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HIGH LEVEL PANEL *for*
A SUSTAINABLE
OCEAN ECONOMY

Blue Paper

Co-producing Sustainable Ocean Plans with Indigenous and traditional knowledge holders

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About this Paper

This Blue Paper was prepared in support of the work of the Ocean Panel to provide a robust science and knowledge base and practical opportunities for action, embedded in Indigenous wisdom, oral teachings and cultural practices, across issues central to the attainment of a sustainable ocean economy. The arguments, findings and opportunities outlined in this Blue Paper represent the views of the authors alone. Ocean Panel members have not been asked to formally endorse the Blue Paper and should not be taken as having done so.

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Foreword

This Blue Paper, commissioned by The High Level Panel for a Sustainable Ocean Economy (the 'Ocean Panel'), represents a significant milestone in our understanding of sustainable ocean management. It explores the critical importance of co-producing Sustainable Ocean Plans (SOPs) with Indigenous and traditional knowledge (ITK) holders, marking a paradigm shift in how we approach ocean governance and conservation.

Traditionally, ocean management strategies have often overlooked or undervalued the rich tapestry of knowledge and practices held by Indigenous Peoples and traditional communities. This oversight has not only led to less effective conservation efforts but has also perpetuated historical injustices and power imbalances. Our paper seeks to address these challenges and proposes a transformative approach that places equity, inclusion, and restorative justice at the heart of ocean planning.

The opportunities presented by integrating Indigenous and traditional knowledge into SOPs are immense. By embracing diverse ways of knowing and understanding the ocean, we can enhance biodiversity conservation, improve ecosystem resilience, and create more sustainable resource management practices. Moreover, this approach offers a path to healing historical wounds, promoting social justice, and ensuring that the benefits of a sustainable ocean economy are equitably shared with indigenous knowledge holders.

The authors of this Blue Paper bring together a unique blend of expertise, combining the voices of ITK holders, scholars, and Western-trained researchers. Their collaborative effort provides a holistic perspective that considers not only ecological aspects but also social, cultural, and governance dimensions crucial for effective ocean stewardship.

Key recommendations from this paper include recognizing and valuing the plurality of knowledge systems, prioritizing equitable access to ocean data, funding Indigenous and traditional-led ocean planning research, and addressing gender biases in marine science and management. These actions are essential steps towards co-producing truly inclusive, place-based, and knowledge-based SOPs. Importantly, the insights and recommendations presented in this paper are applicable and adaptable to all stages of SOP development, from initial scoping to implementation and updating, ensuring that the co-production process with ITK holders can be integrated at any point in a country's journey towards sustainable ocean management.

We call upon policymakers, researchers, and ocean stakeholders to embrace the principles and recommendations outlined in this paper. By doing so, we can create a new paradigm in ocean governance - one that respects and integrates Indigenous and traditional knowledge, promotes equity, and ensures the sustainable use of our ocean resources for generations to come.

As the Lead Experts of the Ocean Panel Expert Group, we extend our heartfelt gratitude to the authors, reviewers, and the Ocean Panel Secretariat at World Resources Institute for their invaluable contributions to this groundbreaking work. We also commend the Ocean Panel member states for their unwavering commitment to realizing a global sustainable ocean economy.

The ocean's health is inextricably linked to human well-being and the planet's future. By co-producing Sustainable Ocean Plans with Indigenous and traditional knowledge holders, we open the door to a more inclusive, equitable, and sustainable approach to ocean management. This Blue Paper not only charts a course for better ocean governance but also offers a vision of reconciliation and shared stewardship of our blue planet.

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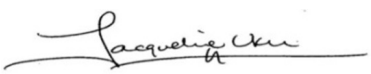

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Highlights

- Co-producing Sustainable Ocean Plans (SOPs) through true partnership with Indigenous and traditional knowledge (ITK) holders is a pathway to achieving ocean equity and regenerative human-ocean relationships.
- Indigenous Knowledge Systems (IKS) hold vital insights for sustainably managing ocean areas and fostering socio-ecological resilience.
- Meaningful co-production requires recognising Indigenous Peoples' and traditional communities' rights, respecting knowledge plurality and establishing equitable partnerships from inception.
- Co-production approaches need to be tailored to local contexts. ITK is deeply rooted in specific ecosystems, landscapes and cultural understandings of nature. Recognise that this knowledge may not be directly transferable to other locations, necessitating flexible and locally adapted co-production methods.
- Collaborative ocean planning needs to acknowledge the historical context of nation-state colonialism to foster more inclusive and equitable approaches in ocean governance, addressing the long-standing social, economic and ecological imbalances.
- Learning from IKS necessitates relationship-building, the adoption of community-based participatory approaches and fostering mutual understanding through Indigenous ways of knowing frameworks.
- Institutionalised recognition of socio-ecological systems — that humans and nature are inextricably interlinked — can better support co-production processes that adequately acknowledge the value of ITK systems.
- Existing laws, policy frameworks and economic models must transform to become inclusive of IKS, prioritising reduced exploitation rates, avoiding tokenistic engagement and ensuring reciprocity within ecosystems.
- Governments and states should address important conflicts between the rights of Indigenous Peoples and traditional communities over space and resources, colonial dispossession and the commercial and tenure systems from which Indigenous Peoples and traditional communities historically have been excluded.
- Supporting Indigenous and traditional-led place-based research, ensuring access to data and addressing cultural barriers are crucial enabling conditions for inclusive co-production.
- The systemic gender biases that Indigenous women, Afro-descendant women, migrant women, women with disabilities, and young girls face in marine science and conservation must be addressed; inclusive practices should be implemented in hiring, leadership and resource allocation, and support systems (e.g., flexible schedules, child care) should be provided to facilitate women's meaningful engagement in ocean management decision-making processes.
- Removing institutional silos, adopting holistic governance approaches and including ITK holders in decision-making bodies are vital for sustaining the co-production process.
- Long-term commitments, capacity-building, and conflict resolution mechanisms are needed to uphold the rights and knowledge systems of Indigenous Peoples and traditional communities in ocean governance.

SOPs, as outlined in the *Transformations for a Sustainable Ocean Economy* (*Transformations* agenda) of the High Level Panel for a Sustainable Ocean Economy (Ocean Panel), are holistic frameworks for sustainably managing 100% of ocean areas under national jurisdiction (High Level Panel for a Sustainable Ocean Economy 2021). SOPs address multiple challenges impacting the ocean, including climate change, marine pollution, overfishing and biodiversity loss. They offer a comprehensive approach, accommodating the interdependence of ocean activities through multisector participation. Although SOPs are developed at national levels, efforts to achieve equity and include ITK need to be made at different scales, including temporal and spatial, local, national, regional and global scales.

Although these plans are developed to reflect specific country circumstances, they should share the same nine attributes (see Appendix B for the full list of attributes and definitions):

- The process should be inclusive, integrative and iterative.
- The content should be place-based, knowledge-based and ecosystem-based.
- The impact should be endorsed, financed and capacitated.

This paper focuses primarily on three of the nine attributes: an inclusive process, place-based content and knowledge-based content.

Executive summary

Purpose of this Blue Paper

This Blue Paper represents a collaborative effort, bringing together the voices and perspectives of ITK holders, scholars and Western-trained researchers to develop a comprehensive understanding of regenerative relationships with marine and coastal ecosystems. This holistic approach considers not only ecological aspects but also social, cultural and governance dimensions to inform the development and implementation of SOPs.

Building upon the Ocean Panel's prior work, this paper presents a compelling case for the value of co-producing SOPs with ITK holders, including various geographically diverse case studies. It provides actionable pathways, both practical and policy oriented, towards achieving this co-production goal which can better support inclusive, place-based and knowledge-based SOP processes. Importantly, the paper recognises that SOPs are iterative and adaptable, allowing for the incorporation of these pathways even in plans that have already been developed. It highlights the significance of collective values such as cultural identity, spirituality, language and knowledge plurality in human-ocean relationships, which are essential for well-being and a sustainable future aligned with fundamental human rights and equity goals. Crucially, the paper emphasises the foundational considerations that must underpin these processes, centring equity and restorative justice. By doing so, it aims to improve socio-ecological systems with both short-term outcomes, such as more equitable decision-making processes, and long-term benefits, including enhanced ecosystem resilience, biodiversity conservation and sustainable livelihoods for coastal communities.

By recognising the diverse relationships and cultural connections between communities and the ocean, this paper offers a perspective that complements the scientific analyses presented in some of the previous Ocean Panel–commissioned Blue Papers. It acknowledges the inequitable distribution of ocean benefits and the active marginalisation of certain peoples, often rooted in colonial legacies and power imbalances perpetuated by current legal, governance and knowledge hierarchies. In response to these inequities, this paper advocates for co-producing SOPs with Indigenous Peoples and traditional communities as a form of restorative justice. This approach seeks to correct and repair harmful practices, prevent future impacts and replace retributive approaches with accountable actions focused on restoration and reconciliation. By integrating ITK into ocean planning processes, we can begin to address the historical and ongoing injustices where Indigenous Peoples and traditional communities have faced forced displacement, ecocide, epistemicide (silencing and devaluing of a knowledge system), discrimination and marginalisation through institutionalised and non-institutionalised governance processes.

This Blue Paper presents a series of overarching actions and considerations that are essential for co-producing SOPs with ITK holders (Table ES-1).

To enhance knowledge co-production, we recommend that policymakers prioritise these four key actions:

- **Recognise and value the plurality of knowledge systems.** Acknowledge and value diverse ways of knowing, deconstructing current knowledge hierarchies and hegemonies that have disrupted ecosystems and disenfranchised Indigenous cultures, languages and knowledge systems. Policymakers should understand and apply participatory, localised and context-specific Indigenous and traditional concepts that empower Indigenous and non-Indigenous entities to co-design and co-produce plans by learning from ITK and relevant local and academic knowledge, using the strengths of these for the benefit of all. Lastly, recognise that these are IKS, not knowledge products that can be extracted. Planning processes

must involve careful and meaningful engagement with Indigenous knowledge holders and appropriate representatives.

- **Prioritise equitable and accessible ocean data and knowledge systems.** Promote equitable access to comprehensive ocean data and recognise the value of IKS by adhering to the CARE (Collective benefit, Authority to control, Responsibility, Ethics) Principles for Indigenous Data Governance. Data collection and management should reflect the dependence, rights and traditional ecological knowledge of Indigenous communities. Recognising and addressing potential cultural and language barriers that may impede the implementation of inclusive and sustainable ocean planning processes is critical (i.e., approaches to collaboration, differing perspectives, approaches to leadership). These include diverse interpretations and implementation of international conventions and agreements, legacies of colonial rule and power structures and the need for perspectivism (multiple viewpoints) and worlding (cultural framing) to meaningfully incorporate IKS.
- **Fund Indigenous and traditional-led ocean planning research and planning.** Prioritise financial resources for Indigenous and traditional-led place-based research and enable Indigenous Peoples and traditional communities to develop and implement their own projects, exploring mechanisms like ocean use fees and tenure-based user fees.
- **Address gender biases in marine science and management.** Implement inclusive practices in hiring, leadership and resource allocation to counter systemic gender biases faced by Indigenous women, Afro-descendant women, migrant women, women with disabilities, and young girls, such as providing support systems (e.g., flexible schedules, child care) to facilitate women's meaningful engagement in ocean management decision-making processes.

To co-produce truly inclusive, place-based and knowledge-based SOPs, we first must recognise that Indigenous Peoples and traditional communities are diverse and not monolithic, each with unique perspectives, traditions and relationships to the ocean. We must act collaboratively to confront structures of dispossession and power dynamics that ultimately continue to place ITK as external to systems of governing power (Muhl et al. 2023; Yua et al. 2022).

The process of co-producing SOPs should be iterative and cyclical (illustrated by Figure ES-1), emphasising the importance of pre-collaboration actions (Phases 0–1), co-construction processes (Phases 2–3) and continuous review and reflection (Phase 4).

TABLE ES-1. **Tabulation of overarching opportunities for action for policymakers to support co-producing SOPs**

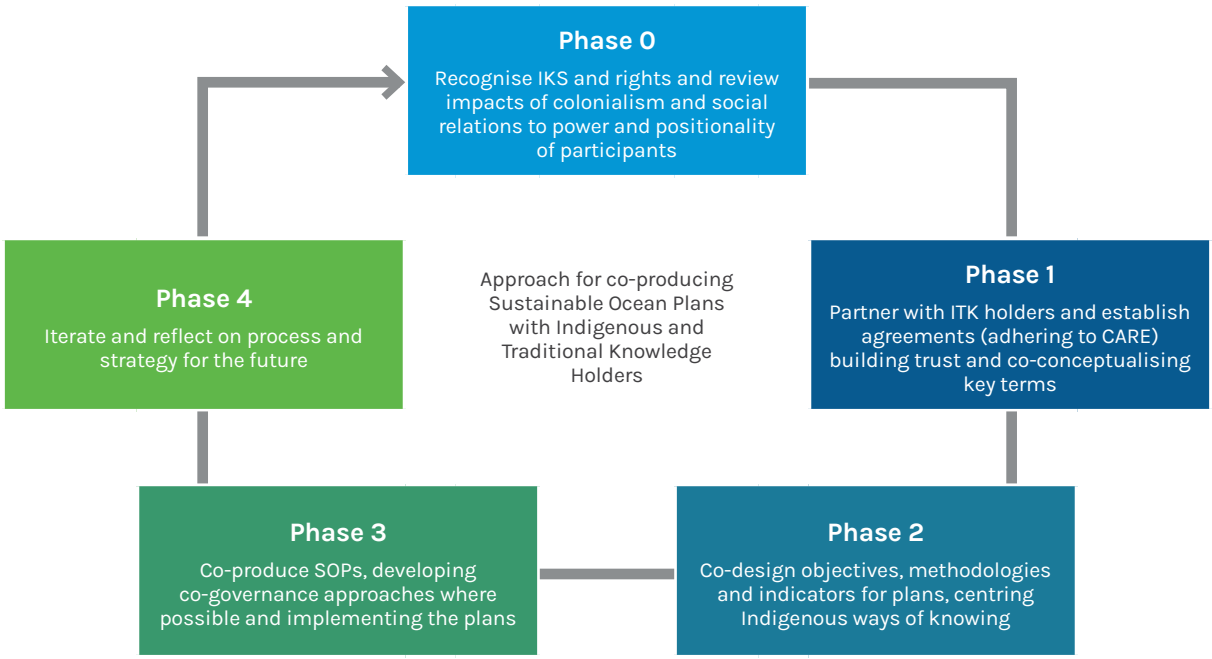
THEME	OPPORTUNITY/ACTION IDENTIFIED
Aligning policy frameworks with Indigenous Knowledge Systems (IKS)	Adopt policies that recognise Indigenous authority and the value in approaches such as Two-Eyed Seeing, where appropriate, in ocean plans to support improved relationships between humans and ecosystems.
	Recognise that Sustainable Ocean Plans (SOPs) are more likely to succeed if situated within co-governance agreements that recognise the authority of Indigenous governments and communities for managing ocean areas and aspects such as fisheries and protected areas in collaboration with other levels of government.
	Build upon existing frameworks and concepts in fisheries science, maritime navigation, health and well-being, social-ecological vulnerability and more, that overlap with aspects of IKS, such as ecosystem-based fisheries management, pretty good yield, social harvest control rules and integrated management of marine protected areas and aspatial aspects.
	Ensure that IKS are included from the outset in developing economic approaches to avoid entrenching human exceptionalism and diluting the IKS principle of reciprocity between people and ecosystems.
Building equitable and reciprocal partnerships	Engage in planned and deliberate relationship-building processes with Indigenous Peoples and traditional communities, respecting protocols, ceremonies and the time required to build trust and understanding with an understanding that time is valued differently amongst different groups.
	Develop agreements and frameworks that protect the intellectual property rights of Indigenous Peoples and traditional communities, regulate access to co-created knowledge and ensure equitable sharing of benefits.

TABLE ES-1. **Tabulation of overarching opportunities for action for policymakers to support co-producing SOPs (cont.)**

THEME	OPPORTUNITY/ACTION IDENTIFIED
Building equitable and reciprocal partnerships (cont.)	Adopt approaches that recognise and reconcile different knowledge systems, fostering mutual understanding, innovation and the co-creation of new methodologies.
Enabling conditions for inclusive and equitable co-production	Fund and support Indigenous- and traditional-led place-based research and provide structures of support for funding rooted in cultural practices important to Indigenous groups and their local customs and processes to make sure that the development of SOPs has been informed from the perspective of Indigenous Peoples and advance further equitable co-production of SOPs.
	Recognise that the ability to participate in and benefit from user fees and blue bonds within ocean economy sectors does not address important conflicts between traditional rights over space and resources, colonial dispossession and the commercial and tenure systems from which Indigenous Peoples were historically excluded.
	Promote equitable access to comprehensive ocean data and recognise the value of IKS by adhering to the CARE principles for Indigenous Data Governance.
	Address systemic gender biases in marine science and conservation faced by Indigenous women, Afro-descendant women, migrant women, women with disabilities, and young girls by implementing inclusive practices in hiring, leadership and resource allocation while providing support systems (e.g., flexible schedules, child care) to facilitate women's meaningful engagement in ocean management decision-making processes.
	Address potential cultural barriers that may impede implementation, such as diverse interpretations of conventions and agreements, and the fundamental incompatibility (incommensurability) of policies that may prioritise conflicting objectives such as economic development over cultural preservation.

Notes: CARE = Collective benefit, Authority to control, Responsibility, Ethics. Actions are categorised by the themes of this Blue Paper.

FIGURE ES-1. **Example of an iterative and cyclical approach to co-producing SOPs with ITK holders**



Notes: CARE = Collective benefit, Authority to control, Responsibility, Ethics; IKS = Indigenous Knowledge Systems; ITK = Indigenous and traditional knowledge.
Source: Authors.

BOX ES-1. **Key definitions**

The language used to describe and discuss knowledge systems is continually evolving as researchers strive to be more inclusive and equitable. The diverse contributors to this paper brought a variety of perspectives and endeavoured to respect these differences. Acknowledging the ongoing evolution of definitions and connotations, we present below our current understanding of important terms for the purpose of this Blue Paper.

Indigenous Knowledge Systems (IKS): IKS reflect a systematic way of thinking and knowing that has been developed and verified over millennia, through long histories of interaction with their surrounding environment and are passed on from generation to generation. IKS are bodies of knowledge generated through cultural practices, lived experiences, multigenerational observations, lessons and skills, including methodologies and approaches informed by values, priorities and understandings that form a living process generating knowledge acquired today and in the future. Indigenous knowledge holders own IKS, often collectively, and IKS are uniquely expressed and transmitted through Indigenous languages.

IKS and other similar place-based knowledge systems refer to dynamic bodies of know-how, skills, practices, beliefs, philosophies and representations that guide Indigenous Peoples and traditional communities, including Afro-descendants.

Knowledge plurality: Acknowledge, recognise and value a diversity of knowledge systems and ways of knowing. This involves deconstructing current knowledge hierarchies and hegemonies that have disrupted ecosystems and disenfranchised Indigenous cultures, languages and knowledge systems.[a]

Co-production: An iterative process of bringing together different knowledge systems in true partnership and equity, to enhance, learn and create new context-specific knowledge on a particular topic.[b] It requires the active involvement of key knowledge holders in the planning, design, implementation and evaluation process from the onset to the conclusion of a project, preferably as co-researchers with equal say in the knowledge production process.[c] Co-production provides co-benefits for all partners in the work.

Ocean equity: This seeks "redress of historic and systemic disadvantages"[d] in contrast to equality, which often overlooks classifications of individuals "on the basis of certain personal characteristics" such as indigeneity, race, ethnicity, class and gender. Advancing ocean equity therefore requires that ocean governance actors and researchers "begin from an understanding of the pre-existing inequities in the contexts in which they work."[e] The process therefore involves deconstructing the privilege of "Western ways of thinking" in ocean governance and planning and elevating knowledge systems that can inform more inclusive, equitable and caring approaches to co-producing ocean plans.

Note: In this paper, terms such as *Indigenous science*, *traditional knowledge*, *traditional ecological knowledge*, *traditional cultural expressions* and *local knowledge*, as well as a combination of terms such as *Indigenous and traditional knowledge* and *Indigenous and local knowledge systems*, occur throughout the text. These terms are used in various contexts and literature. This paper is not intending to conclude on the terminology nor advise which ones are preferred, but we recognise that these terms exist. The main purpose is to convey that these knowledge systems need to be recognised in co-producing Sustainable Ocean Plans with Indigenous and traditional knowledge holders.

The term *local knowledge* is, in this context, understood the same way as in the Convention on Biological Diversity article 8(j): knowledge held by local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity.

Sources: a. Escobar 2018; b. Norström et al. 2020; Yua et al. 2022; c. Strand et al. 2022a; d. Minow 2021; e. Crosman et al. 2022, 1

Positionality statement

Within this Blue Paper, the voices of scholars and researchers of Indigenous and non-Indigenous backgrounds — alongside traditional knowledge holders from the Global North and Global South — unite in a shared purpose: to improve our understanding of a regenerative relationship with marine and coastal ecosystems and the policies and actions that guide them (see "About the authors" for details). Thus, we recognise the importance of the positionality of all contributors and its importance in mitigating bias and discrimination. We recognise power imbalances due to economic, social and environmental disparities experienced by different contributors. As such, we seek to work together to bridge two knowledge systems with the deep understanding of our positionality and that we must consistently and methodically work towards equitable practices throughout this work.

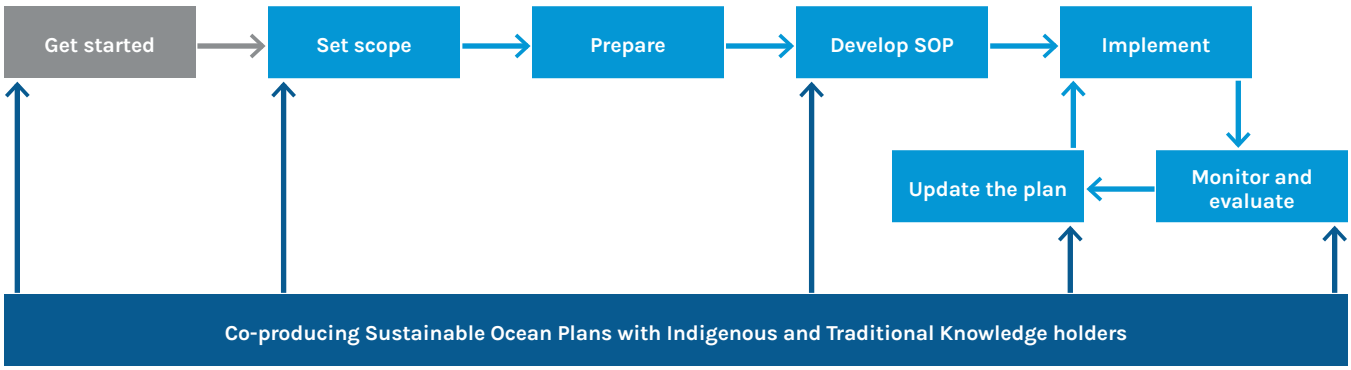
The first knowledge system emerges from Indigenous Peoples' voices. It carries the lived experiences, oral traditions and cultural teachings passed down over generations of ocean stewardship, such as content included in "The significance of Indigenous and traditional knowledge systems in the ocean," "Approaches to knowledge co-production to inform ocean policy" and Case study 6 These truths are often presented without citations because they represent the embodied knowledge of the authors themselves and oral traditions passed down through generations. The second system arises from a (largely Western) scientific voice. It synthesises peer-reviewed scientific literature into technical analyses and arguments. When these two voices merge, it elevates our collective understanding of the ocean's dynamism — its past, present and potential future. This Blue Paper illuminates the transformative values, policies and actions required to meaningfully enhance sustainable ocean management.

Introduction

Sustainable Ocean Plans (SOPs) — as outlined in the *Transformations for a Sustainable Ocean Economy* (*Transformations* agenda) of the High Level Panel for a Sustainable Ocean Economy (Ocean Panel) and the guide *100% Sustainable Ocean Management: An Introduction to Sustainable Ocean Plans* (2021) — guide public and private sector decision-makers on how to sustainably manage 100% of a nation's ocean area under national jurisdiction to advance long-term economic and social development. This is done by protecting the natural marine ecosystems that underpin that development. Under a shared vision, the Ocean Panel's headline commitment is to sustainably manage 100% of the ocean area under national jurisdiction, guided by SOPs. These plans reflect nine attributes (inclusive, integrative and iterative processes, place-based, ecosystem-based, knowledge-based content, endorsed, financed, capacitated impact) and are a unifying framework that brings together existing and new ocean-related plans, processes and policies into a coherent, integrated whole.

To ensure these plans are inclusive, place-based and knowledge-based, we argue that it is essential to co-produce them with Indigenous and traditional knowledge (ITK) holders using transdisciplinary approaches. Centring equity and restorative justice are foundational considerations for effective planning; these considerations recognise the diverse relationships and cultural connections between individuals and the ocean. It is important to note that this process is imperative irrespective of a country's SOP development phase, and that this paper is just as relevant for countries in the "scoping and preparing" phase and it is for countries in the "implementation and updating" phase (High Level Panel for a Sustainable Ocean Economy 2021) (see Figure 1). Although it is ideal for countries to begin the process by ensuring the initial vision establishment and coordinating mechanisms are co-produced, there are several ways in which this process is adaptable to implementation, monitoring, evaluation and updating of the plans. Specifically, because SOPs are iterative in nature, the plans should be periodically monitored and updated, and this process is also an ideal starting point for co-producing SOPs with ITK holders. If previous continuous processes of engaging stakeholders have not involved knowledge co-production processes, then this paper provides a good starting point for how a country can ensure future or current phases are incorporating this into the progress towards SOPs.

FIGURE 1. **The relevance of co-producing SOPs with ITK holders according to the different stages of the iterative process for developing a SOP**



Note: SOP = Sustainable Ocean Plan.
Source: Adapted from High Level Panel for a Sustainable Ocean Economy, 2021.

The sixth assessment report of the Intergovernmental Panel on Climate Change (IPCC) (IPCC 2023) recognises colonialism as a significant factor in climate change adaptation, noting that both tropical and arctic communities, which are home to most of the world's biodiversity and ocean-dependent people, have been marginalised in terms of their autonomous response capabilities. Despite the wealth of ITK in these regions, most governance institutions, approaches, funders and research paradigms originate from high-income nations, often overlooking local perspectives crucial for addressing marine ecosystem threats and understanding systemic inequities (Spalding et al. 2023).

To increase the possibility of community-led adaptation, it is essential to address colonialism and its resultant lack of upheld rights, resources, and equity simultaneously with present climate change impacts. New research, governance policies, and collaborations are needed to effectively adapt to emerging risks, prioritising local, traditional and Indigenous knowledge systems, perspectives, and needs for more equitable and effective ocean governance and conservation strategies.

The purpose of this paper is to explore the case for developing equitable SOPs by co-producing them with ITK holders and includes geographically diverse case studies which highlight both struggles and successes in co-production. In practice, identifying and recognising the appropriate rights holders for engagement requires careful consideration. With respect to the ocean, these may include Indigenous Peoples, Afro-descendants, traditional communities, local communities, small-scale fisherfolk or artisanal fishing communities. What these groups often share is a dependence on marine resources, a long-standing (or historical, in cases not involving forced relocation) connection to the ocean and coastal ecosystems and unique knowledge developed through close relationships and reciprocity with their surrounding environment.

Focusing primarily on three of the nine SOP attributes — an inclusive process and place-based and knowledge-based content — this paper highlights the barriers and opportunities for equitably co-producing SOPs with Indigenous Peoples and traditional communities. First, we present the case for co-production, understanding the value of Indigenous Knowledge Systems (IKS),

and the significance of such knowledge in ocean planning, including providing a set of key definitions (Box ES-1). Second, we outline the importance of knowledge plurality in co-producing ocean plans, recognising multiple ways of knowing. Third, we explore practical approaches and methods for co-producing plans with ITK holders. Fourth, we highlight aspects of data, funding, culture and gender in planning processes. Finally, we provide opportunities for action to co-produce inclusive, place-based and knowledge-based SOPs. These opportunities constitute necessary and reinforcing actions to support and inform pathways to an equitable and just ocean economy.

Defining *Indigenous Peoples, traditional communities, Indigenous Knowledge Systems* and *Indigenous and traditional knowledge holders* can be a contentious and sensitive process in some regions. What it means to be an Indigenous or traditional knowledge holder in one context will be different in another context, and whereas Indigenous Peoples and traditional communities are recognised as rights holders in some countries (e.g., Vanuatu), Indigenous Peoples and traditional communities do not have official designations in other countries. However, one has no bearing on the other; we do not conflate the politics of recognition of rights with identities as knowledge holders. Furthermore, to what extent Indigenous Peoples and traditional communities have access to land and marine tenure differs across contexts and countries and will impact the development of SOPs (Box 1). As pointed out by Carmona et al. (2022), the recognition of Indigenous jurisdiction remains marginal across the world.

BOX 1. Recognising the distinct rights and knowledge systems of Indigenous Peoples and traditional communities

Ensuring full and effective participation of Indigenous and traditional knowledge (ITK) holders in Sustainable Ocean Plan (SOP) development involves respecting their procedures, using pertinent languages, and ensuring their direct and effective participation in implementation processes.

There are several key international instruments and guidelines recognising these rights, such as the following:

- The 2007 UN Declaration on the Rights of Indigenous Peoples (UNDRIP) is a human rights instrument. It recognises Indigenous Peoples as people, collectively and as individuals, who are equal to all other people and have the fundamental right to self-determination.
- The 2018 UN Declaration on the Rights of Peasants and Other People Working in Rural Areas (UNDROP) recognises the rights of people engaged in artisanal or small-scale occupations as well as migrant workers in rural areas, including Indigenous Peoples and traditional and local communities. Article 1 of UNDROP specifically acknowledges the rights of any person engaged in small-scale agricultural production for subsistence and/or the market, including many coastal and ocean-dependent communities.
- Afro-descendants are a recognised category of rights holders within human rights law. The Inter-American Court of Human Rights and the International Committee on the Elimination of Racial Discrimination have pronounced that Afro-descendant peoples such as the Maroons and Garifuna represent a collective subject to rights, or Tribal people, ethnic community or national minority; consequently, they are subjects of collective rights.
- The Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries and the Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests, both by the Food and Agriculture Organization of the United Nations, address issues of tenure and rights relevant to coastal and marine communities.

These, and other mechanisms not mentioned here, all recognise that the people and knowledge holders addressed by this Blue Paper have rights to full and effective participation and engagement in sustainable ocean planning. UNDRIP, however, specifies that Indigenous Peoples have a distinct right as people and, as such, are entitled to self-determination. In this paper, we focus specifically on "Indigenous Peoples and traditional communities," and when referring to their knowledge systems, we use the term *Indigenous and traditional knowledge* (or knowledge of Indigenous Peoples and traditional communities). This distinction in terminology is crucial to avoid unintended conflation of these terms.

In some regions, however, the Indigenous Peoples are not officially acknowledged or recognised by the state, despite their indigenous status. Thus, the term *Indigenous Peoples* is not officially used for these communities.

SOUTH AFRICA AND GHANA HIGHLIGHT TERMINOLOGY NUANCES AND CHALLENGES.

In the context of South Africa, scholars and practitioners often refer to Indigenous and local knowledge systems to make explicit that in South Africa there is a blending or merging of cultural values, kinship and practices between Indigenous Khoi and San, the amaXhosa, the amaZulu and other ethnic groups of South Africa, such as the Cape Malay, Indian, Dutch, Afrikaans and English communities that have settled in and around various coastal areas since the early 1500s.[a] Carstens (1966) refers to this process as "acculturation," arguing that Indigenous identity groups such as the Korana and Khoekhoe were "largely subsumed" under Cape Nguni communities or the apartheid category of "Coloured."[b] Indigenous Khoisan communities are also "not isolated from modernity" and people's identities are "hybrid, multiply-situated, situational and intersectional."[c] Therefore, in the context of Algoa Bay in South Africa, for example, the lines between Indigenous and local traditions, knowledge and cultural heritage connected to the ocean and coast that have been handed down through generations are oftentimes blurred and cannot be neatly categorised and said to belong to a single grouping of people.[d]

In the Ghanaian context, however, although acculturation has affected some aspects of the culture and society, there remains a strong duality of worldviews, with Indigenous and Western scientific knowledge systems co-existing. This duality contributed to the introduction of the Fisheries Co-management Policy in 2020, managed by the Ministry of Fisheries and Aquaculture Development. The policy aims to empower small-scale fishers by giving a voice and decision-making power, including in their governance structure with the presence and recognition of customary laws and chief fishermen and *konkohemaas* ("fisher queens"), among others.[e]

Notes and Sources: a. Bernard 2010; Boswell and Thornton 2021; Carstens 1966; b. Bernard 2010; c. Boswell and Thornton 2021, 144; d. Strand et al. 2022a; e. See Ministry of Fisheries and Aquaculture Development 2020.

The significance of Indigenous and traditional knowledge systems in the ocean

Background and context

> *"There is an enormous potential for the use of mātauranga Māori (traditional knowledge) to more widely enhance the understanding of aquatic ecosystems, underpin culturally-appropriate restoration approaches, and provide a more holistic and integrated perspective for activity in this realm, including research, monitoring, planning, and policy and resource development." (Clapcott et al. 2018, 457)*

Co-producing SOPs with ITK holders is first and foremost an issue of equity. Ocean equity, a key factor for sustainable ocean governance and one of the five core pillars of the Ocean Panel's *Transformations* agenda, seeks "redress of historic and systemic disadvantages" (Minow 2021). This contrasts with equality, which often overlooks classifications of individuals "on the basis of certain personal characteristics," such as indigeneity, race, ethnicity, class and gender. As emphasised by Crosman et al. (2022), considering equity in ocean governance "requires that researchers and governance actors begin from an understanding of the pre-existing inequities in the contexts in which they work." Ocean equity also involves deconstructing the privilege of "Western ways of thinking" in ocean governance and planning (Bennett et al. 2021), and elevating knowledge systems that can inform more inclusive, equitable and caring approaches to co-producing SOPs.

Building on the findings of prior work by Ocean Panel, this Blue Paper provides the case for the value of co-producing ocean plans with ITK holders and recommends actions to take towards this goal. Even within an overall growth-oriented analysis for future oceans, the initial series of Blue Papers began to argue for a more equity-focused approach to ocean governance. In "Towards Ocean Equity," Österblom et al. (2020) extended past concepts of ocean ecosystem services — including food, oxygen, climate stabilization and economic opportunities — to highlight how these benefits are inequitably distributed among and within nations. Inequities in the ocean economy, such as fisheries and seafood labour injustices, which include human trafficking and inhumane work conditions, illegal fishing, resource overuse and lack of transparency in supply chains, are deeply intertwined with gender and racial inequality and social disparities (McCauley et al. 2018; Selig et al. 2022; Singh et al. 2021). Crucially, these inequities happen because of active political and economic marginalisation, often as a legacy of colonialism but continued by current legal and governance frameworks (Finkbeiner et al. 2017) and asymmetrical knowledge hierarchies (Ndlovu-Gatsheni 2012; Niner et al. 2024). This then limits or removes the ability of knowledge holders to inform region- and site-specific approaches to decision-making (Spalding et al. 2023, 8). Inequities can also be exacerbated if no attention is given to marine cultural heritage, cultural ecosystem services and the non-monetary benefits that environments provide to coastal and ocean-dependent peoples (Scott et al. 2023; Strand 2023).

The effects of this social inequity are very clear in the lack of tenure and access to resources and space for many groups, most notably for Indigenous communities throughout the world (Bennett et al. 2021). This is reflected in statistics for the ocean economy, from resource access allocations (Davis et al. 2022) to (lack of) participation (Strand et al. 2022a) to recognised seafood employment (Kleiber et al. 2015) to benefit-sharing agreements in offshore wind energy production (Cisneros-Montemayor et al. 2022). Redressing past harms and ensuring

more equitable ocean futures requires further and real recognition of Indigenous Peoples, traditional communities, ITK holders and acknowledgement of the specific contexts of different groups to make sure that the participation and involvement of Indigenous Peoples and traditional communities do not perpetuate inequitable and asymmetrical power structures.

Social (and by implication, ocean) justice, includes both restitution and restoration (Johnstone and Quirk 2012). Restitution leads to partial recompense for past heinous crimes such as slavery and colonialism. Restoration, on the other hand, specifically refers to the equal and full recompense for past crimes and oppressions. Since restoration is virtually impossible to achieve given the time-specific impacts of oppressive historical regimes (Johnstone and Quirk 2012), restitution becomes an important consideration in financing for ocean justice. The inclusive and equitable development of a sustainable ocean economy relies on deliberate, purposeful discussions and an understanding of the distribution of benefits, resource ownership and risks within Indigenous, traditional and local communities. In the context of serving as an antecedent for this paper, Allison et al. (2020) proposed four key actions for truly integrating non-material relationships within a sustainable ocean economy: redirecting economic growth as a tool to increase human well-being; centring equity, diversity and inclusion; partnering with frontline communities (specifically including Indigenous Peoples); and building capacity to meet these goals beyond national- and consumer-scale strategies. **This recognises that, although SOPs are developed at national levels, efforts to include ITK and to achieve equity need to be made at different scales, both temporal and spatial, local, national, regional and global** (Cisneros-Montemayor et al. 2022; Davis et al. 2022; Finkbeiner et al. 2017; Kleiber et al. 2015; Rivers et al. 2022).

Knowledge co-production is one way to support more just, equitable and ecologically sustainable governance of coastal marine spaces and ecosystems (Muhl et al. 2023; Norström et al. 2020; Strand 2023). Indigenous Peoples and traditional communities see value and relevance in ITK for ocean planning and monitoring as well as sustaining traditional species and customary practices (Alexander et al. 2019; Clapcott et al. 2018; Kaiser et al. 2019; Maxwell et al. 2020; Mulalap et al. 2020; Paul-Burke et al. 2020; Proulx et al. 2021; Rist et al. 2019; Strand et al. 2022a; Vierros et al. 2020). This is exemplified in Case study 1 on the customary rights of marine and coastal resources in Indonesia. Recognising this diversity of individual relationships with the ocean is essential both for a sustainable future and for ensuring that fundamental human rights and equity goals are fulfilled; importantly, these insights from ITK are not only relevant in local contexts but also extend through the vast linkages between ocean species and ecosystems themselves (Strand et al. 2022a; Vierros et al. 2020).

Several international organisations and agencies have called for increased use of Indigenous, traditional and local knowledge systems in marine policies. One example is the Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization (UNESCO-IOC). In its MSPglobal document, UNESCO-IOC outlines challenges and what it calls “good practices” (UNESCO-IOC 2024, 2). Particularly relevant to this paper is the focus on recognising the rights of Indigenous, traditional and local communities — including the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP), the United Nations Declaration on the Rights of Peasants and Other People Working in Rural Areas (UNDROP), the Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests (VGGT) and the Voluntary Guidelines for Securing

Sustainable Small-Scale Fisheries (SSF Guidelines) — adopting participatory knowledge co-production methodologies, building long-lasting and strong relationships and embracing adaptive management "based on Indigenous and Local Knowledge."

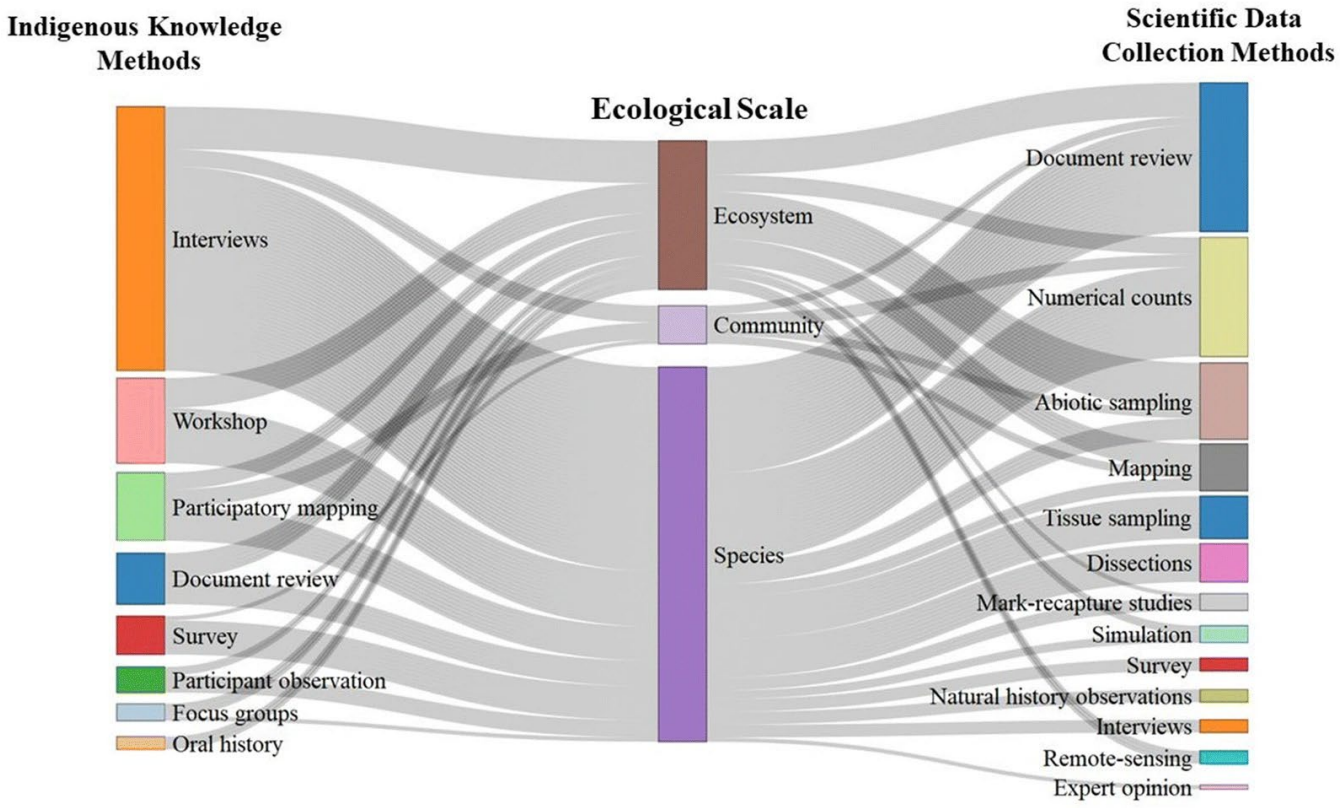
> *"Creating opportunities for Indigenous peoples to operationalise their knowledges in marine research will ensure the appropriate management of culturally significant species, while cultivating productive intercultural collaboration in the research conducted on Sea Country that align with Indigenous obligations to care for Country in sustainable ways." (Williamson et al. 2023, 296)*

Research groups use a variety of methods for mapping ITK and generating scientific data. Figure 2 highlights different methods used across case studies in Canada associated with coastal and marine research, monitoring and management (Alexander et al. 2019).

Discussing the difference between knowledge "integration" and "co-production"

Knowledge integration and knowledge co-production represent distinct yet interconnected approaches to knowledge production and application. Knowledge integration requires a concerted effort to synthesise diverse perspectives, methodologies and approaches into a cohesive framework for problem-solving or solution generation. As noted by Godemann (2008), knowledge integration involves the process of drawing together diverse knowledge bases and disciplines to address complex problems or develop comprehensive solutions. It can foster a culture of collaboration and cross-fertilization of ideas among researchers and practitioners from diverse fields.

FIGURE 2. **Relationship between ITK methods, ecological scale and scientific data collection methods**



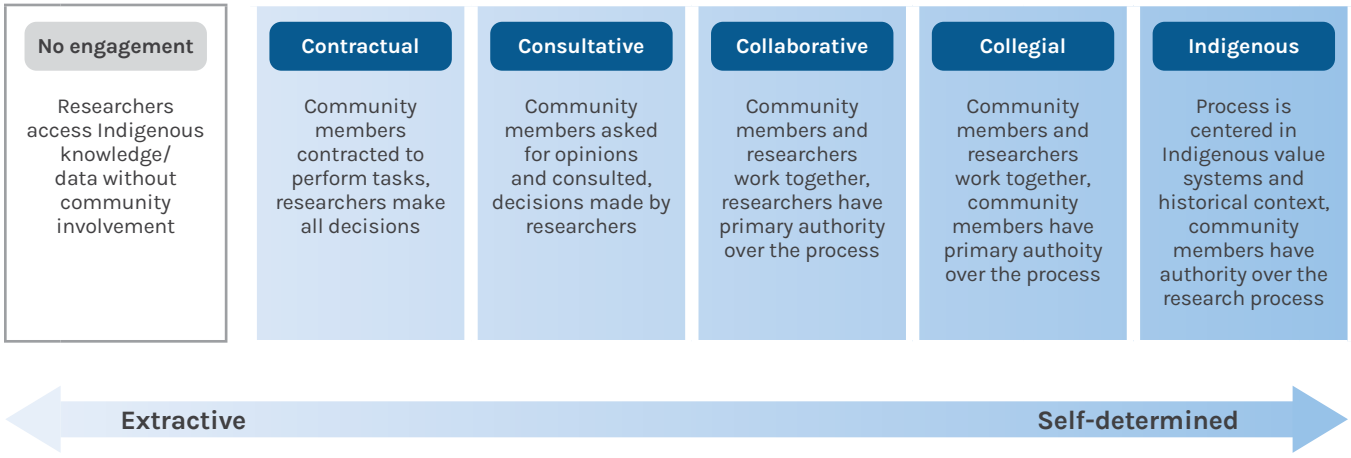
Source: Alexander et al. 2019.

Knowledge co-production emerged as a response to criticism of traditional research practices for their lack of inclusivity and relevance to real-world problems (Jacobi et al. 2022). It emphasises the active involvement of multiple stakeholders in the generation and application of knowledge (Greenhalgh et al. 2016), whereas some argue that "stakeholders" should be recognised as "co-researchers" to advance more inclusive and equal processes (Strand et al. 2022b). Knowledge co-production adds openness to projects and transcends conventional top-down methods of knowledge production by prioritising the active participation of all co-researchers throughout the research process. It marks a shift towards a more participatory and inclusive approach from problem identification to knowledge dissemination in the research process. Rather than relying solely on the expertise of academic researchers or institutional authorities, this approach emphasises the co-construction of knowledge through dialogue, shared learning and mutual respect.

Integrated management from co-creation, in the context of coastal zone management, gained attention in the late 1990s for its benefits (Cicin-Sain and Knecht 1998; Sorensen 1997). In Canada, it was developed under the Oceans Act (1997) to plan and manage human activities to avoid conflicts, ensuring conservation and sustainable use of marine resources and the shared use of ocean space (Canada's Oceans Strategy, 2003; Canada's Oceans Action Plan, 2005). However, recently, there has been a shift towards social-ecological systems approaches, recognising the interconnectedness of humans and nature (Berkes 2017; Virapongse et al. 2016) necessary for more sustainable and caring ocean governance approaches. Knowledge co-production, which promotes horizontal knowledge creation, is increasingly valued over knowledge integration approaches (Manuel-Navarrete et al. 2021), particularly to learn from existing ITK systems that already consider themselves within and part of nature.

UNESCO's *Open Science Outlook 1: Status and Trends around the World* (2023) emphasises the need for inclusivity and diversity in knowledge holders and systems to realise open science's full potential as an equitable global phenomenon. It notes that engaging other knowledge systems requires a broader understanding of what knowledge is and how it's created and shared across cultures and communities. It recommends a spectrum of engagements, through trust building, from no engagement to full engagement centred on Indigenous value systems and knowledge holders for equitable benefits as reflected in Figure 3.

FIGURE 3. **Spectrum of community engagement in scientific research**



Source: UNESCO 2023, 33.

CASE STUDY 1. **Empowering customary communities in coastal and small islands of Indonesia**

Indonesia, an archipelago located in Southeast Asia, is a country rich in both terrestrial and marine biodiversity. Indonesia is also rich in diversity of ethnic groups with more than 1,300 ethnicities recognised and 20–25 percent of the population considered to be Indigenous Peoples,[a] many of whom live in coastal areas of more than 13,000 islands across the country.

Numerous examples demonstrate how Indigenous and traditional knowledge (ITK) contributes to marine resource management. Referred to as *local wisdom*, many practices are still in use today and have been officially recognised by laws (2007 and 2014) on coastal and small islands management.[b] Examples include *sasi* customary laws in Sulawesi, Maluku[c] and West Papua[d] that prohibit temporary exploitation of resources and govern the use of specific territory. *Panglima Laot* is a customary institution of fishermen in Aceh that regulates fishing procedures[e] and conserves coastal and mangrove forests.[f] *Awig-awig* are customary rules that govern fishing and uses of coral reefs in Lombok[g] and Bali.[h]

Indigenous Peoples and customary communities in Indonesia have historically been marginalised in decision-making, with their rights ignored or destroyed during the country's authoritarian rule.[i] In 2000, the 1945 Constitution was amended to recognise "customary communities and their traditional rights" (Article 18 B-2). Over the past decade, legal frameworks have increasingly recognised these communities' rights to manage their marine areas. The Ministry of Marine Affairs and Fisheries adopted a rights-based approach, identifying these communities, jointly mapping their marine spaces and recognising their rights to access and manage their fishery resources.[j]

Coastal communities recognised as *masyarakat hukum adat* (translated as "customary law community") now have the legal right to participate in the planning, use and management of their marine areas. This includes proposing and implementing traditional fishing areas and customary community management areas based on their "customary law and local wisdom." Between 2016 and 2022, 24 such communities have been officially recognised.[k] In addition, nearly half of Indonesia's 704 marine other effective area-based conservation measures (OECMs) are governed by customary communities, highlighting their role in conservation.[l] The most recent law (2023) officially acknowledges the rights of *masyarakat hukum adat* communities to use marine resources based on their ITK.[m]

Globally, the importance of OECMs in conserving biodiversity and contributing to global agreements is increasingly being recognised.[n] This underscores the critical role of Indigenous Peoples and local communities in conservation.[o] Given their long-established history of managing marine resources, marine OECMs managed by customary communities in Indonesia have significant potential to conserve the country's marine biodiversity[p] and contribute to Sustainable Ocean Plans.

Author: Lisa Hiwasaki

Sources: a. IWGIA n.d.a; b. MMAF n.d.; c. Adhuri 2013; d. Sari and Latifah 2021; d. Abdullah et al. 2018; Mujiburrahman et al. 2021; f. Hiwasaki et al. 2015; g. Satria et al. 2006; h. Yulianingsih et al. 2018; i. Satriastanti 2020; j. MMAF n.d.; k. MMAF n.d.; l. Estradivari et al. 2022; m. MMAF n.d.; n. Gurney et al. 2021; o. Joans et al. 2021; p. Estradivari et al. 2022

Ongoing challenges

Knowledge co-production is hypothesised to catalyse better governance outcomes; however, the complex interplay of knowledge, power and decision-making hinders its effectiveness. An analysis of international case studies (Muhl et al. 2023), where both Indigenous and scientific knowledge are used in research and partnerships to understand coastal and marine issues, identified five critical reflection points that create a deeper engagement:

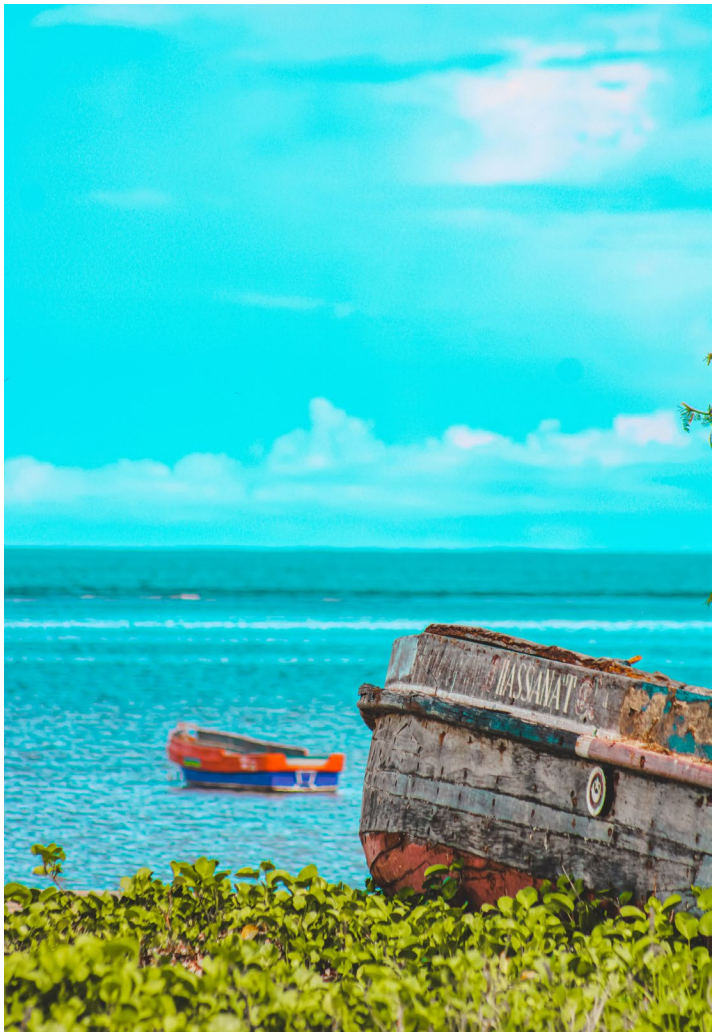
- Recognise diverse motivations that frame co-production processes; joint problem definition and design.
- Acknowledge the way identities, positionality, and values influence and are influenced by governance contexts.
- Highlight governance capacity with respect to spatial and temporal tensions.
- Identify institutional reforms necessary for knowledge co-production and the links to governance.
- Consider the relationship between knowledge-sharing, data sovereignty, and governance.

Acting on these critical reflection points in the process of knowledge co-production helps to reframe the institutional relationships that govern power and knowledge, enabling not only the development of more inclusive SOPs but also providing space to discuss Indigenous rights in relation to conservation and resource management initiatives on land and

sea sites traditionally owned by Indigenous Peoples (Lee and Deubel 2023; van Maurik Matuk et al. 2023).

Although effective engagement may require appropriate time and resources, it leads to more inclusive and equitable outcomes (Almack et al. 2022; Cooke et al. 2021). Formal endorsement by Indigenous or Tribal governments acknowledges appropriate Indigenous and traditional participation and support for SOPs (von der Porten et al. 2019a). Greater participation and authority in relation to the development of plans also leads to greater participation in implementation and ongoing monitoring (Jacobs et al. 2022).

Indigenous Peoples are not always recognised as entities with distinct rights, relationships and responsibilities to ocean environments and marine resources (von der Porten et al. 2019b). The marginalisation of Indigenous communities is commensurate with the marginalisation of Indigenous knowledge in society, silencing the importance of these practices, values and knowledge within planning and decision-making contexts (Bergström 2021; Chilisa 2017; Latulippe and Klenk 2020; Silver et al. 2022). The lack of support and resourcing for IKS is a form of epistemicide, which is the devaluation and silencing of ways of knowing and understanding the world. Fortunately, this is now being reversed in some jurisdictions as Indigenous Peoples embark on initiatives focused on knowledge revitalisation and resurgence (Fischer et al. 2022; von der Porten et al. 2019a; Woodward et al. 2020). However, in many contexts and jurisdictions, Indigenous communities and IKS continue to be marginalised and excluded from environmental, ocean and sustainability governance (Chilisa 2017; Strand et al. 2022a)



Globally, there is growing awareness of the value of ITK in ocean planning, and UNESCO-IOC (2024) recently published an MSPglobal guide listing challenges and good practices for including Indigenous Peoples and traditional and local communities in marine policies. UNESCO's *Open Science Outlook 1* (2023) also highlights the need for open dialogue with other knowledge systems, promoting inclusiveness and diversity of knowledge holders and systems. Being open to a greater ecology of knowledge does not require a discrediting of scientific knowledge or Western ideas of rationality (Mazzocchi 2018). Debates about the similarities and differences between ITK and science highlight their relationality — the fact that regardless of their epistemological foundations they speak to overlapping environmental, social and intellectual spaces (Table 1). This is inevitable given the context of the ocean environment because diverse values and shared resources bring multiple interests, practices and knowledge into the same decision-making domains.

It is important to gain ethical access to SOP-relevant IKS (Leonard et al. 2022). Although some ITK has been recorded and is available through experts on ITK, much is only accessible through ITK holders and experts based in communities. Respecting local protocols in the collection and use of ITK and engaging directly with ITK holders is necessary to ensure the most robust and credible outcome (Buscher et al. 2021). Respectful use of ITK within SOPs, with Indigenous and traditional oversight, is necessary so that communities do

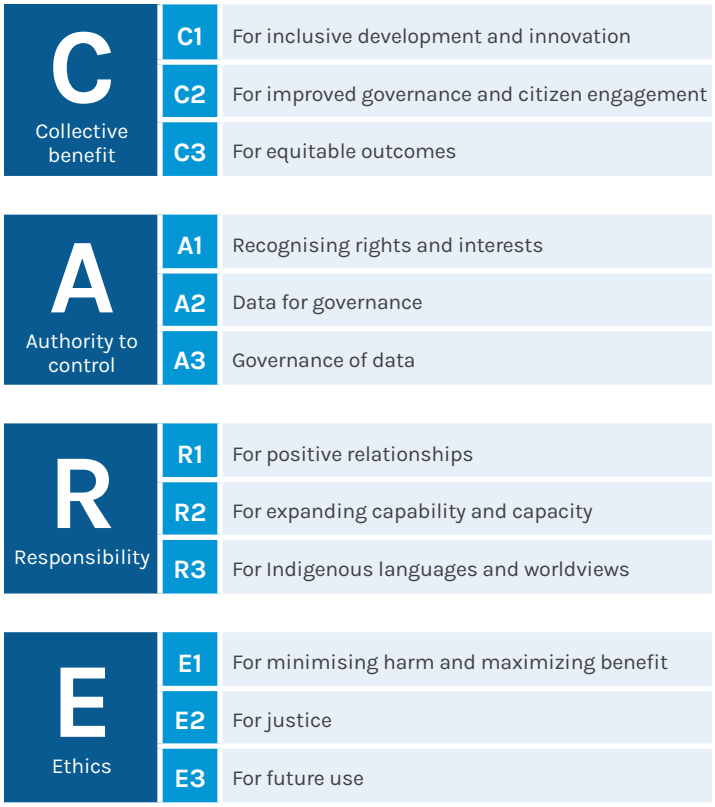
TABLE 1. **Differences and synergies between IKS and Western scientific knowledge**

INDIGENOUS AND TRADITIONAL KNOWLEDGE SYSTEMS	WESTERN SCIENTIFIC KNOWLEDGE	SHARED PRINCIPLES
Ecological principles from place-based cultures, values, beliefs and spirituality	Connection to place and spirituality not explicit	Empirical observation and experimentation (e.g., controlled burns)
Local-regional scale observations over long historical timelines; qualitative predictions embedded in laws, stories, traditions	Local- to global-scale observations over shorter timelines; quantitative predictions based on formalised theory	Intergenerational knowledge transfer and adaptation
Holistic, integrated systems-based approach	Reductionist, part-to-whole approach	Humans integrated into interconnected ecosystems; sustainable resource use while maintaining integrity
Emphasis on inherited wisdom, reciprocity and practical skills	Based on physical evidence; maintains scepticism	Knowledge as unified yet evolving constructs; open-mindedness to new patterns and explanatory models
Oral traditions, storytelling connects knowledge to life and values; verified and passed from generation to generation; knowledge is collectively owned by the community	Hypothesis driven, requires global verification; quantitative written records, discipline-specific education; knowledge is "owned" by the authors/researchers in terms of copyright, not how outputs are circulated	Describe complex systems, seek to understand the world, presence of verification systems (e.g., peer reviewed)

not feel like their knowledge is being misused or misappropriated (Kitson et al. 2018). Decisions about what ITK to include and how it is framed or reshaped to the context should be done alongside community members to mitigate misinterpretation or inappropriate use. These processes should be led by Indigenous Peoples and traditional communities and IKS representatives themselves (Chilisa 2017). Formal review processes by Indigenous or Tribal governments verify the appropriate use of Indigenous knowledge and enhance community support for SOPs.

Protecting cultural intellectual property is often necessary because there is knowledge common to the community and knowledge held by community experts (Muller 2018; Paul-Burke et al. 2020). Issues of ongoing access to Indigenous knowledge, as well as Indigenous data, can be addressed through the CARE (Collective benefit, Authority to control, Responsibility, Ethics) Principles for Indigenous Data Governance (Carroll et al. 2021; Jennings et al. 2023) (see Figure 4). Discussions with community members about appropriate acknowledgement, attribution and authorship may also be necessary as well as agreements about access to data and how Indigenous authority might be exercised into the future (Hudson et al. 2023).

FIGURE 4. **The CARE Principles for Indigenous Data Governance**



Source: Carroll et al. 2020.

Co-producing SOPs with multiple ways of knowing

The ways in which ocean areas are managed and governed continue to favour extractive processes where humans and nature are seen as separate. Although there is increasing recognition of the need for well-functioning ocean ecosystems to achieve long-term sustainable production, many current practices still pose challenges to this goal. For example, economic value systems that commodify marine life indiscriminately downplay human responsibilities towards ecosystems and threaten the health of the ocean. The problem reflects a Eurocentric axiology (value system) which began to overwhelm alternative worldviews during the European colonial era (e.g., Ndlovu-Gatsheni 2013; Reed et al. 2024; Salmond et al. 2023; Silver et al. 2022). To find solutions to our intertwined ecological and social justice crisis, state governments and citizens at large need to acknowledge — and value — diverse ways of knowing. In doing so, we may counter the dominance and conceptual limitations of Eurocentric worldviews that have disrupted ecosystems and disenfranchised Indigenous cultures and knowledge systems (e.g., Chilisa 2017; McAllister et al. 2023; Reed et al. 2024).

IKS are critical to finding solutions for our ecological crisis. For centuries and throughout the world, IKS have supported reciprocal and intimate relationships between humans and other species who share the same ecosystems (Berkes 2018; Ojeda et al. 2022). Although the concepts and practices of IKS vary across cultures, an important commonality is that IKS holistically intertwine governance, values, empirical observations, harvesting practices and other elements that support and enrich the people who give rise to such knowledge (McAllister et al. 2023; Metcalf 2021; Reed et al. 2024; Whyte 2013). The strengths of IKS include embodied and experiential ways of learning which, among other benefits, have led to the intentional tending of landscapes and seascapes in ways that boost the productivity of desired foods and other resources while enhancing biodiversity (e.g., Whitaker et al. 2023). Despite the devastating impacts of colonialism — including attempts to erase cultures, alter livelihoods, decimate entire populations and systemically disenfranchise and exclude people from exerting dominance, IKS endure in many parts of the world (Berkes 2018; Ojeda et al. 2022).

This section synthesises a practice of care for the oceans built on multiple ways of knowing. Our arguments reflect the relatively recent upsurge in the revitalisation of Indigenous cultures and authority, which is disrupting the hegemony of Eurocentric worldviews in how people relate to the ocean and other ecosystems. As part of this renewal, Indigenous Peoples have demonstrated their adaptability and willingness to complement IKS with new methods and technologies, including Western science, to inform decisions pertaining to marine spatial planning, fishery management and other human behaviours in their territories (e.g., McAllister et al. 2023; Metcalf and Robards 2008; Reid et al. 2021).

Knowledge plurality and Two-Eyed Seeing

The “Two-Eyed Seeing” approach was developed in 2004 by Dr. Albert Marshall, a Mi’kmaq Elder in Canada. It integrates Western and Indigenous knowledge systems by acknowledging their differing methodologies and results and addresses disagreements through collaborative methodologies that foster mutual understanding (Figure 5).

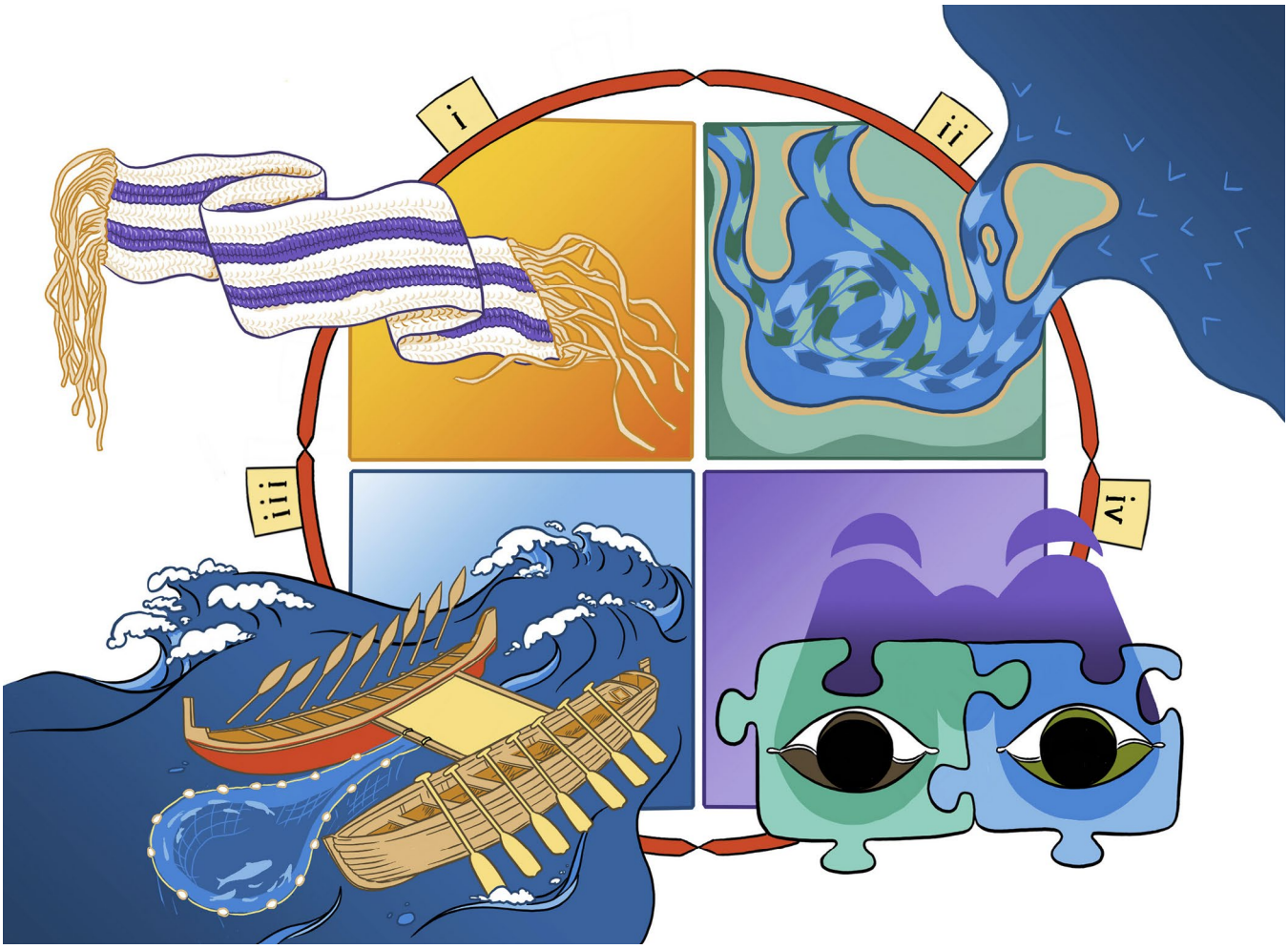
Today, as many countries begin to grapple with their colonial histories and seek to end their ongoing and systemic marginalisation of Indigenous Peoples and traditional communities, there is growing recognition that the pairing of IKS and Western science can create new knowledge, improve the policies and legal frameworks that govern relationships between

people and ecosystems and mitigate some threats to the ocean (e.g., Frid et al. 2023; McAllister et al. 2023; Reid et al. 2021).

In Canada, this movement has given rise to the concept of Two-Eyed Seeing, which Mi'kmaq Elders Murdena and Albert Marshall defined as "the gift of multiple perspective treasured by many aboriginal peoples . . . , it refers to learning to see from one eye with the strengths of Indigenous knowledges and ways of knowing, and from the other eye with the strengths of Western knowledges and ways of knowing, and to using both these eyes together, for the benefit of all" (Bartlett et al. 2012; Marshall and Bartlett 2004). Even as we centre the concept of Two-Eyed Seeing, we are aware that IKS are multilayered and plural in their own rights, across different localities.

To understand Two-Eyed Seeing, it is important to first acknowledge commonalities and differences between IKS and Western science (see Table 1). Commonalities include the generation of knowledge through cumulative and collective observations that are built socially and transmitted intergenerationally, an appreciation for the primacy of species interactions to resilient ecosystems and the use of codified approaches (e.g., traditional stories, ecological theory) to predict how human actions might affect ecosystems (reviewed in Ban et al.

FIGURE 5. **Indigenous conceptual frameworks for promoting knowledge coexistence**



Notes: The figure represents (i) the "Two Row Wampum," or Kaswentha in Haudenosaunee; (ii) the "Two Ways," or Ganma in Yolngu; (iii) the "Double-Canoe," or Waka-Taurua in Māori; and (iv) "Two-Eyed Seeing," or Etuaptmumk in Mi'kmaq.

Source: Artwork by Nicole Burton (Reid et al. 2021).

[2018]). Among their differences, Western science has a greater global scope and reliance on technologies that record data unattainable by human senses (e.g., satellites and other remote sensors, to which IKS readily adapt), whereas IKS are place-based and generally have finer spatiotemporal scales of observation, longer historical baselines and superior understanding of local ecologies. Most importantly, only IKS are embedded in values and systems of ethics that integrate knowledge-generating processes with governance (e.g., McAllister et al. 2023; Metcalf 2021). As described by a team of Indigenous authors, "Although western science can describe the natural world, it does not speak to how to live with it" (Reed et al. 2024).

It is important to recognise that IKS and Western science do not always agree, providing opportunities for collaborators to rethink disagreements and generate new knowledge. When paired together, the two knowledge systems can generate stronger insights for how to govern relationships between humans and ecosystems (Ban et al. 2018; Reed et al. 2024). An example of this is emphasised in Andavadoaka, Madagascar (see Case study 2), where Indigenous and local knowledge systems of octopus closures were paired with conservation scientists to formalise these practices in locally managed marine areas.

It is also important to recognise that Two-Eyed Seeing is only one approach that can be applied towards a common goal—one that does not necessarily translate across the globe to all Indigenous viewpoints with respect to their sovereignty over their territories. One example involves the Indigenous Ngöbe community of Salt Creek (Quebrada Sal), located on Isla Bastimentos in Bocas del Toro, Panama. When asked by the government if they would participate in a survey about expansion of the neighbouring Parque Nacional Marino Isla Bastimentos (PNMIB), 78 percent of community members declined to participate (Rojas et al. 2023). The lack of participation of community members highlights the deep distrust between the community of Salt Creek and the government due to past infringements of trust and forced removal of fishing territories for the establishment of the PNMIB (Rojas et al. 2023). Importantly, the break in social capital and trust, which has been experienced for generations, has led to Indigenous communities throughout the area feeling that they do not equally benefit from the PNMIB and that it would be more beneficial for their communities to establish their own marine protected area (MPA) and manage it without interference from any government entities.). Thus, a Two-Eyed Seeing approach might not be appropriate in this and similar contexts and speaks to the broader need for repairing social capital.

Best practices for knowledge plurality and co-production

As the case studies in this section show (Case studies 2 and 3), SOPs require that different actors work together in an equitable manner. Key to this process is the notion of *knowledge co-production*, in which collaborative research stems from pluralistic conversations that generate research goals, objectives, methods and outcomes inherent to a common goal (Cooke et al. 2021). Success for these collaborations requires that different types of knowledge and worldviews are equally valued and safe *ethical spaces* are intentionally created that nurture individual relationships, build trust, highlight common ground and provide cross-cultural connections through ceremony or other means (e.g., Almack et al. 2022).

Ultimately, the goal of knowledge co-production is for research outcomes to support better policies and legislation for regulating relationships between humans and ecosystems. SOPs, therefore, are more likely to succeed if situated within co-governance agreements that recognise the authority of Indigenous governments and communities for managing ocean areas and aspects such as fisheries and protected areas in collaboration with other levels of government (e.g., CHN et al. 2018, 2021).

Many Indigenous cultures see plants, animals and other living beings as caretakers and teachers of people, which has led some Indigenous scholars to refer to non-human beings as "more-than-human" (Kimmerer 2014). Within that worldview, more-than-human beings have legal rights (Morris and Ruru 2010). This concept was included in Western legal frameworks, including the 2017 granting of legal personhood to the Whanganui River in Aotearoa/New Zealand; other processes that have bestowed nature with legal rights (Nash 1989; O'Donnell et al. 2020; Van Horn et al. 2021) include Panama enacting the Rights of Nature, Law 287, in 2022 which recognises

nature's rights at the national level (Government of Panama 2022). The implication is that knowledge co-production can extend beyond human actors to include collaborations between people and more-than-human beings. That is, the ocean can be a co-producer of knowledge. Acknowledging the ocean as a co-producer of knowledge that deserves legal personhood rights may generate more holistic perspectives and lead to better measures for protecting marine ecosystems (Bender et al. 2023). Fulfilling this potential requires receptivity to the language of more-than-human beings; therefore, leadership from Indigenous knowledge holders is necessary in the co-production of SOPs (Kimmerer 2014; Van Horn et al. 2021, 3).

CASE STUDY 2. Expansion of locally managed marine areas and a success story on networking in Madagascar

Madagascar, the fourth-largest island in the world, located off the southeast coast of Africa, has a coastline of roughly 6,000 kilometres. More than half a million people rely on small-scale fisheries for their livelihoods,[a] but overfishing by international fisheries, climate change and sedimentation have led to declining fish catches, exacerbating poverty in the country. However, the role of Indigenous customary knowledge and traditional restrictions (*fady*) have led to greater conservation of marine life as well as partnerships between coastal communities, governments, research institutions and environmental organisations.[b]

The village of Andavadoaka is located in southwestern Madagascar and is primarily populated by the Vezo people, who are known for traditional fishing and depend on the ocean for livelihoods, sustenance, heritage and cultural identities.[c] In 2005, concerned about the future of their resources and future generations, the village introduced a seven-month octopus fishery closure. This resulted in recovering octopus stocks and significantly increased catches upon reopening.[d] The success inspired neighbouring communities to adopt a similar model, and as temporary closures expanded, the need for a management entity led to the creation of Velondriake, Madagascar's first locally managed marine area (LMMA). Meaning "to live with the sea," Velondriake LMMA now encompasses about 33 villages. An LMMA refers to nearshore waters managed locally by the coastal communities, landowning groups, partner organisations and/or collaborative government.

In Madagascar, LMMAs are governed through three legal mechanisms:

- Community-based protected areas under Category V or VI of the International Union for Conservation of Nature classification.
- Areas of coast and ocean governed by communities through traditional laws known as *Dina*.
- Mangrove forests where management rights have been officially delegated to community associations via a legal framework called "Gestion Locale Securisée" (Gelose).

Although LMMAs have emerged as effective solutions for sustainable small-scale fishery management in Madagascar, they face challenges such as limited market access, lack of legal recognition, lack of funding and conflicts with other ocean users. The displacement of Indigenous Peoples from the coast and erosion of their culture also disrupts these Indigenous and traditional protective measures. Their remoteness from each other further limits communication and coordination between the various LMMAs in the country.

In June 2012, the first LMMA forum in Andavadoaka brought together 55 community members from 18 LMMAs, leading to the creation of MItantana HArena andRanomasina avy eny Ifotony (MIHARI), Madagascar's national LMMA network. MIHARI amplifies local voices, facilitates peer-to-peer learning and advocates for the rights of small-scale fisheries. It also builds leadership and management skills while identifying sustainable funding for LMMAs. Its aim is to manage marine resources sustainably "for the well-being of LMMA communities and their future generations."[e,f]

At its fourth national forum in 2017, MIHARI successfully lobbied for an exclusive fishing zone for small-scale fishers, leading to the commitment of Madagascar's Minister of Fisheries to create and establish a national steering committee.

From 1 LMMA in 2005 to 280 today, MIHARI now focuses on establishing a legal framework to recognise the rights of small-scale fishers, with its success inspiring similar networks in the Western Indian Ocean.

Author: Vatosoa Rakotondrazafy

Notes and Sources: a. World Bank 2020; b. Augustave 2019; c. Gardner et al. 2020; d. Harris 2007; Samoilys and Obura 2011; e. MIHARI and Ralaimihoatra 2022; f. See a MIHARI video here

Challenges to knowledge plurality and co-production

Many frameworks for ocean management have excluded IKS and traditional knowledge (e.g., Kosgei 2021; Rogerson 2015). Historically, this has been evident in major international agreements. For instance, the 1982 United Nations Convention on the Law of the Sea (UNCLOS) grants coastal states the autonomy for issuing fishing licences and determining fishing seasons, areas and targeted species (United Nations 1982, Article 62, 46–47) with limited consideration to the experience and views of Indigenous rights holders and local stakeholders. However, recent developments show a shift towards greater recognition of Indigenous, traditional and local knowledge. The 2023 Agreement on Marine Biodiversity of Areas Beyond National Jurisdiction, which serves as a protocol to UNCLOS, marks a significant step forward. This agreement includes key references to Indigenous Peoples and local communities, notably in Article 13 on marine genetic resources and Article 14 on fair and equitable benefit sharing. These inclusions represent a growing acknowledgement of the value of diverse knowledge systems in ocean governance.

Although essential to developing inclusive and knowledge-based SOPs, knowledge plurality and co-production can be more challenging than the status quo. Greater time and financial costs are required for people to work together (ideally in person) in ways that build trust and a safe ethical space (e.g., Almack et al. 2022; Cooke et al. 2021). Critically, those trained exclusively in Western knowledge systems must undergo self-reflection and acknowledge the power imbalances that have privileged them (Trisos et al. 2022). Without the proper time and resources for slowing down, personalising and legitimising the collaborative process, the illusion of inclusion can promote epistemic injustice and reinforce power asymmetries (e.g., Chilisa 2017; Latulippe and Klenk 2020; Silver et al. 2022). This is particularly true as "the unequal power relations between Western knowledge and other knowledge systems poses a threat to meaningful integration" (Chilisa 2017, 814).

Resource inequity between partners can also diminish legitimacy. For instance, the Eskimo Walrus Commission has one full-time employee regularly interacting with eight full-time staff from US federal agencies, which can overwhelm the capacity of Arctic communities to engage in walrus co-management (see Case study 3). Proactive and flexible financial support for Indigenous communities to contribute their IKS, therefore, is essential to legitimise knowledge plurality and SOPs (see "Equitable co-production: Considering aspects of data, culture, gender and financing").

In some cases, knowledge co-production may represent a mix of positive achievements and unresolved challenges. For instance, for some Arctic communities, co-management agreements are well developed for individual species (see Case study 3) but not the ecosystem. Thus, the Eskimo Walrus Commission and the US Fish and Wildlife Service co-manage walrus harvests through ordinances of Indigenous communities, but other US government branches exclude Indigenous input when planning

trawl surveys that can impact walrus prey. Solving these challenges requires greater systems approaches and holism in how different government agencies engage in knowledge co-production.

How might knowledge plurality and co-production lead to more sustainable and equitable ocean plans?

Resource managers have applied Western science to ecosystem-based fisheries management, which is compatible with many aspects of IKS, and to maximum sustainable yield (MSY) frameworks for fisheries exploitation, which are incompatible with IKS (Frid et al. 2023). MSY — whereby the ocean is viewed primarily as a resource to be exploited sustainably for economic gain — has dominated the history of scientifically managed fisheries (e.g., Silver et al. 2022) and remains the dominant management paradigm today (e.g., Szuwalski et al. 2023). In contrast, IKS generally apply the principle of "take only what you need and leave lots for the ecosystem" (Frid et al. 2023; Reid et al. 2022), demonstrating an ethic in which humans are responsible for supporting species interconnections. Further, "recovery" for diminished species requires much higher abundances from the perspective of IKS than from the perspective of MSY or other scientific criteria (e.g., minimum viable population). The reasons include not only a stronger sense of responsibility towards whole ecosystems but also because greater species abundances support critical socio-cultural functions, such as intergenerational knowledge transfer of harvesting and processing practices via youth education programmes, sharing and trade networks and ceremonial feasts (e.g., Lamb et al. 2023; Reid et al. 2022). Thus, knowledge plurality provides an opportunity to replace MSY approaches for single-species management with more holistic ocean plans that aim to support socio-ecological resilience (Frid et al. 2023).

For example, a recovery plan for Pacific herring in Haida Gwaii, on the west coast of Canada, was co-produced by the Haida Nation and two federal government agencies. Haida governance and knowledge, paired with fisheries science, were inherent to the plan from the outset (see Case study 4). The plan, therefore, exemplifies a Two-Eyed Seeing approach for determining management options that might lead to the recovery of Pacific herring abundances that are consistent with Haida values and practices (CHN et al. 2023). Case studies 2 and 3 provide more examples of how knowledge plurality and co-production have been applied to ocean plans, where the case from the Arctic (Case study 3) specifically shows how the use of "consistent, continuous and culturally appropriate methods" have been integral in ensuring the knowledge co-production process has been aligned with Indigenous Peoples engagement ethics and value systems.

CASE STUDY 3. **The Study of Environmental Arctic Change**

Over the past 50 years, marine resources in the Arctic have increasingly been co-managed by government agencies and Indigenous organisations. However, rapid environmental changes in the Arctic Ocean challenge Indigenous livelihoods and well-being, necessitating co-produced socio-ecological understanding. Scientists, resource managers and Indigenous Peoples are still developing this knowledge co-production, but they can learn from existing co-management regimes.[a] Effective responses to climate change require the best available knowledge of a complex system and must draw on Indigenous Knowledge Systems as well as diverse disciplines of science. This blend of multiple types of knowledge should become standard practice despite challenges like miscommunication, power imbalances and cultural differences.[b]

A growing interest in co-producing socio-ecological knowledge derives support from shared values of sustaining resources for future generations. The 1987 World Commission on Environment and Development report, also known as the Brundtland Report, refers to sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs."[c] Similarly, the Yupik of St. Lawrence Island refer to *Yayasigpenasi* in describing the importance of harvesting only what is needed. Practices for co-producing understanding are evolving across many fields and projects.[d] Despite the slow pace, which can frustrate practitioners and funders, thoughtful conversations are essential to ensure that co-producers know when they actually are saying the same thing, and it is inherent in trying to communicate and work across cultural boundaries.[e]

CASE STUDY 3. **The Study of Environmental Arctic Change (cont.)**

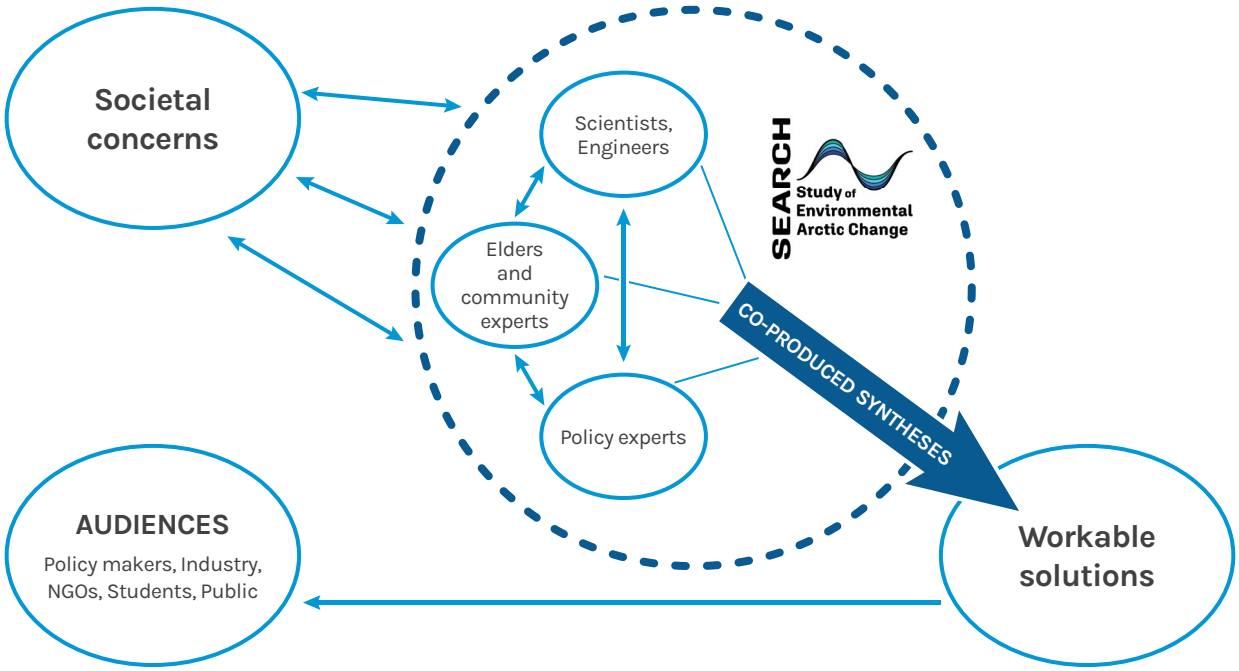
Marine protected areas are important for the conservation of species and ecosystems.[f] The Tallurutiup Imanga National Marine Conservation Area in Canada exemplifies how productive iterative conversations can advance marine conservation while ensuring social and economic benefits to Arctic communities. Including Indigenous Knowledge Systems significantly expanded the size of the protected area to 427,000 square kilometres, ensured Inuit stewardship and created local development opportunities.[g] The Inuit and government creators of the protected area emphasised the necessity of careful listening throughout many negotiation sessions.[h]

"Consistent, continuous and culturally appropriate methods" of communication also are called out in the Inuit Circumpolar Council (ICC) protocols for equitable and ethical engagement.[i] Another of their protocols calls for "building meaningful partnerships" requiring a paradigm shift "to create, maintain and hold equitable and ethical intellectual and political space for Inuit" knowledge. The Study of Environmental Arctic Change (SEARCH) comprises equal numbers Indigenous knowledge holders, scientists and policymakers attempting to apply the ICC protocols to co-produce understanding of the drivers and human consequences of environmental change in the Arctic. SEARCH's focus is to apply the diverse knowledge of co-production teams

to co-develop solutions for real-world challenges in Arctic communities (Figure CS3-1). For example, SEARCH has synthesised Indigenous and scientific understanding to both assess and develop possible solutions for the challenges Indigenous hunters face accessing walruses in the rapidly changing marine environment.[j]

The co-creation of the Tallurutiup Imanga National Marine Conservation Area and SEARCH's application of ICC protocols to co-producing new understanding of the changing Arctic Ocean ecosystem are encouraging, but much work remains to be done.

FIGURE CS3-1. **SEARCH's process for addressing societal and community concerns through iterative consultations with and between local experts, scientists and policymakers**



Note: NGO = non-governmental organisation. The consultations are synthesised into co-produced, practical solutions that are shared in formats specific to each intended audience.

Source: Study of Environmental Arctic Change.

Authors: Athena E. Copenhaver, Brendan P. Kelly, and Vera K. Metcalf

Sources: a. Kelly and Fisher 2021; b. Pennington et al. 2016; c. United Nations 1987; d. Akeeagok et al. 2019; Reid et al. 2021; SEARCH and Justin 2022; e. SEARCH and Justin 2022; f. PAME 2021; g. Akeeagok et al. 2019 ; h. Fisher et al. 2020; i. ICC 2022; j. Apassingok et al. 2024

Policy opportunities

The inclusion of IKS is critical to the transformation of international policy frameworks for ocean governance processes, such as fisheries management and marine conservation. To do so, it is important to advance ocean planning where Indigenous Peoples and/or traditional communities are co-governance partners on an equal basis as other levels of government. In Latin America and the Caribbean, co-governance is often realised as community-based management whereby local and Indigenous communities identify strategies for management themselves that result in the development of best practices for governance (Delgado-Serrano et al. 2017) This is exemplified in Argentina, Colombia, Guyana, and Mexico, whereby Indigenous and Afro-Latino communities were provided with analysis tools to assess the main threats to their environments, which resulted in a shared understanding of the trade-offs between conservation and development (Delgado-Serrano et al. 2017).

In the context of fisheries management in Canada, for example, the government could include biological reference points (benchmarks that gauge whether management goals are being met) and harvest control rules (prescribed management responses to changes in species abundances or fishery mortality). This would allow the government to refocus its current emphasis on MSY to one that prioritises socio-ecological resilience via reduced exploitation rates, as determined by collaborative fisheries management processes in which government and Indigenous Peoples are co-governance partners (Frid et al. 2023).

Several lines of evidence support both the increasing acceptance and feasibility of this transformative change. First, there is a growing willingness by countries wrought from colonial violence to grapple with their histories and seek to reconcile past wrongs (e.g., Wong et al. 2020). There also is growing recognition by scientists and managers of the importance of pairing Indigenous and non-Indigenous ways of knowing to generate new knowledge (e.g., Reid et al. 2021). Consequently, although ocean plans that recognise Indigenous authority and the value of Two-Eyed Seeing are currently the exception (e.g., CHN et al. 2023) (Case studies 2 and 3), they are increasing. Additionally, several emerging priorities for ocean governance processes, as well as precedents in fisheries science, overlap conceptually with *some* aspects of IKS, which may facilitate the transition to Two-Eyed Seeing approaches (Frid et al. 2023). These priorities and precedents include the following:

- A framework of ecosystem-based fisheries management that considers food webs and other biophysical and human interactions within ecosystems (Berkes 2012; Pikitch et al. 2004).
- An increasing emphasis on social-ecological systems approaches to ocean and coastal management, such as marine spatial planning (Rivers et al. 2023), which recognises how humans and nature are inextricably linked and interconnected, similar to traditional ecological knowledge in the Pacific, for example (Himes-Cornell et al. 2022; Mulalap et al. 2020).
- A growing recognition that MSY objectives are untenable under climate change (e.g., Szuwalski et al. 2023).
- The notion of *pretty good yield* (Hilborn 2010), in which exploitation rates at 80 percent of MSY allow fishers to maintain most fish stocks at 50 percent of their unfished abundance while incurring only a minor loss of long-term yield. Although this abundance may be insufficiently high to be compatible with many aspects of IKS (Frid et al. 2023), it is higher than what is typically targeted in fisheries management and thus serves as an entry point for discussions with Western fisheries managers.
- An increasing focus on recognising and safeguarding socio-cultural dimensions of SOPS (Gee et al. 2017).
- Social harvest control rules, which explicitly include social equity goals in fisheries management (Barclay et al. 2023).
- The recognition that MPAs and aspatial aspects of fisheries management are interlinked, and that their integrated application is key to promoting socio-ecological resilience (reviewed in Frid et al. [2023]).

- A growing understanding that smaller spatial scales of management are required to support the resilience of local ecosystems and place-based cultures (Okamoto et al. 2020).
- Two-Eyed Seeing approaches for SOPs — if desired by participating communities — can strengthen IKS-compatible economic frameworks that
  - Value future generations by applying intergenerational discounting to analyses of economic trade-offs (Sumaila 2021);
  - Account for the economic benefits of ecosystem processes that accrue from lower exploitation rates, such as carbon sequestration (e.g., Falciani et al. 2022); and
  - Offset lower harvesting rates by increasing product value and job opportunities through practices that invest in greater product quality and the production of more secondary products (reviewed in Frid et al. [2023]).

To elevate these precedents and priorities, and develop these economic approaches, IKS must be included from the outset through meaningful collaboration with Indigenous Peoples and traditional knowledge holders. Otherwise, there is a risk of entrenching notions of human exceptionalism and diluting the IKS principle of reciprocity between people and ecosystems (Muradian and Gómez-Baggethun 2021).

A shift to Two-Eyed Seeing approaches, where appropriate, also presents the opportunity to improve broader governance structures. Western approaches to the governance of ecosystems often create silos between institutions and disconnects between conservation laws, leading to reductionist decisions that exacerbate many environmental and inequity problems. As the long history of socio-ecological resilience by many Indigenous cultures suggests, a shift to more holistic governance that removes institutional silos would help mitigate human impacts on the biosphere (e.g., Reed et al. 2024). For example, in Pacific Canada's Hereditary Chief governance system, specific individuals steward specific areas under their chieftainship and are responsible for both marine and terrestrial systems and their interface; these practices continue today, with Hereditary Chiefs working with each other and elected council members to holistically manage their entire territory (Ban et al. 2019). Prior to colonial disruptions, Chiefs managed shorelines as integrated systems in which the tending and sustainable harvest of intertidal shellfish, estuarine plants, forest berries, and anadromous fish were unified objectives, enabling large human populations to thrive for centuries (Mathews and Turner 2017).

Approaches to knowledge co-production to inform ocean policy

Recent research has emphasised the importance of local, traditional and Indigenous Peoples' active involvement in the planning process for addressing past injustices, promoting a sense of ownership, and gaining knowledge of local socio-ecological systems in the context of a changing environment. This participation has proven to be crucial for developing socially acceptable policies and addressing democratic shortcomings in natural resource management, particularly in coastal and ocean governance (Chilisa et al. 2016; Loch and Riechers 2021). As such, place-based participation and co-production have become central to sustainable development planning because they involve local stakeholders in decision-making processes, with the aim of ensuring that their voices, knowledge and priorities are meaningfully considered (Quinn and de Vrieze 2019), including Indigenous Peoples and traditional communities as rights holders. This is further emphasised in the *Guidance on Dialogue between IOC Programmes and Indigenous and Local Knowledge (ILK)*, which emphasises the conceptualisation of knowledge as a process rather than as products (IOC 2023).

As earlier sections of this Blue Paper have illustrated, knowledge co-production approaches have increasingly been recognised across marine spaces as an important way of promoting the inclusion of ITK systems and collaborative decision-making processes (Mills et al. 2023; Muhl et al. 2023). When conducted effectively, collaborative knowledge production can result in policy and practical outcomes that more accurately reflect the diverse values, perspectives and worldviews of ITK holders. These outcomes are also more likely to be viewed as valid and trustworthy by the local population (Balvanera et al. 2020). However, this is difficult to achieve because uncertainties still persist (Strand et al. 2022b).

The purpose of this section is to examine the methods for incorporating marginalised voices, including those of ITK holders, into place-based plans that shape ocean policies and strategies. The section will delve into thematic areas, such as the governance of co-production mechanisms, contemporary coastal and ocean governance approaches in research projects and the limitations and opportunities for policy development. Additionally, this section will address important debates surrounding ethical practices in the co-production of knowledge.

Co-production in ocean governance: Rights-based approaches and community-led mechanisms

Indigenous and traditional communities face challenges in their governance over marine areas because meaningful participation in natural resource and ocean management largely depends on whether the nation-state formally recognises their rights and establishes the necessary legislation and policies to facilitate their involvement. Without institutional recognition and enabling mechanisms from the nation-state, Indigenous and traditional sovereignty and self-governance over marine spaces is extremely complicated, if not impossible.

Although certain approaches allow Indigenous Peoples and traditional communities to contribute to or influence resource and ocean planning led by the state, such as the state leading the planning and engaging Indigenous Peoples and traditional communities in the process, there are no guarantees that their priorities will be fully accommodated, especially where they conflict with state interests.

Ultimately, the extent of Indigenous and traditional governance depends heavily on the recognition, rights, and institutional avenues provided through nation-state or decentralised legislation. Mechanisms that enable Indigenous Peoples and traditional communities to lead planning and management remain limited without this critical foundation of institutionalised rights and recognition from nation-states.

Another approach is co-design, which allows for ITK holder involvement at the beginning stages of the place-based planning. This requires initial relationship building and the presentation of priorities alongside limitations (such as laws, regulations and policies). In these cases, although the state maintains control of the process, ITK holders have a greater chance of having their priorities and approaches recognised — contingent on the quality of the state relationship and support provided to ITK holders.

A further example — and aspiration for many ITK holders — is an Indigenous-led approach where they are empowered to determine the scope, process and partners. This would inherently include the values that inform and enable IKS. However, this approach remains challenging to realise. Few states fully empower Indigenous Peoples, but some examples exist (see Case study 4) where Indigenous governance is advancing towards greater control of the planning and delivery process. In the context of the Andean region, Bolivia, Colombia, Ecuador and Peru "recognise and value the rights and the authority of the native, Afro-American, and local communities to decide about their knowledge, innovations, and traditional practices associated with genetic resources and their by-products" through the public policy that protects traditional knowledge in the context of Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization in the Andean region via Decision 391 of July 1996 (Common Regime on Access to Genetic Resources from Organization of American States, Article 7) (Lee and Deubel 2023). This is an example of policies that can support the very first steps of co-production.

What mechanisms do current ocean planning processes employ to engage Indigenous Peoples?

To achieve knowledge co-production, Chilisa et al. (2016) assert that researchers must build relationships and engage in meaningful dialogue with Indigenous Peoples and local communities. These actions show that researchers value the perspectives, knowledge and experiences of the communities involved. More recently, sustainability research highlights the use of transdisciplinary approaches to collaborate with ITK holders and bridge the gap between different knowledge systems — traditional, Western, and Indigenous knowledge. These approaches support structural transformations for a sustainable future through the processes of reflection, sharing and learning (Reed et al. 2023; Strand et al. 2022a).

Often described as an elusive approach (Strand 2023), the transition from a weak to a strong transdisciplinarity, as shown in Figure 7, can be challenging when moving from well-established theoretical foundations to practical implementations.

Moreover, the first step for promoting effective inclusivity and ensuring meaningful participation of ITK holders is recognising the significance of **incorporating traditional knowledge** (Radovich 2023). For example, in a marine conservation project in Australia, Indigenous elders have been actively involved in sharing their traditional knowledge about marine ecosystems, including the behaviour of key species and the seasonal patterns of marine life (Muhl et al. 2023). This traditional knowledge was integrated into the development of a management plan for the MPA (see Case study 5).

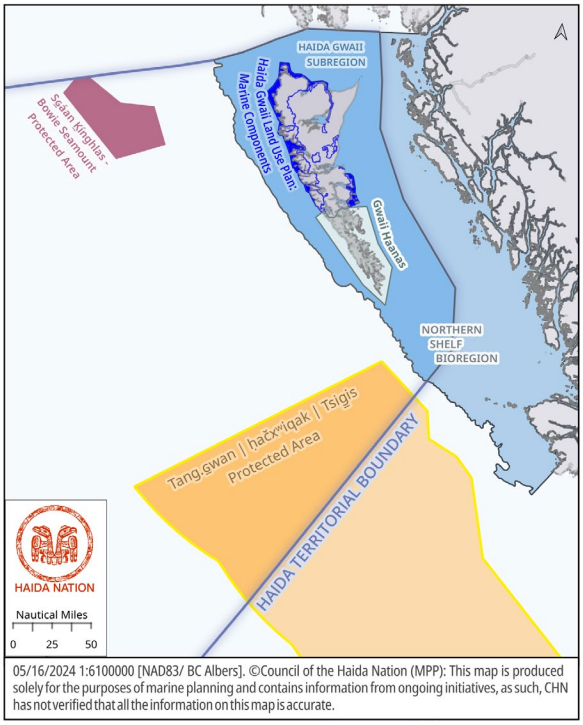
The second step involves the need for **public notification, consultation and informed prior consent.** The literature often highlights this step as being essential for ensuring the involvement of Indigenous Peoples (Ignace et al. 2023). This refers to the requirement of free, prior and informed consent that ensures the rights of Indigenous Peoples are respected when accessing traditional and local knowledge and that they are actively involved in decision-making processes.

CASE STUDY 4. **Haida Gwaii ocean plans and co-governance of ocean spaces**

The Haida Nation has co-produced a variety of comprehensive place-based plans for the land and waters surrounding Haida Gwaii through interim government-to-government agreements in advance of treaties. Haida Gwaii, which means "Islands of the People," is situated on the west coast of Canada (Figure CS4-1). The Haida Nation has its own constitution that establishes an elected governing council with a mandate for natural resource management. Place-based plans now cover much of Haida territory and have followed a fairly consistent process with Canadian partner agencies.

Plans for protection of Gwaii Haanas, "Islands of Beauty," unfolded over about 40 years. In 1985, conflicts over clear-cut logging led to the Haida Nation blockading logging operations, declaring the land and a marine area in southern Haida Gwaii as a Haida heritage site. Watchmen camps were established to manage access to ancient Haida village sites. In 1988, Canada designated the land area as a national park reserve after the province of British Columbia relinquished its interest. Negotiations led to agreements and establishment of the consensus-based Archipelago Management Board in 1993 and an expanded mandate to include fisheries in 2009. A 1998 terrestrial management plan prioritised Haida traditional use, and a backcountry management plan set an annual limit on visitor days. In 2009, Canada co-designated the marine portion of Gwaii Haanas as a national marine conservation area reserve, with an interim plan designating 3 percent of the marine area for strict protection. The 2018 integrated Gwaii Haanas Gina 'Waadluxan KilGuhlGa Land-Sea-People Management Plan now zones 40 percent of the marine area for strict protection, managing the rest for ecologically sustainable use.

FIGURE CS4-1. **Map of Haida Nation protected areas and territorial boundary**



Source: Council of the Haida Nation.

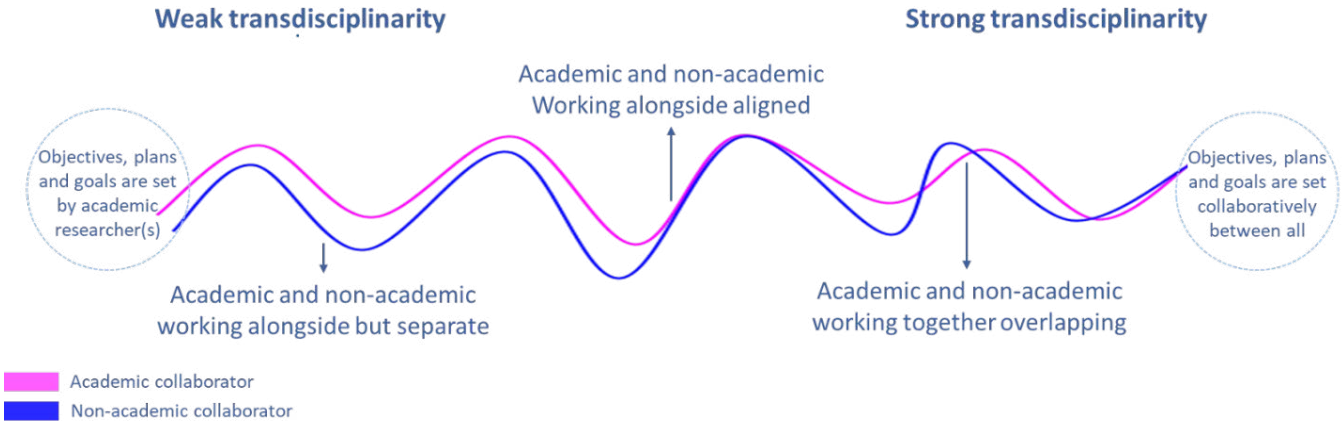
Other co-produced ocean plans for Haida Gwaii include a 2008 land use plan that has a marine component, the 2015 Haida Gwaii Marine Plan, and a marine protected area network that is being established according to a 2023 network action plan. The land use plan and Haida Gwaii Marine Plan were co-developed by the Haida Nation and the province of British Columbia. The marine plan was part of a broader partnership effort with other First Nations to develop marine spatial plans for the Northern Shelf Bioregion in northern British Columbia and focused on candidates for marine protection.[a] Haida ethics and the Haida Marine Traditional Knowledge Study informed these plans,[b] identifying about 22 percent of the marine space for protection. Several large co-managed protected areas lie in the offshore portion of Haida territory. Significant protected areas include SGaan Kinghlas–Bowie Seamount and Tang.gwan-ḥačx̌ʷiqak-Tsigis Marine Protected Area, established with consensus-based management boards in 2009 and 2024, respectively.

Consensus-based decision-making has been a foundation of Haida Gwaii negotiated agreements and management plans and may be one measure for achieving free, prior and informed consent under the United Nations Declaration of the Rights of Indigenous Peoples. A Haida title case that began in 2002 and is nearing trial has been a driver for negotiations about land and ocean management in Haida Gwaii. A forestry decision in 2003 held that the Haida had a strong prima facie case for Indigenous title. In 2024, the province of British Columbia formally recognised Haida title throughout Haida Gwaii by means of an agreement with the Haida Nation and supporting legislation that shift provincial Crown lands to Haida aboriginal title lands. Jurisdiction over federal Crown lands such as Gwaii Haanas and ocean spaces has yet to be resolved. In Canada more generally, federal reconciliation policies that have been in place since 2018 are likely to result in more agreements and place-based plans between First Nations and Canada.[c]

Author: Russ Jones

Sources: a. Diggon et al. 2021; b. Jones et al. 2009; c. Jones et al. 2024.

FIGURE 7. **The continuum of weak-to-strong transdisciplinarity**



Source: Strand 2023.

The third step focuses on the practice of co-production in ocean planning which highlights **community-based participatory approaches** as central for engaging in a collaborative process to develop culturally appropriate solutions that are responsive to local needs and priorities (Maclean and Bana Yarralji Bubu Inc 2015; van Maurik Matuk et al. 2023). This typically includes methods such as participatory mapping, where local communities, resource users and experts collaborate to create maps that represent spatial information such as marine habitats, human activities and conservation areas (Zuercher et al. 2022). An example of this is found in a knowledge integration project in Algoa Bay, South Africa, where a collaborative mapping exercise was conducted with Indigenous knowledge holders and local communities to document traditional ecological knowledge about marine resources, habitats and uses (Rivers et al. 2023). A significant part of this method entails capturing and representing ontologies in relation to place, including how local people map their coastal spaces, identifying important sites and documenting resource management practices.

Next, more recently the use of **arts-based methods** such as music, photography, poems, craft, storytelling and drawings have been used as an effective way of communicating experiences, ideas, knowledge and beliefs in ocean sustainability in the Global South (Galafassi et al. 2018; Strand 2023). An example is *Lalela uLwandle*, a research-based performance theatre project that makes visible stories of living with the ocean. Based on stories collected from South African coastal fishing communities, this play and animation explores themes of intergenerational environmental injustices, tangible and intangible ocean heritage, marine science and the myriad threats to ocean health. It is an invitation to a participatory public conversation on ocean governance which has been shown at international events (One Ocean Hub 2023), and the methods were found to be useful in illuminating cultural connections to the ocean, conveying memories and histories related to the coastlines and envisioning more inclusive and participatory ocean management.

Lastly, **scenario planning** is adopted as a means of developing and exploring alternative future scenarios based on different assumptions and uncertainties in ocean planning co-production. Here, stakeholders work together to create and analyse scenarios that consider various social, economic and environmental factors, helping decision-makers anticipate and plan for future changes in the marine environment (Zuercher et al. 2022). Teh et al. (2017) provide a Canadian case study illustrating how scenario planning is used as a means of bringing together diverse stakeholders, experts and researchers to collectively develop scenarios that integrate social, cultural and environmental knowledge about Canadian oceans and coasts to create scenarios for possible futures.

CASE STUDY 5. Establishing inclusive consultation processes with First Nations people in the development of Australia's Sustainable Ocean Plan

First Nations people have sustainably cared for sea country in Australia for more than 65,000 years. The ocean holds deep cultural and spiritual significance for saltwater people, who have balanced their economic aspirations with respectful stewardship of the marine environment for countless generations. Recognising this enduring connection and the traditional knowledge held by communities across the country, the Australian government is committed to empowering First Nations people to help shape the development and implementation of Australia's Sustainable Ocean Plan (SOP). As an initial step, and on the guidance of the Environment Minister's Indigenous Advisory Committee, the government established a dedicated national sea country First Nations reference group. The group provides strategic advice on culturally appropriate and respectful engagement with First Nations people, and it ensures First Nations perspectives and aspirations from around Australia are central in the development of the plan. The reference group consists of highly respected Aboriginal and Torres Strait Islander people with years of lived and professional experience, skills, deep knowledge and understanding of sea country matters.

Before commencing national discussions on the development of Australia's SOP, the Australian government undertook a desktop review to identify and analyse existing First Nations strategies, priorities and advice on sea country management and ocean policy. The themes generated from this desktop review, along with advice from the reference group, informed an engagement plan that included in-person community events, online workshops, invitations to join cross-sector discussions and meetings with key organisations as part of a broader and ongoing pathway for gathering input.

FIGURE CS5-1. **Member and staff meeting**

Dhimurru board members and staff meet with Department of Climate Change, Energy, the Environment and Water staff in Nhulunbuy to discuss the development of Australia's SOP, January 2024

With the support of independent First Nations facilitators, the Australian government held a series of inclusive, strengths-based and culturally responsive engagement activities with First Nations communities. Using a flexible approach, participants could shape the agenda, discussion topics and format of each activity, which ranged from structured workshops to yarning circle engagements. The Australian government also delivered joint consultations and attended other First Nations forums to complement dedicated ocean-planning engagement activities. This approach aimed to respect the time given by participants and reduce consultation fatigue as well as encourage knowledge-sharing and collaboration. Throughout the consultation process, the team prioritised cultural safety and management of Indigenous cultural and intellectual property.

First Nations voices are central to developing an effective and equitable national approach to ocean management and will be critical to delivering actions included in Australia's SOP. Establishing a longer-term pathway for genuine First Nations representation in national ocean policy reforms and programmes will be essential to ensuring future generations of Australians continue to enjoy healthy, thriving ecosystems that support culture, communities and livelihoods.

"As Convenor of the First Nations Sustainable Ocean Reference Group, I am privileged to work alongside a dedicated group of Aboriginal and Torres Strait Islander reference group members and the committed staff of the Department of Climate Change, Energy, the Environment, and Water. Together, we have created a safe space to respectfully bring together traditional Indigenous knowledge with modern environmental practices to safeguard and support our oceans for the prosperity of all future generations of Australians."

- Stan Lui, convenor of the First Nations Sustainable Ocean Reference Group

Challenges and limitations of knowledge co-production in ocean governance

ITK systems are often deeply rooted in specific landscapes and environments, which means that incorporating this place-based knowledge in planning provides valuable insights for management approaches that are tailored to the unique characteristics of local ecosystems (Loch and Reichers 2021). However, knowledge co-production faces several challenges and limitations that need to be considered.

One limitation arises from potential power imbalances between Indigenous and traditional communities, academic researchers and policymakers. These imbalances can be tied to several dimensions, such as socioeconomic status, race and gender, and we see this play out in various geographical contexts. In Latin American countries, for example, the formation of public policies does not consider racial and ethnic diversity, while research in the region functions as a database for models and theories that are often developed in the Global North (Lee and Deubel 2023). These power imbalances can impact equitable knowledge-sharing and the use of IKS (Vierros et al. 2020). Additionally, resource constraints are frequently cited as a key challenge to knowledge co-production in ocean governance. Projects often do not allocate adequate funding, time, resources and capacity to support the full participation of Indigenous communities in knowledge-sharing processes and decision-making. Mills et al. (2023) recommend aligning co-production efforts with longer time horizons, such as the United Nations Decade of Ocean Science for Sustainable Development. This alignment can support the iterative science-to-action processes required for effective knowledge co-production.

It is also important to consider the aspect of time in co-production and ocean management. Time is conceptualised and valued differently in various societies and knowledge systems, and this should be carefully reflected in the co-production process. Beyond the fact that it takes time to build meaningful relationships for equitable co-production of SOPs, the ways in which time may be seen as circular instead of linear, or how time may be seen as transactional instead of relational, are aspects that needs to be discussed throughout the collaboration between knowledge holders and policymakers. Additionally, there are often differing time sequencing between steps in delivery of a project, as well as different dynamics when dealing with communities and the natural environment as opposed to an institution. The continued push to “hurrying up” blue economy policies and investments is sometimes in direct conflict with the time it takes to develop and maintain meaningful relationships with Indigenous Peoples and traditional communities as partners in co-producing SOPs (Erwin et al. 2022). Kelly and Fisher (2021) emphasise that public engagement in ocean planning is time-consuming and resource intensive, especially when managing diverse stakeholder groups with varying interests, which complicates effective communication on complex issues. This includes considering appropriate forms of recognition and compensation for people’s time

and knowledge contributions, particularly for those not fully employed in ocean management or research. Compensation should not be viewed solely through a Western lens of monetary value but should also acknowledge the intrinsic worth of traditional knowledge and expertise. The process should avoid complicating community power dynamics or creating unethical scenarios where governments pay for tokenistic participation.

Meaningful community participation requires significant time investments, often spanning years, to build trust and genuine partnerships (Partelow et al. 2023). Navigating potential tensions between different community visions and priorities require careful consideration of scale, capacity, intercultural interpretation and processes for co-governance. Current approaches to the integration of Indigenous and local knowledge systems into policy and planning frameworks remains uneven, and dominant Western scientific knowledge systems frequently take precedence (Zurba et al. 2022). Overcoming these barriers requires a genuine political commitment, a willingness for power-sharing through inclusive governance models, and the recognition of diverse knowledge systems as equally valid and valuable.

How to avoid knowledge extraction, devaluation and depreciation through meaningful representation

Ensuring meaningful Indigenous and traditional representation in decision-making requires engaging communities early and maintaining the integrity of their knowledge systems throughout the process. This entails procuring Indigenous and traditional representation at every stage to avoid knowledge extraction or devaluation.

Recognising the diverse backgrounds, traditions and environmental connections of Indigenous and traditional communities is essential to comprehend and analyse knowledge within the community context. This requires acknowledging the knowledge systems employed across different circumstances.

Knowledge extraction occurs when the information obtained for research and/or products does not directly benefit the communities involved. To prevent this, it is essential to move beyond conventional project socialization, which is typically conducted at the end of research projects, and to develop a community-based product portfolio that provides direct benefits. Additionally, ITK can be unintentionally devalued when only fragments are considered without the broader holistic context and societal interactions.

Co-producing research and deliverables has emerged as a strategy to meaningfully include IKS. However, co-development requires a true partnership — with transparency, good faith and relationship-building as prerequisites. To achieve the generation and co-development of information and products of real interest and use to the communities, relationship-building must happen first; only then can co-production happen.

Ultimately, co-production should lead to capacity-building and technology transfer, empowering Indigenous and traditional communities to use their own science, generate new approaches and participate in decision-making processes as equal partners with contextualised knowledge (Figure 8).

Establishing a baseline through prior engagement is considered good practice before initiating processes with Indigenous communities. This includes building rapport, understanding the communities and providing the necessary spaces, conditions and budget.

FIGURE 8. **Steps to generating Indigenous science**

Source: Authors.

Intellectual property rights of Indigenous Peoples

Currently, few systems globally, such as South Africa's National Indigenous Knowledge Systems Office, protect the intellectual property rights of Indigenous Peoples. Intellectual property law assigns rights of intellectual property to an individual or institution, which conflicts with Indigenous knowledge being shared communally through customary actions and oral traditions rather than "invented" and claimed by individuals and protected by intellectual property laws. There have been many instances around the world where Indigenous knowledge has been extracted from Indigenous Peoples by researchers without tangible benefits to the knowledge holders or Indigenous communities (Adame 2021; Latulippe and Klenk 2020). This practice is exploitative and unethical because the knowledge may provide financial gain, be misunderstood or misused or even be used against communities in legal cases around land titles or issuance of rights.

Given the principles of co-production and partnership, it is advisable to dedicate time upfront to develop formal and/or customary agreements for the intellectual property rights of the co-created knowledge. Discussions should cover (i) who will have access to the co-created knowledge, (ii) how and where will the information be stored, (iii) who will be involved with interpreting the results, (iv) whether there will be monetary value to the results and (v) how will it be shared. Funding for identified Indigenous project leads is recommended to conduct interviews and interpretation, preventing misinterpretation due to inexperienced researchers not understanding language, customs or other ways for knowledge generation.

Co-production can be challenging because knowledge systems that study the same topic may yield different results. Rather than automatically defaulting to Western knowledge as reliable, the process of synthesising distinct findings must be carefully navigated without dismissing or devaluing Indigenous perspectives.

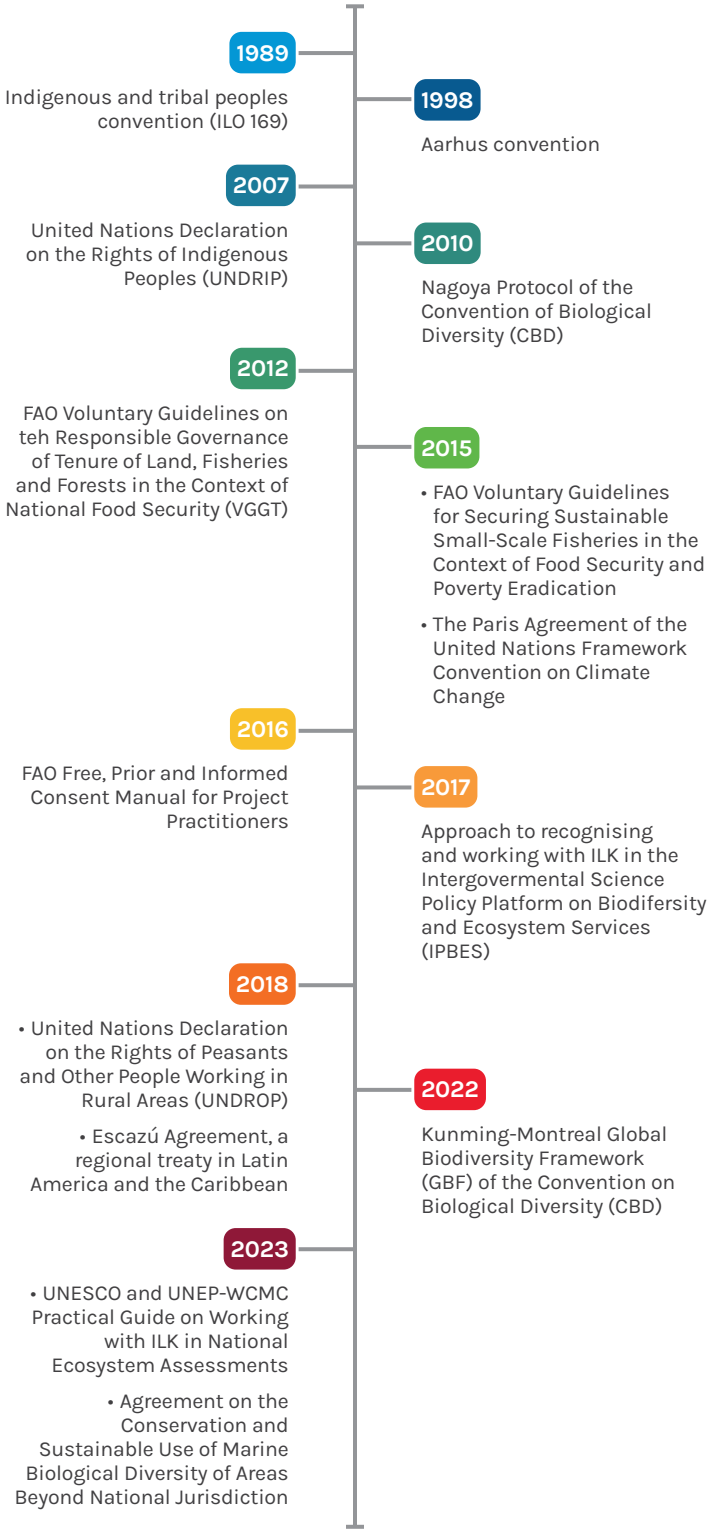
Policy opportunities

Indigenous and traditional communities have varying levels of standing across nation-states. Some are recognised as "nations" with distinct rights, whereas others lack official status and associated rights over lands, waters and resources. Regardless, this section refers to Indigenous Peoples and traditional communities under the articles of the UNDRIP and the UNDROP. To advance place-based, knowledge-based and inclusive co-production of SOPs, we have identified the following strategies and policy opportunities:

- Engaging Indigenous Peoples and traditional communities should be a **deliberate process built on trust and relationship-building**. This involves respecting protocols, ceremonies and research efforts already in progress and dedicating time up front to understand governance, socio-economic conditions and the priorities.
- Processes of co-production should **consider key frameworks** for upholding and respecting the rights of Indigenous Peoples and traditional communities (see Figure 9), such as UNDRIP, UNDROP and the Convention on Biological Diversity (CBD).
- Co-production processes should **embrace knowledge plurality**, which acknowledges and recognises the legitimacy and value of multiple ways of knowing and knowledge forms generated by diverse knowledge systems (i.e., epistemologies, ontologies and axiologies).
- Co-production **implies a partnership** between two or more parties, which means that ITK holders should be involved in project design, funding decisions and result dissemination as well as data collection and knowledge contribution.
- **Financial investment in IKS** and traditional knowledge is needed to enable effective partnerships and support community needs. This includes investment in employment and training, obtaining technical equipment such as a geographic information system (GIS) (see "Equitable co-production: Considering aspects of data, culture, gender and financing" for further details).

- Where possible, researchers, government actors and industry partners should **partner with existing on-going projects** and investigations by Indigenous Peoples and traditional knowledge holders.
- Ensuring **meaningful** Indigenous representation in decision-making requires engaging communities early and maintaining the integrity of their knowledge systems throughout the process. This entails procuring Indigenous representation at every stage to avoid knowledge extraction or devaluation.
- Overcoming barriers such as adequate time and financing for meaningful co-production with ITK holders requires a genuine political commitment and a **willingness for power-sharing** through inclusive governance models.
- There are several approaches to transdisciplinary co-production that have proved valuable and can be considered for SOPs, such as **community-based participatory approaches,** arts-based research and scenario planning.
- Co-production methods and processes need to be **sensitive to context** and cannot pursue a one-size-fits-all approach because ITK is often not transferable to other locations due to its grounding in local ecosystems, landscapes, domestic species and specific understanding of the relationship with nature.
- Given the principles of co-production and partnership, it is advisable to dedicate time up front to develop formal and/or customary **agreements on intellectual property rights** of the co-created knowledge.

FIGURE 9. **Key frameworks for engaging local, traditional and Indigenous communities in marine policies**



Notes: FAO = Food and Agriculture Organization of the United Nations; ILK = Indigenous and local knowledge; UNEP-WCMC = United Nations Environment Programme World Conservation Monitoring Centre; UNESCO = United Nations Educational, Scientific and Cultural Organization.

Source: Updated and adapted from UNESCO-IOC (2024, 2).

Equitable co-production: Considering aspects of data, culture, gender and financing

As stated at the beginning of this Blue Paper, co-producing SOPs with ITK holders is fundamentally an issue of equity and social justice. Social justice assessments often highlight the exclusion and marginalisation of ITK systems in current ocean governance approaches (see Bennett 2018; Lau et al. 2021; Strand 2023). Ocean justice aims to rectify historical injustices, promote equitable access to resources and foster sustainable development. While aspects of equity and justice have become mainstreamed in international debates on land-based environmental issues and climate change, much work remains to integrate these principles in ocean research and governance (see Bennett 2022; Bennett et al. 2021; Crosman et al. 2022; Strand 2023).

Considering historical injustices, it is essential to reflect on the issues of "ocean justice for whom," "ocean justice by whom" and "ocean justice according to whom." It is not merely about access to accurate and comprehensive data for informed decision-making, policy formulation and resource management but also context-specific paradigms, or models of justice (see Bennett 2022; Bennett et al. 2021; Martin et al. 2013; Österblom et al. 2020). In this section we specifically address recognitional, cognitive and restorative justice. For example, leveraging data-driven approaches that emphasise the importance of Indigenous spiritual guidance in ocean management (Strand et al. 2022a) can develop targeted interventions to address systemic disparities (Bennett et al. 2021). However, to advance cognitive justice and achieve an equitable and inclusive ocean justice process, Indigenous perceptions and anticipations of ocean justice must be pursued, unveiled and mainstreamed.

In this section, we also address aspects of cultural barriers, data needs and long-term funding strategies to support meaningful knowledge co-production processes as well as Indigenous-led implementation of SOPs.

Recognitional justice: The equal acknowledgement and respect for people's rights, needs, knowledge, values, cultures, identities and interests, particularly recognising people, populations and communities that have been historically marginalised, discriminated against or excluded from ocean decision-making.

Cognitive justice: The equal treatment and valuation of all types of knowledge and knowledge systems.

Restorative justice: Sometimes referred to as relational justice, refers to correcting, restoring and repairing harmful practices and preventing future harmful impacts; it "seek[s] to replace the values of vengeance and retributions with a more humane and morally defensible stance of restoration, healing, and forgiveness" (Besthorn 2004, 34).

Cultural barriers to planning processes that are primarily technical and resource oriented

Sustainable ocean planning must consider potential cultural barriers that may impact the effectiveness and sustainability of planning processes. A primary concern is that culturally diverse interpretations of international conventions and agreements involving the rights, cultural inclusion and protection of Indigenous Peoples and traditional communities can affect approaches to, conceptualisations of and prioritisation in ocean planning. National governments, influenced by their unique social and political contexts, vary in their responses to ocean care.

For example, both national and local governments — such as in the United States, Antigua and Barbuda, Saint Lucia and Kenya — often prioritise coastal real estate development over the access and use of the coast by historically marginalised groups (Mohammed 2023).

Colonial legacies, now embedded in national governance systems, also impede ocean access and justice. For example, both national and local governments — such as in the United States, Antigua and Barbuda, Saint Lucia and Kenya — often prioritise coastal real estate development over the access and use of the coast by historically marginalised groups (Mohammed 2023). Furthermore, the ways these groups use coastal resources is poorly understood and often ignored. For this reason, decolonial authors have long advocated for perspectivism (Vivieros de Castro 1998) and greater attention to diverse forms of "worlding" in efforts to include Indigenous, traditional and local communities (de Pina-Cabral 2014). The goal is to meaningfully mainstream the perspectives of Indigenous Peoples and traditional and local communities to achieve justice in sustainability science and solutions (Chilisa 2017), including coastal justice.

Even if perspectives of Indigenous Peoples and traditional communities are considered, cultural diversity and dynamics raise two issues: Whose culture and coastal heritage will be prioritised for resourcing and support? And how does one respond to political regimes with cultural biases? In many countries in Africa, ethnicity significantly influences political culture, and majority political groupings are often those containing the dominant ethnic group. This often leads to increased risk of cultural marginalisation and oppression by nationalist governments (see Trouillot 2003). Vertovec (2022) highlights "superdiversity" in global societies, where digital communication amplifies cultural diversity, complicating cultural inclusion and justice efforts. Forced displacement (Okia 2012), language destruction (Shakib 2011) and erosion of social cohesion (Ocheni and Nkwanko 2012) further hinder the participation of Indigenous Peoples and traditional communities in ocean justice and restoration processes and should be addressed when co-producing SOPs with ITK holders.

Ocean planners are not politically or culturally neutral. Advocating for MPAs and environmentally conservative rights can marginalise the rights of Indigenous Peoples and traditional communities and other users of marine resources. Participatory methods (Bergold and Thomas 2012), empathetic inclusion (Nirmal and Rocheleau 2019) and knowledge co-production may advance coastal justice, but they still carry external cultural assumptions about community priorities and sustainable futures and who should be involved to achieve the end goals. For example, many people in Brazil and Sub-Saharan African contexts believe in the existence of an ancestral world (often in bodies of water) and pantheons of gods and spirits that affect everyday life (Bernard 2013). These beliefs and values are anchored in a more fatalistic, communal and holistic perspective of human existence rather than a linear, will-driven process of change.

Policy and legislation diversity — and sometimes fundamental incompatibility — may impede the achievement of coastal justice. The CBD, UNDRIP, the World Heritage Convention (1972), the Convention for the Safeguarding of the Intangible Cultural Heritage (2003) and, in particular, the Hangzhou Declaration of 2013 reinforce the importance of culture to sustainable development. However, the Africa Agenda 2063, African Continental Free Trade Agreement, North American Free Trade Agreement, Association of Southeast Asian Nations economic community, Southern Common Market (MERCOSUR) and Caribbean Charter for Civil Society focus on the importance of economic development and the facilitation of continental trade. The conflicting priorities between cultural/environmental preservation and economic exploitation create challenges that needs to be addressed early on in the co-production phases. Even with goodwill, policies, legislation and mechanisms must be streamlined

and aligned to meaningfully include Indigenous Peoples and traditional and local communities in ocean justice and restoration.

These are some of the solutions to these challenges:

- Expand ocean justice to encompass broader ocean care philosophies.
- Careful communication processes must reflect the diverse modes of communicating ocean valuation and care. Arts-based participatory approaches (Strand et al. 2022a) and storytelling (Erwin 2021) are innovative approaches to address these aspects, but other modes of communication important to Indigenous Peoples and local communities, such as poetry (Case study 6), music, religious practice and ceremonies and performance, may need to be included.
- Enfield (2000) says that people need to make external plans and practices intelligible to themselves before they can meaningfully respond. Time must be taken to achieve mutual intelligibility in processes hopeful of ocean justice.
- It is important to acknowledge differing degrees of sustainable ocean care and balance growth with degrowth (Nirmal and Rocheleau 2019).
- Recognise the impact of the colonial legacy on global inequality and ocean care pursuits.

Gendered access to ocean planning processes

Core to understanding access to ocean planning processes is recognition of intersectionality as key to realising blue justice for gender diverse populations (Bennett 2022; Gustavsson et al. 2021; O'Neill et al. 2024; Soliman 2022). Co-production stresses collaboration between diverse knowledge holders (Crompton 2018; Galende-Sánchez and Sorman 2021), focusing on inclusive and equitable outcomes. Ensuring equitable participation enhances collective intelligence and decision-making, which is crucial in ocean management. However, the planning process in ocean management seems to be rife with various gendered barriers (Baker-Médard 2017; Johannesen et al. 2022; MacNeil and Ghosh 2017; Mutimukuru-Maravanyika et al. 2017). These barriers hinder the meaningful engagement of women and youth, exacerbating equity issues and limiting the accommodation of diverse perspectives essential for achieving ocean justice.

Baker-Médard (2017) indicates that women's participation in decision-making processes related to marine conservation is significantly low in Madagascar where their studies are situated. Nayan (2022) highlights how patriarchal challenges and gender stereotypes limit women's active participation in coastal governance in Ghana. It is evident that despite the discourse around collaborative ocean planning, women continue to face barriers to access and control over marine and coastal resources. In the words of MacNeil and Ghosh (2017), the maritime industry stands out for its stark gender disparity, with women constituting only 2 percent of its workforce.

Gendered access barriers in the planning process often stem from unequal power dynamics, social norms and cultural practices that disproportionately affect women's participation and representation. Women often struggle to balance their workload and multiple roles — such as caregiving, household chores, and income-generating activities — which limits their availability, time and mobility for external engagements such as policymaking, meetings and training sessions (Giakoumi et al. 2021). As noted by Johannesen et al. (2022, 20), systemic gender biases and stereotypes perpetuate the notion that marine science and conservation are inherently male-dominated and unsuitable for women. These biases influence hiring practices, leadership appointments and resource allocation, further limiting women's opportunities for meaningful engagement in decision-making processes (Adams et al. 2018). Both the SSF and VGGT Guidelines address these issues, with gender as a core pillar of the SSF Guidelines.

A further consideration is that in present times, gender inclusion does not merely involve the consideration of women's access to decision-making. A truly inclusive and just ocean management must consider the diversity of women's situations worldwide (de la Torre-Castro 2019), class distinctions and impacts on women's access to ocean management processes as well as the importance of non-binary distinctions of gender, which, in turn, shape the landscape of inclusion in ocean management processes. For example, there is significant exclusion of 2SLGBTQIA+ (two-spirit,

lesbian, gay, transgender, queer, intersex, asexual, and others, who identify as part of sexual and gender diverse communities who use additional terminologies) perspectives on and engagements in ocean management because the presumption is for a heteronormative ocean management landscape and the specificities of justice, applying to this demographic. The heteronormativity of ocean strategies and management plans presume that 2SLGBTQIA+ communities will naturally be included in ocean management and that this stakeholder group will obtain ocean justice. However, the general exclusion of this demographic from development processes per se (Anderson et al. 2018), suggests that they are likely to be excluded from the more delineated processes of ocean management. In addition to considering heteronormative categories of gender, one must consider the differentiating impacts of race and indigeneity on women's access to ocean management. This includes recognising the unique challenges faced by Indigenous women, Afro-descendant women, migrant women, women with disabilities, and young girls, whose experiences are shaped by multiple, overlapping systems of marginalisation. These intersecting identities can create compounded barriers to participation in ocean management processes, often resulting in their perspectives and needs being overlooked or undervalued in decision-making forums. Intersectionality acknowledges that individuals exist across multiple identities that shape their experiences and access to the ocean and influence the measure of blue justice they receive (Bennett 2022). It is apparent that gender designation and indigeneity may converge to contribute to the multilayer exclusion of Indigenous and racially marginalised women in ocean management.

Gender equality and intergenerational collaboration are not just moral imperatives but also are essential for the long-term viability and competitiveness of gender-diverse populations and ocean livelihoods. Gender and youth inclusion in ocean governance can lead to innovative problem-solving approaches. Recognising and valuing the diverse contributions of women, elders and youth is essential for creating inclusive and effective policies that address the full spectrum of societal needs and promote equitable opportunities for all. Youth integration, in particular, is crucial because it can support the intergenerational transfer of IKS, enhance community resilience, bridge Indigenous and traditional wisdom with Western scientific approaches and empower young voices to contribute effectively to sustainable ocean governance. Part of this work involves recognising the interlinkages between ocean access, cultural heritage and ITK systems (see Case study 6) and prioritising opportunities for children and youth to engage with many types of ocean knowledge and ocean literacy (Strand et al. 2023).

CASE STUDY 6. **Creative storytelling and cultural expression can promote and preserve the traditional knowledge of Indigenous coastal communities in Mozambique**

Storytelling using immersive technology —such as audio podcasts, virtual reality, 360-degree film projections — are being used to capture and share traditional coastal knowledge. By preserving oral traditions like sea chants; rituals; memories; stories; and techniques for dhow sailing, dhow making and fishing, these innovative storytelling and oral approaches help promote and protect cultural heritage while supporting ocean management. "Nakhoda and the Mermaid" is a multimedia sensorial, immersive experience that allows visitors to physically go through part of the initiation cycle for a nakhoda, or a dhow captain. Nakhodas understand and interpret the winds, tides, moon and stars; through their trained senses, they can predict cyclones, identify the quantity and species of fishes at long distance and predict whale behaviour, among others. (Click here for a five-minute virtual reality piece.)

During a period of one year, six young people from coastal fishing communities were trained on how to collect and record oral stories and sea chants from fishing people of the island. The result was an unprecedented, extensive and qualitative database of recorded and transcribed oral testimonies. Participants recounted memories of violence and slavery wars connected to the sea; practiced rituals, rites of passage and spirituality connected to the sea; fishing and dhow sailing traditional techniques; and how changes in the ecosystem and climate are witnessed and perceived by the fishing community. This material was then organised by professors at the local university (UniLúrio) and will be available upon request on a digital platform.

CASE STUDY 6. Creative storytelling and cultural expression can promote and preserve the traditional knowledge of Indigenous coastal communities in Mozambique (cont.)

EXCERPT FROM "A DHOW IS BORN"

"A Dhow Is Born" is a short story of the dhow people told from the perspective of a dhow sailing boat being born.

"Along this long historic Swahili coastline, from Mogadishu in Somalia to the small Island of the pigs, in the south of Mozambique, they recognise me by various names, 'dhow,' 'mashua,' 'ekalauwa ya ntanga,' 'ngalava nha litanga.'

I'm Arab-Swahili and one of my origins is Oman. For centuries I have sewn the geography of the people of this coast, trading products, crossing cultures, crossing people, for whom till today the sea is the natural extension of their lives. I've also been used to take hundreds of thousands of people, kidnapped, raped and sold into slavery both to the East and to the West.

Oral tradition accounts that my ancestors landed and settled these slopes of Cabaceira Pequena and Ilha de Moçambique around the 13th century.

But today I'm going to tell you my story, of how I, Ezipo Zampahari (Sound of the Sea), was carved from scratch by the hands of Master Daúdo, tightly bound by the "khero" coconut fiber strings, spun on the legs of Mrs. Fátima, all this in the backyard of a fishing village, and then I touched and sailed the sea for the first time, with my luffed sail, cooked by the needles in Master Saíde's fingers.

It's 5 o'clock on an August morning, 10 fishermen from Cabaceira Pequena carry with all their effort and dignity a huge wooden 'musinji' trunk and mangrove sticks, 'n'saluma,' which together will make up my backbone.

A few moons have passed, and I can hardly bear the swelling of the body that holds me up.

I'm big, huge, able to hold many lives inside me. It's been days of preparation, of attention to the smallest details, while I've watched my forms transform a little more every day.

Thanks to the wise ancestral knowledge that has traveled along this great coastline, and have passed from hand to hand, from masters and mistresses, who persist and reinvent themselves every day, here in Cabaceira Pequena, through the talent of Daúdo, Fátima and Saíde, I am going to be born!

It's been weeks of waiting and patience and waiting for the big day. At this moment, everything hurts, but I feel that the moment is coming for me to burst into the waters, is near and soon this agony will turn into songs, laughter, laughter, tears, cries of joy and life from everyone present and that the absent will be evoked. I know there will be many stories carried inside me. Some of them are of regret and worry, others of love and reinvention, and all of them necessary for us to stay alive.

Until then, I succumb to the pains imposed by the caves placed by Master Daúdo. Not far away, someone else is taking care of the important little details for the day of my birth: the sailcloth and the khero ropes, for the final ties. In Mrs. Fátima's backyard, wads of yellowish fibers from the shell of the young coconut shell, which had previously been burnt by the sun, beaten, buried at low tide for three months, dug up, shredded and the fibers of which are now wrapped around the leg with the feet and hands. Fiber that curls into fiber that curls into yarn and together they make the rope that holds us together. This ritual that Mrs. Fátima learned from her grandmother, who in turn learned it from her grandmother, has its own rhythm, which must be respected and must not be rushed.

Meanwhile, in the shade of a large baobab tree, Master Saíde has already lined up the 8 meters of rectangles of thick unbleached cloth that came from Tanzania, and now with his faithful needles, he lovingly sews the large sail.

Now, yes, almost everything is in place. They're about to 'birth' me.

The respected Nakhodas (dhow captains) have already announced the day of my birth in the village.

Matjane, the fourteenth day of the moon.

Today I was born! I come from an ancient past, I am present in the lives of those who, every day, take to the sea to fish or to be transported on short and longer journeys. By nature, I am ecological, integrated into the sea that surrounds me and my people.

I am 'dhow,' 'mashua,' 'ekalauwa ya ntanga,' 'ngalava nha litanga' and I won't stop existing in many languages and accents."

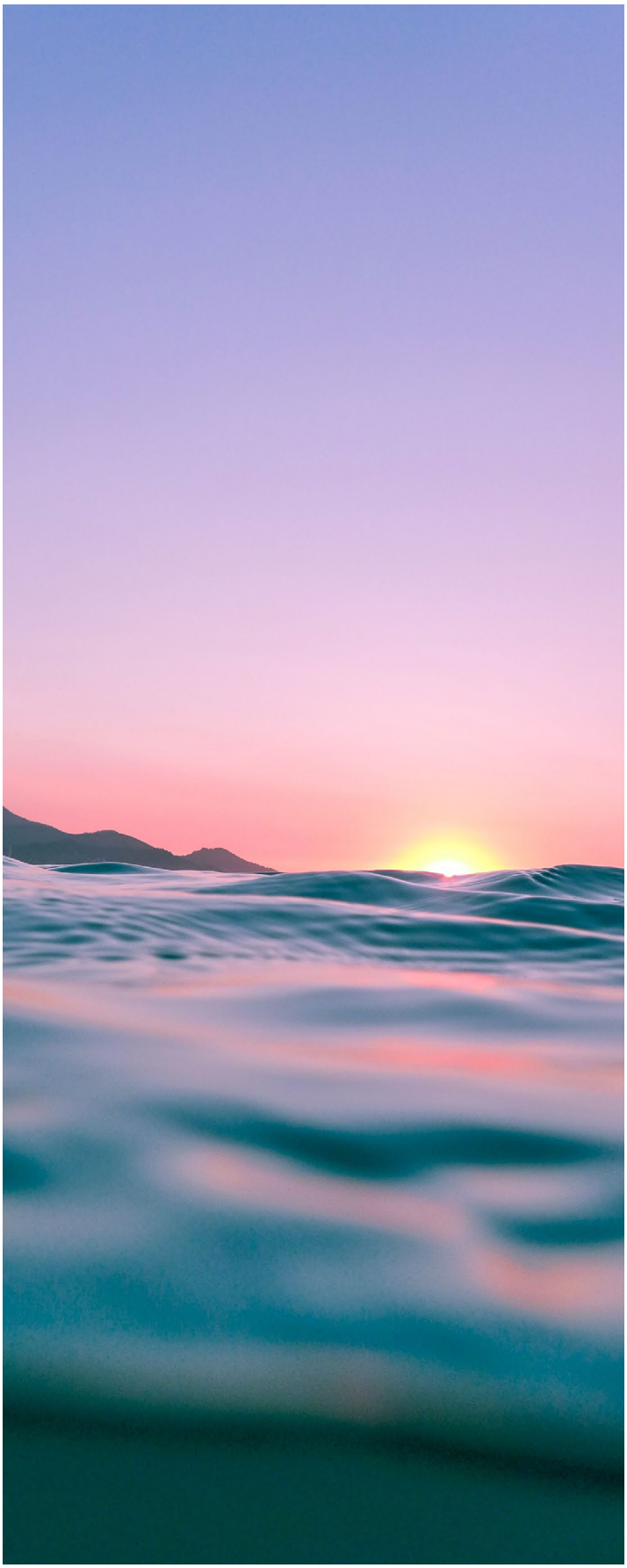
Author: Yara Costa

Data on the rights of Indigenous and traditional communities

Underpinning aspects of cultural barriers and gendered access to ocean planning processes — and central to the pursuit of ocean justice — is the collection, analysis and dissemination of ocean data.

SOPs require comprehensive data that reflects the ocean dependence and rights of Indigenous and traditional communities. These data needs encompass various dimensions, including resource use, traditional ecological knowledge, socio-economic indicators, spatial-use patterns, community engagement and legal frameworks. For instance, the integration of the Indigenous Nations, Communities & Cultures map collection into the Mid-Atlantic Ocean Data Portal is an example of Indigenous data sovereignty, recognising Indigenous Peoples' rights to own, control and manage their data. The data portal incorporates Indigenous-led maps and federal Tribal datasets, highlighting the importance of Indigenous voices in ocean planning and management. An example from Australia is the *Our Knowledge Our Way in Caring for Country* report (Woodward et al. 2020).

To understand the resource use and dependence of Indigenous communities, researchers and policymakers must collect data on fishing activities, marine resource harvesting and other livelihood practices essential for food security and economic well-being. Additionally, integrating traditional ecological knowledge into planning processes requires data on ecological indicators, seasonal patterns and cultural practices, providing valuable insights into ecosystem dynamics and community resilience. A challenge arises from the fact that IKS tend to be information rich but data poor. There is a tendency by researchers for unusual events or variations from the norm to be remembered and passed down, rather than the average of typical occurrences. Focusing on the variations limits the perceived usefulness of IKS as a data source in large-scale modelling; however, IKS can be useful in informing underlying logic and assumptions of the models to guide interpretation and application (Hudson et al. 2020). This is being addressed to some extents as resources are made available to



support the development and monitoring of various cultural (health) indicators (Clay et al. 2020; Nelson and Tipa 2012).

Moreover, data on socio-economic indicators, such as income levels, employment opportunities, education and health are essential for understanding the social dimensions of ocean dependence and rights. Mapping marine spatial-use patterns and customary tenure systems is essential for recognising and protecting community rights to access and manage marine resources, which may require building technical skills and expertise in areas such as GIS mapping and data analysis. Furthermore, ensuring inclusive governance necessitates data on community engagement, stakeholder participation and the effectiveness of communication strategies in planning processes. Understanding the legal and policy frameworks governing ocean use is also crucial for identifying opportunities to enhance community rights and participation, necessitating data on relevant laws, regulations, and international agreements. One of the significant challenges that Indigenous communities face is access to data. Improving the specificity and availability of datasets that relate to their sea country or ocean territories is one important factor in determining the relevance and relationships between different types of knowledge. Approaches to data justice in ocean planning therefore includes considering Indigenous data sovereignty (such as the Mid-Atlantic Ocean Data Portal), shared data monitoring programmes (Case study 7) and adhering to principles such as FAIR (Findability, Accessibility, Interoperability, and Reusability) and CARE (see "The significance of Indigenous and traditional knowledge systems in the ocean").

CASE STUDY 7. **Developing data needs in Whakatōhea, New Zealand**

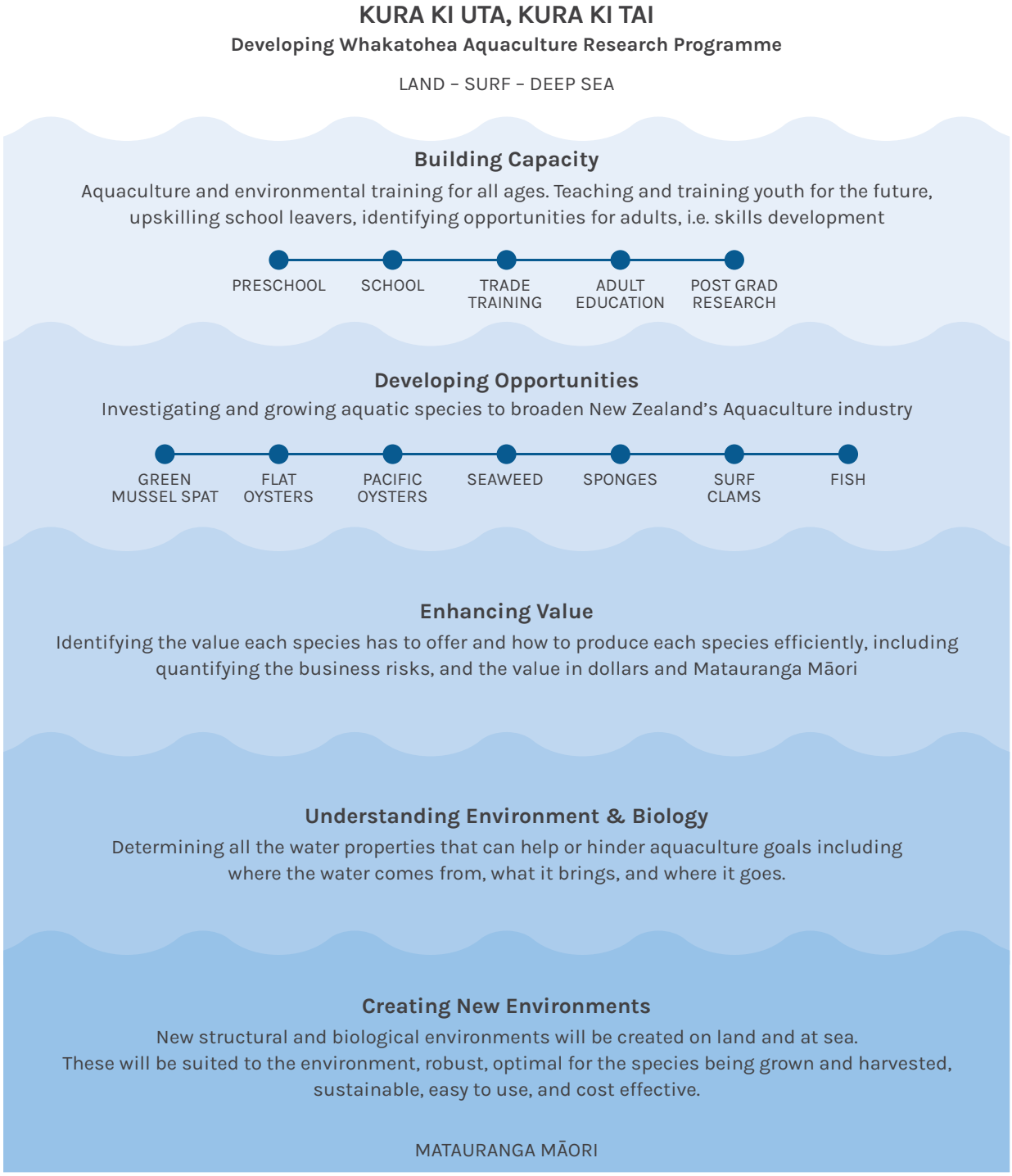
The Whakatōhea Māori Trust Board (www.whakatohea.co.nz) is the legal entity responsible for administering the assets of Whakatōhea, an *Iwi* ("tribe") situated in the eastern Bay of Plenty on New Zealand's North Island. As a coastal people, they have a range of customary rights and responsibilities to exercise *kaitiakitanga* ("stewardship") over the coastal and marine resources in their region. Their interests include customary fisheries, commercial fisheries delivered through fisheries settlements and significant aquaculture farming areas they constructed themselves. The board's aquaculture strategy had three high-level goals: build a harbour entrance, create a successful mussel business and develop a vibrant aquaculture industry (Figure CS7-1). The board recognised the importance of research, access to data and building capacity to meet these aims, and it partnered with the Cawthron Institute to develop an aquaculture research programme.

Cawthron Institute has deployed a coastal monitoring platform (KūtaiCam), with the support of the Whakatōhea Māori Trust Board, to provide information for the development and improvement of open ocean structures as part of a research programme funded by the Ministry of Business, Innovation and Employment, "Enabling Open Ocean Aquaculture." The Whakatōhea Māori Trust Board also partnered in the Moana Project, which is a large multidisciplinary ocean modelling research programme focused on understanding marine heat waves, the connectivity of marine species and cross-cultural knowledge exchange.[a]

Whakatōhea researchers were actively involved in co-designing the Moana Project, leading a research aim (He Papa Moana) as well as key engagement and research activities.[b] This project provided valuable information about ocean circulation, marine heat waves and the movement of mussel spat in the Bay of Plenty. The project also contributed to the development of the Whakatōhea Moana Plan, an indigenous approach to management of the coastal and marine area. The purpose of this plan is to describe how Whakatōhea wishes to *tiaki* ("care") for the *moana* ("ocean") and for their *mokopuna* ("descendants").

The plan acts as a guide, sharing Whakatōhea values, interests, issues and aspirations for the coasts and oceans of the Whakatōhea *rohe* ("marine area") and supporting a collaborative approach to achieving Whakatōhea goals.[c] The use of Indigenous knowledge within the research programme highlights the need to protect Indigenous cultural and intellectual property rights as well as addressing Indigenous data sovereignty issues. These rights were protected in part through inclusive approaches to attribution and authorship and the use of Local Contexts's Traditional Knowledge and Biocultural Labels on the Whakatōhea Moana Plan as well as exploring their use alongside genetic datasets generated from local samples.[d] An integrated approach to research was used which recognised the importance of co-designing with local communities and the building of long-term relationships, explicitly addressing diversity and Indigenous rights and deliberately focusing on benefits to optimise research resources and generate maximum impact from research projects.[e]

FIGURE CS7-1. **Developing the Whakatōhea Aquaculture Research Programme**



Source: Whakatōhea Māori Trust Board and Cawthron Institute.

Author: Maui Hudson
Sources: a. Souza et al. 2023; b, c. Maxwell et al. 2023; d, e. Souza et al. 2023.

Long-term funding strategies to support Indigenous-led SOP implementation

Sustainable ocean planning requires adequate financial resources. Lack of funding can hinder the effectiveness of ocean planning efforts and exacerbate existing inequalities. Limited funding strategies can result in perpetuating ocean inequities where Indigenous Peoples have less agency and leadership in the process. Funding Indigenous-led place-based research is one opportunity to ensure that SOP development has been informed from the perspective of Indigenous communities and advances further equitable co-production of SOPs. An example of such a model is the Ărramăt Project, which specifically funds Indigenous communities and organisations to develop and implement their own research projects. This type of funding is particularly important because many funding and conservation strategies can (at least implicitly) force Indigenous Peoples to enter into colonial market systems which may fundamentally clash with traditional worldviews and local goals (Tran et al. 2020).

Ocean use fees involve levying charges on activities such as fishing, shipping and tourism within marine areas. These fees can generate revenue streams that can be allocated towards financing SOPs and supporting Indigenous-led conservation and management efforts. The most common examples are from tourism operations that take place in Indigenous territories and/or depart from Indigenous "gateway" communities. The benefits of visitor fees to support local livelihoods and management, as well as their best collection structures, have long been well understood (Whitelaw et al. 2014). However, their explicit use to contribute to Indigenous-led management capacity and broader self-determination efforts requires careful consideration. It is critical to assess whether tourism activities align with local cultural values and traditional uses. Additionally, the level of interest tourists may have in Indigenous struggles must also be considered (Mach and Vahradian 2019), and how to ensure that Indigenous Peoples truly benefit given entrenched power dynamics in the tourism sector (Dwijayanthi et al. 2017; Snow and Wheeler 2000).

Other types of user fees and financial instruments include Indigenous Peoples marine tenure over areas or resources, such as territorial use rights for fishing programmes and what is called blue bonds. For example, many Canadian fisheries are managed under quota systems granting individuals an exclusive right to fish a certain amount of a given species. These explicitly capitalist management systems can promote sustainability, but they often lead to quotas being distributed to a few corporate owners rather than among many small or individual fishers (Edwards and Pinkerton 2019). Coupled with programmes to support Indigenous ownership in commercial fisheries, there are indeed opportunities for Indigenous fishers to lease their quota either to Indigenous or non-Indigenous fishers.

Blue bonds, which are financial instruments used to raise capital for marine conservation and sustainable development projects, are deeply embedded in international markets and post-colonial globalisation (Kılıç 2024). In the context of Indigenous Peoples' ongoing struggles for self-determination, caution is needed when using such bonds. While governments must still pay their creditors with (however reduced) interest, as a result, they have less flexibility to direct funds toward local capacity or investments beyond those established within the debt agreement (Benzaken et al. 2024; Pouponneau 2023). However, the problem often remains that the ability to participate in and benefit from user fees and blue bonds within ocean economy sectors does not address important conflicts between traditional rights over space and resources, colonial dispossession and the commercial and tenure systems from which Indigenous Peoples historically were excluded (Silver et al 2022). These long-standing issues involving Indigenous and traditional participation in decisions and benefits from fisheries resources now extend into newer sectors, such as bioprospecting (Bhatia and Chugh 2015) and seabed mining (Guapizaca Jiménez 2024).

However, blue bonds can offer significant potential for Global South states, particularly those burdened by heavy debt and vulnerable to climate impacts. These instruments can raise capital for marine

conservation and sustainable development projects, potentially alleviating debt pressures while supporting climate resilience and ocean health. For instance, Barbados is pursuing a debt-for-climate swap (IFC 2023), and Mozambique has successfully negotiated one with Belgium (Walker 2023). It is important to note, however, that successful examples of debt-for-nature swaps, such as in the Seychelles, are rooted in clear terms that do not perpetuate colonial hierarchies, and public-private partnerships are central to the terms. Additionally, it is important to recognise limitations to blue bonds, including discord between industry stakeholders and lack of monitoring and compliance frameworks.

Grants from foundations, multilateral or non-governmental organisations and private donors are one of the largest sources of funding for ocean management and investments (Schutter et al. 2024). These grants can finance capacity-building, community engagement, research and on-the-ground conservation activities, often in more flexible ways than those under finance streams; thus, they can provide critical support for Indigenous-led marine conservation and sustainable development initiatives. Support for blue economy–related initiatives is often not transparent, and currently a significant amount flows to projects that perpetuate dispossession or otherwise do not truly contribute to more equitable outcomes (Schutter et al. 2024). Therefore, it is imperative that such grants are specifically aligned with and informed by the perspectives and goals of the Indigenous Peoples they aim to support (Allison et al. 2020; Österblom et al. 2020; Pert et al. 2020).

Policy opportunities

Although there is no one-size-fits-all approach when it comes to addressing ocean equity aspects such as cultural barriers, gender inequities, data-sharing and financing, we identify some strategies and policy opportunities that can be considered when co-producing SOPs:

- Governments and states should recognise and address the impact of colonial legacies, or coloniality, on national Indigenous Peoples' access to the ocean and justice. This includes addressing important conflicts between traditional rights over space and resources, colonial dispossession and the commercial and tenure systems from which Indigenous Peoples and traditional communities historically have been excluded.

- A truly inclusive and just ocean management must consider youth perspectives, intergenerational collaboration and the diversity of women's situations worldwide; class distinctions and impacts on women's access to ocean management processes; and the importance of non-binary distinctions of gender, which, in turn, shape the landscape of inclusion of Indigenous and traditional communities in ocean management processes.
- Capacity-building programmes tailored to the needs of Indigenous Peoples and traditional communities can help enhance technical skills and expertise in areas such as GIS mapping and data analysis, which can, in turn, support Indigenous knowledge sovereignty.
- Governments, international organisations and private donors can provide financial and institutional support for Indigenous-led initiatives and community-based organisations working on ocean planning and conservation efforts. This could include establishing mechanisms for Indigenous marine stewardship areas that promote Indigenous-led marine conservation and management of marine areas.
- Funding Indigenous-led place-based research can ensure that SOP development has been informed from the perspective of Indigenous communities and advance further equitable co-production of SOPs.
- Ocean use fees can generate revenue streams that can be allocated towards financing SOPs and supporting Indigenous-led conservation and management efforts.
- Enacting policies that recognise and protect the rights of Indigenous Peoples and traditional communities to their traditional territories and marine resources can help address systemic inequalities and empower communities to participate more actively in ocean planning processes. Adoption and implementation of UNDRIP, UNDROP, the SSF Guidelines and the VGGT, among others, in ocean planning is critical.
- Indigenous data sovereignty issues need to be adequately addressed. Lessons can be learned from the Whakatōhea Māori Trust Board's protection of Indigenous data sovereignty. For the Whakatōhea Moana Plan, the board used inclusive approaches to attribution and authorship as well as Local Contexts's Traditional Knowledge and Biocultural Labels.
- Support for blue economy–related initiatives should be specifically aligned and informed by the perspectives and goals of the Indigenous Peoples they aim to support.

Pathways to co-produce SOPs with ITK holders

This final section recognises some of the main points of contention and discussion (e.g., "How to avoid knowledge extraction, devaluation and depreciation through meaningful representation"), summarises some of the main takeaways, and outlines several pathways for co-producing SOPs with ITK holders — both from a practical and a policy point of view. To this end, we also emphasise some of the main considerations and foundations that need to underpin these processes and ensure they are centring equity and justice.

Restorative justice is necessary when Indigenous Peoples and traditional communities have been forcibly removed from areas and have experienced ecocide, epistemicide, discrimination and marginalisation through institutionalised and non-institutionalised governance processes. Restorative justice can help these groups re-establish their relationships and cultural connections with places that have been forcibly removed from them by "embedding recognition of the interconnectedness of human and ecological relationships" (Forsyth et al. 2021, 18).

SOP co-production pathways

These are some of the overarching considerations that can advance inclusive, place-based and knowledge-based co-production processes:

- **Acknowledge the plurality of knowledge systems by valuing diverse ways of knowing.** In doing so, we should deconstruct current knowledge hierarchies and identify hegemonies such as the dominance and conceptual limitations of Eurocentric worldviews that have disrupted ecosystems and disenfranchised Indigenous cultures and knowledge systems (see "Best practices for knowledge plurality and co-production").
- **Recognise knowledge systems, not knowledge products.** These processes must therefore involve careful and meaningful engagement and participation of Indigenous knowledge holders and Indigenous representatives, emphasising that knowledge systems are not knowledge products that can be extracted from places, persons or relationships.
- **Emphasise place-based and context-specific processes.** There is no one-size-fits-all approach to sustainable ocean planning. Plans must take into account a country's national context — and sometimes even more local contexts of ITK systems and rights (see, for example, the cases from Haida Gwaii, South Africa, Mozambique and Australia).
- **Consider cross-cutting issues such as gender and culture.** It is important to recognise the various ways in which the lack of gender inclusion affects the sustainability of ocean planning and plans; to purposefully address issues of equity, this needs to be prioritised. This is also the case in terms of aspects of cultural barriers and sometimes differing perspectives on what constitutes "sustainability" and "ocean justice" from various Indigenous perspectives.

Here, we provide an outline for an iterative and cyclical approach to co-producing SOPs with ITK holders.

Actions prior to co-producing SOPs: Phases 0–1

In many approaches to transdisciplinary knowledge co-production, scholars emphasise the importance of a "Step 0" (see, for example, Horcea-Milcu et al. [2022]). This, in short, refers to considerations and aspects that need to be in place before we can even begin to co-develop a SOP co-production process. In many ways, this can be imagined as the ingredients we need to have available before we start cooking or the tools we need in our toolbox before we start building our house. In this paper, we have discussed the importance of several considerations that need to be addressed prior to any equitable, inclusive and knowledge-based co-production process (Figure 10). These can be summarised as follows:

- Recognise the importance of IKS in sustainably managing ocean areas, including the advancements already taken (see "Background and context" and "Knowledge plurality and Two-Eyed Seeing").
- Assess the level of recognition of Indigenous Peoples and traditional communities in the specific place-based context and state, and, where necessary, recognise Indigenous Peoples and ITK holders (see UNESCO-IOC 2024) (see Box 1).
- Identify whether the process will be led by Indigenous or traditional communities or by the government, and determine how this influences the process of identifying and approaching the participating actors.
- Consider to what extent existing relationships and social capital are built on trust or animosity and whether a process of conflict resolution and restorative justice needs to take place prior to the co-production.
- Co-conceptualise what is meant by *sustainable ocean plans*, *ocean justice*, *knowledge* and *co-production* as well as other relevant concepts to the process.
- Recognise the diverse — sometimes conflicting and overlapping — motivations that frame the co-production process (see "The significance of Indigenous and traditional knowledge systems in the ocean").
- Establish rules and agreements on data sovereignty and knowledge ownership as well as between participating parties (see Figure 4).
- Emphasise and acknowledge the inextricably linked interactions between people and ecosystems through a social-ecological systems approach to the conceptualisation of SOPs.
- Co-conceptualise ethical procedures, and ensure free, prior and informed consent (see "Approaches to knowledge co-production to inform ocean policy").

Co-construction process: Phases 2–3

- Build on what can be conceptualised as "strong"' transdisciplinarity; ITK holders should be considered collaborators and partners with equal say in the whole process, from funding to design to dissemination (see "How to avoid knowledge extraction, devaluation and depreciation through meaningful representation").
- Align with community-based participatory research approaches. The process should commence with co-designing objectives and methodologies for the co-production process (see "What mechanisms do current ocean planning processes employ to engage Indigenous Peoples?").
- Ensure that the process is also evaluated and monitored collaboratively. It is imperative to co-develop indicators for the planning process.
- Overcome or at least acknowledge cultural barriers and differences. The co-production process should take time to achieve mutual intelligibility in processes hopeful of ocean justice while recognising the positionality and power of all participants (see "Cultural barriers to planning processes that are primarily technical and resource oriented"). Determine a culturally appropriate timing of the process to avoid taking knowledge holders and collaborators away from seasonally important cultural activities.
- Disseminate the draft plans for public comment and consideration. This should be an inclusive process that considers aspects of language, formats of knowledge-sharing, platforms,

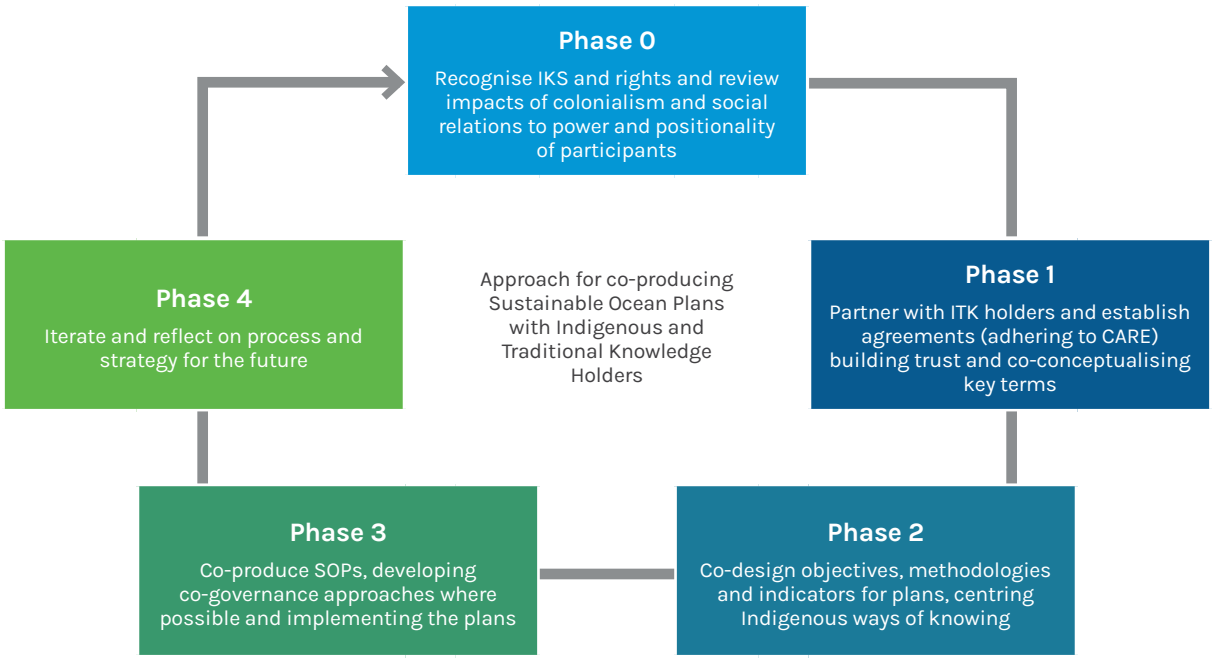
time and resources to ensure that Indigenous Peoples and traditional communities who did not play a central role in the co-production have opportunities to comment.

- Share data and datasets that relate to Indigenous Peoples' sea country or ocean territories. This is imperative for more equitable co-production processes and to identify data gaps and work with diverse partnerships to fill critical quantitative needs.
- Consider how Indigenous-led SOP implementation will be financed during the co-production process to ensure that these crucial resources are secured throughout the lifetime of the project.
- Decide on the specific approaches to co-production processes, such as scenario planning or arts-based participatory research (see "What mechanisms do current ocean planning processes employ to engage Indigenous Peoples?"); this should be a collaborative process adapted to context.
- Recognise Indigenous data sovereignty throughout the process to avoid knowledge extraction and exploitation (see "Data needs and data-sharing upholding the rights of Indigenous and traditional communities").

Review and iterative reflection: Phase 4

- Monitor and evaluate co-developed indicators to successfully co-produce SOPs that are adapted to context and relevant worldviews (e.g., an African relational evaluation approach in Chilisa et al. [2016]).
- Iterate and reflect on the process; where possible, include learning and reflection in the evaluation process to inform more equitable and inclusive processes in the future.
- Ensure that the process is cyclical and iterative. The co-production journey should involve developing strategies for the future, including aspects of co-governance; further needs for knowledge co-production; and monitoring, evaluation and learning.

FIGURE 10. **Example of an iterative and cyclical approach to co-producing SOPs with ITK holders**



Notes: CARE = Collective benefit, Authority to control, Responsibility, Ethics; IKS = Indigenous Knowledge Systems; ITK = Indigenous and traditional knowledge.
Source: Authors.

Learning from existing approaches to co-production and co-governance

- To adequately respond to current power asymmetries in both ocean governance and knowledge production processes, states should prioritise funding for research projects led by Indigenous and/or traditional knowledge holders on sustainable ocean planning (see "Long-term funding strategies to support Indigenous-led SOP implementation").
- An approach that has worked well in Australia is Indigenous-led and community-based mapping of ocean areas; these maps were then used to co-develop SOPs between Indigenous Peoples and government entities. At the Fifth International Marine Protected Areas Congress, Rowena Mouda from Mayala Inninalang Sea Country stated, "Grab the tools and make them work for you" (see also Paul-Burke et al. [2020]).
- Understand and apply Two-Eyed Seeing, which can be described as follows: "The gift of multiple perspective treasured by many aboriginal peoples . . . , it refers to learning to see from one eye with the strengths of Indigenous knowledges and ways of knowing, and from the other eye with the strengths of Western knowledges and ways of knowing, and to using both these eyes together, for the benefit of all" (Mi'kmaq Elders Murdena and Albert Marshall in Bartlett et al. [2012], and "Knowledge plurality and Two-Eyed Seeing").
- Community-based participatory research, particularly in the form of arts-based methods, have proven valuable in upholding Indigenous knowledge sovereignty, supporting plural knowledge valuation and conveying various ways of knowing and valuing the ocean (Strand 2023) (see "What mechanisms do current ocean planning processes employ to engage Indigenous Peoples?").
- Scenario planning can provide a means of developing and exploring alternative future scenarios based on different assumptions and uncertainties in ocean planning co-production (see "What mechanisms do current ocean planning processes employ to engage Indigenous Peoples?").

Recommendations for co-production of SOPs

- **Social-ecological systems approaches.** Institutionalised recognition that humans and nature are inextricably interlinked can better support co-production processes that adequately acknowledge the value of ITK systems. Removing institutional silos, adopting holistic governance approaches and including ITK holders in decision-making bodies are vital for sustaining the co-production process of SOPs (see "Policy opportunities" in "Co-producing SOPs with multiple ways of knowing").
- **Contextual approaches.** To achieve ocean equity and the ocean knowledge outcomes of SOPs, we must recognise that there is no one-size-fits-all approach. Smaller spatial scales of ocean management are sometimes preferable, particularly to support the resilience of local ecosystems and place-based cultures (see "Policy Opportunities" in "Co-producing SOPs with multiple ways of knowing").
- **Centre ocean equity.** At the heart of SOPs is the aspect of ocean equity, which includes issues of distributional, recognitional, procedural, contextual, cognitive and restorative justice. Cognitive and restorative justice should be emphasised to respond to the legacies of colonialism and marginalisation which have resulted in knowledge depreciation, silencing and forced removals from ocean areas.
- **Recognise the rights of Indigenous Peoples and traditional communities.** Meaningful co-production requires recognising the rights of Indigenous Peoples and traditional communities, respecting knowledge plurality and establishing equitable partnerships from the inception of SOPs.
- **Transform existing policy frameworks.** Existing policy frameworks and economic models must transform to become inclusive of IKS, prioritising reduced exploitation rates, avoiding tokenistic engagement and ensuring reciprocity with ecosystems.
- **Commit to co-production processes**. Long-term commitments, capacity-building and conflict resolution mechanisms are needed to uphold the rights and knowledge systems of Indigenous Peoples in ocean governance. This involves

securing adequate and equitable funding mechanisms because SOPs require sufficient financial resources to support inclusive and effective processes. Funding strategies should prioritise Indigenous-led place-based research, enable Indigenous communities to develop and implement their own research projects, and explore mechanisms such as ocean use fees and tenure-based user fees (see "Equitable co-production: Considering aspects of data, culture, gender and financing").

- **Co-governance agreements.** SOPs are more likely to succeed if they are embedded in co-governance agreements that recognise the authority of Indigenous governments to manage ocean areas, fisheries and protected areas in collaboration with other levels of government (see Case study 4 and "Best practices for knowledge plurality and co-production").
- **Invest in IKS.** Funding must be made available to Indigenous Peoples and traditional communities. Available funding would allow Indigenous partners to create employment and training opportunities; invest in technical equipment, such as GIS and other field and data collection tools; and provide for community needs such as family care, possibly necessary to create a working environment to embark in a partnership (see "Intellectual property rights of Indigenous Peoples"). Supporting Indigenous-led place-based research, ensuring access to data and addressing cultural barriers are crucial enabling conditions for inclusive co-production.
- **Gender equity.** All individuals, regardless of gender, should be able to benefit from and contribute to a sustainable ocean. Women, gender minorities and marginalised communities experience inequities in ocean sectors, including marine conservation, ocean science and fisheries. Systemic discrimination and barriers to participation in high-level decision-making and access to resources continue to prohibit our collective ability to successfully advance in the realm of ocean sustainability (Commonwealth Blue Charter of inclusion, 2024).
- **Recognise Indigenous data sovereignty.** Data is a vital part of monitoring and decision-making. To recognise Indigenous data sovereignty, it is essential for Indigenous communities to participate in data governance activities. This involves both access to scientific data and the right to govern the use of Indigenous knowledge and data. This participation helps to acknowledge the rights and interests of Indigenous communities and build productive future-focused relationships.

Conclusion

After a long history of colonial expansion which actively attempted to decimate IKS and precipitated the decline of many ocean ecosystems, we may now be at a turning point in which knowledge plurality, social equity and reciprocal relationships between people and more-than-human beings could become dominant drivers of ocean plans. Transformative change, however, will occur only if ITK holders are co-governance and technical partners from the outset. They must participate in processes that generate knowledge and apply that knowledge to the policies and legal frameworks that govern human relationships with the ocean.

Decision-making and ocean planning are often informed by what is described as the "best available science." Similarly, Indigenous Peoples have built their decision-making within their IKS. Indigenous Peoples and traditional communities have a profound relationship with their territories' environment. This has allowed them to acquire and transmit extremely accurate knowledge of marine and coastal ecosystems over many generations and to develop management practices aimed at the sustainable use of these ecosystems' resources.

Thus, SOPs need to be built on the best available knowledge, with both scientific and Indigenous, local and traditional knowledge systems on an equal basis. This paper has described experiences with, and challenges and opportunities for, knowledge co-production methods to generate the best available knowledge for SOP development.

An inclusive co-production process needs to recognise the historical inequalities in the power relations (see "The significance of Indigenous and traditional knowledge systems in the ocean" and Case study 3). A less-described element is the equity that needs to surround the process of co-production. Similar to Yua et al. (2022), we see equity as an overarching principle and a cornerstone of SOPs, which brings together science and IKS.

Current approaches and practices must change to build equity and create new, inclusive places. Research and observation systems, decision-making processes and comprehensive policies would all benefit from an equity-focused approach, which

> *means recognizing Indigenous Peoples' Sovereignty and the need for mutual Trust and Respect between Indigenous partners and researchers. Engaging in ethical research requires that we must be Deliberate and Intentional about the approaches, methods, and ideas we are using. Increasing the Means and Ability of Indigenous Peoples related to research, policy, and decision-making requires Decolonization efforts in the realms of funding, research leadership, and access to decision makers (among other things) (Yua et al. 2022).*

Similar to equitable knowledge co-production processes, the process of co-producing SOPs needs to embrace aspects of power-sharing, cognitive justice, restitution and restoration. Yua et al. (2022) point out that the process should be "iterative and cyclical" rather than a linear approach and should bring together various knowledge systems "in true partnership and equity, to enhance, learn, and create new understandings on a specific topic." This holds true for our final reflections in this paper, and for the need to co-produce SOPs with care, reflexivity and relationality.

Enkosi | Giitu | Gracias | haawa | Igamsiqanaghhalek | Koxukuro | Obrigada | Medaase Ndiyabulela | Ngā mihi | Salamat | Tabutne | Takk | Thank you | Wayunaiki: Anayawats'je | woliwon

Appendix A.
Notable projects and initiatives to explore

To further enrich your understanding of these topics, the authors have compiled a brief list of notable projects and initiatives that offer valuable insights into related areas of study and practice.

PROJECT	LOCATION	DESCRIPTION
Assessment of the Vulnerability of Artisanal Fishing Communities to Seagrass Loss in Inhambane Bay	Mozambique	This project aims to evaluate the socio-ecological vulnerability of fishers, prawn fishers, and gleaners to seagrass loss in communities along Inhambane Bay, Mozambique. By identifying crucial fishing resources and assessing dependencies on seagrass ecosystems for nutrition, income and cultural identity, the study seeks to gauge adaptive capacities and vulnerabilities among these groups. Led by World Resources Institute and Ocean Revolution Mozambique, the research aims to inform decision-making processes, ensuring the representation of diverse community members in efforts to sustainably manage coastal ecosystems.
MPA Network BC Northern Shelf	Canada	First Nations communities have worked together with the governments of Canada and the province of British Columbia to develop a plan for an MPA network in the Northern Shelf Bioregion, which extends from the top of Vancouver Island (Quadra Island/Bute Inlet) and reaches north to the Canada–Alaska border.
Blue BioTrade: Promoting Sustainable Livelihoods and Conservation of Marine Biodiversity in the Caribbean Region	Eastern Caribbean: Grenada, Saint Lucia and Saint Vincent and the Grenadines	Blue BioTrade is a spin-off of the Oceans Economy and Fisheries Programme of United Nations Trade and Development and the BioTrade Initiative. Although the global demand for queen conch (*Strombus gigas;* a sea mollusc or shellfish used in and exported from the Caribbean) is booming, small-scale coastal producers in the eastern Caribbean are not fully tapping the full breadth of opportunities offered by sustainable conch markets. The 18-month initiative aims to empower small-scale coastal producers (traditional fishers and the Indigenous fishers of Bequia) from the main queen conch–producing nations in the eastern Caribbean while developing planet-friendly livelihoods and adaptation to dynamic markets and changing ecological conditions.
Haida Gwaii Pacific Herring: Ecosystem Overview and Ecosystem-based Rebuilding Plan	Canada	A draft plan for Haida Gwaii ’íináang | iinang herring was co-developed by the Council of the Haida Nation, Parks Canada Agency and the Department of Fisheries and Oceans Canada. It provides an overview of Pacific herring ecosystem attributes in Haida Gwaii. This plan is being refined through consultation with herring harvesters, other stakeholders, other government agencies and the Haida Gwaii community.
Ărramăt Project — supporting Indigenous-led place-based research	Worldwide, but based out of Alberta University, Canada	This is a team of Indigenous organisations, governments, university researchers and other resource people who work together for research and action in support of the health and well-being of the environment and people. The project’s aim is to strengthen Indigenous voices and capacities to document their knowledge about the importance of the whole environment (including biodiversity) to the health and well-being of their communities. The outcomes of the research will support Indigenous leaders who want to be heard by local, national and global governments and organisations and address current problems of environment and human health. Together, the team works to develop a strong voice for protecting the environment in ways that benefit Indigenous Peoples. Its goal is to “support 146 Indigenous-Led Place-Based Projects (ILPBP) globally between 2023–27.”

PROJECT	LOCATION	DESCRIPTION
Bocaina Sustainable and Healthy Territories Observatory (OTSS; Observatório de Territórios Sustentáveis e Saudáveis da Bocaina)	Brazil	OTSS is a partnership between Fiocruz and the Traditional Communities Forum. OTSS proposes the generation of critical knowledge and furthers the dialogue between traditional and scientific information in order to design strategies that provide traditional communities and their territories with sustainability, health and rights.
South African International Maritime Institute (SAIMI) maritime Indigenous and local knowledge project	South Africa	The think thank SAIMI has started a maritime Indigenous and local knowledge project that seeks to bring together knowledge holders, researchers and representatives from various sectors to explore how to better elevate and recognise maritime Indigenous and local knowledge systems (see video here).

Appendix B. Nine core SOP attributes

An SOP should incorporate nine core attributes related to process, content and impact, as per the guide *100% Sustainable Ocean Management: An Introduction to Sustainable Ocean Plans.* The depth and comprehensiveness of each attribute will evolve over time to reflect a country's unique starting conditions and resources.

Process

Inclusive. It is developed and implemented through a participatory, transparent, equitable and accountable process that ensures all relevant interests are heard and addressed at an early stage. The process includes representatives from relevant government agencies, economic sectors, local communities, Indigenous Peoples, research institutions and other stakeholders.

Integrative. It establishes cross-sectoral and cross-administrative coordination mechanisms that bring together relevant authorities with sectoral responsibilities on ocean management — breaking down proverbial management and data silos among ministries (e.g., fisheries, commerce, environment, transport, finance, statistics) and scales (e.g., national, state, local, tribal). It combines sustainable use by ocean sectors (e.g., ports, fisheries, energy, tourism, shipping) with effective protection of marine ecosystems in a holistic manner. In addition, it links various plans, processes and data that a country may already have (or will develop) into a coherent whole.

Iterative. It is "living" — it works for today yet anticipates the changes of tomorrow. It establishes a defined time frame and process for periodic, transparent monitoring and evaluation to check progress against agreed-upon goals and indicators of implementation. It gets updated and refined in light of results, new knowledge, new stakeholder input and changing conditions). Through such iterations, imperfect early SOPs can improve over time.

Content

Place-based. It encompasses all marine and coastal areas under national jurisdiction. These areas could be captured in one single plan or via a suite of plans (e.g., one per type of marine ecosystem within the national jurisdiction). A plan covers the surface, water column and seabed of the defined area. In addition, effective plans consider the linkages among the national marine/coastal jurisdiction and adjacent land and river basins (including watersheds). For some countries, major impacts from neighbouring waters or from areas beyond national jurisdiction may be important to consider.

Ecosystem-based. It is grounded in an ecosystem approach or ecosystem-based management — "the management of natural resources focusing on the health, productivity, and resilience of a specific ecosystem, group of ecosystems, or selected natural assets as the nucleus of management. It recognises the full array of interactions within an ecosystem, including with humans" (Winther et al. 2020). It acknowledges that to maintain healthy, resilient and functioning ecosystems, ocean areas need to be protected from unsustainable use. It also integrates the needs of human communities that rely on marine ecosystems for food security and livelihoods, and it underpins nature-based climate solutions.

Knowledge-based. It is underpinned by the best available science and knowledge, including Indigenous and local knowledge, creating a shared and publicly available knowledge foundation (except for security-sensitive data). Among other things, this knowledge covers current and planned economic activities, social conditions and dynamics, the current and anticipated future state of the marine environment as well as cumulative impacts of land-based activities and climate change projections. The plan is also clear about what is not currently known and reflects a precautionary approach.

Impact

Endorsed. It is officially endorsed or politically supported at the highest level within a country (e.g., president, prime minister, cabinet, parliament) and at relevant sub-national levels (including leadership from Indigenous Peoples where relevant). This endorsement should translate into institutional support within government agencies for the ongoing development, refinement and implementation of the SOP. This creates legitimacy, catalyses sufficient high-level attention and grounds steadfast implementation over the long term.

Financed. It is accompanied by sufficient long-term financial resources for development, implementation, monitoring, evaluation and improvement. This funding should come from domestic resources (where feasible) and can be supplemented by funding from development banks, official development assistance, philanthropies and other sources.

Capacitated. It includes measures to ensure sufficient institutional capacity (e.g., skills and knowledge in relevant agencies) for developing, implementing, monitoring, evaluating and improving the plan. Where capacity is insufficient, the plan should provide for long-term institutional support for relevant capacity-building.

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