

COMMENT OPEN



Engaging the tropical majority to make ocean governance and science more equitable and effective

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How can ocean governance and science be made more equitable and effective? The majority of the world's ocean-dependent people live in low to middle-income countries in the tropics (i.e., the 'tropical majority'). Yet the ocean governance agenda is set largely on the basis of scientific knowledge, funding, and institutions from high-income nations in temperate zones. These externally driven approaches undermine the equity and effectiveness of current solutions and hinder leadership by the tropical majority, who are well positioned to activate evidence-based and context-specific solutions to ocean-sustainability challenges. Here, we draw together diverse perspectives from the tropics to propose four actions for transformational change that are grounded in perspectives, experiences, and knowledge from the tropics: 1. Center equity in ocean governance, 2. Reconnect people and the ocean, 3. Redefine ocean literacy, and 4. Decolonize ocean research. These actions are critical to ensuring a leading role for the tropical majority in maintaining thriving ocean societies and ecosystems.

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PRESSING ISSUES FOR PEOPLE AND THE OCEAN IN THE TROPICS

The tropics are home to most of the world's biodiversity and the majority of directly ocean-dependent people (i.e., the 'tropical majority')¹(Fig. 1). Many of these people reside in places where cultures and livelihoods are inextricably linked to the ocean, making their perspectives and knowledge uniquely valuable for identifying and addressing accelerating threats to marine ecosystems, and for understanding the limiting effects of systemic inequities in governance². Despite existing relationships with and knowledge about the ocean by the tropical majority, most governance institutions and approaches, dominant educational organizations and marine research paradigms, technologies, and funders are from high-income nations outside tropical regions³. Furthermore, these external perspectives are often one-size-fits-all and come from former colonizers of tropical regions who tend to overlook or misunderstand complex local dynamics related to factors such as culture, race, ethnicity, poverty, inequality, and institutional capacity. Ocean conservation interventions, such as marine protected areas (MPAs) are also disproportionately located in the tropics, leaving tropical nations with a higher management burden related to the MPAs that exist there and to their relevant impact on marine biodiversity loss (Fig. 1).

The importance of addressing these inequities has recently been reflected in high-profile international ocean fora, such as the Our Ocean Conferences (held annually since 2014), the UN Ocean Conferences (2017 and 2022), the first Blue Economy Conference (Nairobi, 2018), and the High-Level Panel for a Sustainable Ocean Economy (2018–2022). Indeed, the renewed focus on oceans under the UN Decade for Ocean Science and trends towards mainstreaming equity, justice, diversity, and inclusion goals, showcase a clear opportunity for decision-makers around the globe to support the development of locally-relevant responses to the environmental crises affecting people and the ocean; particularly driven by global warming and biodiversity loss⁴. This can be done by ensuring tropical nations and territories design and lead those responses, while ensuring accountability from high-income nations within and outside the tropics.

Our diverse (64% of authors are Latinx or non-white and 64% are women) group of marine scientists, policy analysts, and ocean experts is comprised of people who are mostly either from or have an institutional base in the tropics (80% of the 25 authors call the tropics home). We specifically call on decision-makers to focus on four tangible actions: 1. Center equity in ocean governance, 2. Reconnect people and the ocean, 3. Redefine ocean literacy, and 4. Decolonize ocean science (inclusive of social and natural sciences). These directly address underlying barriers to solving pressing issues for people and the ocean and provide paths

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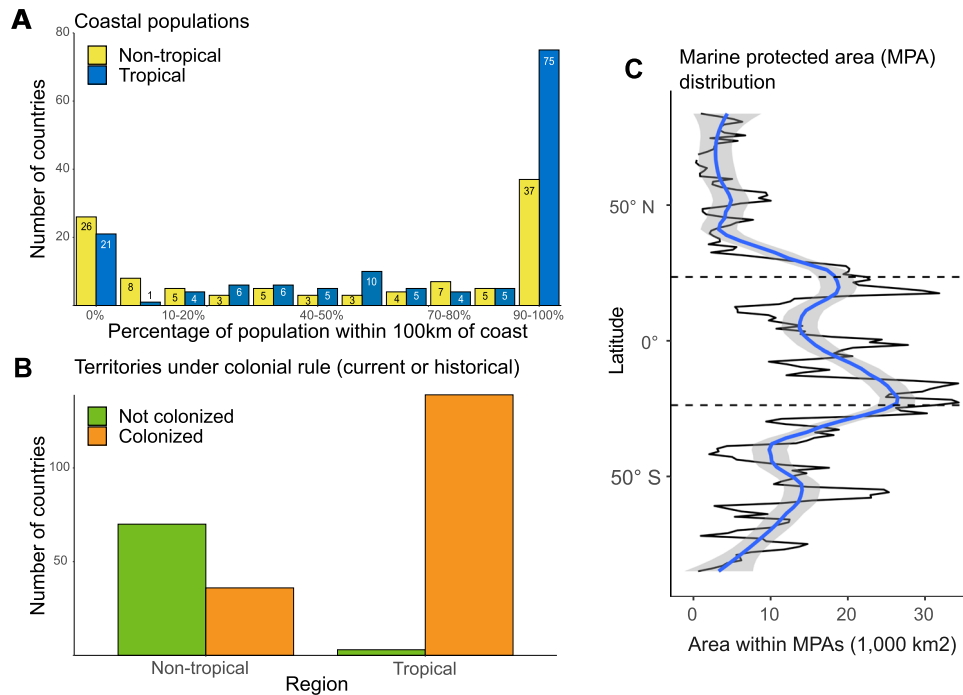


Fig. 1 Characterizing the Tropical Majority. (A) Tropical countries' populations are largely in coastal areas, making them the tropical majority of ocean-dependent people. (B) This tropical majority has also been disproportionately impacted by colonialism since the late 15th century, which creates a mismatch between where, how, and by whom ocean governance is implemented (B). (C) The largest total area allocated to the world's marine protected areas is in the tropics. (Dashed lines in (C) represent the Tropics of Capricorn and Cancer (23.5° N and 23.5° S), respectively). See Supplementary Information for methods used for designating tropical countries and determining colonial rule. Source data are provided as a Source Data file.

forward for centering the tropical majority in ocean science and governance.

CHALLENGES FOR EFFECTIVE OCEAN GOVERNANCE AND SCIENCE IN THE TROPICS

Restricted access to natural resources through shifts in property rights⁵; unfair distribution of costs and benefits of ocean governance interventions; and ingrained sexism, genderism, ableism, and racism⁶, are social processes and governance outcomes that perpetuate inequities across ocean sectors and that are prevalent in tropical zones; partly due to legacies and new forms of colonialism⁷. Similarly, phenomena such as 'parachute science' (i.e., science carried out by external researchers who do not engage with local people and values), itself a legacy of colonization; and citation bias against non-white authors, undervalue and undermine local leadership, knowledge, and priorities^{8,9}. Furthermore, the exclusion of non-scientific forms of knowledge in efforts to build 'ocean literacy' is often exacerbated by academic programs that privilege scientific knowledge and limit pathways for local knowledge-holders to inform region- and site-specific approaches to decision-making. The outcome of these non-inclusive governance and science systems is that local populations, even if they maintain historical relationships with the ocean, are effectively removed from the dominant models of governance and knowledge that will shape their future¹⁰.

The mismatch between where, how, why, and by whom ocean governance and science are produced and implemented limits the equity and effectiveness of actions to address the negative socio-ecological impacts of environmental change. For example, vast quantities of fishery resources are extracted from tropical nations and territories to feed the demand from wealthier and better-nourished nations. Growing demands for energy, minerals, and genetic resources place tropical nations with limited technological

capacity at risk of exploitation (ironically sometimes voluntary and at the expense of communities dependent on natural resources) by private companies and governments from high-income nations outside the tropics¹¹. Ultimately, this severing of power, knowledge, and relationship of local peoples with place reduces access to the ocean and related benefits, erodes or prevents local governance altogether, and hinders both locals' ability to meet their needs and our collective ability to pursue shared goals for people and the ocean.

FOUR ACTIONS AS OPPORTUNITIES FOR CHANGE

As inequities in ocean governance and science are exposed¹², an opportunity for solutions requires engaging with and shifting power to the tropical majority. By doing so, decision-makers can support an urgent yet timely foundational shift in the ocean narrative from 'tropical crisis' to 'tropical opportunity'. That is, they can move away from a vision where the global tropics are seen as victims or a region limited in its ability to resolve problems, towards one where the region's opportunities to lead such transformational change are recognized, valued, and acted upon. This shift recognizes that to maintain thriving ocean societies and ecosystems and to adapt to the coming decades of rapid change, the global ocean governance community must act now in support of the tropical majority. Specifically, we call on decision-makers to act on the following interrelated opportunities:

1. **Center equity in ocean governance reform** with particular focus on power, inclusion, and the recognition and restoration of Indigenous Peoples' rights¹³. This requires developing and implementing ocean equity commitments across temporal and geographical scales and sectors. It must also ensure accountability for past impacts as well as future funding and benefit-sharing pledges at global governance fora through identifying beneficiaries, monitoring

expenditure against promises, assessing coherence between policy goals and outcomes, and identifying impacts on intended beneficiaries¹². Evidence suggests voluntary commitments can lead to tangible outcomes¹⁴, yet specific and measurable goals for ocean equity and people-inclusive conservation are still lacking. This makes it difficult for decision-makers to make commitments in support of people and the ocean, likely leading to limited long-term effectiveness of related pledges. Equitable ocean governance also requires formalizing hybrid systems that incorporate elements of customary and contemporary knowledge systems and management approaches that consider local context and socio-cultural dynamics. These hybrid systems center local priorities and the creation of locally relevant adaptive governance that can more effectively respond to emerging stressors. For example, through a Ministerial agreement, the government of Ecuador recognizes the ancestral and traditional rights of mangrove resource users; whereby the associated stewardship agreements generated by community user associations embody empowerment in community-based conservation efforts¹⁵.

2. **Re-connect people and ocean** by resisting and reversing large-scale coastal privatization and degradation, facilitating access to ocean resources and coastal lands, and stopping exclusionary conservation practices such as ‘fortress conservation’¹⁶. Re-building and supporting existing mutually beneficial people-ocean relationships requires formally recognizing and integrating conventional and alternative property rights structures for coastal communities to strengthen local agency and values. The resurgence of local stewardship, based on legally recognized access rights, that incorporates customary practices and governance has shown promise globally¹⁷. For instance, The Parties to the Nauru Agreement (PNA) is a regional agreement for joint control of 25–30% of the world’s tuna supply among eight Pacific Island nations that were able to shift the political power dynamics and work together to set the rules for foreign nations to fish their waters. The PNA was a step toward these nations’ self-determination and reconnection, and it increased fisheries profits, with members’ fisheries revenues increasing 900% to USD 500 million in 11 years from 2010¹⁸.
3. **Redefine ‘ocean literacy’** to recognize tacit and practical wisdom and local and Indigenous knowledge that, where applicable, is also in concert with the dominant scientific paradigm. For instance, the Polynesian Voyaging Society, founded on a legacy of Pacific-Ocean exploration, has revitalized the art and science of traditional Polynesian voyaging and the spirit of exploration through experiential educational programs that inspire students and their communities to respect and care for themselves, each other, and their natural and cultural environments¹⁹. Critical to this effort is replacing the transactional notion of ‘capacity building’ with the integrated perspective of ‘capacity sharing’ in recognition of the wealth of existing local expertise⁸, as well as expanding notions of value beyond economics, to include ethics, culture, spirituality, and empathy for others and for the natural world¹⁷. Locally, it is important to elevate and center Indigenous and local knowledge on ecological processes, changing environmental conditions, and spatial resource use and human-environment interactions. For example, the cultural heritage of the Austral people called *rāhui* is a traditional practice of restricting access to marine areas for the conservation of resources²⁰. To address this, global decision-makers could, for instance, require environmental and cultural competency and proficiency training for public officials across scales of governance.

4. **Decolonize science while broadening the scope of who leads, who participates, and who benefits** by developing protocols to ensure scientific research programs integrate local capacity and priorities, build equitable partnerships and opportunities, and guarantee inclusive authorship⁸. This requires increased and sustained open-source investments in science, from philanthropies and multilateral institutions, that is led by researchers from the tropics and focuses on local or regional impact instead of academic metrics such as publication numbers²¹. Additional conditions for these investments should include the democratization of data through in-country training on its collection, analysis, and use; integration of local and Indigenous knowledge; covering costs associated with long-term storage and sharing of data; establishing agreements for access to peer-reviewed literature beyond well-resourced academic institutions from developed nations; and ensuring inclusivity by translating and inviting participation from non-English speakers. Beyond how science is conducted and who benefits from it, it is clear that traditional or dominant ocean science has had an inappropriately narrow focus. This scope must be expanded to include the social sciences, humanities, and co-production involving multiple disciplines, all of which are well-suited to reflect and address the social-ecological complexities of issues affecting diverse historical contexts, cultures, worldviews, and well-being goals across the global tropics.

MOVING FORWARD ON THESE OPPORTUNITIES FOR CHANGE

Opportunities for change include commitments to adopting governance approaches that center Indigenous and local stewardship and customary practices and embrace a narrative of the ocean where local leadership, values, and the connection between people and ocean are recognized, valued, and supported in governance, science, and associated legal frameworks. Decision-makers can promote this urgently needed shift by recognizing the opportunities presented by the tropical majority, identifying the systemic inequities and ongoing exclusion of local values and knowledge, and committing to taking specific and measurable goals and actions in support of ocean governance and science that reverses these inequities and gaps in understanding. In light of rapid climate change and biodiversity loss, now is the time to leverage both global interest and tropical leadership in finding equitable and effective solutions for people and the ocean.

DATA AVAILABILITY

Source data for Fig. 1 are provided with this paper.

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COMPETING INTERESTS

The authors declare no competing interests.

ADDITIONAL INFORMATION

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