological mediation, regional policy design, ocean safety, and participatory mapping—yet all converge on the need to pluralise and recontextualise the concept of OL within diverse social, cultural, and political settings. The contribution of each article is discussed in the following section, before concluding remarks are presented on how this thematic issue illustrates the growing potential of OL to function as a mechanism for change across the UN Ocean Decade and beyond.

2. OL as a Mechanism for Change

The opening article in this issue, by Portman and Portman (2025), reflects the various ways in which literature has focused on humankind's complex relationship with the sea. They explore portrayals of the sea in literary texts from three periods: the mid-19th century (pre-World War I), the mid-20th century (post-World War II), and the 21st century (current times). The article demonstrates how ocean themes are of interest in parallel with important societal shifts, tensions, and currents. It is demonstrated how popular literary works contribute to OL, both by supporting marine citizenship and by encouraging greater protection of ocean resources.

Morris-Webb et al. (2025) centre on the access dimension of OL (McKinley et al., 2023) and explore the notion of "tidal literacy" as a fundamental component of contemporary OL discourse and practice, even suggesting that its consideration is a new OL principle. Their work explores UK perceptions and knowledge relating to tides, highlighting concerningly low levels of public understanding of "tidal literacy." As research continues to push the evolution of OL, this article challenges us to ensure responsible and safe use of ocean and coastal spaces and presents recommendations as to how tidal literacy could and should be integrated into future OL initiatives.

Morgan and Braungardt (2025) focus on the potential contribution of learning theory and praxes in promoting OL. In their article, these concepts are advocated as important social dimensions of the requisite changes and outcomes required to promote the sustainability and resilience of marine environments. Additionally, the article demonstrates how to promote personal resilience and ocean stewardship as positive personal and social outcomes. These insights are exemplified through a case study of Sail Training Programmes developed and operationalised in the UK. Findings indicate the development of OL, marine identity, and marine citizenship amongst participating trainees, with key enabling factors demonstrated.

Re-considering research responsibility and knowledge dynamics in OL, Lamontagne-Cumiford and Graham (2025) assess how critical perspectives on inter-epistemic exchanges can contribute to transforming research practice. This article expands on scholarship that analyses the relationship between researchers and local/Indigenous knowledge holders, suggesting a need to move from notions of knowledge commensurability to interpersonal practices. To enable relationship-building, as a prerequisite of local perspectives and knowledge being included in research, the authors call for marine scientists to spend time disembarked from sampling vessels in local communities. In such scenarios, a paradigm shift can occur, wherein the researcher's function is that of a guest. The article demonstrates this as a process of repositioning OL as a reciprocal process.

Fidan (2025) foregrounds the epistemological dimensions of OL through an ethnographic analysis of wave buoys in the German North Sea. By examining the Directional Waverider as both a scientific instrument and a socio-material mediator, Fidan demonstrates how buoys simultaneously stabilise knowledge for coastal safety and expose the sea's inherent unpredictability. This paradox highlights the multiplicity of literacies at stake: forecast literacies generated by scientific modelling and embodied literacies cultivated through surfing and lived experiences. Drawing on Ingersoll's "seascape epistemology," the article advances a sea-centred perspective that challenges land-based assumptions and argues for recognising OL as plural and situated. Such an approach underscores the importance of embracing embodied, Indigenous, and experiential ways of knowing alongside scientific practices to foster more respectful and adaptive relations with the ocean.

Kelly et al. (2025) provide insight into the current and future role of OL in Australia. The increasing interest in OL is limited by different barriers, and the article suggests steps for progressing OL in the Australian context, including supporting ocean learning and education, engaging communities at all levels, fostering cross-sector collaboration on connecting people to the ocean, and building strong and actionable policy and funding frameworks to ensure long-term impact. It emphasizes the need to collaboratively develop a national OL strategy to guide and structure these efforts and to establish an Australian OL coalition to facilitate research, cross-sector collaboration, and implementation in practice. The overall insight into the process and visions of expanding OL in Australia is highly relevant to other countries with emerging OL communities facing similar challenges.

Critically debating the emergent field of urban marine ecology, Salazar et al. (2025) demonstrate new opportunities to promote OL and contribute to the UN Ocean Decade. The article reviews the Gorgonia Barcelona project—a collaborative and inclusive approach to fostering collaboration among a broad range of marine stakeholders—identifying learning lessons on how to co-produce knowledge on marine benthic ecosystems. The article provides a tool for exploring divers' alignment with OL dimensions. Three main diver profiles are extracted: "optimistic," "pessimistic," and "neutral." The article highlights the need for stronger conservation efforts and more sustainable, inclusive governance models in urban marine areas.

Artioli et al. (2025) add a new perspective to OL by introducing an ocean cycle-centric design approach, thereby expanding the scope of environment-centered design to the ocean realm. It defines ocean-centric design as an approach to expanding OL dimensions and driving change across disciplines by introducing and emphasizing a blue epistemology and integrating OL into resilient design practices for a restored human–ocean relation. The study proposes a framework and devises indicators to help designers ensure their practices are ocean-centric. For validation, the indicators are tested on a range of ocean-design case studies to assess whether the designs are inherently ocean cycle-centric or merely contextualized within an ocean setting.

McRuer et al. (2025) present the co-development of the Ocean and Society Survey. Adopting a transdisciplinary approach, the instrument embedded a diversity of perspectives and ensured global applicability. The survey highlights the need for dynamic, two-way engagement processes that involve people and communities in contributing to solutions and fostering a sense of shared ownership over ocean health outcomes. The development of a validated international tool for measuring OL is an important advancement that allows for understanding public ocean perceptions over time and across countries. The article highlights the role of public ocean perceptions to guide the design, facilitation, and coordination of effective engagement pathways, communication strategies, and decision-making toward measurable and solution-focused actions for the ocean.

Building on this epistemological reframing, Soffietti et al. (2025) explore OL as an operational governance tool. Focusing on the EU context, the authors examine the integration of OL within maritime spatial planning (MSP) through the development of the Regional Ocean Literacy Strategy for MSP toolbox. This methodological framework—comprising a guiding questionnaire, mapping tool, and strategy index—was co-designed and tested in Sardinia, a region with strong educational networks and institutional involvement in MSP. The findings demonstrate that OL can serve as a lever for participatory governance, policy coherence, and cross-sectoral collaboration when strategically embedded into regional planning processes.

However, the study also reveals persistent barriers, including institutional fragmentation and resource constraints, which limit long-term implementation. By presenting OL as a replicable and transferable instrument for regional governance, they position OL as a strategic asset at the science–policy–society interface.

Fauville et al. (2025) delve into the field of ocean extended reality (ocean XR), critically examining its potential to contribute to marine education and OL by simulating marine environments using augmented, mixed, and virtual reality technologies. Through an analysis of ocean XR user experiences, positive relations were identified between OL principles and key features of virtual simulations. The article represents a first step in understanding how ocean XR can benefit marine education and OL and offers suggestions for creating more impactful virtual ocean experiences.

Complementing these perspectives, Kaae and Olafsson (2025) introduce a methodological innovation for linking OL with participatory knowledge production. Using public participation geographic information systems in the Oslo Fjord, the authors collected more than 12,000 survey responses, mapping recreational activities, perceived benefits, and conflicts. The results reveal the high social value of marine recreation—particularly its health benefits—while documenting accessibility issues, environmental concerns, and user conflicts. Importantly, the participatory mapping not only generated spatially explicit data for planners but also functioned as a literacy-enhancing process: participants reflected on their relationship with the fjord, articulated problems, and proposed solutions. By integrating experiential and recreation-based knowledge with natural science data, the article illustrates how participatory methods can simultaneously enrich governance and cultivate OL, and the potential for more socially inclusive and adaptive management of coastal and marine environments.

3. Concluding Remarks

Together, these contributions exemplify the diversification and maturation of OL as both a concept and practice. Across these approaches, OL emerges as plural, situated, and deeply entangled with governance challenges and opportunities. This thematic issue thus positions OL not as a static framework but as an evolving field of inquiry and practice. By exploring a diversity of epistemological, strategic, and participatory dimensions of OL, the contributions collectively argue for embedding OL within the heart of marine governance, rather than relegating it to the margins of education and communication. Further, they underscore the potential of OL to bridge science, policy, and society; to mobilise cultural and experiential assets; and to reimagine human–ocean relationships in ways that are adaptive, inclusive, and respectful of the ocean's dynamic character. Finally, these contributions echo calls from the UN Ocean Decade Challenge 10 White Paper to reframe OL, positioning it not as an individual process or action, but as a whole society outcome. This thematic issue presents contributions that can guide, influence, and support an ongoing evolution of the concept and practice of OL that has a legacy beyond the end of the UN Ocean Decade.

Conflict of Interests

The authors declare no conflict of interests.

References

Artioli, L., Soffietti, F., Fagnoni, R., Sinni, G., De Martino, P., & Musco, F. (2025). Designing with an ocean literacy approach: Towards the definition of "ocean cycle-centric design". *Ocean and Society*, *2*, Article 9725. https://doi.org/10.17645/oas.9725

Bennett, N. J. (2019). Marine social science for the peopled seas. *Coastal Management*, *47*(2), 244–252.

Brennan, C., Ashley, M., & Molloy, O. (2019). A system dynamics approach to increasing ocean literacy. *Frontiers in Marine Science*, *6*, Article 360.

Cava, F., Schoedinger, S., Strang, C., & Tuddenham, P. (2005). *Science content and standards for ocean literacy: A report on ocean literacy*. National Geographic Society.

Fauville, G., Pimentel, D., & Woolsey, E. (2025). Ocean XR: A deep dive into extended reality for marine education and ocean literacy. *Ocean and Society*, *2*, Article 10714. https://doi.org/10.17645/oas.10714

Fauville, G., Voşki, A., Mado, M., Bailenson, J. N., & Lantz-Andersson, A. (2024). Underwater virtual reality for marine education and ocean literacy: Technological and psychological potentials. *Environmental Education Research*. Advance online publication. https://doi.org/10.1080/13504622.2024.2326446

Fidan, T. (2025). Making the sea knowable: Ocean literacies from a sea-centred perspective. *Ocean and Society*, *2*, Article 9622. https://doi.org/10.17645/oas.9622

Glithero, L. D., Bridge, N., Hart, N., Mann-Lang, J., McPhie, R., Paul, K., Peebler, A., Wiener, C., Yen, C., Kelly, R., & McRuer, J. (2024). *Ocean decade vision 2030 white papers: Challenge 10: Restoring society's relationship with the ocean*. IOC-UNESCO.

Kaae, B., & Olafsson, A. (2025). PPGIS-mapping of coastal-marine recreation: Participatory tool for increasing ocean literacy in planning and management? *Ocean and Society*, *2*, Article 9878. https://doi.org/10.17645/oas.9878

Kelly, R., Francis, P., Shellock, R., Andrews, S., Arthur, B., Birkmanis, C., Breidahl, H., Buxton, L., Chambers, J., Church, E., Condie, C., Croft, F., Freitas, C., Hurley, S., Jateff, E., Le Busque, B., Marshall, J., O'Brien, A., Pecl, G., . . . Waters, Y. (2025). Ocean literacy for ocean sustainability: Reflections from Australia. *Ocean and Society*, *2*, Article 9797. https://doi.org/10.17645/oas.9797

Lamontagne-Cumiford, M., & Graham, M. (2025). Getting off the boat: Re-considering research responsibility and knowledge dynamics in ocean literacy. *Ocean and Society*, *2*, Article 9732. https://doi.org/10.17645/oas.9732

McAteer, B., & Flannery, W. (2022). Power, knowledge and the transformative potential of marine community science. *Ocean & Coastal Management*, *218*, Article 106036. https://doi.org/10.1016/j.ocecoaman.2022.106036

McAteer, B., & Flannery, W. (2025). "How can you quality assure a citizen?" Expert rationalities, self-governance, and power in marine community science in the UK and Ireland. *Maritime Studies*, *24*(2), Article 23.

McKinley, E., Burdon, D., & Shellock, R. J. (2023). The evolution of ocean literacy: A new framework for the United Nations Ocean Decade and beyond. *Marine Pollution Bulletin*, *186*, Article 114467.

McKinley, E., Kelly, R., Mackay, M., Shellock, R., Cvitanovic, C., & van Putten, I. (2022). Development and expansion in the marine social sciences: Insights from the global community. *Iscience*, *25*(8), Article 104735.

McRuer, J., Glithero, D., McKinley, E., Pagès, J., Fauville, G., Morris-Webb, E., Hart, N., Strang, C., Christofoletti, R., Hulme, S., Grainger, E., Pinheiro, B., Payne, D., Bridge, N., Lindoso, V., Martins, I., Zandvliet, D., Bueno Fernandes, M., Bumbeer, J., & Shellock, R. (2025). The Ocean & Society Survey: A global tool for understanding people–ocean connections and mobilizing ocean action. *Ocean and Society*, *2*, Article 9809. https://doi.org/10.17645/oas.9809

Morgan, A., & Braungardt, C. B. (2025). Setting sail for resilience and ocean sustainability. *Ocean and Society*, *2*, Article 9724. https://doi.org/10.17645/oas.9724

Morris-Webb, E., Austin, M., Cousens, C., Kent, N., Gosney, K., & Tenbrink, T. (2025). Cut off by the tide: How ocean literacy can help save lives. *Ocean and Society*, *2*, Article 9793. https://doi.org/10.17645/oas.9793

Portman, M. E., & Portman, J. (2025). Taking ocean literacy literally: Reflections on literature's influence on ocean literacy. *Ocean and Society*, *2*, Article 9484. https://doi.org/10.17645/oas.9484

Salazar, J., Gili, J., Millán, L., Vendrell-Simón, B., & Gómez, S. (2025). Ocean literacy opportunities in urban marine ecosystems: Gorgonian populations in Barcelona (Catalonia, Spain). *Ocean and Society*, *2*, Article 9731. https://doi.org/10.17645/oas.9731

Shellock, R. J., Fullbrook, L., McKinley, E., Cvitanovic, C., Kelly, R., & Martin, V. (2024). The nature and use of ocean literacy in achieving sustainable ocean futures: A systematic map. *Ocean & Coastal Management*, 257, Article 107325.

Soffietti, F., Carella, F., Jacob, C., Cervera Núñez, C., Kerninon, A., Brigolin, D., Laroussinie, O., & Musco, F. (2025). Ocean literacy as a strategic asset for regional marine policy: Insights from an implementation case study. *Ocean and Society*, *2*, Article 9713. https://doi.org/10.17645/oas.9713

Spalding, A. K., & McKinley, E. (2025). The state of marine social science: Yesterday, today, and into the future. *Annual Review of Marine Science*, *17*, 143–165. https://doi.org/10.1146/annurev-marine-121422-015345

Wisz, M. S., Satterthwaite, E. V., Fudge, M., Fischer, M., Polejack, A., John, M., Fletcher, S., & Rudd, M. A. (2020). 100 opportunities for more inclusive ocean research: cross-disciplinary research questions for sustainable ocean governance and management. *Frontiers in Marine Science*, *7*, Article 576.

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