

Territories of Life: Reclaiming Indigenous Conservation Governance at the Land-Sea Interface

Leila Vaziri Zanjani

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Prepared by: Leila Vaziri Zanjani

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Abstract

Territories of Life: Reclaiming Indigenous Conservation Governance at the Land-Sea Interface

Leila Vaziri Zanjani, PhD

Concordia University, 2025

Indigenous peoples and local communities (IPLCs) play a vital role in sustaining global biodiversity and environmental resilience through the stewardship of their collectively governed territories, commonly referred to as “territories of life”. Spanning vast land and seascapes across continents, these social-ecological systems integrate cultural, spiritual, and ecological dimensions. Yet despite their contributions to conservation, territories of life often lack formal recognition, face legal and governance threats, and are excluded from national and international environmental policy frameworks. This manuscript-based thesis critically examines key considerations for addressing these constraints.

The first manuscript highlights the global significance of IPLC-governed territories, advocating for an integrated, action-oriented research agenda to support these communities amid rising ecological and political pressures. The second emphasizes the need for biocultural indicators that capture the interdependence of nature, culture, and well-being, rooted in Indigenous knowledge and locally defined values – metrics essential for shifting conservation paradigms toward relational worldviews. The third presents a systematic review of coastal and marine governance scholarship, highlighting how colonial-era jurisdictional boundaries fracture land-sea continuity, marginalize IPLC rights, and constrain customary governance. While some states are making strides in legal recognition, policy and research frameworks often exclude Indigenous-authored knowledge, limiting inclusive transformation. The fourth analyzes marine conservation databases in Canada, revealing governance fragmentation that obscures Indigenous contributions and misrepresents conservation progress. Spatial analyses and evaluation tools point to transparency and Indigenous inclusion as key to accurate Marine Protected Area (MPA) reporting. Finally, a comparative study of philanthropic funding in Chile, Malaysia, and Tanzania demonstrates that community-defined goals—when supported through decolonial, trust-based partnerships—advance more equitable outcomes, with intermediary organizations crucial in translating donor agendas into culturally grounded initiatives.

Together, these manuscripts underscore the urgent need to decolonize environmental governance and conservation sciences by opening space for IPLC governance and tenure systems, prioritizing knowledge sovereignty, and reinforcing biocultural resilience. This thesis calls for reimagining conservation not as a top-down intervention but as a pluralistic, equity-driven partnership that centers Indigenous rights and relational stewardship at the land-sea nexus.

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Producing this dissertation has been the most pleasurable—and, dare I say, humbling and at times painful—human experience of my life. It has been a journey of discovery, learning and unlearning, imagination, exuberance, overwhelming loss, and yearning for a home under fire. It was a journey marked, too, by a spine that quite literally fractured.

To the dearly departed Dr. Taghi Farvar, Dr. Khadija Razavi, Ghanimat Aghdari, and Mr. Didari: I carry your memory with reverence. To my Cenesta and ICCA Consortium colleagues: it has been an honor to be your student, and I am humbled by the wealth of knowledge you shared so generously.

To my maman and baba—you are my light and my heart. If there is any goodness in me, I owe it to you. To my sister, Zahra, you are and always will be my safe space. To Lina, thank you for all the laughs. To my friends and peers at Concordia University and beyond, thank you for supporting me throughout this journey.

Contribution of Authors

Zanjani, L. V., Govan, H., Jonas, H. C., Karfakis, T., Mwamidi, D. M., Stewart, J., Walters, G., & Dominguez, P. (2023). Territories of life as key to global environmental sustainability. *Current Opinion in Environmental Sustainability*, 63, 101298. <https://doi.org/10.1016/j.cosust.2023.101298>

As the lead author, I (Leila V. Zanjani) was responsible for conceiving the manuscript, coordinating input from co-authors, drafting the initial version, and finalizing the text. I also contributed to the theoretical framing and synthesis of the core arguments. Holly C. Jonas and Hugh Govan provided foundational conceptual inputs based on their long-standing involvement with the ICCA Consortium and contributed significantly to the articulation of key frameworks. Theodore Karfakis and Daniel M. Mwamidi offered regional perspectives and literature from the Pacific and East African contexts, respectively. Daniel M. Mwamidi produced figures and all files for journal submission. Jessica Stewart and Gretchen Walters supported the integration of case material and spatial analysis. Pablo Dominguez contributed to revisions, helped refine the structure, and ensured the coherence of the argument in relation to broader sustainability discourse. All co-authors reviewed and approved the final manuscript.

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Zanjani, V., L., Sarrazin, M.-L., Scott, C., Sterling, E. J., & Pascua, P. (2020). *Policy Brief 1: Measuring biocultural diversity*. Centre for Indigenous Conservation and Development Alternatives (CICADA) & Center for Biodiversity and Conservation, American Museum of Natural History. Retrieved from <https://cicada.world/publications/>

This policy brief draws on the discussions held during the first North American Dialogue on Biocultural Diversity to advance joint strategies to promote the diversity of life on earth as well as the recommendations of the Atateken Declaration, adopted by the participants of the Dialogue. Colin Scott, as the Director of CICADA, was the main organizer of this conference. As lead author, I (Leila V. Zanjani) was responsible for conceiving the manuscript, coordinating input from co-authors, drafting the initial version, and finalizing the text. I also contributed to the theoretical framing and synthesis of the core arguments. Colin Scott and Marie-Line Sarrazin substantially revised and critically reviewed the Policy Brief. Eleanor J. Sterling and Pua'ala Pascua revised and critically reviewed the Policy Brief.

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As lead author, I (Leila V. Zanjani) was responsible for conceiving the manuscript, coordinating input from co-authors, drafting the initial version, and finalizing the text. I also contributed to the theoretical framing and synthesis of the core arguments. Monica Mulrennan made significant contributions to the article including conception, study design, data analysis and interpretation, and critical revisions of the text.

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As the lead author, I (Leila V. Zanjani) was responsible for conceiving the manuscript, spatial analysis, coordinating input from co-authors, drafting the initial version, and finalizing the text. I also contributed to the theoretical framing and synthesis of the core arguments. Monica Mulrennan made significant contributions to the article including execution, data analysis and interpretation, and critical revisions of the text.

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This article draws on a project implemented by Observatorio Ciudadano co-led with regional Indigenous organizations and councils, Mwambao Coastal Community Network and Land Empowerment Animals People (LEAP Spira) co-led with Indigenous and coastal communities including the Suluk, Sungai and Tidong people. The ICCA Consortium provided overall coordination, technical support, and strategic linkages at regional and international levels. As the lead author, I (Leila V. Zanjani) was responsible for conceiving the manuscript, coordinating input from co-authors, drafting the initial version, and finalizing the text. I also contributed to the theoretical framing and synthesis of the core arguments. Ali Razmkhah (Global Coordinator, the ICCA Consortium) verified the analytical methods, encouraged to investigate decolonial philanthropy and supervised the findings of this work. Monica Mulrennan substantially revised and critically reviewed the article. All authors discussed the results and contributed to the final manuscript.

Table of Contents

Abstract.....	iii
Acknowledgements.....	iv
Contribution of Authors.....	v
Table of Contents.....	vii
List of Tables	1
List of Figures.....	1
List of Boxes.....	2
List of Abbreviations	2
Preamble	4
Statement of Positionality	4
Introduction.....	10
Main Research Problem: Jurisdictional Fragmentation at the Land-Sea Interface.....	10
Territories of life as an analytical framework.....	15
Research Objectives.....	18
Research Design and Rationale.....	19
Manuscripts.....	21
Chapter 1	21
Territories of life as key to global environmental sustainability.....	21
Abstract.....	22
What are “territories of life”?.....	23
Aims.....	25
Methods.....	25
Narrative Review	25
Evidence base for Indigenous peoples’ and local communities’ contributions to biodiversity and nature conservation at global scale	27
Variable policy, legal and institutional recognition statuses of Indigenous peoples’ and local communities’ contributions to conservation.....	31
Threats and challenges.....	34
Key opportunities for action- and policy-oriented research.....	36
Chapter 2.....	38
Policy Brief 1: Measuring Biocultural Diversity	38
Key points	38
Introduction.....	38
Opportunities.....	42

Weaving knowledge systems for effective conservation and resource management	42
Supporting biocultural restoration, conservation, and monitoring.....	43
Policy recommendations	44
Conclusion	48
Chapter 3.....	50
A systematic review of research trends in addressing the land-sea connections of coastal and marine Indigenous Peoples and Local Communities	50
Abstract.....	50
1. Introduction.....	50
2. Methods.....	53
2.1 Data Extraction and Analysis.....	55
3. Results and Discussion	55
3.1 Governance and Management at the Land-Sea Interface	58
3.1.1 Governance by IPLCs	59
3.2 Conservation Initiatives	60
3.2.1 Governance of Natural Resources in Protected Areas	62
3.3 Development.....	62
3.3.1 Effects on Indigenous Peoples and Local Communities	63
3.3.2 Coupled Jurisdictional Fragmentation and Development	64
3.3.3 Integrative Management Approaches	64
3.4 Legal Mechanisms and Policies.....	65
3.4.1 Specific Law/Legislative Mechanism	65
3.5 Fisheries	67
3.5.1 Obstacles to Accessing Fisheries	69
4. Conclusion	69
Chapter 4.....	71
Fragmented Data, Fragmented Oceans: How reporting discrepancies undermine Canada’s marine conservation commitments	71
Abstract.....	71
Introduction.....	71
Methods	74
Data Processing.....	75
Results.....	76
Discussion.....	78
DFO Protected Area Designation vs ECCC’s Pan-Canadian Standards Decision Support Tool	81

Conclusion	84
Chapter 5	86
Territories of Life at the Land–Sea Interface: Rethinking Philanthropic Funding for Indigenous and Coastal Community Governance	86
Abstract	86
1. Introduction	86
2. Case Overview: Funding Practice Across Three Countries	88
2.1 Chile: Legal Pluralism and Marine Territorial Governance	89
2.2 Tanzania: Fisheries Governance and Gendered Economic Inclusion	92
2.3 Malaysia: Relational Seascapes and LMMA Recognition	93
3. Methods	94
3.1 Synthesis and Interpretive Insights	96
4. Discussion	98
4.1 Inequities in Conservation Practice and the Legacy of Colonialism	101
4.2 The Politics of Sustainability	102
5. Conclusion	103
Chapter 6	105
Conclusion and Future Directions	105
Bibliography	109
Appendix A: Supplementary material for Chapter 3	144
Appendix B: Supplementary material for Chapter 3	156
Appendix C: Supplementary material for Chapter 3	157
Governance thematic area data extraction and analysis Table 1	157
Conservation Initiatives data extraction and analysis table 2	169
Legal Mechanisms and Policies data extraction and analysis table 3	189
Fisheries thematic area data extraction and analysis table 4	202
Development thematic area data extraction and analysis table 5	212

List of Tables

Chapter 3	
Table 1. Objective and research questions	52
Chapter 4	
Table 1: Legal authority and instruments of Canada’s marine territories	72
Table 2. Comparison between CPCAD and WDPA conservation coverage data as of august 2025.	75
Table 3. Comparison of Oceans Act new MPA establishment with the ECCC's reporting process	81
Table 4. Principal mechanisms available for the designation of MPAs in Canada.	82
Chapter 5	
Table 1. Key information extracted from narrative reports and supplementary project materials related to Mapuche-Williche communities in the Los Lagos and Aysén regions in Chile.	89
Table 2. Key information extracted from narrative reports and supplementary project materials for related to Tanzania	91
Table 3. Key information extracted from narrative reports and supplementary project materials related to Malaysia	93
Table 4. Comparative summary of community-led conservation strategies, outcomes, and funding modes across Chile, Tanzania, and Malaysia with quantitative and qualitative evidence drawn from project reports and grant documentation.	96
Table 5. Cross-Cutting Interpretive Themes across Chile, Malaysia and Tanzania	97

List of Figures

Chapter 1	
Fig 1. Spatial representation of the publications reviewed for this article	27
Fig 2. Graphic depiction of some of the key findings of the global spatial analysis conducted by UNEP-WCMC and the ICCA Consortium	30
Chapter 2	
Fig 1. Alaska landscape.	40
Fig 2. Kennedy Lake, in Ha’uukmin Tribal Park, BC, Canada.	43
Fig 3. Participants of the 2019 North American Dialogue on Biocultural Diversity, which informed this series of policy briefs	48
Chapter 3	
Fig 1. Flow of information through the different phases of our systematic review	53
Fig 2. Geographic distribution of case-based studies.	56
Fig 3. Growth in number of publications since 2000.	56
Chapter 4	
Fig 1. Overlap type map of MPAs recorded in CPCAD, WDPA, and Ocean Act	75
Fig 2. Fragmentation scoring between the WDPA, CPCAD and Ocean Act layers	76

Fig 3. Offshore areas are OECMs under DFO governance designated through the Fisheries Act.	79
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List of Boxes

Chapter 2	
Box 1	46
Box 2	47

List of Abbreviations

AFN	Assembly of First Nations
AOI	Area of Interest
BMUs	Beach Management Units
CBD	Convention on Biological Diversity
Cenesta	Centre for Sustainable Development and Environment
CES	cultural ecosystem services
CFMAs	Collaborative Fisheries Management Areas
CFMAs	Community Fisheries Management Areas
CICADA	Centre for Indigenous Conservation and Development Alternatives
COP	Conference of the Parties
CPCAD	Canadian Database on Protected and Conserved Areas
DFO	Fisheries and Oceans Canada
DST	Decision Support Tool
ECCC	Environment and Climate Change Canada
ECMPO	Espacio Costero Marino de Pueblos Originarios or Indigenous Peoples' Marine Coastal Areas
Ecosystem Services	ES
EEZ	Exclusive Economic Zone
EEZ	Exclusive Economic Zone
FABN	Frontenac Arch Biosphere Network
FPIC	free, prior and informed consent
GBF	Global Biodiversity Framework
ICCA(s)	Territories and areas conserved by Indigenous peoples and local communities/ territories of life
IK	Indigenous Knowledge
IMAs	Indigenous Marine Areas
Indigenous Land and Sea Management Programs	ILSMPs
IPAs	Indigenous Protected Areas
IPCAs	Indigenous Protected and Conserved Areas
IPLCs	Indigenous Peoples and Local Communities
IUCN	International Union for the Conservation of Nature

LILCA	Labrador Inuit Land Claims Agreement
LMMA	Locally Managed Marine Areas
MPA(s)	Marine Protected Area(s)
NGO	Non-Governmental Organization
NMCAs	National Marine Conservation Areas
OECMs	Other Effective Area-Based Conservation Measures
PICEF	Partners in Indigenous Conservation and Environmental Futures
SES(s)	Social Ecological System(s)
SOPs	Standard Operating Procedures
UNCLOS	United Nations Convention on Law of the Sea
UNDRIP	United Nations Declaration on the Rights of Indigenous Peoples
UNEP	United Nations Environment Program
VICOBA	Village Community Banks
WCMC	World Conservation Monitoring Centre
WDPA	World Database on Protected Areas
WOS	Web of Science

Preamble

I would like to begin by acknowledging that Concordia University is located on unceded Indigenous lands, for which the Kanien'kehá:ka Nation is the recognized custodian. Tiohtià:ke/Montréal is historically known as a gathering place for many First Nations and today is home to a diverse population of Indigenous and other peoples. Since my thesis applies both a global and regional analysis of the territories of Indigenous peoples and local communities, I also acknowledge the historic and ongoing role of these territories in safeguarding the biocultural richness and diversity of planet earth.

Statement of Positionality

As an Iranian, I was always vaguely aware of the presence of nomadic people in Iran. I had seen them on television, in magazines and had even visited the summering grounds of one Bakhtiari sub-tribe as part of a university excursion. After returning to Iran in 2015, following the completion of my MSc degree in Landscape Ecology in Germany, I was fortunate to be hired as an ecologist for the Centre for Sustainable Development and Environment (Cenesta)¹. The experience I gained during my time with Cenesta introduced me to, and profoundly shaped my understanding and appreciation for, Indigenous territories and ways of knowing and being. At the time, the head of its board of directors was Dr Taghi Farvar, a vivacious and all-knowing old man with a prophet like face, who was also a member of the Shahsevan Tribe Confederacy of nomadic pastoralists in Iranian Azerbaijan. By then, Taghi had already successfully led at least three international movements from within Iran, all under the unifying theme of respect and recognition for the unique ways of life and wisdom of Indigenous peoples in their traditional territories. He was one of the most prominent international figures in the fight of Indigenous peoples for their autonomy worldwide and served as Chair of the International Union for the Conservation of Nature's (IUCN) Commission on Environmental, Economic and Social Policy (CEESP) from 2000 to 2008. In 1979, along with his wife Dr Catherine Razavi², Taghi established Cenesta.

Taghi, along with Dr Grazia Borrini-Feyerabend, were among the founding members of the ICCA Consortium. "The ICCA Consortium grew out of the movement promoting equity in conservation in the decades around the turn of the Millennium. It was officially established in Switzerland in 2010 as an International Association under the Swiss Civil Code. It is a membership-based civil society organization supported by an international semi-volunteer Secretariat based in twenty-two countries (ICCA Consortium n.d.)". During the first year of my employment at Cenesta, the role of Regional Coordinator for West and Central Asia and the Caucuses of the ICCA Consortium became vacant and Taghi asked me to take over the position.

¹ Cenesta is a not-for-profit civil society organization that struggles to re-empower Indigenous peoples and local communities in Iran and beyond

² Dr Catherine Razavi, after battling cancer for 3 years, passed away on April 16th, 2022.

My job description was to network, provide peer-support and advocacy at national and regional levels. In 2017, the ICCA Consortium began its' regionalization process in the hopes of enhancing self-organization within its six designated regions and promote regional and national assemblies that operate through consensus-based decision-making. These assemblies aim to foster mutual learning, support, and solidarity among members, while also aligning with and advancing the Consortium's strategic priorities for territories of life.

What follows are excerpts from my field notes that attempt to recapture my experience of two particular collaborations involving Cenesta; the first with the Shahsevan Tribal Confederacy³ and the second with Qeshm islanders for different projects. I include them here to convey how I came to understand the importance of territories of Indigenous peoples and local communities (IPLCs) in conserving biocultural diversity on planet earth. My learnings of nature conservation prior to working for Cenesta were very much limited to technocratic, fortress-type, monocentric and top-bottom conservation governance in protected and conserved areas.

The workshop is about to start; someone reads a few verses of the Quran to mark the commencement of the workshop. The community has set up 3 alachighs⁴ (tents) for the workshops. 32 curved wooden poles maintain the circular shape of the alachigh, each representing one of the 32 sub-tribes of the Shahsevan Tribal Confederacy. Pointing towards a few short stone stacks, Mr Ahmadi, a Shahsevan elder, explains to me how each sub-tribe marks their arrival in their summering and wintering grounds. I am the wide-eyed newcomer to Cenesta, and Mr Ahmadi knows how to impress an audience. Dr Ilse Kohler-Rollerfson, from Hanover, Germany, is accompanying the Cenesta team in a series of workshops to help document the Biocultural Protocol of the community. Ilse has a long history in advocating pastoralist rights to biodiversity and has a soft spot for pastoralists with camels. Her fondness of camels has been the subject of good-natured taunting between Taghi and Ilse for the past few days. I serve as Ilse's interpreter. I am now only learning some vocabulary and key concepts related to the nomadic life so I stick to translating Farsi into English, occasionally throwing a bit of German in the mix.

"We, pastoral peoples, have always considered our land what you would call a "protected area". We have always embraced "conservation", not as a professional activity but as intimate duty and pride of every member of our tribes, as the heart of our livelihood, because our very subsistence depends on it". Taghi explains; "this is how my dear friend and Qashqai⁵ elder, Uncle Sayyad, addressed the World Parks Congress in Durban in 2003" (Cenesta, 2003). "We are here to document the biocultural protocols we have developed in these lands over the past

³ One of the larger nomadic pastoralist tribes of Iran. More information is available at: <https://iranicaonline.org/articles/shahsevan>

⁴ Alachigh is a circular tent (similar to a yurt) designed and used by the Shahsevan Tribal Confederacy. https://www.youtube.com/watch?v=FuzipuvXULg&ab_channel=NomadArchitecture

⁵ <https://iranicaonline.org/articles/qasqai-tribal-confederacy-i>

12,000 years. This lady sitting next to me”, Taghi points to Ilse, “is a German veterinarian and she has helped pastoralists in India map and document their biocultural protocols⁶. I call her the Camel Lady and the girl sitting next to her, Leila, will be our translator so shower her with as many questions you want and wear her down!”. A ripple of laughter breaks through the tent. The young children throw a few mischievous looks my way as if to say: “we’ve got a few questions for you for sure”.

Ilse recommends we start the conversations about biocultural diversity with the Shahsevan women. Ilse and I walk to the tent where the women have congregated. A few other Cenesta colleagues follow us to start the documentation process. To write anything down two rounds of translation are needed first. From Azeri Turkish to Farsi followed by Farsi to English (and a few sentences in German). It is an onerous process and I feel things are getting lost in translation. To my surprise, the elder⁷ does not start by telling us how many lambs are born every year or even about the Shahsevan seasonal migration to and from summering grounds calendar. She points instead to a half-woven Shahsevan rug on its loom; “this flower blooms a week or so after we settle in the summering grounds. We dye the yarn with its petals and so it should be present in the rug”. As she continues to share botanical details of plants in her ancestral territory, frantic writing and translation ensues. She has not moved on from the rugs. She glances at another less vibrantly colored rug and tells us the tale of a 5-year long drought in the summering grounds; “drought means less dye for the yarn and you can see it reflected in the rug. It took my daughter 3 years to complete the weaving and she started a year into the drought. These rugs hold history. I remember the names of the girls and women who dye the yarn and weave the rugs. It is important to remember the families of each oba⁸, patterns vary from one oba to the other”.

This was a moment of sudden insight and discovery for me, my first of many such moments, during my years as a Cenesta employee; this elder taught me that these people don’t see rugs, migration, pastures, resources or livestock as separate entities and events. This gishsefid (woman with white braids) clearly saw the stories from years of migration reflected and woven into the rugs beneath her. This same understanding infused Taghi with vigor when expounding on the importance of territory and migration for nomadic identities.

In the years that followed working with other nomadic tribes and coastal communities this deep acknowledgement that “territory is life” repeated itself one community after the other. Cenesta, in collaboration with Indigenous communities, published eight Biocultural Protocols. These affirm the extent to which tribal peoples and coastal communities maintain a familiarity with

⁶ Biocultural protocols are documented by their relevant community in accordance with their customary laws and can be utilized to uphold the right to self-determination within territories of life (Jonas et al., 2010). Presentation of biocultural protocols to outsiders is strictly monitored by the community.

⁷ گیس سفید (white braids) is how female elders are referred to in Farsi. The term in Azeri Turkish is similar to Farsi.

⁸ An oba is the assembly of a number of Shahsevan tents from one subtribe that have entered summering or wintering grounds.

their territories including intimate respect and understanding of water throughout its cycle, running through and on every layer, every crevice (Cenesta, 2014, 2015, 2016). My exposure to this world solidified my own personal commitment to community related work. My passion was and continues to be conservation of nature. In many ways, Taghi was a prophet or messenger in my life. He taught me that nature conservation takes different shapes and with that, a world of complex and intricate networks of relationships between and among humans and nature opened up to me.

The gishsefid continues: “rain falls less and less every year, the year I wedded my husband the snow on the mountain was so high we had to postpone migration to the summering grounds. This cost us a great deal, we had to sell most of the herd since the entire migration calendar was disrupted.” The elder continues to talk about how the consistent rise in temperatures and decrease in precipitation (Alizadeh-Choobari & Najafi, 2018) has changed the pastures. At this point, other women join the discussion. They tell us stories of how strategies of resilience, relationships with each changing government, provincial and national natural resources agencies and middlemen have changed over time.

Qeshm Island local communities also published their Biocultural Protocol⁹ in collaboration with and through Cenesta. In this protocol they state “Our main sources of livelihood are fishing, livestock husbandry, trade and maritime transport, palm planting, and handicrafts.” (Qeshm and Adjacent Islands Bio-cultural Protocol, 2016). I recall being struck by the absence of any distinction or division in the classification of communities between marine based and land based activities. Each activity, performed by men and women, supports life on the island. Below I retell a story to expand the notion of “connectivity” or continuity between marine and terrestrial ecosystems in the eyes of a Qeshm islander.

*I start my story on the shores of the Persian Gulf. The first time I came to Qeshm Island was to assist my colleague in setting up the Burqa¹⁰ Women’s Community Based Organization (CBO)¹¹. Women from several villages work together, produce handicrafts, sell them countrywide, and on some occasions their products reach Europe. Part of the income generated is invested by the CBO in conservation activities. Examples include working alongside men to eradicate the invasive species *Prosopis juliflora*¹² from their island.*

This time we are back to document the Globally Important Agricultural Heritage Systems (GLAHS) on the island. First the Free, Prior and Informed Consent (FPIC) form is reviewed and signed by an elder who is also our guide. I am so impressed by this person; they navigate the

⁹ <http://www.cenesta.org/wp-content/uploads/2007/12/Qeshm-protocol-2016-en.pdf>

¹⁰ <http://www.cenesta.org/en/2016/03/16/visit-to-qeshm-cbo-eco-tourism/>

¹¹ <http://www.cenesta.org/en/2018/08/05/burqa-cbo/>

¹² “Mesquite (*Prosopis juliflora* (Sw.) DC), is a medium-sized tree (family Fabaceae, subfamily Mimosoideae), that has been introduced around the world. It is a noxious invasive species in Africa, Asia, and the Arabian Peninsula and a source of highly allergenic pollen.” (Hussain., et al. 2020)

complex relationships and kinship culture of this island with grace and determination. They are knowledgeable and even though they are in their early forties, they are considered an elder, someone you go to for answers. I refer to them as F here. Beyond the northern margins of their village lie the winding inlets and estuary of the Hara Forest Protected Area. Hara is the local name for a mangrove¹³ species of the Persian Gulf. Hara branches are a source of livestock feed on the island. Traditionally, men prune the trees and either use or sell the fodder for the camel, cow and goat population of the island. Pruning is done from certain parts and trees of the mangrove forest. The seven villages with ancestral territorial rights to the hara forest have systems that control the amount of hara extraction. The state has designated the forest a protected area with various degrees of protection since 1973. This designation has periodically and systematically pushed the local community out of the forests, which led to irresponsible and unsustainable extraction of natural resources; including fish, hara, shrimp and even mud (Cenesta, 2012). The elder explains; “while my father was still alive, not one person could enter the hara without alerting the watchmen. Of course, now we don’t have that and even people from our own village are involved in illegal fishing.”

The traditional territory of the communities on this part of island often extend from village margins to the intertidal shoreline and beyond into the sea. Historically, the fisher folk also participated in trade routes between east Africa and India (Sabaye Moghaddam, 2012). Their involvement in trade is evident in cultural practices, stories, clothing and food. F and her family are also the customary owners of a moshta¹⁴ (Moradi & Sarvandi, 2020) on the southern sandy shores of Qeshm Island. F and their family, like many other islanders, rely on the sea for maintaining their traditional lifestyles as much as they do on land.

F looks around at me and my fellow sarhaddi¹⁵ colleagues and explains “we have to prove our ownership, not only on land but also in water. We talk to so many government employees in the Department of Fisheries, Department of Environment, municipal and provincial employees and the hardest discussions are with the people from the National Iranian Oil Company (NIOC). What headaches we have to endure to prove that we rely on the fish! We rely on the fresh water dams, we rely on “life”¹⁶ on this place to live!”. I ask “Where are you talking about when you say this place, F?”. they respond “the sea, the land, what Taghi calls territory. The place we have based our calendar on. It determines what we eat, what equipment to be repaired and made ready, what comes through trade. But to prove that we are connected to both land and sea is too hard. We can’t talk to these employees. They don’t get it” (“Anonymous, 2017). The barriers to territorial integrity here are manifold, undermined by the designation of the protected area, degradation of the mangrove ecosystem, a decline in adherence to customary governance

¹³ *Avicennia marina*

¹⁴ In the Indigenous culture of southern Iran, “moshta refers to any enclosed area with walls made from plant materials.” Moshta relies on the tide to capture fish and shrimp. (Moradi & Sarvandi, 2020)

¹⁵ Sarhaddi is a word in the Qeshmi language that refers to non-islanders.

¹⁶ This is a direct translation of the word حیات. This word implies both life and wildlife.

institutions, contested cultural and religious heritages, and the presence of a multiplicity of authorities; Qeshm Free Zone Authority, Department of the Environment of Iran, Hormozgan Province Municipality, Iran Fisheries Organization, Bureau of Natural Resources and the public and private sectors of the oil industry. Here is where I heard about and began to appreciate why local communities hesitate to negotiate basic access to their ancestral territories, let alone complex governance and/or management jurisdiction for them. The web of laws and regulations and the need to develop and maintain relationships with so many authorities is daunting indeed.

During my time at Cenesta, I arranged and participated in many international and national events mostly focusing on conservation issues such as conservation farming, rotational fishing and various population restoration activities developed by the relevant communities. Once I started my PhD program in 2018, I was honored to become an Honorary Member of the ICCA Consortium at the invitation of Holly Jonas, then serving as Global Coordinator. In 2021, I joined the ICCA Consortium project “Territories of life: 2021 Report”. This report is a multimedia report composed of local, national, regional and global analyses of territories and areas conserved by Indigenous peoples and local communities. I co-authored “A global spatial analysis of the estimated extent of territories and areas conserved by Indigenous peoples and local communities (UNEP-WCMC & ICCA Consortium, 2021)” as well as the Executive Summary of the report (ICCA Consortium, 2021). My participation in this project was foundational to the production and publication of the first article (Zanjani et al., 2023) in this dissertation.

In June 2022, I started my position as Conservation Expert at the Frontenac Arch Biosphere Network (FABN). As a conservation expert I work on a project titled “Qualifying UNICEF buffer zones as Other Effective Area-based Conservation Measures within the Frontenac Arch Biosphere, Eastern Ontario” funded by Environment and Climate Change Canada (ECCC). My responsibilities include assessing properties to be included in the Canadian Database on Protected and Conserved Areas (CPCAD) and relevant provincial and federal bureaucratic processes. I also work closely with property/landowners including Indigenous-led land trusts, conservation authorities and NGOs in the Frontenac Arch Region. I also co-manage a collaborative devised and governed Wild Rice Revitalization Project with colleagues at Plenty Canada and the Environmental Office of the Mohawk Council of Akwesasne. I have participated in multiple Ethical and Two-eye Seeing trainings organized and led by Anishinaabe and Mohawk Elders.

My initial research plans included fieldwork in territories of life in Iran, where I had hoped to engage directly with coastal communities in the south. However, the outbreak of the COVID-19 pandemic severely restricted international travel and community access, creating logistical obstacles to in-person engagement. Equally limiting is the geopolitical position of Iran with international sanctions and conflict in the Middle East, which posed substantial obstacles to the flow of research funding, communication and collaboration. These constraints made it infeasible

to pursue fieldwork in the Iranian context without compromising the safety, autonomy or confidentiality of local communities.

I am committed to being an ally and research partner to Indigenous peoples and local communities through the ICCA Consortium and the Centre for Indigenous Conservation and Development Alternatives (CICADA) as well as through my doctoral research project, working in collaboration with Dr Monica Mulrennan, Director of the Partners in Indigenous Conservation and Environmental Futures (PICEF) lab at Concordia University. The following dissertation is part of my ongoing commitment to contribute to efforts that support and enhance the authority of Indigenous peoples and local communities as the traditional custodians of their lands and waters.

Introduction

Coastal and marine environments are intrinsically fluid and adaptive systems. Yet, the accelerating impacts of climate change—most notably sea-level rise—are projected to radically transform the form, function, and ecological integrity of these environments in the coming decades (Fang et al., 2018; Cooley et al., 2020). Governing authorities are under pressure to develop governance structures that have the capacity to respond to and mediate these devastating changes. This effort is complicated by the separation of marine and terrestrial environments in state jurisdictions across the globe. It is further compounded by the relative neglect by conservation scientists of coastal and marine environments in favor of terrestrial and freshwater ecosystems (Di Marco et al., 2017).

The formation of the modern state is predicated on separation of marine from terrestrial and nature from culture (Pierson, 1996; Warner, 2001; Wilson, 2021), which informs the conceptualization of governance and management of natural resources. In contrast, many cultures across the world adopt the principle of connection in shaping their relationships to natural phenomenon (Anbleyth-Evans et al., 2020; Baker & Constant, 2020). These cultures, including those of many Indigenous peoples and local communities, are deeply embedded in connections and continuities of terrestrial and marine realms. Indigenous ways of knowing and being are frequently premised on the universality and circular nature of relational and governance systems which transcend the land and water dichotomy. Jurisdictional separation at the land-sea interface disrupts the connections and relationalities that Indigenous peoples and local communities have to ancestral territories in coastal and marine settings.

Main Research Problem: Jurisdictional Fragmentation at the Land-Sea Interface

Too often across the globe terrestrial and marine environments are governed as separate jurisdictions within the nation state. This separation in governance creates fragmented land-seascapes, undermines local authority and decision-making processes, and limits access to coastal and marine resources (Blythe et al., 2021). Governance and management of resources and conservation regimes at the land-sea interface typically fail to “effectively combine information

from multiple natural realms” (Häkkinen et al., 2021). This land-sea binarism, imposed by modern states, disregards and disrupts the continuous and fluid relationships that shape coastal ecologies and cultures, human and non-human alike. Instead, seas and oceans are often reduced to an empty space with no customary territoriality, a space for resource exploitation, economic gain and exertion of state power (Scott & Mulrennan, 1999; Mulrennan & Scott, 2000). This fragmentation at the land-sea interface is caused by regulations set at varying scales. At the highest level, the 1982 regulations mandated by the United Nations Convention on Law of the Sea (UNCLOS) designates a universal 12nm territorial sea and 200nm Exclusive Economic Zone (EEZ) for each nation state to the multiple national, regional and provincial regulations that interrupt the inherent connectedness of nature and culture in coastal ecosystems (Cocks, 2006).

The formation of modern states, led and shaped by European and colonial traditions, turned areas (both terrestrial and marine) formerly known as frontiers, into static bounded spaces that support the territorial claims and imperatives of the colonizing culture and or society (Kratochwil, 1986; Østhagen, 2020). The imposition of modern and post-colonial boundaries often resulted in various forms of physical and biological division between ecosystems, ecotones, waterways and watersheds and the natural realms of terrestrial and marine. The science of ecology has shown how marine and terrestrial ecosystems are connected by studying the life cycles of various marine species, climate and sediment and nutrient cycles. Terrestrial and marine realms are functionally (behaviorally) and bio-geochemically connected. Spatial and temporal connectivity vary between local and intercontinental scales (Fang et al., 2018). To determine whether the dramatic decline in North Pacific adult salmon (*Oncorhynchus* spp.) biomass had effected the population of its predator species and the vegetation that receive nutrients from salmon carcasses, Reimchen (2017) carried out a five-year field study in the “largely intact old-growth forest” within the Haida Gwaii territories. Other research has shown that the health of mangrove forests, stated as one of the most productive ecosystems, depend on the fresh water they receive from rainfall on land (Blaber, 2007; Nagelkerken et al., 2008). During their spawning season, Norwegian spring spawning herring transfer substantial marine-derived resources into freshwater streams, serving as an “ecological cornerstone” in the ecosystems that receive them (Varpe et al., 2005). Research on trans-species transmission of certain viruses shows that marine avian species have transmitted the virus to both marine and terrestrial mammals (Harder et al., 2013). These studies are examples from a rich body of literature that target cross-realm and coastal species and pinpoint the ecological continuity of natural cycles.

Cultural fragmentation at the land-sea interface is another byproduct of modern statehood. Kratochwil (1986, p.32) states that “boundaries are points of contact as well as of separation between a social system and an environment”. The boundaries of modern statehood, either physically or jurisdictionally, enforced cultural divides between peoples and places (Warner, 2001). The extension of territorial sovereignty over marine spaces was made possible through the direct or gradual colonization of coastal areas. Dominant European conceptions of “high seas” in

shared legal systems enabled the spread of imperial powers over large marine areas as well as maritime networks (Wilson, 2021).

Østhagen (2020) deems boundary making in open waters and coastal areas as “inherently distinct”. The distinction between marine and terrestrial governance also percolated into the making of modern jurisdictions. Thus, governance at the land-sea interface has been shaped by an inherent jurisdictional fragmentation (Álvarez-Romero et al., 2011; Ban & Frid, 2018; Cicin-Sain & Belfiore, 2005; Scott & Mulrennan, 1999). European conceptions of resource extraction and the settlement of colonizers in coastal and marine environments resulted in the suppression and obliteration of Indigenous jurisdiction and “absolute control over territory, bodies and resources” of Indigenous peoples (Wilson, 2021). The all-encompassing administrations and newly demarcated territorial boundaries of colonial powers disrupted, and at times erased, the territorialities of Indigenous peoples and local communities across the land-sea interface (Wilson, 2021).

Research shows that western and colonial cartography and mapping have contributed to land-sea division in coastal areas. Researchers have cautioned that using GIS to map the fluid territories of marine and coastal IPLCs may lead to Indigenous assimilation (Reid and Sieber, 2020). For the Indigenous Maori of the North Island of New Zealand, boundaries in coastal areas were set through “a collective group of families”. These boundaries, unlike the uncompromising static lines of modern mapping, were flexible, based on mutual respect of the tribes and respected the continuity of life across natural realms (Ryks, 2014).

Indigenous peoples must navigate a complex maze of local and national regulations, land designations, and overlapping private or government ownership when seeking to establish new conservation relationships or renew ancestral ties to their territories. Communities whose territories span the land-sea interface face particularly complex challenges, as they must navigate separate jurisdictions (terrestrial and marine), each governed by distinct laws and regulations. Examples include land allotment policies in the United States, which fragmented Indigenous territories (Carroll, 2014), and Bolivia’s neo-extractive policies granting unilateral state control over mining, logging, and oil exploration – even within areas officially registered as Indigenous Territories (Gambon & Rist, 2018). After a 17-year struggle for sea country native title, the Thuwathu-Bujimulla Indigenous Protected Area (IPA) was officially recognized in 2013 (Carpentaria Land Council Aboriginal Corporation, 2016). During this time, the Wellesley Islands’ traditional owners had to engage with multiple government committees, collaborated with various organizations, and actively fought to secure their rights to their sea country (Carpentaria Land Council Aboriginal Corporation, 2016).

IPLCs have developed and availed of many mechanisms to facilitate the process of reinstating conservation governance over their ancestral and traditional land-sea territories. Some examples include the tribal park Wanachis-hilth-hoo-is, located on Vancouver Island, BC, Canada, which

is governed and managed exclusively by the Tla-o-qui-aht First Nation (Murray & Burrows, 2017) and the *Edézhíe* protected area co-managed by the Environment and Climate Change Canada (ECCC) and Dehcho First Nations (Dehcho First Nations, n.d.). However, the management schemes, conservation strategies and policy regarding these mechanisms are at best vague in the context of marine and coastal governance (Andrade & Rhodes, 2012; Nadasdy, 2003; Premauer & Berkes, 2015; Scullion et al., 2019). Indigenous worldviews, values and life ways are shaped by holistic, circular and relational ontologies. Core principles – relatedness, respect, reciprocity and responsibility – guide relationships within territories of life. Many Indigenous peoples follow the sustainability principle of “take only what you need” (Lyons et al., 2020; Artelle et al., 2018; Ryks, 2014; Ayers et al., 2012; Scott, 2004). For instance, Canadian Indigenous perspectives emphasize that: “Land and water are inextricable from Indigenous cultures; they cannot be separated from Indigenous ways of life, identities, values, spiritual practices or knowledge systems. Similarly, elements of nature are indivisible. Land cannot be considered separately from the air, wind, water and complex biodiversity that make up a natural system” (Indigenous Circle of Experts, 2018).

This division between terrestrial and marine environments is also reflected in both academic and non-academic research. Studies focusing on the land-sea interface are unevenly distributed with a majority focusing on the global north. IPLCs in many regions have next to no representation in scholarly articles. Canada, Australia, New Zealand, Colombia and some island nations hold the highest share of knowledge co-creation and co-design of research methodology. Conservation of biological diversity is historically biased towards terrestrial ecosystems, endothermic vertebrates, and certain geographical and ecological realms. This bias has been demonstrated by multiple meta-analysis studies published in biodiversity conservation journals (such as *Biological Conservation*), which tend to categorize ecological systems into distinct freshwater, marine and terrestrial realms; furthermore 81% of articles published between 2011 and 2015 on biological conservation focused on terrestrial ecosystems (Di Marco et al., 2017).

Similar patterns of bias exist in the designation of protected and conserved areas as well as restoration projects on a global scale. As of September 2025, 309,398 (54.29 million km²) terrestrial Protected and Conserved Areas (PCAs) are registered in the IUCN World Data Base on Protected and Conserved Areas (WDPA¹⁷) while the number of marine PCAs is at 19,903 (≈ 30.5 million km²). Notably, between 2010 and 2020, the number of marine protected areas grew at a faster rate than in the 2000s, as nation states raced to meet Aichi Target 11. Under this target, nation states committed to conserving at least 17 per cent of terrestrial and inland waters and 10 per cent of coastal and marine areas by 2020, with a focus on sites of particular importance for biodiversity and ecosystem services (CBD, 2010). However, the latter part of the goal “effective and equitable management” is at best, described vaguely (Zurba et al., 2019) or is missing from the WDPA data base.

¹⁷ <https://www.protectedplanet.net/en>

Coastlines are impacted by multiple large scale threats including climate change, forestry, agricultural and industrial runoff, invasive alien species, waste release and aquaculture (Álvarez-Romero et al., 2011; Cooley et al., 2020). Indeed, they are recognized as being among the most vulnerable ecosystems to climate change (Cooley et al., 2020). Studies show that by the end of this century sea levels could rise up to 82cm in some coastal regions and temperatures may rise up to 3 degrees, resulting in severe weather conditions, flooding, increase in invasive alien species, melting of shorefast sea ice and coastal erosion (Cooley et al., 2020; Lapointe et al., 2020, IPCC., 2021). The last two decades have seen accelerated changes in both the appearance of coasts as well as biophysical characteristics as a result of human activities mentioned above. These changes are most evident in arctic coastal areas and shorefast sea ice as well as on islands (Cooley et al., 2020; Fache et al., 2021; Galappaththi et al., 2019). These changes have also accelerated the rate of marine biodiversity loss at the land-sea interface (Bulleri et al., 2018; Eger et al., 2022; Gray., 1997.). While habitats change, species composition, interaction and population change at a community¹⁸ level (Bulleri et al., 2018) which in turn alters the connections of many coastal communities to marine resources such as nutrition habits and regimes, food security and sovereignty, reliance on species abundance, sailing habits and fishing calendars (Cross, 2016; Ferguson et al., 2022; Galappaththi et al., 2019). Policy and decision makers at the land-sea interface often overlook Indigenous ways of knowing and being in processes that affect IPLC livelihoods, food sovereignty, and customary resource governance. At the same time, climate change, pollution, overfishing and other pressures continue to alter, degrade, and erase biocultural diversity in coastal and marine environments (Aswani, 2019; Indigenous Circle of Experts, 2018; Ryks, 2014). Alarming environmental conditions of seas, ocean and coastal ecosystems and the failure of conservation regimes in safeguarding biodiversity have propelled scientists to undertake research that examines different worldviews and relationships to coastal and marine areas (Ban et al., 2019).

Amid rapid environmental changes, recognition of IPLCs rights remains a global challenge (Reyes-Garcia et al., 2021). Developing approaches to document and communicate the diversity and nuances of their territories can help IPLCs defend their rights and restore land-sea connections. Addressing the widespread fragmentation of nature and culture at the land-sea interface is crucial, and one approach is to apply holistic concepts that respect the cultural continuity of IPLC across these interconnected landscapes. Multiple ongoing international frameworks provide the opportunity to highlight this global issue and offer solutions that may potentially elevate national and regional decision-making and better inform negotiations related to conservation of nature in territories of life.

In December 2022, the second phase of the fifteenth Conference of Parties (COP) to the Convention on Biological Diversity (CBD) was held in Montreal, Quebec. I attended the COP in the capacity of researcher/observer and Honorary Member of the ICCA Consortium. The major outcome of COP 15 was the adoption of the Kunming-Montreal Global Biodiversity Framework

¹⁸ Non-human species communities.

(GBF) which comprises “23 action-oriented global targets for urgent action over the decade to 2030. The actions set out in each target need to be initiated immediately and completed by 2030 (CBD, n.d.)”. Similar to the Aichi Targets, the GBF also sets out ambitious area-based conservation goals, namely Target 3; to conserve 30% of land, waters and seas by 2030. The GBF Indigenous Peoples are explicitly mentioned in 9 out of 23 targets, especially in the context of rights, customary governance, knowledge systems, conservation participation, and benefit-sharing. This explicit recognition of Indigenous Peoples marks a historic shift in global biodiversity conservation which until the GBF, largely overlooked Indigenous rights and governance, signaling a significant move toward inclusive, rights-based, and culturally grounded approaches.

In response to the problem outlined above, this research critically examines how academic scholarship on conservation governance has historically contributed to, and often reinforced, the fragmentation of coastal and marine governance. By examining the conceptual and institutional disconnects that persist at the land-sea interface, this dissertation identifies key knowledge gaps that impede the development of integrated, equity-centered conservation frameworks. Central to this response is an effort to generate actionable insights that support the rights of IPLCs to steward their territories of life. Drawing on a systematic review of peer-reviewed literature, spatial database comparisons, and case studies, this research highlights how governance regimes rooted in colonial legacies and jurisdictional divisions disrupt the ecological, cultural, and political continuity of land-sea systems. Despite a growing body of literature advocating for co-governance models and legal pluralism, Indigenous governance systems remain underrepresented in both policy and scholarship, often filtered through state-centric or externally imposed frameworks. Finally, this work seeks to inform more inclusive conservation strategies that reinforce biocultural resilience, uphold knowledge sovereignty, and restore land-sea continuity in alignment with Indigenous (and local communities) worldviews.

Territories of life as an analytical framework

Territories and areas conserved by Indigenous peoples and local communities (ICCAs) are where “a close association is often found between a specific Indigenous people or local community and a specific territory, area, or body of natural resources. This association is combined with effective local governance and conservation of nature” (ICCA Consortium, 2021). ICCAs or territories of life encapsulate the holistic understandings and circular ways of living on land and water. Here, I refer to the stories in my statement of positionality to explain territories of life as the overarching conceptual framework of this research project. For an elder from the nomadic Shahsevan community, everyday objects such as a handwoven rug, are a reflection of their territory. In the case of a rug, its colors convey stories of the local flora, livestock, climate, seasonal migrations, as well as the lives of women and family relationships. A Qeshmi person perceives their clothing as reflecting the history of property ownership, ancestral migrations, fluctuations in species abundance, and patterns of trade. In both stories, knowledge of land and water is passed down inter-generationally; it is a deep understanding of how life shapes and moves, and changes and survives. Knowledge of territory includes strategies of hope, resilience,

wellbeing and living a good life (Fa et al., 2020; Hudson & Vodden, 2020; McElwee et al., 2020; Premauer & Berkes, 2015).

For many Indigenous peoples across the planet, nature and culture are inextricably linked (Berkes et al., 2009). Sustaining life in the territories of Indigenous peoples and local communities is a daily practice and rooted in the law of nature (also referred to as law of origin (Torres & Verschoor, 2020), and centered on respect, reciprocity, relationality and responsibility (Artelle et al., 2018; Awāsis, 2020; Ayers et al., 2012; Gauvreau et al., 2017). For many, the relationship with territory is sacred and developed in deep time (Saedi, 1976, Saboohi et al., 2018, Yunkaporta, 2020). In Indigenous conceptualizations, human mental and physical health are often strongly correlated to territorial health (Torres & Verschoor, 2020; Vélez et al., 2020). In their research with the Andoke Peoples of the Colombian Amazon, Torres and Verschoor (2020) suggest that territorial health is synonymous with abundance in both material and spiritual wealth. Generally, governance institutions of Indigenous peoples and local communities have the advantage of being place-based, evolving bodies of knowledge that are deeply intertwined with sustaining territorial wellbeing.

Good governance of natural resources is understood to lead to territorial health and the continued regeneration of life in IPLCs territories (Absolon, 2020; Pert et al., 2015; Torres & Verschoor, 2020), otherwise aptly referred to as “territories of life” (UNEP-WCMC and ICCA Consortium, 2021). It is well documented that Indigenous peoples and local communities play “an outsized” role in governing and conserving the biodiversity of the world. By living on land and water they conserve and sustain “an astounding diversity of globally relevant species, habitats and ecosystems, providing the basis for clean water and air, healthy food and livelihoods for people far beyond their boundaries (ICCA consortium, 2021, P10)”. A similar observation is made by Dominguez and Benessaiah (2017), Hermann et al. (n.d.) and Perez Bukluran (2018). The inextricable connection between nature and culture in territories of life has fostered remarkable linguistic diversity and a wealth of tangible and intangible cultural heritage. This holistic conceptualization of human-nonhuman relationships provides a comprehensive framework for examining Indigenous conservation governance. Territories of life are where Indigenous peoples create knowledge and sustain their life projects. As described by Blaser (2004, P.26), life projects are embedded in culture and territory and are an extension of “land and seascapes, memories, expectations and desires” of Indigenous worldviews.

For many IPLCs, the jurisdictional division between marine and terrestrial environments is an obstacle to maintaining the integrity of conservation governance in coastal and marine territories of life (Ban & Frid, 2018; Mulrennan & Bussi eres, 2018;  lvarez-Romero et al., 2011; Cicin-Sain & Belfiore, 2005). State jurisdiction, in many settings, erases territorial jurisdiction of Indigenous peoples and local communities (Harris, 2008; 2001). These boundaries are often linear and static and the policies, laws and regulations prescribed for governance and management of resources and ecosystems are more often than not coast-wide (Crowder & Norse, 2008). International jurisdiction over open seas and oceans continues to disrupt Indigenous marine conservation governance in many areas globally including but not limited to the Canadian North Pacific, Arctic communities, East Asian island communities, Caribbean and

Polynesian islanders (Ban et al., 2019; Ban & Frid, 2018; Grydehøj et al., 2020; Tran et al., 2020).

Marine social-ecological system thinking has gained much traction among sustainability scientists in the past two decades. This system aims to integrate human systems, ecosystems and governance systems (Charles, 2012). Governance systems are the decision-making processes that are guided by the values of the decision makers. The governance systems of many Indigenous peoples and local coastal communities across the globe already integrate ecosystems and humans. These are integral components within the holistic ways of being and doing of Indigenous peoples (Fox et al., 2017). This is evident in the way Indigenous communities articulate their relationship with their territories; such as “the river is us; the river is in our veins”, “There is no Dayak community without forest.”, “Initiation in the sacred forest is the most exciting part of our existence, and the most vibrant element of our community.”, “I am the fish, the fish is me” (Fox et al., 2017).

The need for cross-realm governance and planning has received much attention in recent decades (Álvarez-Romero et al., 2011, 2015; Pittman & Armitage, 2017; Reuter et al., 2016). Researchers have called for social-ecological approaches in governance of resources at the land-sea interface to deal with the “complex, dynamic and intangible” (Mulrennan & Bussi res, 2018) nature of these edge Social Ecological Systems (SES), building capacity for the engagement of stakeholder groups, jurisdictional alignment for integrated management of the land-sea interface, among others (Pittman & Armitage, 2016). The capacity of governance to account for ecological processes that span terrestrial and marine natural realms or “functional fit” is too often inhibited by nation state jurisdictions and authorities (Pittman & Armitage, 2016; Aswani et al., 2012; Charles, 2001; Crowder et al., 2006). Pittman & Armitage (2016) have identified the need for social ecological systems thinking to expand the capacity of governance at the land-sea interface for both social and ecological processes.

Given its holistic nature, I propose that the concept of territories of life can provide guidance for future planning and governance systems while accommodating ontological plurality at the land-sea interface. Although previously applied primarily in terrestrial contexts, its extension to the land-sea interface is relatively new. Territories of life transcend the state-imposed divisions of land and sea, encompassing both natural and cultural dimensions, and offer the potential to address the multi-layered fragmentation common in coastal areas. I have adopted territories of life as the overarching conceptual framework for my PhD project.

The framework of territories of life is compatible with other theoretical approaches used in multidisciplinary research, such as social-ecological systems and social-ecological edge theory (Mulrennan and Bussi res, 2018). It is applied here with the same cautions noted by Zanjani et al (2023,p 2): “The concept “territories of life” is by nature generic, and is only intended to provide an ‘umbrella’ for the sake of intercultural understanding and communication about phenomena that are necessarily place-based and context-specific, each with its own name imbued with unique values and practices, while providing more identifiable meanings than most acronyms can. However, Indigenous peoples and local communities are the ones who choose if to use it strategically to advance their self-determined priorities for their people and territories, including

in nation-state policy and legal frameworks, both domestically and internationally (Zanjani et al., 2023)”.

Research Objectives

This thesis explores the current state, governance, and future potential of territories of life with particular attention to the land–sea interface. It brings together systematic review, spatial analysis, and case study research to investigate how policy, governance, and funding systems shape the recognition and sustainability of these territories. A central objective is to provide a comprehensive and up-to-date review of territories of life globally, with particular attention to their contributions to sustainability, biodiversity, and cultural resilience. The narrative review presented in Chapter 1 highlights key insights from policy, legal, and institutional developments, along with the multiple threats and challenges affecting the persistence and recognition of these territories (UNEP-WCMC & ICCA Consortium, 2021; WWF et al., 2021). Going beyond academic sources, the narrative review incorporates grey literature and community-authored reports, offering a broader, more grounded understanding of territories of life that are often excluded from scholarly analyses.

A novel contribution of this work is the explicit attention to marine and coastal territories of life, which have often been overlooked in conservation policy and academic discourse. This research examines how Indigenous and local marine governance systems are marginalized through jurisdictional fragmentation and data exclusion—particularly in settler states like Canada—and identifies opportunities to improve recognition and reporting mechanisms through integrated marine accounting and spatial analysis. Chapter 2 emphasizes the importance of biocultural indicators rooted in Indigenous knowledge systems and recommends the development of holistic, place-based measures of well-being; increased support for Indigenous-led conservation and monitoring; and policies that integrate Indigenous governance, knowledge, and values into decision-making processes at all levels.

Through a systematic review of peer-reviewed literature, Chapter 3 identifies, appraises, and synthesizes existing scholarship on conservation governance at the land–sea interface, with a particular focus on the following research questions:

- How has this literature evolved in recent decades, across different disciplines, journals, and geographic contexts?
- To what extent and how has the issue of jurisdictional fragmentation at the land–sea interface been addressed?
- To what extent and how have the rights and interests of IPLCs at the land–sea interface been addressed?

To assess and map governance overlaps, identify recognition gaps, and to propose a harmonized framework for inclusive marine conservation reporting in Canada, I conduct spatial analysis

using national systems such as the CPCAD and global databases such as the World Database on Protected Areas (WDPA). Chapter 4 presents these findings alongside a critical discussion of the structural and epistemological barriers to Indigenous inclusion in marine and coastal governance.

Following the systemic literature review and spatial governance assessment, Chapter 5 examines how philanthropic funding affects IPLC governance of coastal and marine territories. Using a cross-regional case study of Oak Foundation-supported initiatives in Chile, Malaysia, and Tanzania, the research investigates how decolonial philanthropy and intermediary governance models either support or constrain community-defined goals (Ray, 2020; Mitlin et al., 2007). Key questions include:

- How does philanthropic funding shape access to and governance of marine and coastal territories for IPLCs?
- What insights can be drawn from a cross-regional analysis of community-led conservation outcomes under philanthropic support?

By triangulating data from narrative reports, interviews, project documentation, and community co-authorship, this research identifies shared lessons across regions and uncovers structural constraints, including those related to intermediary roles, funding modalities, and global crises such as COVID-19.

Across all chapters, the importance of weaving Indigenous Knowledge (IK) with Western science in ways that respect the integrity of both systems is highlighted. Rather than subsuming one knowledge system within another, this research adopts the concept of “ethical space” (Indigenous Circle of Experts, 2018) as a basis for respectful intercultural collaboration. By recognizing IK as dynamic, adaptive, and situated, I hope to demonstrate how it contributes not only to monitoring and stewardship, but also to policy development, legal recognition, and ecosystem resilience. In sum, through the thesis I aim to generate evidence, frameworks, and reflections that can inform more just, inclusive, and pluralistic approaches to governing territories of life, especially in marine and coastal contexts where legal fragmentation, data gaps, and funding dynamics continue to hinder IPLC leadership and recognition.

Research Design and Rationale

My dissertation adopts a multi-scalar and multi-method research design to examine how jurisdictional fragmentation affects IPLCs governance and access across the land-sea interface. The project integrates conceptual, spatial, and community-based analyses to understand fragmentation as both a structural condition and a lived experience. It is anchored in five interrelated manuscripts that progress from global conceptualization to locally grounded practice, each contributing to a comprehensive understanding of governance at the land-sea interface.

Three of the manuscripts are global scale analysis. This scale provides the opportunity to synthesize emerging scholarship and identify conceptual advances and persistent gaps. It also offers a practical framework for integrating Indigenous values and relational accountability into policy and reveals persistent disciplinary and geographic silences that reproduce fragmentation at the global level. At the national scale, a spatial analysis of Canada's marine protected area systems critically interrogates the assumptions embedded in spatial governance tools. It reveals how data classification standards perpetuate fragmentation by obscuring IPCAs and misrepresenting governance realities. Finally, a community-level analysis, explores how conservation funding can shape and constrain Indigenous and community led governance. It conceptualizes philanthropy itself as a political and cultural terrain, where the design of funding mechanisms can either reproduce or help repair fragmentation.

Across these scales, the dissertation treats fragmentation as multi-dimensional; jurisdictional, ecological, epistemic, and scalar. This methodological framework was intentionally designed to match that complexity. Each method: conceptual synthesis, policy brief, systematic review, spatial analysis, and grounded comparative inquiry, targets a different dimension of fragmentation. By mobilizing the territories of life framework, this research centers relational, Indigenous and community led pathways toward reweaving fragmented governance at the land-sea interface.

Manuscripts

Chapter 1

Territories of life as key to global environmental sustainability¹⁹

Leila Vaziri Zanjani^a, Hugh Govan^{b & c}, Holly C. Jonas^d, Theodore Karfakis^e, Daniel Maghanjo Mwamidi^f, Jessica Stewart^g, Gretchen Walters^{h & i}, Pablo Dominguez^{j, k & l *}

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^aConcordia University, Department of Geography, Planning and Environment
Lab: Partners in Indigenous Conservation and Environmental Futures
Concordia University registered address: Sir George Williams Campus
1455 De Maisonneuve Blvd. W.
Montreal, Quebec, Canada.
H3G 1M8
leila.vazirizanjani@mail.concordia.ca

^bLocally Managed Marine Area (LMMA) Network International
PO Box S-37, Superfresh, Suva, Fiji Islands.

^cAdjunct Senior Fellow
University of the South Pacific (USP)
School of Law and Social Sciences (SoLaSS)
Suva, Fiji Islands.
hgovan@gmail.com

^dGlobal Coordinator, ICCA Consortium
ICCA Consortium
Chemin Très-chez-Roget 1, 1272 Genolier, Switzerland.
holly@iccaconsortium.org

^eHead of the board of directors and scientific advisor of Terra Sylvestris
Director of the Kalamos Island biological field station
31081 - Kalamos Island, Levkas, Greece.
tedkarfakis@terrasyvestris.org

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^fLaboratory for the Analysis of Social-Ecological Systems in a Globalised World (LASEG),
Institute of Environmental Science and Technology, Autonomous University of Barcelona, Spain.
dmmwamidi@gmail.com

^gProgramme Officer, Conserving Land and Seascapes Programme
UN Environment Programme World Conservation Monitoring Centre (UNEP-WCMC)
219 Huntingdon Road, Cambridge, CB3 0DL, United Kingdom.
jessicalilystewart@hotmail.com

^hInstitute of Geography and Sustainability, University of Lausanne, Lausanne, Switzerland (main affiliation)

ⁱDepartment of Anthropology, University College London, London, United Kingdom (secondary affiliation).
gretchen.walters@unil.ch

^jLaboratoire de Géographie de l'Environnement (GEODE), UMR 5602 CNRS - Université Toulouse 2 (France), 5, Allée Antonio Machado, 31058 – Toulouse, France (main affiliation).

^kDepartament d'Antropologia social i cultural (AHCISP), Universitat Autònoma de Barcelona, 08193 – Bellaterra, Spain (secondary affiliation).

^lLaboratoire Population-Environnement-Développement (USAGES), UMR 151 IRD - Aix-Marseille Université, Centre St Charles, case 10, 3 place Victor Hugo, 13331 Marseille, France (secondary affiliation).

*Corresponding author
eco.anthropologies5@gmail.com

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Abstract

The territories and areas that Indigenous peoples and local communities (hereafter territories of life) govern, manage and conserve are increasingly recognized as central to the future of a healthy and sustainable planet, including by scientists, international agencies, non-governmental and grassroots organizations. Hundreds of thousands of such social-ecological systems exist worldwide, covering millions of square kilometers of land and seascapes on all five continents, contributing to the conservation and sustainable use of a very significant proportion of the world's biodiversity. Nevertheless, these systems are facing many threats and often have little to no formal recognition or support from nation-state governments. In order to address this growing need, the text provides the most complete, recent and updated global overview of these, while advocating for a holistic approach of territories of life and identifying key opportunities for researchers to favor action- and policy-oriented research in support of such key systems for global sustainability.

What are “territories of life”?

Territories of life is a concept developed for over a decade of partnership and negotiations by the Indigenous and non-Indigenous partners of the ICCA Consortium (<https://www.iccaconsortium.org/>), organization to which all authors of this text are members, and that has been proposed as a more tangible and inspiring term than the more frequently used *Indigenous peoples and local Communities* (here after IPLCs) *Conserved Areas and territories* or its abbreviation ‘ICCA’²⁰. It is important to note that Indigenous peoples and local communities were front and center during the process formulating this new wording. In fact, the ICCA Consortium grew out of a movement in support of IPLCs and composed by many IPLC members pushing for greater equity and inclusivity in conservation during the decades around the turn of the Millennium. This organization was officially established in Switzerland in 2010 as an International Association under the Swiss Civil Code, and it is a civil society organization membership-based and supported by an international semi-volunteer secretariat based in twenty-two countries. The ICCA Consortium defines territories of life (or ICCAs) as “territories and areas conserved by Indigenous peoples and local communities”, which share certain commonalities and three key characteristics: (i) a specific community that maintains strong and deep-seated links with a specific territory or area; (ii) this community is a key actor in the process of decision-making relative to the territory or area and its resources; and (iii) this governance system contributes to the responsible and sustainable management of the ecosystems and of the community’s tangible and intangible heritage (Sajeva, Borrini-Feyerabend & Niederberger, 2019). The concept refers to age-old, widespread, diverse and dynamic systems that have as many different names as the peoples and communities who sustain them around the world. For example, *wilayah adat*, *kaw*, *himas*, *agdals*, *tagal*, *yerli qorukh*, *faritra ifampivelomana*, *oran*, *ili*, *asang*, *rumak*, *qoroq-e bumi*, *sapari*, *baldíos*, *comunales*, *crofts*, *regole*, *cayolar*, and *aschii* among thousands of others. In broader contexts, they may be referred to as, or encapsulated within, concepts with clear political and legal connotations such as *commons*, *ancestral domains*, *country*, *territorios autonomos comunitarios*, *territorios del buen vivir* or *LMMA*s. However, as explained by Sajeva, Borrini-Feyerabend & Niederberger (2019, p5) “For the custodians of such ‘territories of life’, the connection between their community and territory is much richer than any single word or phrase can express. It is a bond of livelihood, energy and health. It is a source of identity and culture, autonomy and freedom. It is a link among generations, preserving memories from the past and connecting to the desired future. It is the ground on which communities learn, identify values and develop relationships and self-rule. For many, it is also a connection between visible and invisible realities, material and spiritual

²⁰ E.g. [Convention of Biological Diversity](https://www.cbd.int/doc/publications/cbd-ts-64-en.pdf) (CBD: <https://www.cbd.int/doc/publications/cbd-ts-64-en.pdf>), the [International Union for Conservation of Nature](https://www.iucn.org/news/protected-areas/201905/iccas-biological-and-cultural-diversity) (IUCN: <https://www.iucn.org/news/protected-areas/201905/iccas-biological-and-cultural-diversity>), or the [United Nations Development Program](https://sgp.undp.org/about-us-157/partnerships/icca-gsi.html) (UNDP: <https://sgp.undp.org/about-us-157/partnerships/icca-gsi.html>)

wealth. With territory and nature go community life and dignity, and self-determination as peoples”.

The concept “territories of life” is by nature generic and is only intended to provide an ‘umbrella’ for the sake of intercultural understanding and communication about phenomena that are necessarily place-based and context-specific, each with its own name imbued with unique values and practices, while providing more identifiable meanings than most acronyms can. However, Indigenous peoples and local communities are the ones who choose if to use it strategically to advance their self-determined priorities for their people and territories, including in nation-state policy and legal frameworks, both domestically and internationally.

In the worldviews of many Indigenous peoples and local communities, biological and cultural diversity are uniquely linked (Yunkaporta, 2020). Their identities, cultures and ways of life have most often been deeply embedded in their relationships with the environments upon which they depend. For example, Awâsis, an Indigenous scholar from the Anishinaabe First Nations of Canada, explains that being Anishnaabe means to be and do simultaneously: “Anishinaabewin is an action, it is embodied *gkendaasowin* (knowledge) that is lived, experienced, and attained through direct interaction with the land (Awâsis, 2020)”. These interactions and relationships are historic, and most often inscribed in the biodiversity of ecosystems (Odonne & Jean-François, 2020) and ever-evolving into continuous diversification of life and adaptations of sustainable practices (Dawson et al., 2021). Consequently, Indigenous and local knowledge systems rooted in their collective lands, waters or territories are equally diverse and exclusive to the Indigenous peoples or local communities who produce and sustain them (Renom, Mwamidi, & Domínguez, 2020). Governance institutions embedded in such territories are distinctive, time and place based, and generally guided by the holistic values of respect, reciprocity, relationality and responsibility (Absolon, 2010; Aswani, 2019; Brondízio et al., 2021; McGreavy et al., 2021). In fact, the cultural grounding and deep connection of Indigenous peoples and local communities with their territories and ecosystems has proved to equip them with an array of resilience strategies in the face of social and environmental change (Walters et al., 2021; Domínguez et al., 2012; Caillon et al., 2017; Palazzo & Bardsley, 2021).

Although the term ‘*Indigenous peoples and local communities*’ is widely used (e.g. in reference to ICCAs), there are important differences between these two human groups that should be respected, and they should not be conflated. Indigenous peoples have internationally recognized rights arising from their self-identification as Indigenous peoples (see the UN Declaration on the Rights of Indigenous Peoples adopted by the UN General Assembly in 2007), while local communities are not yet a clearly defined group under international law. However, a growing body of knowledge, policy and law recognizes the rights of non-Indigenous communities whose identities, cultures and ways of life are intimately connected with specific areas and resources. While we fully acknowledge the differences in terms of historical rights and international recognition, in the present article ‘Indigenous peoples and local communities’ are both

considered in an effort to put the focus on the stewardship role of both groups within the notion of territories of life, as there are or can be many positive synergies between the two, particularly in the context of their links between cultural diversity and global sustainability.

We fully recognize there are evolving concerns from Indigenous Peoples around the complexities and implications of the use of the term ‘Indigenous peoples and local communities’²¹ (Jonas, 2017). There is also increasing awareness of the need for better recognition of both Indigenous and community governance and management, and their rights to lands and resources, which are often not legally recognized. There are increasing threats to the lands and waters that are under the care of Indigenous peoples and local communities and both of these diverse groups require support and appropriate recognition for their self-determined practices. Therefore, considering these two groups together in the present article, is a means of highlighting an important research gap that, if addressed well, could support key custodian communities of much of our planet (independently of if Indigenous or not).

Aims

A key aim of this review is to provide the most up to date review on the state of territories of life and their values in terms of sustainability. Simultaneously it aims to identify existing key insights into policy, legal and institutional developments, along with threats and challenges to both persistence and recognition of territories of life. A review of this scale with the aforementioned diversity of elements in a sole text is not frequent. Moreover, our review makes a special effort to open the scope to highly valuable reports and other grey literature in this arena that are less accessible to the public and less considered in previous reviews. We have taken into account over a dozen titles of this kind. At the same time, readers can access more information through the extra grey literature that can be found mostly in the reports we reference in this article. One more novel aspect of our review is that it highlights the outstanding presence of marine territories of life that are frequently overlooked by researchers and policy/decision makers alike. Ultimately, the aim of this review is to identify key opportunities for action and policy-oriented research supporting the contributions of territories of life to conservation of global biocultural diversity and sustainability efforts as reflected at the end of the paper.

Methods

Narrative Review

This article has chosen a “narrative review” methodology due to the diversity of territories of life and the interdisciplinary nature of engagement with them in the past decades, as well as the sheer number, type and language of publications examining these systems directly or indirectly. Narrative reviews describe existing knowledge on a specific idea for examining subjective, dynamic and situated realities (Sukhera, 2022). This type of review is generally used to identify gaps in knowledge and to offer insight for future research and policy action (Ferrari, 2015;

²¹ CBD, "Compilation of Views Received on use of the term "Indigenous Peoples and Local Communities," UNEP, Montreal, 2013

Sukhera, 2022). This review uses territories of life as a conceptual framework and the contents are “separated according to dependent or independent variables and their relationships (Ferrari, 2015) and has adapted the six-phase narrative review process proposed by Greenhalgh et al. (2005): planning, search, mapping, appraisal, synthesis and recommendations.

This research conducted searches using “Web of Knowledge”, “Scopus”, “Google Scholar” as well as gray literature through specifically selected keywords as described below.

Simultaneously, Levac et. al. (2010) recommend including stakeholder consultation as part of such narrative review processes. In this sense, direct quotes and inputs from Indigenous peoples and local communities, as well as the consultation step of indirect stakeholder involvement is represented here through the wide networks and well-established relationships of the co-authors with Indigenous peoples and local communities, as well as with some of the main international agencies and organizations that support such systems, who together have over two decades of experience in collaborative research and allyship. In fact, the co-authors of this study include honorary members and the global coordinator of the ICCA Consortium who are by profession academics at different research centers, advisors to different international organizations in this field as well as experts in mapping and registering territories of life in global databases (e.g. <https://www.iccaregistry.org/>).

To develop the search protocol, key words were selected based on the three common characteristics of territories of life described in the introduction. Categorization of the literature identified the following main themes in which territories of life have been examined: spatial coverage, natural realms (terrestrial and marine), culture, policy, development and sustainability. The following sections map evidence related to these themes.

Evidence base for Indigenous peoples' and local communities' contributions to biodiversity and nature conservation at global scale



Fig 1. Spatial representation of the publications reviewed for this article (a total of 166 titles listed in annex). Those in purple (106) correspond to IPLC site based studies and the remaining 60 correspond to non IPLC site based studies focused on territories of life (e.g. global reports, policy publications, etc.).

Indigenous peoples and local communities have developed complex and place-based knowledge and governance institutions that enable sustainable use of resources and conservation of much of the world's biocultural diversity (Studley, 2019; Ban, Wilson, & Neasloss, 2019; Gould et al., 2021). Here we provide some examples. The Kham peoples are situated at the eastern end of the Himalaya between Qinghai-Tibetan plateau and China and they comprise various ethnicities, linguistic ecologies with multiple shamanistic and animistic cultural practices and lived experiences (Studley, 2019). The eco-spiritual relationships of the *Kham* peoples of southwest China with their sacred natural sites, knowledge of fauna and flora and governance of natural resources are inherently sustainable and unique (Studley, 2019). Similarly, the Kitasoo/Xai'xais people of the west coast of Canada consider the ocean sacred and their governance structure is based on their laws of "respect, reciprocity, intergenerational knowledge, and interconnectedness" (Ban, Wilson, & Neasloss, 2019). The hereditary chiefs of the Kitasoo/Xai'xais people take on the responsibility of caring for land and water and to ensure abundance of species as well as territorial health (Ban, Wilson, & Neasloss, 2019). While Mwanda-Marungu pastoral commons in Taita hills, south-west Kenya, have been managed sustainably for centuries through customary norms that have proved to continually provide ecosystem services to the local communities, wildlife and livestock (Mwamidi, Nunow, & Dominguez, 2023). Although there is a growing evidence base on the conservation contributions

of Indigenous peoples and local communities in specific territories or areas, there are still few studies with a global scope, and even fewer encompassing the two types together (Indigenous peoples and local communities), which the notion of territories of life holistically addresses. In this sense, in an effort to estimate the potential global extent and conservation values of territories of life, the UN Environment Programme World Conservation Monitoring Centre (UNEP-WCMC) and the ICCA Consortium collaborated on a global spatial analysis (UNEP-WCMC & ICCA Consortium, 2021). This drew on the best available data, including from other spatial analyses, such as the companion report by UNEP-WCMC and several other organizations (WWF et al., 2021), which itself drew heavily on a pre-existing dataset of Indigenous peoples' lands (Kumari, Chauhan, & Shankar, 2021).

This UNEP-WCMC and ICCA Consortium analysis revealed that territories of life could cover at least 28 million km², which is over one-fifth (21%) of the world's land surface, and an area approximately the size of the African continent. At the same time over 17% of the world's land is uniquely covered by potential territories of life, i.e., territories of life that lie outside existing state and privately governed protected and conserved areas (UNEP-WCMC & ICCA Consortium, 2021). In another estimation, WWF et al. (2021) reports that 43 million km² of terrestrial ecosystems (approximately 32% of the world's land) is under the *de facto* or *de jure* governance of Indigenous peoples and local communities.

It is important to note that these estimates only cover territories and areas in terrestrial systems. No marine spatial data was used. The engagement of academic research with coastal and marine territories of life is considerably small compared to their terrestrial counterparts. Therefore, there is a relative scarcity of available literature on the spatial coverage of marine and coastal territories of life, as well as their contributions to conservation of biocultural diversity and sustainable use of resources (Blythe et al., 2020; Resende et al., 2021). Nevertheless, the approach of Locally Managed Marine Areas (LMMAs)²² are a powerful force in the Pacific Islands, Southeast Asia, Latin America, Western Indian Ocean and East Africa. Despite low government support, the proliferation of LMMAs in the Pacific Islands of Oceania, where community-based protected areas make up 37.5% of protected areas (Nimwegen et al., 2022), shows the potential of area-based approaches to achieve sustainable management of some of the most biodiverse marine areas on the planet, particularly coral reef ecosystems (Govan & Arju, 2021; Roccliffe et al., 2014). LMMAs are one example of territories of life-based management in the Pacific Islands of which the latest survey has counted 662 examples covering 1028 communities (Govan & Lalavanua, 2022), which are usually based on customary marine tenure or acknowledged indigenous management rights over nearby coastal areas such as the Fijian traditional fishing grounds, Qoliqoli. Such rights may even be acknowledged in the national constitutions (e.g. Vanuatu). But even where there is legal ambiguity, traditional governance and

²² Areas of nearshore waters and coastal resources that are largely or wholly managed at a local level by the coastal communities, land-owning groups, partner organizations, and/or collaborative government representatives who reside or are based in the immediate area (Govan et al., 2008).

rights form part of plural legal systems (Rohe et al., 2019). Consequently, the extent of the planet that is actually governed, managed and conserved by Indigenous peoples and local communities would be in fact even considerably greater than what has been spotted by all these different analyses, and granting so even greater importance to territories of life as key to global environmental sustainability.

In terms of biodiversity value, territories of life could cover at least 33% of Intact Forest Landscapes as defined in footnote²³ and nearly one-third (32%) of areas that are considered key to reversing biodiversity loss, preventing CO₂ emissions from land conversion and enhancing natural carbon sinks (Fa et al., 2020). Given the importance of forests for sustaining livelihoods and climate mitigation, it is crucial to expand support to forested areas conserved by Indigenous peoples and local communities (Brondízio et al., 2021). For example, the Garo people of Bangladesh have been applying their ethnobotanical knowledge in agroforestry since time immemorial. Through their agrosilvopastoral²⁴ system, the Garo produce sustainable crops while maintaining forest cover and health] (Rahman & Fardusi, 2012). Similar practices have been observed in the Bedouin of the Negev Arid Highlands. The role of territories of life in mitigating the effects of climate change and monitoring climate drivers that are modifying landscapes and seascapes has also been recorded by multiple scientists (Schlingmann et al., 2021; Charles, 2012; Kumari, Chauhan, & Shankar, 2021; Loch & Riechers, 2021; Perry et al., 2010). The National Adaptation Strategy of Canada (2022), includes key opportunities for national, provincial and non-governmental actors to invest in co-developed and co-implemented (with Inuit, Métis and First Nations) climate resiliency programs and nature-based solutions to mitigate the effects of climate change (Perry et al., 2010; Vogel et al., 2022). Simultaneously, Indigenous peoples and local communities can also act as important monitors for climate change and thereby contribute directly to conservation. A prime example comes from the Arctic with the Inuit, where they observed the significant changes happening and have contributed significantly to the debate about climate change using indicators as diverse as caribou meat and weather patterns to migrations of various animal species (Vogel et al., 2022). Other examples exist from mountains of Tajikistan and Indian Himalaya that illustrate the value of Indigenous communities in monitoring climate change and its impacts where a diverse array of monitoring variables from animal migration patterns to vegetation changes are reported providing invaluable records for high altitude areas (e.g. Haag et al., 2021; Negi et al., 2021; IUCN, 2012).

²³ Following the definition of (Potapov et al., 2018), an Intact Forest Landscape is a seamless mosaic of forest and naturally treeless ecosystems with no remotely detected signs of human activity, and a minimum area of 500 km². They are large enough to maintain all native biodiversity and are crucial for carbon storage and regulating hydrological regimes, as well as other ecosystem functions (Potapov et al., 2018).

²⁴ As defined by United Nations Economic and Social Commission for West Asia (UN-ESCWA): Multiple land use including livestock breeding, forestry and cultivation, integrated crops, trees, pastures/animal systems.

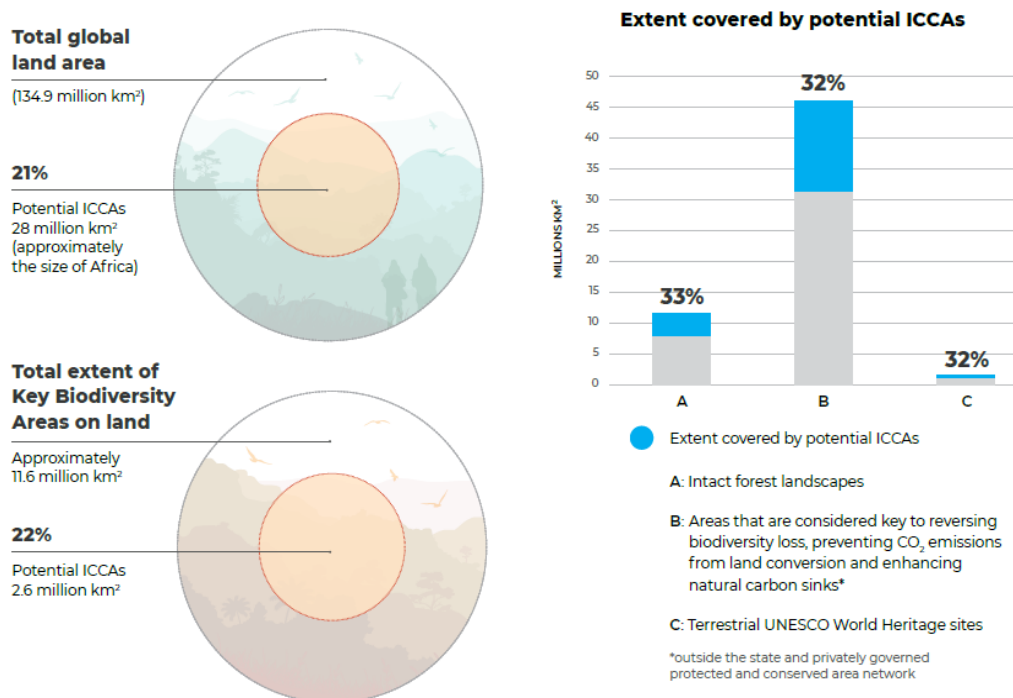


Fig 2 Graphic depiction of some of the key findings of the global spatial analysis conducted by UNEP-WCMC and the ICCA Consortium²⁵. The graphs on the left-hand side illustrate the estimation that potential territories of life cover more than one-fifth of the world’s land and over one-fifth of the extent of the world’s terrestrial Key Biodiversity Areas. The bar graph on the right-hand side shows that potential territories of life cover at least one-third of intact forest landscapes globally and nearly one-third of areas that are considered key to reversing biodiversity loss, preventing CO₂ emissions from land conversion and enhancing natural carbon sinks.

Also, the notion of ecosystem services, although it could be considered an anthropocentric western-centered framing (Paing et al., 2022), is increasingly used to measure the effectiveness of protected and conserved areas, including under different governance and management arrangements. In this context, for example, many rice agro-ecosystem of the Benguet and Ifugao peoples in Northern Philippines are managed as sacred sites that lay the ground for provisioning (food, income, etc.) and regulating (purification of water, and climate regulation) while canalizing meaningful cultural practices (ritual purposes, rice wine-making, holy mass offering, educational information, preservation of memories). These systems are sustained through traditional watershed management known as “*Muyong* systems” (woodlot planted with trees which is owned by a clan for generations). The vast contributions of Indigenous ancestral territories to maintaining ecosystem services have been also recorded in the Colombian, Peruvian

²⁵ The lead author and several other co-authors of this paper are also lead authors and co-authors of this 2021 Territories of Life Report by UNEP-WCMC and ICCA consortium, and are therefore also co-authors of the figure that is now brought into this paper.

and Brazilian Amazon forest, in forested areas of Myanmar (both conserved and degraded), Indigenous territories in northern Australia and Fiji, the Gangetic basin in India, coastal and marine Indigenous territories in Papua New Guinea and Torres Strait islanders in Australia. These are a few examples where Indigenous peoples and local communities sustain ecosystem services that benefit not only themselves but also larger populations on national and global scales (Haag et al., 2021; Negi et al., 2021; Diele-Viegas & Rocha, 2020; Kam, 2020; Watkin, 2012; Rasheed, 2020).

Territories of life are also key in sustaining cultural practices, such as ceremony, language, and Indigenous technologies and knowledge systems (Caillon et al., 2017; Palazzo & Bardsley, 2021; McIvor, 2020). Many Indigenous peoples and local communities consider wellbeing, mental and physical health and good living to be a community issue rather than an individual effort (Stoeckl et al., 2021; Vélez et al., 2020). Community wellbeing is intertwined with the health of ecosystems, promotion of traditional practices, rituality, traditional medicines and diet, among other aspects of living on a given territory (Vélez et al., 2020). For example, the Mantheding Community in Limpopo Province of South Africa (Rankoana, 2016) and the Sakha peoples of Yakutia²⁶ (Swiderska et al., 2022), carefully and collectively manage and harvest medicinal plants and assure that their health is guaranteed by maintaining a diet from native crops.

Variable policy, legal and institutional recognition statuses of Indigenous peoples' and local communities' contributions to conservation

As local-to-global understanding of the contributions of Indigenous peoples and local communities to biological diversity and nature conservation has grown, so too have different forms of recognition and support. This has occurred both in multilateral and international contexts and within domestic contexts in several countries around the world.

Since 2004, the UN Convention on Biological Diversity (CBD) and the International Union for Conservation of Nature (IUCN) have recognized the rights and roles of Indigenous peoples and local communities, including territories of life specifically, in several decisions of their respective bodies (Jonas, 2017), which has led to several countries (such as Malaysia and Senegal) incorporating such language into national and sub-national policy and legal frameworks related to biodiversity and area-based conservation. In the 2011-2020 Strategic Plan for Biodiversity and Aichi Targets and related decisions, CBD Parties adopted and subsequently defined a new term, “other effective area-based conservation measures” (abbreviated as OECMs). OECMs could possibly provide another avenue for recognizing and supporting Indigenous peoples' and local communities' contributions to conservation (Jonas, 2017) and for continuing to shift area-based conservation towards genuinely equitable and effective conservation (Jonas et al., 2021). Some Indigenous peoples and local communities in both marine and terrestrial environments have used the concept of OECMs to strengthen ties to their

²⁶ For more information on the health issues of the Sakha peoples please refer to the publications of Yakut Research Centre for Complex Medical Problems SB RAMS, Yakutsk.

territories as they offer a venue for diversified governance and management as well as decentralized conservation of natural resources recognised within state systems (Alves-Pinto et al., 2021; Woodley, Jarvis, & Rhodes, 2021). However, given OECMs were only defined by the CBD in 2018, there is still relatively limited experience in national contexts and there are concerns that some countries might misuse the concept to meet spatial conservation targets without ensuring proper application of the standards and safeguards (Jonas et al., 2021). There are also concerns about sparse distribution, disconnectedness from officially recognized networks of protected and conserved areas and vague legal language that may lead to governance disputes (Alves-Pinto et al., 2021). Nonetheless, they remain as an avenue for the recognition of Indigenous peoples and local communities' governance. A proposed example is the *section de commune* in France, numbering as many as 40,000. Having a pre-Roman heritage, they took their present form during the Middle Ages when lords ceded land to peasants for management as a common (Potapov et al., 2018). These collectively managed agricultural and forest lands, are often found in protected areas and biodiverse habitats (Pouvreau & Ragache, 2022). In one case governance of a common by a *Commission Syndicale*, in charge of managing forests over centuries, and the presence of a nationally recognized biodiversity zone, clearly demonstrate that when these territories have the right to self-govern, they can effectively manage their resources and so contribute to the Global Biodiversity Framework as an OECM (IUCN, 2012). Multiple marine areas in Indonesia have been identified as potential OECMs including the Kabu Kaya local communities. The Kabu Kaya have “increased harvest rates of mud crab fisheries and protected their forest through temporary fishery closure (Estradivari et al., 2022)”.

In the UN CBD process to agree the post-2020 Global Biodiversity Framework, there was a strong push from the Indigenous, youth, women's and civil society caucuses to include clear recognition of Indigenous peoples' and local communities' rights, including to free, prior, and informed consent, Indigenous and local knowledge, customary sustainable use, equity, and a rights-based approach to implementation of the post-2020 framework²⁷. The Kunming-Montreal Global Biodiversity Framework, agreed in December 2022, now recognizes²⁸ the rights of Indigenous Peoples and local communities, including their lands and territories, as well as their roles and contributions to conservation. It also recognizes the integrity and distinct nature of Indigenous and traditional territories to conservation beyond the mainstream categories of Protected Areas and OECMs, and the need for access to justice and protection for environmental defenders.

In several countries, Indigenous peoples and local communities have advocated for policy, legal and institutional recognition and support for their rights in general and in the specific context of conservation law and policy. Simultaneously, Indigenous peoples and local communities have employed diverse and innovative approaches in recovering and protecting their territories as well

²⁷ (CBD), Convention on Biological Diversity, "Kunming Declaration: Available at: <https://www.cbd.int/doc/c/c2db/972a/fb32e0a277bf1ccfff742be5/cop-15-05-add1-en.pdf>.

²⁸ Commitment number 10 and 15, P 4, Kunming Declaration (2021)

as in decolonizing research on conservation governance. In Canada, Indigenous Protected and Conserved Areas (IPCAs) and the Indigenous Guardians Initiative are among such programs (Indigenous Circle of Experts, 2018). For example, the Tongait KakKasuangita SilakKijapvinga – Torngat Mountains National Park was established with the negotiation and consent of Labrador Inuit, Nunavik Inuit and in collaboration with Parks Canada, and is managed through a cooperative management board (Indigenous Circle of Experts, 2018). In the Arctic, to fight against historic loss of tenure, working within the Finnish legal context, some *Sámi* and Finnish villages purchase private land and restore community rights enabling them to manage the land for biodiversity protection (Mustonen, 2017). In Italy’s autonomous region of Aosta, collective pastures and woodlands known as *consortories* were recognized for their role in protecting the environment, culture, and for collective and intergenerational solidarity (Louvin & Alessi, 2021). The increasingly favorable legal context appears to facilitate the recognition of territories of life in northern Italy (Bassi, 2022). Switzerland also recognizes commons institutions as a balancing act of maintaining decision-making power and in working with the state, and in between traditional ways of organizing, and taking on new responsibilities related to land management (Haller, 2021). In Scotland, after historical enclosures of their commons, and in the interest of austerity, the government initiated the Community Empowerment (Scotland) Act 2015, which since 2017, amongst other things, has created the Community Asset Transfer scheme, allowing communities to buyout publicly owned land to create community woodlands (Sharma, Walters, & Ghazoul, in press). In Spain, the Valdeavellano de Tera Declaration vigorously called for the recognition of territories of life (Iniciativa Comunes, 2013) and Iniciativa Comunes developed an innovative peer-reviewed protocol by local communities for the recognition of such systems in the UN based ICCA Registry, which has integrated many of the practices led by this NGO. However, recognition of community governance is not the same case for other European countries. For instance, commons are generally legally unrecognized and unprotected in most of the EU as well as in countries in accession talks, while they are thought to cover over 9% of its territory²⁹, with cases in the Balkans where local communities have co-produced some of the largest mountain pastoral ecosystems in Europe, which have been even recognized as part of a UNESCO Biosphere Reserve, and still are turned into military grounds by simple decree law, with no consultations involving local communities, and not even an environmental, socio-economic or health public assessment (e.g. <https://sinjajevina.org/>). Or other commons in France which are increasingly appropriated by the state for other purposes (Joye, 2021). These territories have been threatened since the French revolution, with regularly instated laws which favor private over common property (Joye, 2021) and in 2013, reducing the capacity of communities to self-govern, while placing most of these territories under the supervision of the local authorities, without consultation again, and facilitating their transfer to state control. A coalition of elected

²⁹ Eurostat 2013: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Farm_structure_survey_%E2%80%93_common_land#Statistics_on_common_land

officials, legal scholars, activists, and researchers collaborate to change this legal framework to favor commons in France (Hymas, J.-F., & Walters, 2021).

However, protected areas under co-governance, shared governance and governance by Indigenous peoples and local communities are expanding worldwide (Reed et al., 2021). Indigenous Protected Areas in Australia and granting personhood to rivers in Aotearoa/New Zealand are a few examples of the diversification of conservation governance and management arrangements that are led by Indigenous peoples (Macpherson & Ospina, 2020). The Ngadju Land Claim received state recognition in 2014 after 2 decades of active engagement of the Ngadju people with the Australian legal system³⁰. “The Traditional Owners of a large part of the Great Western Woodlands, the Ngadju people, retain their knowledge of and connection to the country³¹” and practice traditional fire management within their territories.

In a number of countries in Africa, and even if the many imperfections they have been object of, governments have recognized community contributions to conservation through decentralization and devolution of certain rights, for example, through communal conservancies in Namibia, wildlife conservancies and beach management units in Kenya, Wildlife Management Areas in Tanzania, and Community Forest Management Areas in Zambia (Nelson et al., 2021). In Latin America, Colombia is among the leading examples with its *resguardo* system and Mexico with its *ejidos*, although these are more generally rooted in land rights and Indigenous rights, than in conservation outcomes as such (Burgos-Ayala et al., 2020). The high proportion of community-based (47.6%) and low level of government managed protected areas (13.4%) in the Pacific Islands is partly attributed to countries explicitly recognizing Indigenous tenure and access rights, or similar hybrid arrangements (Nimwegen et al., 2022). All in all, each of these country-specific forms of recognition and support comes with potential benefits and opportunities as well as potential risks, gaps and drawbacks. But as international recognition of Indigenous peoples’ and local communities’ contributions to conservation continue to strengthen, it is likely that pressure will increase on nation-state governments to do the same within their respective contexts.

Threats and challenges

At least a quarter of Indigenous peoples’ and local communities’ lands and territories could face a high level of future development pressure, particularly from commodity-based and extractive industries (WWF et al., 2021). Extractive industries threaten many resource-rich territories of life, including on Arctic ecosystems, tropical forests in South America and Africa and highly productive coral reef systems (Diele-Viegas & Rocha, 2020; Fohringer et al., 2021; Scullion et al., 2019). Competing land use pressures and expropriation from both industrial and conservation sectors have made large parts of territories of life functionally unavailable to their custodians, stemming in large part from lack of or insufficient recognition of their collective and individual

³⁰ Government of Australia: <https://www.dcceew.gov.au/environment/land/indigenous-protected-areas>

³¹ <https://ngadjuconservation.org/>

rights³² (RRI, 2020). Entire territories of life or large parts of them are under the increasing threat of irreversible natural and cultural degradation, for example, industrial agriculture encroaching on the wintering grounds of the Shahsevan Nomadic Tribal Confederacy in Iran and reindeer herders in *Sámi* territory, intensive ranching in the Brazilian Amazon, or industrial logging encroaching on the territories in Gabon (Macpherson & Ospina, 2020; Fohringer et al., 2021; Cenesta, 2017; Betts et al., 2021; Evine-Binet, 2022). The access to wintering grazing grounds of the nomadic *Sámi* reindeer herding peoples of northern Sweden is heavily disrupted by mining activities. In 2018, 11 mining complexes were actively exporting minerals from the wintering grounds while conducting exploratory studies in other grounds that are part of the *Sámi* territories of life. Both *Sámi* and Finnish village territories in Finland have also been threatened by extractive industries as well as a lack of recognition of communal land tenure (Mustonen, 2017). For the coastal Indigenous peoples of northwest America, the considerable decline in pacific herring populations, has become synonymous with extreme sadness and depression (Odonne & Jean-François, 2020). These Indigenous communities have long-standing reciprocal relationships with herring and the loss of access to this species, due to prohibition of traditional harvest, large-scale commercial fishing, etc., has resulted in the erosion of their lived cultural experiences. More recently, Indigenous communities have acted to maintain their cultural continuity such as negotiating with governmental organizations and commercial fishing companies or demanding co-management of fisheries and Supreme Court cases (Odonne & Jean-François, 2020).

At the same time, lack, unclear, inefficient or insufficient legal recognition of customary rights of Indigenous peoples and local communities to their land, freshwater and sea territories (and access to and use thereof) has led to many disputes with the private and public sectors. For example, Indigenous peoples in West Papua have had long-held strong claims to forests that are subject to fast land use change in favor of expanding oil palm monoculture plantations. Since 2001, two laws (Special Autonomy Law) specifically recognized the governance institutions of Indigenous peoples over “Tanah Adat or Tanah Ulayat (customary land)”. At the same time, in 2012, the Constitutional Court of Indonesia of which West Papua makes part, ruled that forests under customary land tenure are no longer under the control of the state. But the insufficient elaboration of customary governance in these laws has led to confusion, land disputes and misinterpretation by different parties in their implementation (Runtuboi, 2020). Such land disputes have been recorded in multiple other community managed forests across the world. Even though Indigenous groups in Bolivia and Ecuador have formal recognition of territory by state, extractive industries continue being a major threat to Indigenous sovereignty and governance over their territories and communities. This is due to lingering colonial structures and conceptions of sovereignty, resource management, ownership and power imbalance (Radhuber & Radcliffe, 2022). Clarification of terms related to governance and management of customary lands and waters, and increasing the capacity of state laws and structures to adapt to

³² <https://ipbes.net/global-assessment>

the many forms of territories of life is essential for their continued existence and thriving as populations and resource-use pressures continue to grow.

Key opportunities for action- and policy-oriented research

Territories of life are key to equitably governing and sustainably managing biological and cultural diversity for a healthy planet. Researchers in relevant fields may assist communities in a number of key conservation and policy-oriented studies. For instance, research projects that are co-designed and co-created with IPLCs often offer opportunities for communities in their self-determination and self-strengthening processes. It is important to note the growing diversity of such processes on a global scale such as cultural revitalization and Indigenous resurgence, decolonization, and sustainable self-determination. Below are some of the key identified opportunities for action- and policy-oriented research in relation to territories of life that we have been able to distill from our review:

- Support, share knowledge, and collaborate with IPLCs in various aspects of documenting their territories of life and biocultural diversity to help toward safeguarding Indigenous languages and cultures and to strengthen self-awareness, mutual recognition, and support from other communities, as well as from relevant state authorities, where they wish to seek it.
- Support communities to employ innovative approaches to documenting their territories and practices such as through story mapping or through submitting information to global platforms such as the ICCA Registry hosted by UNEP-WCMC. Mapping of biocultural diversity may also be in the service of safeguarding Indigenous languages, decolonizing mapping practices, countermapping, and spatial justice.
- Create and hold equitable and inclusive spaces for researchers and scholars from IPLCs to foster collaboration, colearning, and the reinforcement of community leaders. Support IPLCs to develop adaptable tools to communicate the diversity and nuances of their territories of life, governance systems, and practices. Explore the holistic views of many IPLCs, including reducing the dominance of bio-ecocentric views in conservation.
- Advancing supportive legal, policy, and institutional frameworks at national and international levels, including the great conventions deciding on global matters, as well as through support from lawyers, legal practitioners, and decision-makers with relevant research and knowledge.
- Advance research on collaborative forms of conservation, value of Indigenous and local knowledge in sustainable resource management, and sociocultural and economic benefits as well as legalities of cross-natural realm governance and stewardship of territories of life.
- Providing relevant information and support tools for IPLCs to advocate for and secure their rights and territories of life on their own terms (e.g. in legal claims or court cases). Critically assessing existing and potential forms of nation-state recognition and support for territories of life.

- Advancing funding mechanisms that engage with IPLCs in conservation and sustainability initiatives, with priority given to understanding how to improve direct funding support for territories of life.
- Further, the engagement and recognition of the efforts of Indigenous and traditional community members in ecosystem and monitoring such as identification of species with respect to decision-making for nature conservation and contributions to relevant scientific research.

Although territories of life exist all around the world and their contributions to maintaining biological and cultural diversity have been essential for millennia, nuanced understanding of many of their aspects and dynamics is still very limited, while transmission of their values to decision-makers is only in an emergent state, and scientists can do a lot to reverse this situation. Territories of life are not only contributing significantly to global sustainability, but they are also under immense pressures from interconnected global social and environmental changes. It is therefore important, necessary, and urgent for the research community to mobilize in solidarity with the active support of IPLCs who are governing, managing, and sustaining their territories of life and to which our global sustainability is linked.

Chapter 2

Policy Brief 1: Measuring Biocultural Diversity

By Leila Vaziri, Marie-Line Sarrazin, Colin Scott, Eleanor J. Sterling and Pua'ala Pascua, 2020

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Key points

- The conventional separation of biological and cultural diversity in worldviews and in conservation and sustainable development decision-making can reinforce divergent and conflicting agendas and inhibit the reconciliation of competing interests.
- Actions and strategies that acknowledge the connections between nature, culture, and well-being should be strengthened and supported by local, regional, and national political authorities as well as research institutes and universities.
- Biocultural indicators can integrate biological and cultural diversity through the lens of relationships between human and other-than-human life.
- Biocultural indicators of well-being should be rooted in place-based cultural perspectives, values, and knowledge systems. They should be both context-specific and given voice in global arenas.

In May 2019, more than 120 participants - Indigenous Peoples from Canada, the United States of America, Aotearoa New Zealand, and Australia, together with partners and supporters - came together at a Regional Indigenous Research Action Conference and at the first North American Dialogue on Biocultural Diversity to advance joint strategies to promote the diversity of life on earth. This series of policy briefs draws on the discussions held at these meetings and draws from the recommendations of the Atateken Declaration (Atateken Declaration, n.d.), adopted by the participants of the Dialogue.

Introduction

In 1988, Indigenous Peoples, Local Communities, scientists, and environmentalists from across the globe came together in Belem, Brazil, for the first International Congress of Ethnobiology. The main output of this Congress was the Declaration of Belem (Declaration of Belem, n.d.). This declaration is one of the first global policy documents to address the “inextricable link” between nature and culture. Since then, cross-mapping of linguistic, cultural, and biological diversity has shown substantial geographic overlap among these (Maffi, 2007). Biocultural diversity is the combination of biological, cultural, and linguistic diversity, which comprises the species, cultures, and languages that have evolved on our planet (Merçon et al., 2019). These diversities are embedded within complex networks of place-based interactions and inform the

ways people adapt practices over time to enhance local and global sustainability. The co-evolution of humans and nature creates complex and reciprocal social and ecological feedback (Berkes et al., 2003). Governance and management maintain this feedback over time and, when responding to change, adjust and transform them (Berkes et al., 2000). Knowledge of how, when, and why to employ specific resource management strategies is locally nuanced. Accordingly, plans and strategies should address the unique social, cultural, economic, and environmental contexts of various communities (Sterling et al., 2017). One important source of this knowledge comes from Indigenous Peoples, who possess significant experience developing strategies and actions to govern the sustainable use and conservation of resources in unique biocultural landscapes and important biodiversity hotspots around the world (Ban et al., 2018; Garnett et al., 2018).

Many Indigenous-based approaches feature holistic concepts of well-being that acknowledge interconnected social, cultural, and ecological dimensions. This lens, used in combination with a biocultural approach to locally defined measures of well-being, results in indicators that are directly tied to territory and grounded in the places, cultural practices, and knowledge of self-governing local peoples (Caillon et al., 2017). Efforts to support and enhance the full and effective participation of Indigenous Peoples and the equitable inclusion of Indigenous Knowledge (IK) in resource management have revealed important gaps in the environmental monitoring and reporting metrics currently used by state-centric managers. For example, one analysis from Canada noted that national and international forest management frameworks focus primarily on ecological processes and may omit locally meaningful factors essential for decision-making such as community well-being, historically embedded cultures, and customary governance systems (Sherry et al., 2005). While many national and international sustainability goals and commitments focus on indicators of biodiversity to inform on-the-ground sustainability, biological diversity, resilience, and conservation actions, this can be problematic given the strong links between nature, culture, and multidimensional well-being. Fully exploring and realizing these links for conservation and sustainability planning requires locally attuned approaches based on Indigenous cosmologies, worldviews, values, and priorities (Sterling et al., 2017). This includes creating indicators that reflect Indigenous visions for healthy socio-ecological systems (Sangha et al., 2015). Ultimately, acknowledging and fostering interdependent biological and cultural dimensions of environmental stewardship can support dialogue and exchange in natural resource management toward meaningful collaboration for future solutions.

Main challenges

Differing conceptions of health, well-being, and territory Indigenous and non-Indigenous knowledge systems may define health and well-being on quite different scales (i.e. geographic, social, cultural, etc.). For example, definitions of well-being focused on individual benefits may contrast with Indigenous holistic definitions of well-being as pertaining to whole communities of

life or collective wellness (AMNH, n.d.). While Indigenous worldviews describe human and other-than-human well-being as extensions of one other, other ontologies differentiate between human and ecological health (Agpar et al., 2011). Most ecosystem health indicators to assess conservation efficacy in state-governed protected areas currently focus on quantitatively assessing ecological states, trends, and functions (Sterling et al., 2017).

In contrast, Indigenous-defined measures of success in ecosystem management center on maintaining healthy relationships between humans and other-than-humans through respectful interactions, including sustainable use when appropriate. Neglecting these differences in indicators of ecological and human well-being can undermine national and international conservation goals, while contravening the rights of both peoples and nature. Indigenous practices of stewardship and guardianship may substantially differ from prominent global resource management strategies. For example, conservation policies across decision-making scales often separate land and sea areas through jurisdictional divides, whereas Indigenous knowledge systems support holistic resource management by acknowledging habitat continuity and interconnections between human and other-than-human relations across terrestrial, freshwater, and marine spaces. For example, Henry Huntington, an arctic researcher, recorded the IK of Inuit hunters in Alaska about the population dynamics of beluga whales (Robbins, 2018). Inuit Elders informed him that there is a connection between an increase in beaver populations and a decrease in beluga populations. More beavers translate into less habitat for spawning fish, which, in turn, negatively affects food resources for beluga whales. Hence, biocultural indicators rooted in places and networks of places are superior measures and guides to conservation practice. While there are growing efforts to acknowledge other effective conservation measures in global conservation policy and action, for instance those of Indigenous Peoples, this remains an area where additional efforts are necessary (IUCN-WCPA, 2019).



Fig 1. Alaska land-sea scape. Photo by Rod Long.

Indigenous Peoples have historically shared their observations, traditional teachings, and insights with those open to hearing and listening. However, access to and use of this knowledge comes with inherent responsibilities. Groups who work with Indigenous Peoples, or those who conduct research on traditional territories, should recognize the right of Indigenous Peoples to grant free, prior, and informed consent. Interested groups should obtain consent within appropriate institutional and local community pathways before initiating any project (FAO, 2016). For instance, the Mi'kmaw people of Canada have established a set of principles and guidelines to regulate access to and use of Mi'kmaw knowledge, including the need for research to be reviewed by Mi'kmaw Ethics Watch, and for research to be understood as a “negotiated partnership” (Mik'maw Ethics Watch, 2019). Researchers and groups who work with Indigenous Peoples should consider the role of knowledge co-production and project co-development together with the host community.

Despite the rise in legitimacy of IK in academic and policy circles, some major issues, such as dualistic tensions between Indigenous knowledge systems and Western science, romanticization, decontextualization, asymmetrical power relations, and fears of misappropriation continue to inhibit the role of IK in development planning and implementation. These issues also complicate dialogue between Indigenous perspectives and predominant approaches to environmental governance. For instance, the ecosystem services (ES) framework is an increasingly popular way to describe natural systems in relation to human needs. ES are a conservation science tool used to characterize the diverse suite of values provided by the environment. One aspect of the ES approach is the ability to attribute monetary value to changes to ecosystem services and their impact on human well-being. Since the early 1970s, monetary valuations of common pool resources (i.e. clean air and water) have been one way to increase public interest in conservation by demonstrating well-being in economic terms.

While there are both challenges and opportunities surrounding the theoretical and practical application of monetary valuations, there remain key concerns regarding the ideology and assumptions required to assess resources as commercial commodities in contrast to Indigenous perspectives on human and other-than-human relatives. While the ES framework can accommodate spiritual, cultural, aesthetic, and other non-material values through the cultural ecosystem services (CES) category, mainstream approaches - if they consider CES at all - tend to consider only the CES that can fit within the current economic valuation system, such as recreational activities (Hirons et al., 2016; Chan et al., 2012). Approaches that partially or superficially consider CES risk supporting, rather than challenging, the dominant neoliberal approach to environmental governance (Hirons et al., 2016). In other words, the use of IK within existing Western-based conservation frameworks, without proper consideration for local priorities, institutions, and place-based values and relations, may lead to unfavorable results for conservation and further territorial alienation of Indigenous Peoples (DeRoy et al., 2019). Indigenous approaches to environmental governance are often grounded in situated relatedness, reciprocity, and respect; these values, which are linked to sustained relationships with place,

should inform the development of biocultural indicators and approaches to conservation and environmental management (Artelle et al., 2018).

Opportunities

Weaving knowledge systems for effective conservation and resource management

IK is dynamic and adaptive. It has changed and evolved over time, continues to do so, and can speak to global, national, and regional issues caused by environmental degradation and excessive exploitation of resources. Dialogue between Western and Indigenous sciences is a fundamental step in the governance of protected and conserved areas by Indigenous Peoples, in all contexts of shared jurisdiction, decision-making, and administration (Berkes, 2009). It is increasingly recognized that resource governance by Indigenous Peoples in their ancestral territories contributes to the conservation and sustainable use of natural resources (Lee et al., 2019; Schuster et al., 2019). When Indigenous Peoples are on their ancestral territory, they can observe the changes and/or assess the necessary measures to nurture resilience, drawing on their historical relations with the land and water (Berkes, 2009). This recognition has led, for instance, to the establishment of the Peace-Athabasca Delta Ecological Monitoring Program, which combines IK and community-based monitoring with Western science to inform the cooperative management of Wood Buffalo National Park, in Canada (McInnes et al., 2017). IK can facilitate effective and equitable long-term outcomes for conservation through arrangements variously described as Indigenous Protected Areas (IPAs), Indigenous Protected and Conserved Areas (IPCAs), National Marine Conservation Areas (NMCAs), tribal parks, biodiversity reserves, and Territories and Areas Conserved by Indigenous Peoples and Local Communities (ICCAs, or ‘territories of life’), among others. In weaving Indigenous and Western Knowledge to set and monitor conservation goals, it is essential to recognize and accept the differences between the worldviews and methodologies that produce the two knowledge systems, and to question the notions of universality and objectivity that provide a privileged position to Western science (Parsons et al., 2017). Indigenous methodologies involve experiential, subjective, collective, and relational processes and methods, including storytelling (Kovach, 2015). For Indigenous and Western scientific knowledge systems to work in synergy, each knowledge system needs to be seen as equally relevant and valid (Tengö et al., 2014). Indigenous and Western scientific knowledge can complement each other, sharing information from different scales and ways of understanding.



Fig 2. Kennedy Lake, in Ha'uukmin Tribal Park, BC, Canada. Photo by Brett Vachon, CC BT 2.0, photo cropped, <https://bit.ly/kennedy-lake>.

The objective is therefore not to fit one knowledge system into another, but to consider insights and evidence from each knowledge system, even when contradictory, to inform analysis and decisions (Tengö et al., 2014). This requires fostering collaboration through participation at all stages, and through respectful intercultural dialogue (Tengö et al., 2014). According to the Indigenous Circle of Experts (ICE) the concept of ‘ethical space’ provides a relational setting where diverse knowledge systems can interact respectfully, and as equals (Indigenous Circle of Experts, 2018).

Supporting biocultural restoration, conservation, and monitoring

Biodiversity and the territories of Indigenous Peoples worldwide are subjected to accelerated pressures from resource extractive activities, pollution, and climate change. Such pressures simultaneously threaten traditional livelihoods, food security and sovereignty, stewardship institutions, and sacred attachments of Indigenous communities to place. Cultural and ecological restoration and conservation are therefore intertwined processes (Hobson Haggerty et al., 2018), sometimes described as “reciprocal restoration (Kimmerer, 2011).” Exploring the nexus between nature, culture, and well-being can help us understand “the mutually reinforcing restoration of land and culture in such a way that revival of ecosystem services contributes to cultural revitalization, and renewal of culture promotes restoration of ecological integrity (Kimmerer, 2011).” IK and cultural values reflect and inform the relationships that Indigenous Peoples maintain with their territories. Tools, methodologies, and indicators for assessing the efficiency of conservation measures should therefore reflect this knowledge and these values and relationships. The revitalization of Indigenous languages is a key component of biocultural

restoration. Indigenous languages are a central component of biocultural diversity and play an important role in protecting the world's biodiversity (Wilder et al., 2016). They also make important contributions to individual and community identity, health, and well-being (Duff & Li, 2009). Indigenous languages derive from, and are contextualized by, place-based and land-based practices; thus, they play a fundamental role in transmitting IK on conservation and corresponding stewardship practices across generations (Gorenflo et al., 2012). Given the links between language, IK, and cultural practices, language loss threatens to weaken biodiversity stewardship. Similar impacts to language loss can be expected with increasing threats to biodiversity. Walpole Island First Nation's approach to the restoration of the St. Clair River, in Canada, exemplifies the connections between ecosystem restoration, IK, cultural revitalization, and language preservation. Major development sites have been built along the St. Clair River upstream from Walpole Island First Nation's unceded territory, resulting in pollution and water quality degradation. Walpole Island First Nation considers the river as an ancestor, whose health is tied to the well-being of the community. Walpole Island First Nation is actively participating in restoration efforts, which include water ceremonies led by women, who traditionally play a key spiritual role in fulfilling the community's responsibility to care for water. Through water ceremonies and prayers in Anishnaabemowin, women are enacting their IK to care for the St. Clair River and, in doing so, are restoring their community's relation to the river. Walpole Island First Nation regards healing the river as part of the process of healing itself from colonial trauma (Fox et al., 2017).

Policy recommendations

We call for holistic approaches to conservation, sustainable development, and decision-making. In particular, we call for the development of actions, strategies, and biocultural indicators that link biological and cultural diversity through the lens of relationships between humans and nature. Our recommendations include:

- Ensure that Indigenous ways of knowing are integral to biocultural diversity monitoring, conservation, sustainable development, and decision-making, leading to equitable outcomes. Institutional processes should incorporate evidence and interpretations from multiple knowledge systems. These processes must fully and effectively engage IK, in full partnership with Western scientific knowledge. Weaving together Indigenous and Western sciences must also occur in contexts of respect for Indigenous institutions and authority. To facilitate the monitoring process in Indigenous protected and conserved areas and territories, provincial/state/federal authorities should adopt policies that strengthen governance or shared governance by Indigenous Peoples.
- Develop biocultural indicators of well-being rooted in place-based cultural perspectives, values, and knowledge systems, through culturally appropriate and ethical processes of co-development, co-validation, and knowledge co-creation. In decision- and policy-making processes, consideration for Indigenous conceptualisations of well-being is

essential to assess the cultural values of natural resources and ecosystem services, as well as to identify preferred outcomes and measures of success. The role of natural resources or valued ecosystem components in the socio-cultural well-being of Indigenous Peoples cannot be understood without the full participation of Indigenous Peoples. Biocultural indicators should be identified through culturally appropriate and ethical processes (an example is provided in Box 1).

- Develop indicators, both context-specific and generalizable, particularly those that relate to traditional livelihoods, land and marine stewardship, food and water sovereignty and security, and the relationships among cultures, economies, and ecosystems. Interventions aiming to revive biocultural diversity must be based on indicators defined by Indigenous Peoples and researchers, their allies, and other non-Indigenous experts. The monitoring of intervention success should also be area-specific and based on locally developed biocultural indicators, with primary responsibility in the hands of Indigenous Peoples. Financial and logistical support should be provided for analyzing specific aspects of biocultural diversity, such as the links between food sovereignty and biodiversity, or between religious diversity and biodiversity.
- Increase resources available to Indigenous Peoples for engaging in biocultural diversity monitoring, conservation, sustainable development, and decision-making. Governments at various levels should create funding opportunities for Indigenous and non-Indigenous researchers to carry out region/ecosystem/territory-specific programs for biocultural protection and revival. In particular, funding should support Indigenous-driven initiatives for cultural restoration and youth engagement as well as biocultural diversity monitoring programs, including in designated areas such as Ramsar sites and biosphere reserves.

Box 1: The following steps represent one pathway, among others, to establish appropriate biocultural indicators for reaching national and international goals for conservation:

1. Arrange appropriate working groups to fully accommodate culturally diverse approaches to defining sustainability and resilience
2. Hold workshops in local communities to identify needs and aspirations in situ
3. Establish biocultural working groups
 - The members of the working groups should be selected by the Indigenous community, using locally and culturally appropriate participatory processes. Indigenous social institutions will guide the selection process, number of working groups necessary, and relations among them. Elders and Indigenous researchers play a key role in this stage of the process.
4. Apply Indigenous methodologies, drawing on the experience and insights of Elders and experienced land users, in the selection of biocultural indicators · The tools and indicators that assess the effectiveness of conservation measures should reflect relationships across local, regional, and national scales that are vital to Indigenous communities and territories.
5. Prepare biocultural protocols, for instance processes and procedures encompassing:
 - Knowledge and practices of social and cultural norms related to place-based traditional values;
 - Knowledge and practices of ceremonies, stories, songs, chants, and dance;
 - Connections within and between communities and social groups for various sharing practices, which should define the appropriate scale and scope of each indicator.
 - Innovation in practices for land management, resilience, restoration, and food security and sovereignty based on IK;
 - Routine collaboration of Indigenous and non-Indigenous researchers in working groups;
 - More information on biocultural protocols. such as the one available [here](#) and [here](#).
6. Revisit the biocultural indicators in light of communities' evolving life projects
 - The relevant communities discuss their observations and goals in regard to well-being and ongoing life projects.
 - Locally defined social, economic, and ecological aspects of well-being are reflected in any needed adjustments to the indicators.

Box 2: Examples of biocultural indicators provided by the Indigenous participants of the North American Dialogue on Biocultural Diversity include:

- Trend in the reintroduction of culturally important species (i.e. buffalo), in tandem with the restoration of cultural practices, to support cultural identity
- Presence and engagement of traditional spiritual/religious societies
- Presence of Elders (as knowledge holders and mentors)
 - Presence of spaces for Elders to exchange among themselves
 - Presence of pathways for Elders to share/exchange information across generations
- Presence of active youth societies
- Ability of a community to feed themselves on their traditional territory
 - Knowledge of places, species, and methods for gardening, hunting, fishing, and gathering
 - Knowledge of traditional names of wild harvested and cultivated food and medicinal species
 - Presence of customary institutions for managing resource areas and infrastructure
- Presence of, and access to, opportunities to heal from intergenerational trauma (for instance, Elder circles)
- Presence of institutional mechanisms to support the time and resources necessary to build relationships within and between communities, to refine locally defined research questions, and to promote research co-development and knowledge co-production
 - Maintenance of local knowledge and practices that can be communicated to others, for instance non-Indigenous collaborators
- Trend toward reclaiming and restoring spiritual terms of reverence; for instance, reclaiming the Mi'kmaki term for "Creator" despite negative connotations/interpretations imposed by colonial powers
- Knowledge and application of animal health as an indicator of broader ecosystem health
- Knowledge and recognition of the importance of spiritual connections
- Presence of musical festivals and other cultural celebrations of music
- Trend in the availability and continued implementation of culturally informed teacher certification programs
- Presence of indicator sets that accommodate both context-specific and generalizable indicators

- Trend in recognition of the intergenerational “peer-review” processes of Indigenous Knowledge

Funding opportunities should be made available for community programs to revive Indigenous languages. University and other research must also support the production apps, books, video games, and land-based learning, among others, to raise interest among Indigenous youth. Indigenous research and educational institutions must be supported to develop strong projects, programs, and certifications fully recognized alongside others. Support should also be provided to build networks and leadership initiatives for strengthening community resilience in the face of social and ecological changes on local, regional, and national scales.

Conclusion

Separating biological and cultural diversity in conservation, sustainable development, and decision-making has contributed to divergent and conflicting agendas and competing interests. To remedy such conflicts, biological and cultural diversity must be recognized as intimately entwined and mutually reinforcing. Holistic approaches must be taken in designating protected areas and conservation territories, in methodologies for environmental monitoring, and in policy making, dissolving the conceptual and practical separation of biological and cultural diversities. These actions can help to avoid siloed colonial approaches to conservation, sustainable development, and decision-making. Regional and national authorities as well as research institutes and universities should support actions, strategies, and biocultural indicators that link biological and cultural diversity through the lens of relationships between humans and nature. These biocultural indicators of well-being should be rooted in place-based cultural perspectives, values, and knowledge systems. They should be both context-specific and generalizable, particularly those that relate to traditional livelihoods, land and marine stewardship, food and water sovereignty and security, and the relationships among cultures, economies, and ecosystems. To ensure cultural continuity and sustainability of cultural-ecological systems, Indigenous ways of knowing and governance systems must be revitalized and safeguarded. IK is integral to biocultural diversity monitoring, conservation, sustainable development, and decision-making and can lead to equitable outcomes for society at large.



Fig 3. Participants of the 2019 North American Dialogue on Biocultural Diversity, which informed this series of policy briefs

Chapter 3

A systematic review of research trends in addressing the land-sea connections of coastal and marine Indigenous Peoples and Local Communities

Leila Vaziri Zanjani, Monica Mulrennan

Keywords: Indigenous peoples and local communities (IPLCs), coastal and marine, land-sea interface, jurisdiction, fragmentation

Abstract

Governance of coastal territories is frequently characterized by fragmentation, with terrestrial and marine systems managed separately under state-centric, jurisdictional regimes. Rooted in colonial legacies and formalized through instruments such as the United Nations Convention of the Law of the Sea (UNCLOS), this division disrupts the ecological, cultural, and political continuity of land-sea systems. These disruptions disproportionately affect Indigenous Peoples and Local Communities (IPLCs), whose governance systems are grounded in holistic and integrated approaches to stewardship. In contrast to state-imposed land-sea boundaries, IPLC practices transcend such divisions, sustaining biocultural resilience through their integrated stewardship of coastal environments. This systematic review analyzes 129 peer-reviewed English-language journal articles published between 2001 - 2024 to assess how, and to what extent, IPLC rights and governance at the land-sea interface are addressed in the academic literature. Our findings reveal a twenty-fold increase in relevant publications over the review period, with research predominantly published in interdisciplinary journals and usually local in geographic scope. Governance emerges as the most common analytical lens, followed by themes related to conservation, development, fisheries, and legal mechanisms. While certain nation-states have made progress in recognizing IPLC land-sea claims, the literature consistently highlights the ongoing marginalization of customary governance systems and the limited incorporation of Indigenous knowledge in coastal and marine management frameworks. The review also underscores the epistemological limitations of peer-reviewed literature, which often excludes grey literature and works by Indigenous scholars and knowledge holders, resulting in partial and filtered representations. We argue for more inclusive and participatory research approaches that center Indigenous governance, recognize legal pluralism, and foster the development of co-governance models. Advancing coastal governance in ways that restore land-sea continuity and align with Indigenous worldviews will require sustained attention to socio-cultural context, knowledge sovereignty, and equity.

1. Introduction

Across the globe, terrestrial and marine environments are too often governed separately, divided into distinct jurisdictions within nation-states (Stevens et al., 2024, p 11; Bell-James, 2023; Gonçalves & Pinho, 2022; Gonçalves et al., 2021). Rooted in colonial and postcolonial

governance models, this distinction has resulted in parallel but disconnected legal and governance systems that have institutionalized terrestrial-marine divisions through sectoral policies and jurisdictional boundaries (Stevens et al., 2024, p 16; Bell-James, 2023; Gonçalves & Pinho, 2022; Gonçalves et al., 2021). In practice, this has meant that different agencies or ministries often oversee land and marine spaces with little coordination or cooperation, reinforcing siloed management structures and limiting holistic responses to socio-ecological dynamics (Pittman & Armitage, 2016).

This fragmented approach to governance disrupts the integrity of land-seascapes, undermines local decision-making, and limits access to valuable coastal and marine resources (Bell-James, 2023; Gonçalves et al., 2021; Mulrennan & Scott, 2000;). Moreover, management regimes at the land-sea interface frequently fail to integrate knowledge across different natural realms in a cohesive manner (Lilleyman et al., 2024; Singh et al., 2021). As a result, governance often reinforces a false binarism that overlooks the continuity and fluidity of human and non-human ecologies and cultures across the land-sea interface (Lilleyman et al., 2024; Singh et al., 2021; Pittman & Armitage, 2016).

Seas and oceans are often reduced to spaces stripped of their customary territoriality and viewed primarily as resources to be exploited for economic gain and instruments for asserting state power (Knott et al., 2024; Tsiouvalas & Evans, 2023; Mulrennan & Scott, 2001; 2000). Fragmentation at the land-sea interface is largely driven by regulations operating at multiple scales. At the global level, the 1982 United Nations Convention on Law of the Sea (UNCLOS) established a universal 12 nautical mile territorial sea and 200 nautical mile Exclusive Economic Zone (EEZ) (UNCLOS, 1982). At national and sub-national levels, a patchwork of additional regulations further disrupts the natural and cultural continuity of coastal ecosystems.

In contrast, IPLCs maintain a holistic understanding of their territories, recognizing and nurturing the deep connections between land and sea. Their integrated approaches to environmental stewardship ensure that cultural, social, and economic practices flow seamlessly across terrestrial and marine domains (Lähde et al., 2024). For example, Afro-Indigenous communities in the Southwestern Caribbean have historically navigated and sustained social and kinship networks that transcend maritime boundaries, emphasizing the unity of land and sea spaces (Garcia Ch., 2024). Similarly in Australia, Indigenous Land and Sea Management Programs (ILSMPs) illustrate how traditional ecological knowledge underpins the health of ecosystems and human communities. Indigenous peoples engage in practices that reinforce their connection to Country, encompassing land, sea, and spirit, thus safeguarding biocultural diversity (Jarvis et al., 2018).

Through their practices, many IPLCs living in coastal and marine settings exemplify an enduring understanding of environmental continuity and fluidity. Their assertion of customary rights and resistance to state imposed jurisdictional fragmentation (Fisher, Talbot-Jones, & Hewitt, 2023; Johnson & Lee, 2014), underscores the critical role of Indigenous Knowledge in sustaining

interconnected land-sea ecosystems. This relational perspective strengthens resilience in the face of geopolitical conflicts, climate change impacts, and socio-economic challenges (Lähde et al., 2024).

Increasing attention to Indigenous marine and coastal contexts has been propelled by the active engagement of Indigenous communities advocating for the recognition of their rights and responsibilities over traditional marine territories (Stevens et al., 2024; Klain, Beveridge, & Bennett, 2018). A recent shift towards greater recognition of Indigenous sea rights, reinforced by the formation of international alliances among Indigenous peoples and their allies, has further catalyzed this field (Ban & Frid, 2018; Parsons, Taylor, & Crease, 2021). As Indigenous communities mobilize to assert their authority, sovereignty, and stewardship responsibilities, they have increasingly pursued legal options, often requiring extensive documentation of their rights, interests, and longstanding connections to marine environments.

At the same time, there has been broader recognition of the value of Indigenous knowledge systems, traditional practices, and the importance of Indigenous-led and community-based management approaches (Ban et al., 2017; Aswani, Ferse, Stäbler, & Chong-Montenegro, 2020; Begg et al., 2023). Co-management frameworks, which integrate Indigenous governance with state-based systems, have also gained prominence as critical pathways for more equitable and effective coastal and marine stewardship (Winter et al., 2020; Winter et al., 2021; Bennett-Jones et al. 2022).

As a result, a growing body of peer-reviewed literature has emerged in recent decades examining the roles of IPLCs in coastal and marine conservation, natural resource governance, fisheries management, stewardship of traditional territories, and response to cross-system threats at the land-sea interface (Ban et al., 2017; Begg et al., 2023; Winter et al., 2020, 2021). While previous syntheses have addressed land-sea governance and Indigenous participation in marine management through environmental science perspectives (Dahlet et al., 2023; Parsons et al., 2021; Pittman & Armitage, 2016), there remains a lack of critical synthesis interrogating how IPLCs with territories spanning both terrestrial and marine environments have been addressed within dominant academic and policy discourses. To confront the entrenched normalization of fragmented approaches to land-sea relations, we conducted a systematic review of peer-reviewed English-language journal articles that explicitly engage with IPLC rights and interests in the land-sea interface.

In this review, we use the term IPLCs to acknowledge the broad range of communities who maintain deep cultural, ecological, and governance relationships with coastal and marine territories. While IPLCs often share overlapping interests in land-sea systems—such as customary stewardship, place-based knowledge, and collective governance—Indigenous Peoples (IPs) are recognized under international and national legal frameworks as holding distinct rights, including rights to self-determination, free, prior and informed consent (FPIC), and land and sea tenure rooted in ancestral occupation.

2. Methods

We employed a systematic review methodology to identify broad trends in research and policy relevance within the existing body of peer-reviewed journal articles. This approach allowed us to aggregate and synthesize diverse research findings into a comprehensive overview, helping to reduce biases that may exist in individual studies (Bilotta et al., 2014). Systematic reviews provide a transparent, reproducible framework for evaluating the quality and relevance of research, ensuring that policy decisions are informed by robust, evidence-based insights (Moher et al., 2009). They also enable the identification of gaps in the current knowledge base, helping to shape future research priorities and guide funding decisions (Bilotta et al., 2014; Dahlet et al., 2023; Parsons et al., 2021). Systematic reviews are particularly valuable in environmental science, where research often addresses complex, interconnected factors using diverse methodologies (Bilotta et al., 2014). However, it is important to acknowledge that potential biases may arise from the selection criteria and the relatively limited number of publications analyzed, as well as from the restriction of the review to English-language academic journal articles.

Objective	Research Question(s)
To identify, critically appraise, synthesize findings, and highlight gaps in knowledge and directions for future research by conducting a systematic review of academic journal articles that address the land-sea interface	● How has this literature evolved in recent decades, across different disciplines, journals, and geographic contexts? a. To what extent and how has the issue of jurisdictional fragmentation at the land-sea interface been addressed? b. To what extent and how have the rights and interests of IPLCs at the land-sea interface been addressed?

Table 1. Objective and research questions

Literature Search and Selection

To identify relevant articles for this systematic review, we conducted a comprehensive search of Scopus and Web of Science (WOS) since both databases cover a wide spectrum of journals in the social and environmental sciences. A variety of keyword combinations, tailored to the research questions (Appendix B), were used to ensure a comprehensive search.

Articles were selected for inclusion based on the following criteria: (1) they had to be peer-reviewed to ensure a standard of quality and reliability, and (2) they had to be published in the English language for accessibility and consistency in data extraction and analysis. While Web of

Science and Scopus primarily index peer-reviewed literature, the language restriction was applied at the screening stage and reflects an inclusion criterion. We set 2000 as our limiting timeline for the review since it marked a global shift toward recognizing Indigenous rights in environmental governance. Key developments include the 2007 UN Declaration on the Rights of Indigenous Peoples, the rise of co-management and Indigenous Protected Areas, and the growing influence of concepts like biocultural diversity and legal pluralism.

The article selection process followed a structured, multi-stage approach. First, titles were screened to determine relevance to the research focus. Next, abstracts were reviewed to further refine the selection. Finally, full-text articles were examined to confirm their suitability for inclusion.

Initially, 529 articles were identified through the database search. After removal of duplicates, title screening, abstract review, and full-text examination processes, 129 articles met the inclusion criteria. These articles collectively provide the foundation for the analysis and findings presented in this systematic review. The omission of grey literature is a key limitation of this methodology especially since Indigenous peoples and local community voices are often shared in grey literature such as grant reports and policy documents which may lead to the omission of context-specific knowledge (Zurba & Papadopoulos, 2023). Our privileging of English-language literature imposes a linguistic bias that can marginalize research produced in other languages.

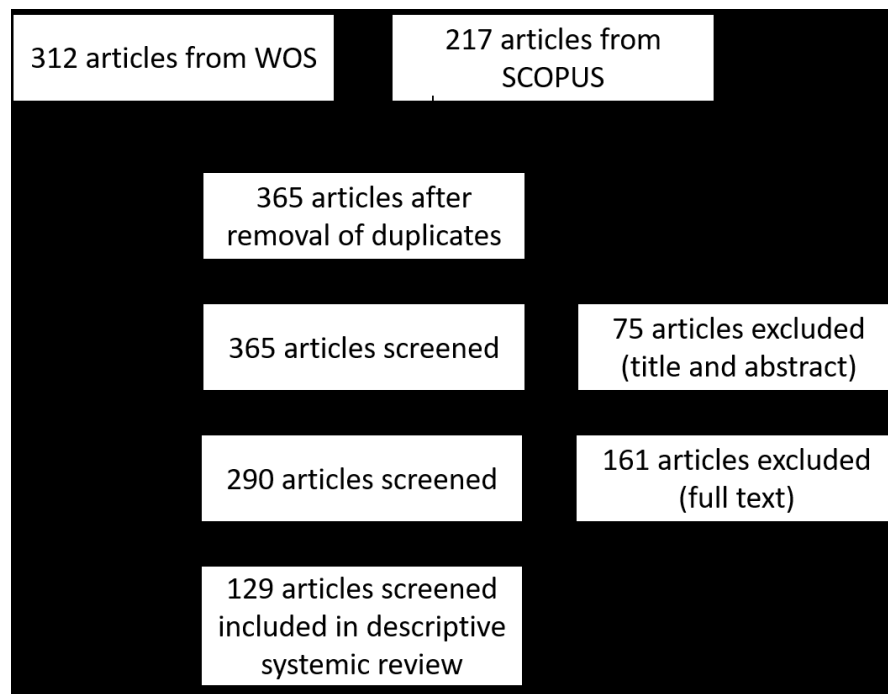


Fig 1. Flow of information through the different phases of our systematic review

2.1 Data Extraction and Analysis

The full text screening resulted in 129 articles. The final set of articles was organized thematically according to the primary lens through which authors examined the land-sea interface and its implications for the rights and interests of IPLCs. Through a coding process, five principal thematic categories were identified: Protected Areas, Development, Legal Instruments, Fisheries and Governance. Each theme offers an in-depth examination of critical dimensions that shape land-sea territories.

“Protected Areas” examines the role of designated conservation zones in the governance of land-sea spaces. “Development” encompasses a broad spectrum of issues, including anthropogenic climate change and climate-related health impacts, mining, habitat degradation, overfishing, land-clearing, colonial development, shipping, and pollution. “Legal Instruments” focus on policy interventions, particularly legal aspects of establishing protected areas and community-conserved areas. “Fisheries” investigates historical and contemporary fishing practices, mariculture, and conservation governance within the fisheries management. “Governance” explores the structures and practices of governance and management, with particular attention to how they engage IPLCs. Additionally, this theme considers governance across multiple geographical scales and explores strategies for mitigating the adverse impacts of development through effective management approaches. Collectively, this thematic organization provides a nuanced framework for examining the interconnected issues of economic development, the blue economy, and management across the land-sea interface.

Data for each theme was extracted and organized into separate spreadsheets. For example, for the governance theme, we collected information on governance system/management type, methodological approach, geographical location, case study (yes or no), overlap with other themes, and included a notes column to capture specific details, such as Indigenous authorship or use of Indigenous methodologies. A similar process was repeated for each article within each thematic category. After cleaning and structuring the data, we conducted frequency and cross-tabulation analysis for each spreadsheet. These statistical methods helped simplify and summarize the complex datasets. Using Python 3.1, we performed the analysis and systematically interpreted the results to identify key patterns, relationships, and trends, forming the evidence on which to base our conclusions.

3. Results and Discussion

This study aimed to assess the current state of the literature and identify research trends concerning IPLCs whose ancestral territories span the land-sea interface. Most articles focus on specific communities or Indigenous peoples through empirical research, with a smaller portion addressing global-level analyses. The majority of articles appear in interdisciplinary journals, with *Ecology and Society*, *Frontiers in Marine Science*, *Marine Policy*, *Maritime Studies*, *International Journal of Environmental Research and Public Health*, *Coastal Management*, and *Ocean and Coastal Management* ranking first to seventh, respectively in publication frequency.

Geographically, South and Southeast Asia account for the highest share of publications, followed by North America, Australia and South America, and the Philippines (Fig 2). Overall, our results show a twenty-fold increase in the number of English-language academic journal articles over the past 23 years (Fig 3). The apparent decline after 2023 is likely an artifact of incomplete data rather than a real drop in scholarly activity. Given recent policy developments, climate-related concerns, and advances in Indigenous rights, publication levels will likely continue to rise once the 2024 record is complete.

A wide range of researchers engage with IPLC land-sea overlapping territories. Among the articles selected for review, governance emerged as the most prevalent analytical lens, applied in 37% of articles. This was followed by marine conservation (19%), fisheries (16%), development (14%), and legal instruments (13%).

During the categorization process, a notable pattern of overlapping thematic areas was observed. We categorized the articles in their dominant theme and then identified their overlapping theme(s). Governance and marine conservation show the highest overlap, with a 13.8% rate of communality, followed by governance and fisheries, at 9.4%. Shared governance arrangements have attracted the majority of attention in marine conservation studies. However, there is significant recognition that exclusionary governance arrangements, particularly in the context of Marine Protected Areas, have frequently led to conflicts and restricted access for IPLCs. Plural governance systems are also acknowledged to sometimes produce negative outcomes when underlying power imbalances remain unaddressed.

The study also investigated the challenges stemming from jurisdictional fragmentation of governance across the land-sea interface. Most of the reviewed articles indicate that current governance arrangements disrupt coastal IPLC's access to their territories and natural resources. Key sources of disruption include legal restrictions, commercial competition, environmental degradation, exclusion from policymaking, poor coordination across levels of government, policy inconsistencies, and licensing and enforcement mismatches, and competing interests across administrative regions.

The breakdown of primary challenges by thematic area is as follows:

- Fisheries: overlapping authorities and conflicting regulatory regimes.
- Governance: coordination difficulties, policy inconsistencies, and gaps in implementation.
- Development: overlapping or conflicting jurisdictions, governance structures that either exacerbate or mitigate development impacts, imbalanced power dynamics, and lack of social acceptability.
- Legal: challenges around recognition of Indigenous rights, the management of ancestral and sacred places, and the exercise of Indigenous agency in conservation and resource management.

- Marine conservation: the neglect or denial of Indigenous tenure and management systems, often rooted in colonial legal and administrative practices.

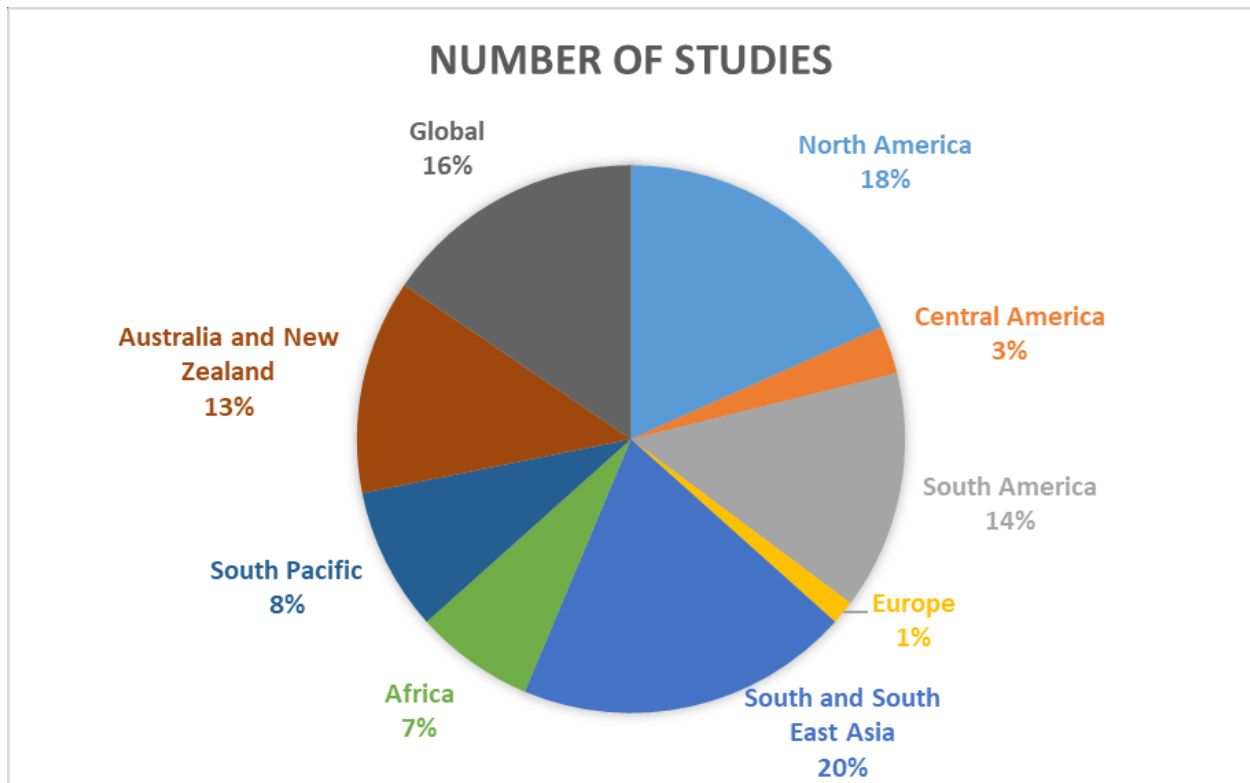


Fig 2. Geographic distribution of case-based studies.

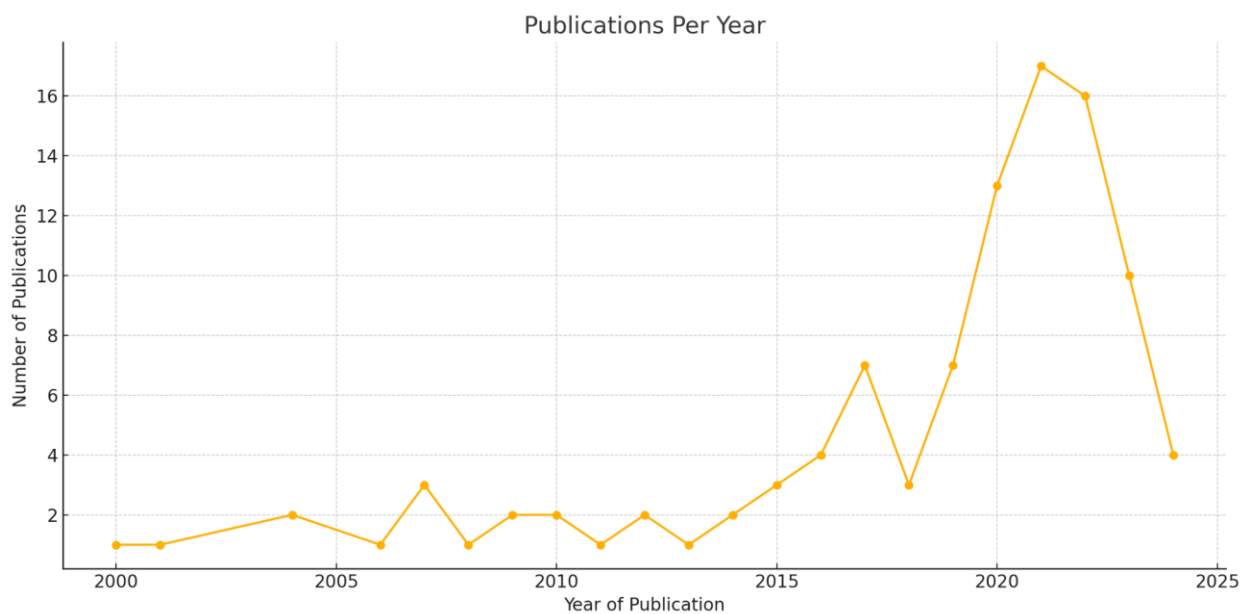


Fig 3. Growth in number of publications since 2000. Note:

3.1 Governance and Management at the Land-Sea Interface

With 48 articles, governance and management of resources and ecosystems represents the most dominant thematic lens used by researchers to investigate the relationships between IPLCs and their land-sea territories. Of these studies, 15 are large-scale analysis or reviews, while 33 are case studies. The governance lens shows the highest degree of overlap with the conservation and legal lens, with 60% thematic communality. Over half of the case-studies included in the review were conducted in Canada and Australia, and all articles authored by Indigenous scholars originate from these two countries. Analysis of the case-studies reveals that collaborative, co-designed and participatory research approaches are the dominant methodologies (employed in 18 articles). In studies where Indigenous peoples are either co-authors or collaborators, Indigenous methodologies, such as yarning or story-telling, were incorporated (Fischer et al., 2022; Beveridge et al., 2020; li-Anthawirriyarra Sea Rangers et al., 2014; Scott & Mulrennan, 2010).

Studies of governance and resource management at the land-sea interface address a variety of models and approaches. Australia, Canada and Aotearoa (New Zealand) are leaders in developing collaborative governance and integrated, cross-cultural approaches, as well as emphasizing Indigenous governance systems, knowledge integration, and localized stewardship. Chile is also relatively well represented, with three articles focusing on institutional frameworks and the application of laws to support Indigenous governance (Barceló et al., 2024; Fernández et al., 2021; González-Poblete et al., 2020).

Both large-scale analysis and case-studies consistently show that co-governance, involving collaborative decision-making and shared responsibilities between government authorities and local stakeholders, has been the most effective approach in promoting sustainable resource management (Dahlet et al., 2023; Lowe et al., 2019; Madarcos et al., 2021). Co-governance has facilitated the integration of diverse perspectives and knowledge systems, leading to more comprehensive and adaptive management strategies (Begg et al., 2023; Nykvist & von Heland, 2014; Winter et al., 2020). It has also enhanced conservation outcomes by aligning initiatives with local social contexts and fostering coordinated and adaptive approaches (Fischer et al., 2022). In addition to co-governance, governance led by IPLCs (documented in 12 studies) has proven highly effective for achieving sustainable resource management at the land-sea interface (Aguirre et al., 2016; Madarcos et al., 2021; Anbleyth-Evans et al., 2023).

The critical role of bridging organizations is also highlighted in relation to improving the “fit” between conservation efforts and social contexts, emphasizing the essential contributions of IPLCs (Berdej & Armitage, 2016). Their involvement has introduced valuable knowledge, practices, and perspectives critical to the success of conservation initiatives.

Furthermore, the studies underscore the importance of recognizing and strengthening traditional management systems related to blue carbon ecosystems (Fischer et al., 2022; Vierros, 2017; Vierros et al., 2020). IPLCs possess deep traditional knowledge about these ecosystems, and their governance systems have been effective in contributing to carbon storage, biodiversity

conservation, and sustainable livelihoods (Begg et al., 2023; Fa et al., 2020, Berkes et al., 2007; Fischer et al., 2022; Vierros, 2017). Garnett et al. (2018) reveal that over 37% of the world's remaining natural lands are managed by Indigenous Peoples, many of which overlap with critical carbon sinks and biodiversity hotspots. For example, the governance practices of the *iTaukei* people of Fiji, based on traditional knowledge and customary ownership of land and fishing areas, are shown to be crucial for regulating and managing coastal and marine resources (Begg et al., 2023).

3.1.1 Governance by IPLCs

The role of IPLCs in the governance of resources at the land-sea interface is both significant and multifaceted. Their contributions – including resource governance practices, traditional ecological knowledge, and the integration of Indigenous governance systems with broader frameworks – are essential to the sustainable management of their territories.

In Aotearoa's (New Zealand) Waitematā Harbour and Hauraki Gulf, the Sea Change—Tai Timu Tai Pari project exemplifies the meaningful incorporation of Māori authority into governance structures (Aguirre et al., 2016). This initiative brings together mana whenua, Auckland Council, Waikato Regional Council, the Department of Conservation, the Ministry for Primary Industries, and the Hauraki Gulf Forum. By integrating scientific knowledge with mātauranga Māori (ancestral knowledge), the project has developed innovative and enduring solutions aimed at ensuring the Gulf's protection, use, and shared stewardship for future generations, grounded in the values and traditions of IPLCs (Aguirre et al., 2016).

Similarly, in Palawan, Philippines, local perceptions of the drivers and pressures affecting coastal marine environments play a crucial role in influencing governance and management decisions (Madarcos et al., 2021). Researchers found that local perceptions varied based on gender, education, ethnicity, and study site, highlighting the importance of accounting for sociodemographic characteristics in decision-making (Madarcos et al., 2021). Additionally, the study noted a strong alignment between the views of experts and local communities, suggesting effective communication between the community and policymakers (Madarcos et al., 2021).

However, jurisdictional fragmentation remains a widespread challenge across all forms of governance at the land-sea interface. Studies frequently report issues such as coordination difficulties, policy inconsistencies, implementation gaps, mismatches between centralized governance systems and local realities, and differences in perceptions of drivers and pressures between experts and local communities (Aheto et al., 2016; Vierros et al., 2020; Lowe et al., 2019, Madarcos et al., 2021; Aburto et al., 2017).

Effective strategies identified in the literature to address these governance challenges include the following (Aguirre et al., 2016; Aheto et al., 2016; Aswani et al., 2017; Begg et al., 2023; Berdej & Armitage, 2016; Booth et al., 2022; Fischer et al., 2022; Lowe et al., 2019; Madarcos et al., 2021; McCarter et al., 2018; Vierros et al., 2020; Winter et al., 2020):

- Establishing public-private partnerships,
- Ensuring that tourism and complimentary livelihoods initiatives generate economic returns for local communities,
- Recognition of local people as effective management agents by relevant authorities
- Incorporating community-based institutional arrangements into governance structures,
- Encouraging collective action for resource management within communities,
- Applying local norms and customs to deter illegal activities within traditional territories,
- involving traditional authorities to provide legitimacy and ensure adherence to governance principles,
- Implementing co-management arrangements involving governments, academic institutions, non-governmental organizations, and resource users;
- Integrating scientific and ancestral knowledge systems to co-develop innovative and lasting governance solutions.

3.2 Conservation Initiatives

The participation of IPLCs in conservation efforts at the land-sea interface is marked by meaningful and impactful engagement, highlighting the value of their traditional knowledge and practices. Indonesia, Chile, Canada, and South Africa are among the most well-represented regions for IPLC participation across various scales and contexts, reflecting a diversity of conservation efforts at both local and national levels, and spanning a range of governance and development themes.

Marine conservation initiatives in the reviewed studies can be grouped into five main categories based on their objectives: Conservation and Biodiversity Protection, Community Engagement and Indigenous Governance, Sustainable Development and Economic Goals, Legal and Institutional Challenges, and Marine Conservation Specific to Threat Mitigation. Of the 26 articles categorized within the conservation lens theme, all are case study based, with study scales ranging from local to national and international and comparative.

A substantial number of studies were conducted at the local scale (14 instances), compared to the national scale (7 instances), suggesting that localized conservation initiatives may be more prevalent or easier to implement and study. Our analysis reveals that governance is most frequently coupled with conservation, highlighting a strong focus on governance structures and management systems within marine conservation efforts. Governance predominantly appears at the local scale (10 instances), reflecting a focus on community-driven initiatives and localized management practices.

At the local scale, there is also a strong association between conservation, fisheries, and development. This points to the importance of local conservation strategies in protecting fisheries, which are critical for IPLC livelihoods. Governance systems, such as community-based resource management, ecosystem-based approaches, and co-governance models frequently show a strong connection with fisheries and the development of legal mechanisms (Aburto et al., 2020; Bennett et al., 2021).

International studies often focus on governance issues, driven by the need for cross-border cooperation and large-scale policy alignment in marine conservation (Fernández et al., 2021; Gaymer et al., 2014). These studies also highlight the connection between fisheries and development at the local level, suggesting that enhancing fisheries is commonly pursued as a development goal to strengthen local economies and food security. Although comparative studies are fewer, they offer valuable insights into different governance models and their effectiveness across regions.

Specific examples from the literature illustrate the depth and significance of Indigenous engagement in conservation initiatives. In Chile, Indigenous communities play a crucial role in the management and protection of marine protected areas (MPAs). Their participation includes contributing to the identification of management objectives and advocating for the establishment of Indigenous Marine Areas (IMAs), which aim to protect traditional coastal uses, revitalize Indigenous culture, and support broader marine conservation goals (Fernández et al., 2021, Araos et al., 2020). Similarly, in South Africa, Indigenous communities actively participate in community-based conservation initiatives, leading to conservation strategies that are better aligned with local social and ecological contexts, enhanced levels of community participation, and strengthened partnerships (Rice et al., 2021; Fernández et al., 2021).

The extent, nature, and impact of Indigenous participation in conservation efforts at the land-sea interface are both significant and multifaceted. Drawing on their traditional knowledge and governance systems, Indigenous peoples are playing crucial roles in the stewardship and protection of these environments. In Canada, a number of local-level studies from British Columbia, Nunangat (the Inuit homeland), Quebec, and Nova Scotia highlight the prominent role of Indigenous leadership in marine conservation, Indigenous rights assertion, and biodiversity protection. For instance, the marine conservation planning approach developed by the Songhees Nation in British Columbia emphasizes Indigenous self-determination and expanded Indigenous stewardship responsibilities (Buscher et al., 2021). Their approach integrates the entire social-ecological system into a unified planning process, aiming to achieve ecocultural goals and strengthen Indigenous stewardship. Songhees Nation's active involvement has enhanced the effectiveness of conservation initiatives, by fostering transparency, securing community approval, and aligning protection efforts with long-term goals for ecocultural health and stewardship (Buscher et al., 2021). Likewise, the Nuu-chah-nulth, Haida, and Heiltsuk Nations in British Columbia have employed a variety of strategies to reassert authority over herring

governance, reinforcing their inherent rights and traditional responsibilities in marine stewardship. Their efforts highlight the profound impact of Indigenous engagement on conservation outcomes (Augustine & Dearden, 2014; von der Porten et al., Corntassel & Mucina 2019).

3.2.1 Governance of Natural Resources in Protected Areas

Plural conservation governance structures – those that engage multiple stakeholders, legal systems, and institutions – can be highly effective in achieving conservation goals, particularly when they integrate local knowledge, promote inclusivity, and remain flexible to changing conditions. In places like Cebu, the Philippines, and Belize, community-managed marine protected areas (MPAs) have demonstrated success by improving coral health and fish populations through active local community involvement in decision-making (Diedrich, 2007). Similarly, in Indonesia's Aceh and Sulawesi regions, community-driven conservation initiatives have boosted tourism and enhanced economic opportunities in marine reserves, demonstrating the social and economic benefits of effective, inclusive governance (Syakur et al., 2012).

In Canada, governance models in Haida Gwaii and the Southern Gulf Islands have incorporated Indigenous knowledge and adaptive management practices, enhancing the resilience of marine ecosystems in the face of climate change (Augustine & Dearden, 2014; Jones, Rigg & Lee, 2010). However, plural governance systems are not without challenges (Fernández et al., 2021; Vave, 2022). Managing multiple governance frameworks can give rise to conflicts, power imbalances, and complexities that sometimes undermine conservation efforts (Mbatha, 2022). The success of plural governance ultimately hinges on careful coordination among stakeholders and the alignment of conservation goals with local priorities and values (Araos et al., 2020; N. J. Bennett et al., 2021; Buscher et al., 2021; Fernández et al., 2021; Mbatha, 2022; Vave, 2022). Across the literature, there is strong emphasis on the importance of recognizing and supporting Indigenous governance systems in marine conservation. This includes facilitating the exchange of ideas between Indigenous peoples and Indigenous leaders, supporting both established and emerging Indigenous initiatives, and promoting the use and application of Indigenous knowledge systems within conservation practices (Buscher et al., 2021; Lucrezi, 2021; Syakur et al., 2012).

3.3 Development

Ecosystems at the land-sea interface are facing profound and varied impacts from anthropogenic climate change, mining, habitat degradation, overfishing, land-clearing, colonial development, shipping, and pollution. Anthropogenic climate change, in particular, has led to ocean warming, decreased oxygen levels, increased acidification, shifts in the timing and quality of salmon spawning habitats, erosion, saltwater intrusion, and changes in the abundance and distribution of plant and animal species (Bennett et al., 2021; Huntington et al., 2023; Kiruba-Sankar et al., 2023; Varea et al., 2022). These environmental changes have disrupted the tightly coupled social-ecological systems developed by Indigenous peoples, undermining their capacity for sustainable resource management (Abernethy et al., 2021; Barnett et al., 2023; Bennett et al.,

2021; Huntington et al., 2023; Kramer et al., 2017; Obie, 2018; van der Ploeg et al., 2020; van Putten et al., 2023).

Colonial development has further constrained Indigenous peoples' participation in resource management and governance, limiting their ability to manage marine resources effectively (Barnett et al., 2023; Nuttall, 2020; Pafi et al., 2023; Varea et al., 2022). Mining activities have contributed to habitat degradation, sedimentation, and biodiversity loss (Whitney et al., 2020), while overfishing has reduced the availability of fisheries resources, impacting the livelihoods of coastal communities (Tulloch et al., 2022; Whitney et al., 2020). Habitat degradation, land-clearing, and pollution have disrupted critical food webs by threatening prey species such as salmon and herring, which support a wide range of coastal predators (Tulloch et al., 2022). Cumulative impacts of shipping, pollution, and climate change have led to increased risks of erosion, saltwater intrusion, and shifts in the abundance and distribution of plant and animal species, affecting both the marine environment and the resources relied upon by Indigenous communities (Huntington et al., 2023). These impacts are reshaping the connections between terrestrial and marine ecosystems, creating new linkages and spatial feedback that fundamentally alter the ecological dynamics of the land-sea interface.

3.3.1 Effects on Indigenous Peoples and Local Communities

Development activities at the land-sea interface have had significant effects on the livelihoods, cultures, and well-being of IPLCs. Evidence from the reviewed literature shows that the combined impact of anthropogenic climate change, mining, habitat degradation, overfishing, and land-clearing has disrupted the tightly coupled social-ecological systems that Indigenous peoples have sustained over generations (Abernethy et al., 2021; Barnett et al., 2023; Pafi et al., 2023; van Putten et al., 2023). This disruption has led to profound changes in customary practices, loss of local knowledge, and increased challenges in governance across the land-sea interface, ultimately affecting the capacity for sustainable resource management (Abernethy et al., 2021; Nuttall, 2020; van Putten et al., 2023; Whitney et al., 2020). The legacy of colonial development continues to impact Indigenous stewardship practices, cultural continuity, and knowledge systems, further threatening the preservation of non-human life in coastal ecosystems (Aswani et al., 2020; van der Ploeg et al., 2020). Climate change-related health issues, including high rates of kidney disease and the spread of invasive species, have compounded these challenges, affecting both human populations and the ecosystems that they depend upon (Abernethy et al., 2021; Barnett et al., 2023; Huntington et al., 2023; Kiruba-Sankar et al., 2023; Whitney et al., 2020). These pressures have heightened vulnerabilities to climate change, leading to the erosion of crucial assets, such as biodiversity, cultural heritage and economic stability.

Transitions in coastal livelihoods related to globalization have further strained IPLC capacity to manage resources sustainably, creating novel linkages and tradeoffs between terrestrial and marine ecosystems, and generating spatially explicit feedback (Kramer et al., 2017). Overall, development activities at the land-sea interface have complex, multifaceted consequences for

IPLCs, undermining traditional ways of life, weakening resource management practices, and impacting overall well-being.

3.3.2 Coupled Jurisdictional Fragmentation and Development

Jurisdictional fragmentation has played a significant role in shaping the impacts of development activities on IPLCs at the land-sea interface. Overlapping or conflicting governance structures have both contributed to, and in some cases, mitigated the negative consequences of development. In coastal British Columbia, for example, colonial development has historically created conflicts between industries and local communities, influencing the acceptance of emerging industries such as deep seabed mining (Abernethy et al., 2021; Whitney et al., 2020). A lack of social acceptability has fueled tensions, increased environmental harm, and ultimately weakened the resilience and sustainability of local ecosystems (Barnett et al., 2023; Nuttall, 2020; van Putten et al., 2023).

The colonial legacy continues to shape governance systems, entrenching unequal power dynamics that threaten the preservation of non-human life and further erode ecosystem resilience (Abernethy et al., 2021; Huntington et al., 2023; Kiruba-Sankar et al., 2023; Petheram et al., 2015; Varea et al., 2022; Whitney et al., 2020). Colonial legal frameworks have also complicated the management of Indigenous health and food systems, undermining traditional harvesting practices (Abernethy et al., 2021). Indigenous communities, who have traditionally harvested outside of commercial markets, now face heightened threats to food security due to the cumulative impacts of colonial development and climate change (Huntington et al., 2023; Varea et al., 2022). Similar dynamics are observed in Papua New Guinea, where jurisdictional fragmentation has affected community engagement in new industries like deep seabed mining, resulting in conflict, environmental degradation, and weakened ecosystem resilience (van Putten et al., 2023).

3.3.3 Integrative Management Approaches

Addressing the complex impacts of development at the land-sea interface requires integrative management approaches that center IPLCs while promoting the sustainable use of natural resources (Aswani et al., 2020; Nuttall, 2020; Pafi et al., 2023; Whitney et al., 2020). The reviewed studies identify several strategies for fostering cross-jurisdictional and cross-sector collaboration (Barnett et al., 2023; Nuttall, 2020; Pafi et al., 2023). Key strategies include proactive community engagement, ensuring cultural safety, and establishing Indigenous-led monitoring programs to track climate trends and correlations, and predict risks, such as emerging pathogens (Abernethy et al., 2021). Policy frameworks should also support increased participation of coastal communities in development planning, marine governance, and decision-making processes, fostering collaborative rather than conflict-driven approaches to seascape management (Pafi et al., 2023).

Researchers further emphasize the importance of adopting a trans-ecosystem approach to natural resource management and development policy, particularly in coastal regions undergoing rapid

change (Barnett et al., 2023; Nuttall, 2020; Pafi et al., 2023). These findings underscore the need to consider cross-realm linkages and ecosystem-wide dynamics to more effectively protect critical coastal foundation species and promote sustainable development.

3.4 Legal Mechanisms and Policies

The articles reviewed under this thematic lens focus on addressing jurisdictional fragmentation and governance across the land-sea interface, with particular attention to the legal mechanisms and policies supporting IPLC rights and access to land-sea territories. This area of study is critical for advancing the recognition of Indigenous fishing rights, informing fisheries management systems, and exploring potential alliances between Indigenous and non-Indigenous coastal fishers. The legal frameworks and policies examined here are crucial for understanding how Indigenous communities have utilized various strategies to recover marine and coastal territories, and how protected areas can facilitate their access to fisheries resources and participation in governance and policy making (Bennett et al. 2021; Ban et al., 2020; Jentoft & Chuenpagdee, 2022).

3.4.1 Specific Law/Legislative Mechanism

Of the 18 cases reviewed within the legal thematic lens, 10 (59%) involved a specific legal or legislative mechanism, highlighting the pivotal role played by formal legal frameworks in the governance and management of fisheries involving IPLCs. In cases lacking a formal legal framework, greater flexibility often exists for practicing customary governance systems, though in many such instances, formal legal structures are emerging or under negotiation. Legal frameworks in fisheries typically address critical issues such as access rights, fishing quotas, conservation measures, and the protection of traditional practices. The strong correlation between fisheries management success and the presence of well-defined legal mechanisms underscores the importance of legal recognition for achieving sustainability and equity.

The fact that the strongest convergence occurred between the legal and fisheries thematic areas highlights the critical role of law in regulating access to resources and supporting IPLC rights to traditional and subsistence fisheries. Fisheries also share thematic overlaps with the conservation lens, with five cases demonstrating a growing recognition of need for robust legal structures to uphold IPLC rights and to integrate Indigenous and traditional knowledge in biocultural heritage management. Four of the five conservation-related cases involved specific legal mechanisms, further highlighting the role of the law in safeguarding IPLC rights. Such mechanisms often include international treaties, national legislation, and regulatory frameworks designed to protect ecosystems, species, and cultural sites. When the development thematic lens, especially regarding resource extraction - intersects with conservation concerns, robust legal foundations become even more critical for enforcing protective measures (Perez-Alvaro, 2023; Tsiouvalas & Evans, 2023; Engen et al., 2021).

Some Indigenous communities in Chile, Canada, and Aotearoa (New Zealand) have effectively leveraged legal mechanisms to reclaim their marine and coastal territories, and strengthen their

rights (Anbleyth-Evans et al., 2020; Engen et al., 2021; Frid et al., 2016; Tsiouvalas & Evans, 2023). In Chile, the Marine and Coastal Areas for Indigenous Peoples (MCAIP) policy facilitates indigenous communities' access to, and management of, marine areas, with objectives of enhancing marine biodiversity and advancing sustainable fisheries management (Anbleyth-Evans et al., 2020; Hiriart-Bertrand et al., 2020). It also offers the potential for scaling up marine biodiversity and cultural conservation by granting Indigenous communities management rights over marine areas (Anbleyth-Evans et al., 2020). In Canada, the Mi'kmaq have successfully used legal strategies to assert their rights. The Mi'kmaq's treaty rights were affirmed by the Supreme Court, while Canadian First Nations more broadly have secured priority access to marine resources for food, social, and ceremonial purposes under Canada's Constitution (Bennett, 2018). In Norway, the Saami have advocated for a dedicated fisheries zone to protect their traditional livelihoods (Anbleyth-Evans et al., 2020; Hiriart-Bertrand et al., 2020). In Aotearoa (New Zealand), Māori have utilized legal avenues such as the Marine and Coastal Area (Takutai Moana) Act 2011, enabling them to assert customary marine title and negotiate settlements, further supporting the restoration of their land-sea territories (Macpherson et al., 2023). Māori have also achieved major settlements with the Crown over commercial and customary fisheries and aquaculture rights (Macpherson et al., 2023; Ulrich et al., 2022). These examples collectively illustrate a broader global movement towards recognizing and empowering Indigenous rights in marine and coastal conservation and resource management. Even though IPLCs have made advancements on reclaiming rights over the customary marine territories, these rights are invariably weaker compared to their terrestrial counterparts (Bennett et al. 2021; Bennett, Govan, & Satterfield, 2015; Stevens, 2014).

Key differences between Indigenous law and state legal systems in resource governance across the land-sea interface lie in their underlying principles, sources of authority, and approaches to management (Engen et al., 2021; Enyew et al., 2021; Frid et al., 2016; von der Porten et al., 2016; Winter et al., 2021). Indigenous legal traditions are rooted in cultural and spiritual connections to the land and sea, relying on traditional knowledge, customary practices, and community-based decision-making (Bennett, 2018; Hiriart-Bertrand et al., 2020; Winter et al., 2021). These systems prioritize holistic and sustainable resource management, emphasizing the interconnectedness of ecosystems and the long-term well-being of communities. Indigenous law tends to uphold collective rights and responsibilities, stressing the stewardship and protection of traditional territories, including marine and coastal areas.

In contrast, state legal systems tend to rely on statutory laws, regulations, and policies enforced through governmental authority (Engen et al., 2021; Snook et al., 2022; Winter et al., 2021). State systems often prioritize economic development, conservation objectives, and regulatory frameworks that manage resources within the broader context of national interests and governance structures (Anbleyth-Evans et al., 2020; Bell-James, 2023; Macpherson et al., 2023; Mulalap et al., 2020). Furthermore, Indigenous law places a strong emphasis on intergenerational knowledge transmission, recognition of customary rights and responsibilities, and decision-

making processes that are deeply embedded within community governance (Bell-James, 2023; Klain et al., 2018; Macpherson et al., 2023; Mulalap et al., 2020; Wheaton et al., 2021; Winter et al., 2021). In contrast, State legal systems tend to favor formalized legal procedures, property rights, and centralized decision-making processes.

These differences between Indigenous law and state legal systems highlight the complexities and challenges involved in reconciling diverse legal traditions and governance frameworks for managing marine and coastal resources (Engen et al., 2021; Enyew et al., 2021; Frid et al., 2016; Winter et al., 2021).

3.5 Fisheries

Three main governance and management models are currently implemented at the land-sea interface for fisheries management: state-led governance, IPLC-led governance and co-governance/co-management regimes. Analysis of 18 case-studies in the fisheries thematic area shows that 10 cases (62.5%) reflect strong overlaps between fisheries and the governance lens, highlighting the instrumental role of governance structures (IPLC led, state led, co-led) in shaping fisheries outcomes at the land-sea interface.

Among studies featuring IPLC-led governance, 80% (4 out of 5 cases) are associated with legal contexts (e.g., Indigenous rights, legal frameworks for conservation). This strong association indicates that governance led by IPLCs often depends on robust legal frameworks to protect rights and manage resources sustainably, a trend similarly observed in the legal thematic. In state-led fisheries governance, 71.4% of studies are linked to the governance theme, indicating that centralized control and coordination dominate these management approaches. Notably, all three co-led cases (100%) correlate with the legal thematic, underscoring that co-governance between IPLCs and state actors consistently require clear legal frameworks to define and safeguard rights and responsibilities.

However, only 42.9% of state-led cases (3 out of 7) explicitly involve legal mechanisms. This lower percentage suggests that state-led fisheries governance may rely more on administrative or policy frameworks than on formalized legal structures, pointing to a potential area where legal support could be strengthened. Furthermore, nearly all state-led governance studies recommend recognizing and incorporating IPLC fishers' knowledge into decision-making and resource management processes (Ferguson et al., 2022; Vásquez-Carrillo & Peláez-Ossa, 2021). Some studies also highlight the need to strengthen women's leadership within IPLC fisheries (Ferguson et al., 2022).

Overall, the analysis demonstrates a significant correlation between the presence of legal mechanisms and particular governance models. All IPLC-led governance cases (5 out of 5) feature specific legal mechanisms, affirming the crucial role of legal support in protecting Indigenous rights and ensuring sustainable fisheries management. For instance, in Brazil, the creation of protected areas initially marginalized traditional fishing communities, leading to conflicts. In response, Brazil recognized Indigenous land rights through its Federal Constitution

and developed participatory mechanisms, such as public consultations and deliberative councils, to involve IPLC in conservation governance (Nayak et al., 2014; Castelo Branco Araujo & de Aguiar Portela Moita, 2018). Another example comes from Fiji which operates under a system of legal pluralism, particularly in the governance of coastal and reef fisheries, where multiple overlapping legal systems coexist. These include state legal frameworks enforced by government agencies, customary law maintained by iTaukei communities primarily through traditional practices, and hybrid institutions such as the Fiji Locally Managed Marine Area (FLMMA) network, which integrate both statutory and customary laws to resource management (Fache & Pauwels, 2020).

Other approaches implemented by nation-states to enhance community participation include establishing community management committees (Calvo-Ugarteburu et al., 2017), integrating Indigenous knowledge into fisheries management, and recognizing Indigenous knowledge as the intellectual property of communities (Deepananda et al., 2015). However, the existence of legal mechanisms does not automatically guarantee access to, or reclamation of, land-sea territories (Bodwitch et al., 2022; Cáceres et al., 2022). In Aotearoa (New Zealand), for instance, challenges in implementing co-management for customary fisheries include the centralization of management within large-scale agencies, resistance to customary management systems, and unequal power-sharing arrangements (Bennett-Jones et al., 2022). Similar patterns are evident in other settler-state contexts such as Canada, Australia, and South Africa (Adams et al., 2021).

Fisheries linked to legal mechanisms often intersect with the conservation theme, indicating that where legal frameworks are present, they are typically oriented to resource protection, Indigenous rights, or biodiversity conservation. IPLCs have leveraged a range of legal strategies - negotiating co-management agreements, partnering with conservation organizations, initiating legal action, and enforcing traditional leadership decisions – to access and manage fisheries sustainably in Asia and Africa (Ferguson et al., 2022). In settler-state contexts like Australia and Canada, legal advances such as treaty processes, ratification of the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP), and formal inclusion of Indigenous knowledge in management decisions as part of nation-to-nation frameworks have supported Indigenous peoples in reclaiming access to their traditional fishing territories (Adams et al., 2021, Butler et al., 2019; Scott & Mulrennan; 2010).

IPLCs have pursued various strategies to maintain and revitalize their land-sea connections through fisheries governance. These strategies include applying Indigenous knowledge to contemporary fisheries management, securing local food security, sustaining cultural practices, and addressing contemporary fisheries challenges in ways that support Indigenous rights (Ban et al., 2017; Calvo-Ugarteburu et al., 2017; Castelo Branco Araujo & de Aguiar Portela Moita, 2018; Deepananda et al., 2015; Konar et al., 2019; Vásquez-Carrillo & Peláez-Ossa, 2021). IPLCs have also leveraged legal mechanisms such community-based fisheries legislation, customary tenure recognition, and co-management frameworks to access and manage

aquaculture in their ancestral territories across Asia, Africa and the Americas (Bennett-Jones et al., 2022; Vásquez-Carrillo & Peláez-Ossa, 2021).

3.5.1 Obstacles to Accessing Fisheries

IPLCs face numerous obstacles that constrain their ability to exercise control over fisheries in their ancestral territories and affect the effectiveness and fairness of fisheries management. These barriers include jurisdictional fragmentation, overlapping authorities and regulatory regimes, legal restrictions, recognition-based injustices, commercial competition, environmental degradation, and exclusion from policy-making processes (Ban et al., 2017; Bennett-Jones et al., 2022; Bodwitch et al., 2022; Cáceres et al., 2022; Castelo Branco Araujo & de Aguiar Portela Moita, 2018; Ferguson et al., 2022; Konar et al., 2019; Nayak et al., 2014; Van Holt, 2012). Such challenges have profoundly disrupted the traditional ways of life and economic sustainability of IPLCs (Aswani, 2020; Bodwitch et al., 2022; Butler et al., 2019; Castelo Branco Araujo & de Aguiar Portela Moita, 2018; Vásquez-Carrillo & Peláez-Ossa, 2021). Legal restrictions often limit IPLC rights to access and manage fisheries within their territories (Bennett-Jones et al., 2022; Butler et al., 2019; Castelo Branco Araujo & de Aguiar Portela Moita, 2018; Vásquez-Carrillo & Peláez-Ossa, 2021), while commercial competition from industrial fishing operations undermines their ability to sustain traditional fishing practices and secure livelihoods (Ban et al., 2017; Calvo-Ugarteburu et al., 2017).

Environmental degradation, including overfishing and habitat destruction, has further reduced the availability of fisheries resources, compounding the economic vulnerability of IPLCs. At the same time, exclusion from policy-making processes has marginalized IPLCs, preventing them from influencing decisions that directly affect their access to and management of fisheries (Bennett-Jones et al., 2022; Vásquez-Carrillo & Peláez-Ossa, 2021). Together these obstacles have eroded the cultural and economic foundations of IPLC communities, posing significant threats to their long-term well-being and resilience.

4. Conclusion

This review underscores the ongoing fragmentation of governance at the land-sea interface and its implications for IPLCs whose territories extend across both domains. Our results indicate that dominant governance arrangements continue to separate terrestrial and marine systems, marginalizing customary institutions and limiting IPLC participation in coastal and ocean decision-making. While some nation states, such as Chile and Australia, have made significant strides towards granting IPLC rights to their land-sea territories, others have a long way to go in recognizing and implementing these rights, often constrained by outdated legal systems, political resistance, or limited institutional capacity to engage with Indigenous governance systems in a meaningful and sustained way.

We acknowledge, however, that the current review—restricted to English-language, peer-reviewed journal articles—reflects a narrow and potentially limited body of knowledge. Much of the nuance, innovation, and resistance led by IPLCs at the land-sea interface is documented in

grey literature, community-authored reports, oral histories, and other non-academic formats that are underrepresented in scholarly databases (Zurba & Papadopoulos, 2023; Smith, 2012). As a result, Indigenous perspectives are often conveyed through Western-centric or external interpretations rather than articulated in their own terms (David-Chavez & Gavin, 2018). Addressing this imbalance calls for greater methodological openness in academic research, particularly through participatory and co-produced knowledge processes that recognize and integrate Indigenous epistemologies while upholding principles of data sovereignty (Latulippe & Klenk, 2020).

Future academic work would benefit from engaging with non-traditional scholarly sources, multilingual literatures, and Indigenous-authored materials in order to broaden the evidence base and avoid reproducing colonial knowledge structures (Carothers et al., 2019). We anticipate further growth in emerging trends in collaborative research, Indigenous-led mapping, and legal pluralism at the land-sea interface (Reid et al., 2021), but further work is needed to center voices from underrepresented regions such as the Pacific Islands, Arctic communities, West Asia and parts of Southeast Asia. Creating inclusive citation practices and building collaborative research frameworks with IPLCs will be essential to ensuring that future governance models reflect the pluralism of knowledge, rights, and responsibilities that define these interconnected coastal spaces.

This review finds specific legal or legislative mechanisms have strengthened the representation and authority of Indigenous and local community actors, particularly in rural and coastal areas. To advance more just and sustainable governance supporting customary institutions, improving access and participation, and ensuring that legal policies legitimately recognize Indigenous rights to self-determination, accounting for differences in worldviews, timelines, financial resources, and conflicts with non-Indigenous actors is necessary. Integration across jurisdictions and sectors is essential to overcome institutional separation and reflect the biocultural interconnections of land-sea systems.

Future policy and research efforts should prioritize the inclusion of traditional governance systems, consider local socio-demographic contexts, and adopt co-governance models that enable adaptive, participatory, and cross-scale decision-making. Addressing entrenched inequities and aligning conservation and development strategies with Indigenous worldviews is critical to transforming land-sea governance in ways that are both equitable and ecologically resilient.

Chapter 4

Fragmented Data, Fragmented Oceans: How reporting discrepancies undermine Canada's marine conservation commitments

Leila Vaziri Zanjani, Monica Mulrennan

Key words: marine protected areas, conserved areas, land-sea interface, fragmentation, reporting, accounting

Abstract

Canada's ability to fulfill its international marine conservation commitments – most notably Aichi Target 11 – relies on transparent, consistent, and inclusive tracking of marine protected areas (MPAs). While recent initiatives have established a national baseline for coastal protected and conserved areas, this study identifies ongoing discrepancies and misalignments across key databases, including the Canadian Protected and Conserved Areas Database (CPCAD), the World Database on Protected Areas (WDPA), and Oceans Act MPAs. Using spatial overlay analysis and a Decision Support Tool (DST) framework, we demonstrate how fragmented governance structures and inconsistent reporting practices hinder an accurate assessment of progress toward coverage targets, particularly at the land-sea interface. Our findings highlight the persistent underrepresentation of Indigenous-led protected and conserved areas and point to concrete, actionable steps to strengthen the credibility, integrity, and inclusivity of MPA reporting at both national and international levels.

Introduction

Jurisdictional fragmentation at the land–sea interface remains a critical but often overlooked barrier to effective conservation governance (Pittman & Armitage, 2016). Around the world, terrestrial and marine environments are typically governed by separate authorities, a division that is reflected and reinforced in global conservation frameworks. International instruments, such as the United Nations Convention on the Law of the Sea (UNCLOS) and global databases like the World Database on Protected Areas (WDPA), institutionalize this spatial separation, embedding geopolitical boundaries that treat land and ocean as distinct. This approach reflects and perpetuates colonial cartographic traditions that divide coastal environments, rather than recognizing them as ecologically interconnected and culturally continuous spaces (Jay et al., 2016; Todd, 2016). The resulting governance arrangements, often developed without the meaningful participation of Indigenous peoples, tend to reflect worldviews that fragment land-seascapes and overlook customary systems of stewardship (Mulrennan & Bussi res, 2020; Ban et al., 2018; Smith, 2012; Mulrennan and Scott, 2001; 2000). This exclusion has contributed to inconsistencies in how marine and terrestrial protected areas are designated, reported, and governed. These mismatches undermine the representation of biodiversity, weaken recognition of Indigenous rights, and compromise the coherence and integrity of national efforts to meet conservation goals and targets (Artelle et al., 2019).

The designation and recognition of Marine Protected Areas (MPAs) are central to Canada's efforts to meet both national and international biodiversity targets. However, effective governance is often undermined by jurisdictional fragmentation and inconsistent data reporting across agencies and databases. A significant milestone in global conservation policy was marked by the adoption of the Aichi Targets, during the 10th Conference of the Parties (COP10) to the Convention on Biological Diversity (CBD) which took place in October 2010 in Nagoya, Japan. These targets introduced the first comprehensive global framework for biodiversity conservation, complete with reporting mechanisms and indicators. Aichi Target 11 committed signatory countries, including Canada, to conserving at least 10% of its coastal and marine areas through effective, equitable and representative management by 2020. Notably, the Aichi framework marked a global conservation milestone by explicitly acknowledging Indigenous Peoples' rights to their lands, territories, and traditional knowledge within the CBD. The Aichi Targets have since been succeeded by the Kunming-Montreal Global Biodiversity Framework (GBF), adopted at COP15 in Montreal in 2022. The GBF builds on earlier commitments while advancing stronger recognition of Indigenous leadership and rights in global biodiversity conservation.

To advance its commitments under Aichi Target 11, Canada launched the Pathway to Canada Target 1 initiative in 2015. As part of this effort, the Indigenous Circle of Experts was established in 2016 to provide guidance on Indigenous leadership in conservation. In 2018, the group released the *We Rise Together* report, which introduced the concept of Indigenous Protected and Conserved Areas (IPCAs) and called for shared governance of protected and conserved areas, alongside formal recognition of Indigenous rights and responsibilities in their territories (Indigenous Circle of Experts, 2018).

In 2021, as part of the broader Pathway to Target 1 initiative, Environment and Climate Change Canada (ECCC) released the Pan-Canadian Standards for Protected Areas and Other Effective Area-based Conservation Measures (OECMS) for Terrestrial and Inland Waters and guidance to assist decision-makers - including Indigenous Nations, governments, and NGOs - in applying the criteria. Because Fisheries and Oceans Canada is the lead department for coastal and marine dimensions of Canada Target 1, MPAs are qualified and reported through different processes. As of 2024, 12 MPAs have been formally included in the CPCAD, compared to more than 9000 terrestrial Protected Areas since the Pan-Canadian Standards were operationalized.

This striking disparity between the recognition of marine and terrestrial protected areas can be attributed to several challenges, particularly how the governing authority is identified and operationalized within the Pan-Canadian Standards, the Ocean's Act, and the CPCAD. As part of the Pan-Canadian Standards, a Decision Support Tool was developed by ECCC to "help evaluate whether areas meet the definitions of "Protected Area" (PA) or "Other Effective Area-based Conservation Measure" (OECM)" (ECCC, 2021). The evaluation can be carried out by any person, and it gathers information on various criteria required for an area to qualify as a PA or an OECM, including governing authorities, governance type and adherence to conservation standards.

One key requirement of the Pan-Canadian standards for terrestrial areas is that proposed areas must have clearly defined and mutually agreed-upon boundaries, along with a form of land or sea governance that supports long-term, legally secure protection that cannot be easily revoked or altered. As indicated in Table 1, legal authority over marine spaces is generally limited to federal and provincial governments and exercised through frameworks such as the Oceans Act, UNCLOS and the Canada Shipping Act. In practice, the governments of Canada and Quebec have relied on instruments like the Fisheries Act (1985, c. F-14), the Natural Heritage Conservation Act, and intergovernmental administrative agreements to designate and manage MPAs. These legal and administrative constraints complicate the recognition of marine spaces – especially those governed or co-governed by Indigenous Nations – as qualifying protected or conserved areas under CPCAD.

Table 1: Governing authority and legal instruments for Canada’s marine territories

Zone	Governing Authority	Key Instruments
Offshore (12–200 nm)	Federal (Crown)	Oceans Act, UNCLOS
Territorial Sea (0–12 nm)	Federal (Crown)	Oceans Act, Canada Shipping Act
Tidal Waters (e.g., bays, estuaries)	Federal (surface), Provinces (shoreline)	Fisheries Act, Land Acts (legislative frameworks at the federal or provincial level that govern the administration, allocation, tenure, and use of land, often including Crown land, Indigenous lands, and private property such as Federal Real Property and Federal Immovables Act (FRPFIA), Canada National Parks Act and Canada National Marine Conservation Areas Act)
Indigenous Territories	Indigenous + negotiated Crown roles	Treaties and Comprehensive Land Claims, IPCAs, Canadian Constitution (Section 35), United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP)

Indigenous rights and title to marine and freshwater areas are constitutionally protected under Section 35 of the *Constitution Act, 1982*, which affirms the inherent rights of Indigenous Peoples to govern, access, and steward their traditional territories, including aquatic environments. Despite this Constitutional recognition, Indigenous-led marine conservation remains largely

invisible in official reporting systems. As of 2024, the only marine IPCA listed in the CPCAD is the Gwaxdlala/Nalaxdlala (Lull/Hoeya) marine refuge – classified as an OECM and formally designated under the ownership of the federal government. This reflects a broader structural issue; current recognition frameworks tend to prioritize state-defined legal mechanisms over Indigenous governance systems, limiting the visibility and legitimacy of Indigenous-led marine protection efforts in national and international reporting. MPAs are central to Canada's efforts to meet Target 3 of the Kunming-Montreal GBF (Fu et al., 2024; Wilson et al., 2024; Lemieux et al., 2023). While recent progress has prioritized increasing total MPA coverage, persistent challenges related to data integration, jurisdictional overlap and fragmentation, and the recognition of Indigenous governance remain unresolved (Fu et al., 2024; Wilson et al., 2024; Lemieux et al., 2023; Townsend and Roth, 2023).

Lemieux et al. (2023) provided the first national baseline of protected and conserved coastal areas using the CPCAD. Their study highlighted critical gaps in representation, data transparency, and spatial coherence. Building on this foundation, our study compares the CPCAD, the WDPA, and the dataset of federally designated Oceans Act MPAs to assess points of convergence and divergence across these datasets. Using a multi-source spatial overlay combined with a governance gap analysis, we evaluate the consistency of MPA reporting and examine the implications of overlapping designations and jurisdictional boundaries. We pay particular attention to how IPCAs are represented – or omitted – within these datasets, with special attention to the land-sea interface where legal, ecological, and cultural boundaries often intersect.

Our objectives are to: 1. Quantify and map governance overlaps and omissions; 2. Assess jurisdictional fragmentation and recognition gaps; 3. Advance a framework for harmonized, inclusive marine accounting. To orient the reader, we begin by situating the study within current research and policy contexts, with particular reference to the work of Lemieux et al. (2023). This is followed by a detailed *Methods* section outlining the spatial datasets, geoprocessing steps, and fragmentation scoring framework. The *Results* section present key findings from the GIS overlay analysis and governance alignment metrics. In the *Discussion*, we interpret these results in relation to jurisdictional fragmentation and the inclusion of Indigenous governance models. The paper concludes with recommendations for improving data integration and recognition of marine and coastal conservation areas in Canada.

Methods

We used ArcGIS Pro to spatially analyze three national-level MPA datasets: CPCAD (2024 edition), WDPA (Canada extract, 2025), and Oceans Act MPAs (via Fisheries and Oceans Canada (DFO) open data services). After filtering CPCAD and WDPA to include only marine areas, we used the Union tool to generate an overlap layer and classified each polygon by its source combination (e.g., CPCAD only, CPCAD + WDPA, All Three). The Union tool is used to combine multiple polygon layers and preserves all input features, creating a new layer that

includes overlapping and non-overlapping areas with their associated attribute data. It is commonly used to identify and analyze spatial overlaps between datasets (ESRI, 2024). We calculated the area in square kilometers and created an "Overlap_Type" attribute for each polygon. Symbolic heat maps (image 1) and fragmentation scores (Fig 2) were used to visualize governance complexity. Additionally, IPCA data and information were acquired from the IPCA Knowledge Basket and Indigenous data portals, where permitted.

The lead author is directly engaged in supporting the inclusion of protected and conserved areas into the CPCAD by applying the Pan-Canadian criteria for terrestrial and in-land waters. The second author has been directly involved in supporting the establishment of IPCAs in Canada, including contributing to the foundational proposal for the Wiinipaakw (James Bay) Protected Area IPCA as a National Marine Conservation Area in the offshore waters of the Eeyou Marine Region (Mulrennan et al. 2019). The authors are also members of the Conservation Through Reconciliation Partnership as well as honorary members of the ICCA Consortium. This positionality provides unique insight into the institutional mechanisms, spatial standards, and procedural constraints that shape which areas are recognized and reported. While this embeddedness strengthens the technical and procedural analysis presented in this study, it also grounds our critical examination of the area-based Conservation limitations in engaging with Indigenous governance and biocultural conservation approaches.

Data Processing

All spatial datasets were reprojected to EPSG:3979 to ensure consistent spatial resolution. We used the Union and Intersect tools in ArcGIS Pro to merge and compare overlapping features across the CPCAD, WDPA, and Oceans Act MPA layers. Each resulting polygon was examined to identify how many distinct governance sources were present (e.g., whether an area was recognized by one, two, or all three databases as seen in Fig 1).

To measure fragmentation, we designed a simple scoring scheme. Polygons recognized in only one database received a Fragmentation Score of 1 (low integration), those recognized in two databases received a score of 2, and those appearing in all three were scored 3 (high integration). This scoring reflects the degree of multi-source agreement and integration (see image 2).

This approach has several limitations. First, overlapping geometries required manual inspection to ensure accurate attribute retention, given differences in dataset schemas. Second, near-identical spatial extents with inconsistent attribute formats (e.g., mismatches in name or designation type) created ambiguity in assigning overlap categories. Finally, since CPCAD and WDPA enforce mutually exclusive biome tagging (terrestrial vs. marine), spatial continuity at the land-sea interface was sometimes disrupted, complicating the classification of estuarine and coastal protected and conserved areas. We summarized area (km²) by overlap type and visualized governance complexity using a fragmentation heat map. A separate mismatch map highlights where each dataset contains unique or omitted MPAs. We then analyzed gaps in CPCAD recognition of IPCAs using overlay and attribute comparisons.

Results

Our analysis found that 78.7 percent of MPAs appear in all three databases (refer to image 1). The WDPA includes several sites missing from the CPCAD and Oceans Act datasets, while the CPCAD includes areas with no representation in the WDPA. Oceans Act MPAs, are legally established and are consistently reflected in the CPCAD. Several IPCAs are absent from all three federal datasets. As of December 2024, CPCAD reports that 15.5% of national marine environments are under some form of official recognition. We also found that information is not clearly communicated between national agencies and international organizations as the total areas under conservation reported by the WDPA is reported as 9.18% (table 2).

Table 2. Comparison between CPCAD and WDPA conservation coverage data as of august 2025.		
	Total area of MPAS and OECMS (km2)	Total percentage of baseline area
CPCAD	893,437	15.5
WDPA	526,161	9.18

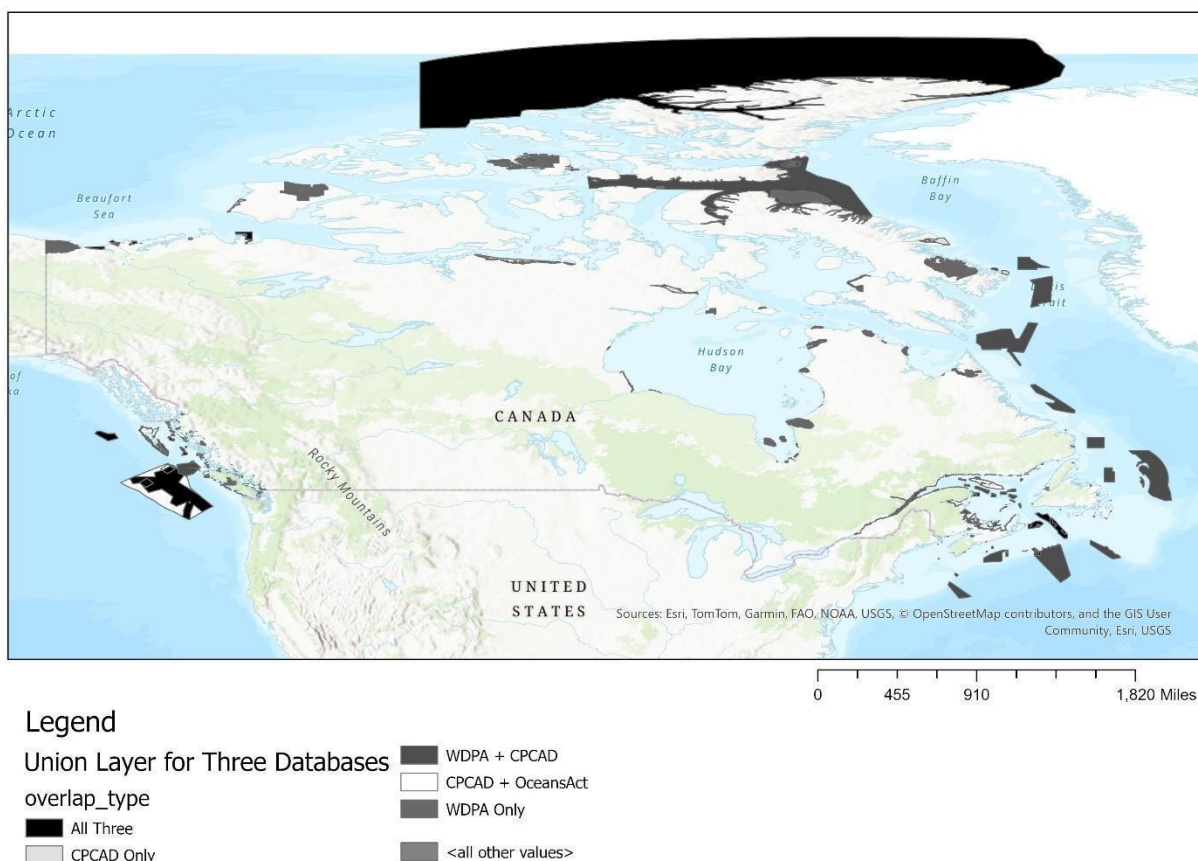


Fig 1. Overlap type map of MPAs recorded in CPCAD, WDPA, and Ocean Act

Spatial overlap analysis indicates that jurisdictional fragmentation is particularly pronounced in coastal regions of British Columbia (BC) and Atlantic Canada. The union of CPCAD, WDPA,

and Oceans Act MPA layers reveals complex overlaps in these regions. Areas with high Fragmentation Score values (2 or 3) are concentrated in regions such as the BC's fjords and the bays of Nova Scotia. These zones illustrate complex governance landscapes, where multiple layers of protection and management intersect. Overlaps include federal fisheries closures, provincial or territorial parks, IPCAs, and MPAs reported under international frameworks. Each of these designations may be governed by distinct authorities, reported through different frameworks, and guided by varying objectives and criteria for protection. The result is a mosaic of jurisdictions that can lead to both opportunities for collaborative management and challenges related to coordination, accountability, and clarity of purpose. Inconsistencies in reporting can compound these challenges. For example, some MPA polygons reported to the WDPA for BC's coast are absent from the CPCAD, while certain Oceans Act MPAs in Atlantic Canada appear in the CPCAD but have no corresponding entries in the WDPA.

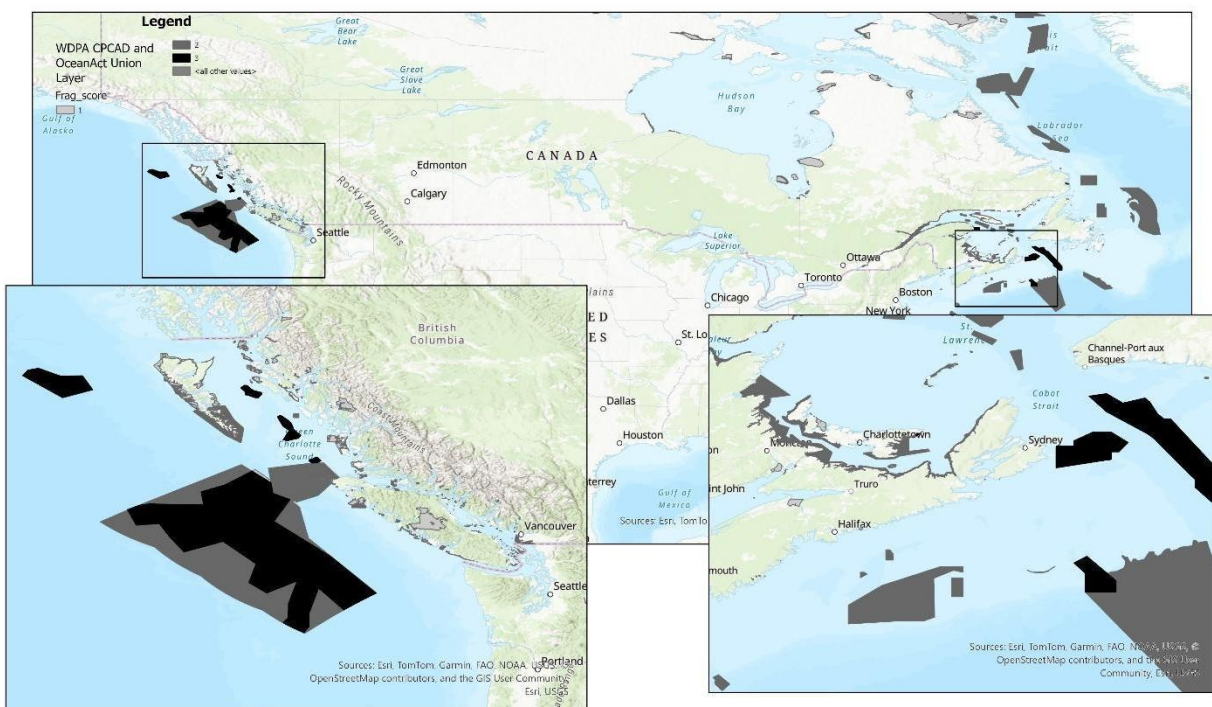


Fig 2. Fragmentation scoring between the WDPA, CPCAD and Ocean Act layers

Image 2 depicts the spatial distribution of the *Fragmentation Score* values across Canada's marine and coastal zones. Darker colors indicate higher scores (greater integration across CPCAD, WDPA, and Oceans Act datasets). As shown, full three-way overlap (score = 3) is concentrated in parts of the high Arctic—particularly around Lancaster Sound—and in sections of coastal BC and the Cabot Strait where federal and provincial jurisdictions have historically coordinated protection. In contrast, large stretches of Atlantic Canada, particularly the Gulf of St. Lawrence and parts of Nova Scotia, display lower scores (1–2), reflecting gaps in WDPA or

CPCAD reporting. Several coastal and estuarine areas that are known to have local or Indigenous protections are absent altogether from the composite layer, indicating that these sites are missing from one or more datasets.

Nearly 27% of MPAs appear solely in the WDPA. This discrepancy reflects not just technical classification issues but also institutional fragmentation across federal conservation mandates. In Canada, responsibility for marine and coastal environments lies with the DFO, while terrestrial and inland water areas are tracked through the CPCAD, managed by ECCC. CPCAD's reporting structure categorizes sites by a single biome—either *terrestrial* or *marine*—which results in many coastal or interface-spanning protected areas appearing as discontinuous. The WDPA reporting structure allows for one contiguous area to be reported with both terrestrial and marine components. The 27% share of WDPA-only marine designations illustrates this misalignment and highlights how institutional silos and biome-based classification reinforce spatial and jurisdictional fragmentation at the land–sea interface. 3.9 % of MPAs that only appear in the CPCAD database such as the Wapusk National Park and Kaskatamagan Wildlife Management Area in Manitoba, Ukkusiksalik National Park and Ahik Migratory Bird Sanctuary in Nunavut, Anderson River Delta Migratory Bird Sanctuary and Banks Island Migratory Bird Sanctuary in the Northwest Territories, Hakai Lúxvbálís Conservancy and K'una Gwaay Conservancy in BC, are all under national (ECCC and Parks Canada) or provincial governance.

The heat map (image 2) also reveals that marine representation along the land–sea interface is patchy, with some estuaries and fjords fragmented into terrestrial and marine components due to technical classification rules such as biome type, which limits visibility of truly integrated coastal conservation. Jurisdictional fragmentation is highest at ecotones, including estuaries, inlets, and fjords where federal, provincial, and Indigenous jurisdictions converge.

Discussion

In 2023, the Assembly of First Nations (AFN)' *Report on Marine Conservation in Canada* was published setting out 21 short- and long-term policy recommendations to enhance the operationalization of IPCAs by the DFO (Heidt & Jones, 2023). The report calls for enhanced data coordination and transparency across jurisdictions and between Indigenous and Crown governments, as well as close collaboration with ECCC and Parks Canada to facilitate the formal inclusion of IPCAs in national reporting frameworks. Our spatial analysis shows that technical and legal silos—such as CPCAD's biome restrictions—systematically exclude Indigenous-led marine conservation from national and international accounting, even when these areas are ecologically and culturally significant. Moreover, our identification of missing or misclassified areas supports the report's conclusion that current systems reinforce colonial boundaries rather than enabling co-governance or “Two-Eyed Seeing” approaches. In the long term, the AFN calls on Canada to co-develop legal recognition pathways that acknowledge Indigenous marine governance systems and secure formal reporting status for Indigenous-led designations. The report categorically states that “Parks Canada and ECCC have been more successful in

supporting IPCAs through existing legislation than DFO has” (Heidt & Jones, 2023, p24). Our findings offer a practical diagnostic tool to guide these reforms by identifying which governance gaps are spatial, technical, or policy-based.

Our spatial analysis reveals systemic challenges in MPA recognition and data integration. The CPCAD prioritizes legal designation and enforcement over Indigenous governance and biocultural values (Mansuy et al. 2023; Mullen, 2022; Roth, 2009). The current tracking framework does not account for place-based protection led by Indigenous nations. We propose that federal datasets integrate self-declared IPCAs, provincial marine areas, and harmonize reporting with WDPA standards. Further, the CPCAD’s data schema should be restructured to include Indigenous indicators and flexible governance models.

The classification of the only marine IPCA as an OECD under federal governance reinforces a prevailing limitation in Canadian conservation accounting: Indigenous governance is frequently recorded through the lens of federal designation rather than an autonomous governance authority. The Kluskap IPCA, led by the Mi’kmaq Nation in Unama’ki (Cape Breton Island), is an example of an Indigenous-led conservation initiative that is currently unrecognized in Canada’s official conservation datasets. Although formal negotiations began in early 2023 between the Province of Nova Scotia and Mi’kmaq representatives to co-govern the Kluskap Wilderness Area—the first agreement of its kind in the province’s history—this IPCA has not yet been included in national or international spatial inventories (Government of Nova Scotia, 2023). Encompassing both terrestrial and marine ecosystems and rooted in Mi’kmaq cultural principles such as *Netukulimk* and *Etuaptmumk* (Two-Eyed Seeing), the site remains absent from CPCAD due to requirements for state-endorsed designation, GIS shapefile submission, and a governance typology that continues to privilege colonial categories (Nova Scotia Environmental Network, 2021). This omission is particularly concerning given Nova Scotia’s pledge to protect 20% of its land and water by 2030, a target that will be difficult to meet without the formal recognition of Indigenous-led conservation efforts (Nova Scotia Environmental Network, 2023). While the province’s Shared Understanding with the Mi’kmaq acknowledges the cultural and ecological value of the Kluskap area and proposes it as part of its protected areas strategy, the lack of integration into CPCAD undermines both reconciliation and accounting accuracy. Other IPCAs declared under Indigenous law include the Hada (Bond Sound) & Kakweikan (Thompson Sound) by the K̓w̓ik̓w̓asut’inuxw̓ H̓axwa’mis First Nation (KHFN), which are also absent from all databases (K̓w̓ik̓w̓asut’inuxw̓ H̓axwa’mis First Nation, 2021).

A similar dynamic is visible in the Nunatsiavut Government’s Imappivut (“Our Oceans”) initiative, which seeks to develop a marine management plan for the Labrador Inuit Settlement Area marine zone, including consideration of future Indigenous-led protected areas (Nunatsiavut Government, n.d.). Under the Labrador Inuit Land Claims Agreement (LILCA), however, clause 6.2.2 excludes National Parks and other federally designated protected areas from the Agreement’s co-management provisions (Government of Canada, Crown-Indigenous Relations

and Northern Affairs Canada, 2005). This means that if an Imappivut-designated conservation zone were to be established through the Oceans Act MPA process, governance authority would rest primarily with the DFO, with Inuit participation limited to advisory or consultative roles as defined by federal policy. Any NMCA designation would be led by Parks Canada, again operating outside LILCA's co-management framework. Conversely, areas protected through Fisheries Act measures, such as Marine Refuges, or through provincial coastal mechanisms could fall more squarely within LILCA's governance scope, enabling greater Inuit authority in management decisions. Given that the coastline of Newfoundland and Labrador has almost no protected areas (Image 3), the Imappivut initiative offers a unique opportunity for advancing Inuit governance over their traditional marine territories. This underscores the urgency of aligning federal, provincial and Indigenous-led designation processes to close spatial and governance gaps in Canada's marine protection network.

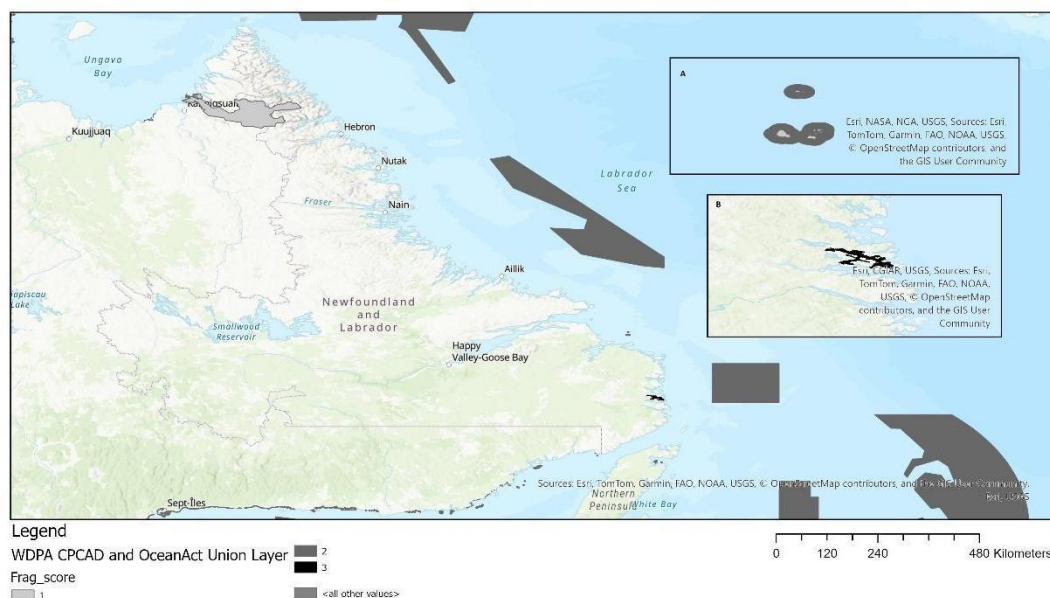


Fig 3. Gilbert Bay Marine Protected Area (rectangle A) and Gannet Islands Ecological Reserve (rectangle B) are the only two protected areas on the coastline of Newfoundland and Labrador. The former appears in all databases and the latter in CPCAD and WDPA respectively. The offshore areas are OECMs under DFO governance designated through the Fisheries Act.

The CPCAD has adopted the same governance types as the WDPA-defined categories, including "National Government," "Sub-national Government," "Government-delegated Management," and "Indigenous Peoples." In practice, however, many Indigenous communities do not submit their IPCAs to the CPCAD. This may be due to the requirement to clearly define geographic boundaries using GIS shapefiles, limited resources to comply with CPCAD's technical protocols, lack of incentives or benefits to reporting and reluctance to fit Indigenous conservation practices

into a federal framework that can overlook relational land-sea continuities or customary stewardship systems. It is also shaped by historical distrust and disengagement from environmental decision-making processes (Mulrennan & Bussi res; 2020; Townsend, Moola, & Craig, 2020; Boyd & Lorefice, 2018).

A deeper problem lies in how governance fragmentation is normalized within the CPCAD classification system. For example, CPCAD requires that each protected or conserved area be designated as either a "marine" or "terrestrial" biome. This sharp split fails to accommodate biocultural spaces spanning the land–sea interface. When a protected or conserved area spans both marine and terrestrial environments, it can be submitted to the CPCAD with only a single biome indicated in its GIS metadata. This means the other component is either omitted from the federal dataset or classified solely as either marine or terrestrial, contributing to underreporting of spatial extent and complexity. By contrast, the WDPA metadata structure allows a protected area to include one or both biomes.

Furthermore, Pan-Canadian criteria is applied to the DST process often privilege legal mechanisms such as fee-simple ownership by land-trusts, not-for-profit organizations, and government delegated governance through conservation authorities and state forms of tenure. While the DST nominally includes “Indigenous Peoples” among its governance types, the recognition of this category is often contingent on alignment with government-defined standards. In effect, customary law and Indigenous stewardship regimes—particularly those outside modern land claims agreements—are subordinated to Crown or provincial governance systems. This reinforces spatial and jurisdictional fragmentation and inhibits progress toward inclusive, rights-based conservation reporting under Target 3 of the Kunming-Montreal GBF.

DFO Protected Area Designation vs ECCC’s Pan-Canadian Standards Decision Support Tool

To further investigate discrepancies between the designation of protected areas, we compared the terrestrial-oriented Pan-Canadian Standards for Protected and Conserved Areas CPCAD Decision Support Tool (DST) and the DFO Oceans Act MPA designation process (Table 3). The CPCAD rigid requirement to classify protected areas as either “terrestrial” or “marine”—and to submit appropriately categorized shapefiles—is ill-suited to conservation initiatives that span the land–sea interface, leading to systematic underrepresentation of coastal and transitional ecosystems. The DFO process (pre-planning → feasibility and policy → regulatory development → management) is structured to include ecological, socio-cultural, and traditional knowledge inputs during coastal and marine planning. However, in practice, the “lack of policy direction around IPCAs and DFO’s role in supporting their establishment” constrains the operational capacity for new area designations (Heidt & Jones, 2023; Warrior et al., 2022; Hubert & Gray, 2020). For example, in Atlantic Canada, Mi’kmaq perspectives were consulted during the

DFO Oceans Act MPA process, yet Warrior et al. (2022) found that these perspectives were not systematically incorporated into governance structures.

Moreover, the CPCAD enforces a standardized governance typology based on WDPA categories, which tends to reify colonial administrative models and places Indigenous governance on par only if communities submit to state-defined definitions. The DFO approach includes advisory committees and feasibility assessments where Indigenous and local knowledge can be incorporated, but this is not guaranteed nor uniformly applied, and outcomes depend on local political will, staff capacity, and pre-existing relationships (Durand, 2020; Hubert & Gray, 2020). Together, these differences perpetuate fragmentation: areas managed through marine-specific processes, such as those under the Fisheries Act or designated as Marine Refuges, are often excluded from terrestrial databases, and vice versa, reinforcing artificial divisions at the land–sea interface. This structural misalignment compromises holistic conservation accounting and undermines Canada’s ability to meet Target 3 commitments, unless tools like the data requirements of the CPCAD are adapted to support cross-ecosystem inclusion and integration of Indigenous governance (Boyd & Lorefice, 2018).

Table 3. Comparison of Oceans Act new MPA establishment with the ECCC's reporting process.

Feature	Pan-Canadian Standards for PAs and OECMS for Terrestrial and Inland Waters	DFO Oceans Act MPA Process
Scope / Biome	Designed primarily for terrestrial and inland-water protected areas; requires specification of biome (marine vs. terrestrial) and GIS shapefile submission.	Focused exclusively on marine environments ; includes coast, territorial sea, and EEZ.
Spatial data requirement	Requires GIS boundaries and marine/terrestrial category; cross-interface areas may be split or omitted if not properly defined.	Area of Interest (AOI) defined via scoping stage; boundaries refined in step-by-step process with consultation and science input.
Governance typology	Uses WDPA-based governance categories (e.g. national, sub-national, Indigenous, NGOs) standardized through 2022 Data Schema.	Advisory committees include interested parties, input phases, but governance types not codified as rigid categories.

Regulatory pathway	Uses administrative data submission; designation depends on concordance with Pan-Canadian criteria and data provider.	Formal regulatory pathway: pre-planning → feasibility/policy → regulation → management, published in Canada Gazette.
Engagement of Indigenous/traditional knowledge	Optional or dependent on submission; inclusion may require Indigenous bodies to adapt to tool's technical standards.	Indigenous/traditional knowledge is required in feasibility assessments and consultations (e.g., in AOI, advisory committees).
Integration across land–sea interface	Biome dichotomy may exclude cross-interface features unless specifically submitted; no coastal integrative logic.	Spatial process considers ecological, biophysical, social, cultural, risk data across coastal/marine zones in AOI phase.
Transparency and reporting	Data aggregated in CPCAD for national and international reporting; inclusion depends on data provider.	DFO follows a structured, phased process with public comment, gazettal, management planning; data is public via DFO portals.

To clarify how these differing processes and governance pathways influence Canada's progress toward the GBF Target 3, Table 4 summarizes the principal mechanisms available for the designation of MPAs in Canada. The table distinguishes between Oceans Act MPAs, Fisheries Act measures (including Marine Refuges), National Marine Conservation Areas (NMCAs), and other federal or provincial designations, indicating their legal basis, lead authority, and whether they are currently counted toward Target 3.

Table 4. Principal mechanisms available for the designation of MPAs in Canada.

Mechanism	Legal Status	Used by DFO?	Counts toward Target 3?
Oceans Act MPAs	Legally designated	Yes	Yes
Fisheries Act – Fishing Area Closures	Legally designated (regulatory)	Yes	Sometimes (if meets OECM criteria)

Marine Refuges (Other Effective Area-Based Conservation Measures – OECMs)	Policy-based; not legislated but recognized	Yes	Yes (if meets DFO’s science criteria)
Canada National Marine Conservation Areas Act (NMCAs)	Legally designated	No (led by Parks Canada)	Yes

In addition to the Oceans Act, DFO employs other legal and policy tools such as the *Fisheries Act* and the designation of Marine Refuges (OECMs) to protect marine habitats. These mechanisms can be implemented more rapidly than Oceans Act MPAs and can address specific ecological features, but their establishment and reporting do not consistently center Indigenous governance or knowledge systems (Hubert & Gray, 2020). For instance, while Central Coast First Nations in Pacific Canada developed marine use plans combining Indigenous and scientific knowledge, Reid et al. (2022) report that these plans were only partially reflected in formal federal protections. The absence of a national standard for Indigenous knowledge integration in MPA or OECM designation means that some areas with strong Indigenous stewardship remain invisible in the CPCAD and the WDPA, even when they are functionally protected (Jessen et al., 2011).

Conclusion

Canada’s current MPA accounting system is hampered by jurisdictional fragmentation, inconsistent data integration, and statutory exclusions that undermine comprehensive reporting. The CPCAD, managed by ECCC, enforces a strict biome classification—marine or terrestrial—that often fragments coastal or estuarine sites and omits marine components of areas recorded as terrestrial (Lemieux et al., 2023). This technical constraint intersects with institutional silos: *Oceans Act* MPAs, *Fisheries Act* Marine Refuges, and NMCAs are administered by different agencies, with distinct pathways for inclusion in the CPCAD and the World Database on Protected Areas (WDPA) (Hubert & Gray, 2020). Indigenous-led designations such as IPCAs remain largely absent from national reporting due to the requirement to conform to WDPA governance typologies and provide shapefiles through the CPCAD DST (Boyd & Lorefice, 2018; Durand, 2020). Legal frameworks such as the Labrador Inuit Land Claims Agreement (Government of Canada, 2005) further complicate governance by excluding federally designated protected areas from Indigenous co-management provisions, limiting opportunities for integrated recognition. Case studies show that while federal processes nominally provide for Indigenous and local knowledge integration, this is applied inconsistently and often depends on political will and local relationships (Reid et al., 2022; Warrior et al., 2022). As a result, Canada’s official MPA accounting may overstate integration while undercounting ecologically significant areas, particularly those at the land–sea interface or under Indigenous governance.

Canada's marine conservation tracking framework remains fragmented and incomplete, particularly in recognizing Indigenous-led initiatives and harmonizing with global datasets. Building on Lemieux et al. (2023), this paper demonstrates how spatial analysis of overlap can surface critical reporting gaps that result from colonial jurisdictional boundaries and uncoordinated designation processes. Addressing these gaps requires a multi-faceted approach: the co-development of national standards for MPA recognition that include Indigenous governance systems; the integration of biocultural and customary indicators into CPCAD reporting; and the alignment of terrestrial and marine designation frameworks through a unified land-sea interface strategy. The implementation of the Assembly of First Nations' recommendations—which call for Indigenous-led governance, equitable access to spatial decision-making, and legal reform—is one vital step among many (Heidt & Jones, 2023). Broader structural changes are also necessary, including legislative updates, cross-jurisdictional data flow, and binding accountability mechanisms to ensure that Canada's contributions to Target 3 reflect both international standards and Indigenous rights.

Chapter 5

Territories of Life at the Land–Sea Interface: Rethinking Philanthropic Funding for Indigenous and Coastal Community Governance

Leila Vaziri Zanjani, Ali Razmkhah, & Monica Mulrennan

Abstract

This article investigates how philanthropic funding supports Indigenous Peoples and local community (IPLC) governance at the land–sea interface, by drawing on a comparative analysis of Oak Foundation-funded initiatives in Chile, Malaysia, and Tanzania. Using a theoretical framework that integrates decolonial philanthropy and intermediary governance, we explore how conservation efforts rooted in local priorities advance territorial recognition, marine stewardship, and knowledge exchange. The cases demonstrate that Indigenous Peoples and Local Communities are supported in defining success on their own terms, conservation outcomes extend beyond biodiversity to include strengthened governance, cultural revitalization, and enhanced access to coastal and marine spaces. Intermediary organizations played a pivotal role in translating donor objectives into locally meaningful processes. While philanthropic funding enabled significant gains, its transformative potential hinged on trust-based partnerships and community-led design. This study advances understanding of conservation funding by highlighting the land–sea interface as a critical, yet often overlooked, site where environmental justice intersects with Indigenous and local community sovereignty.

1. Introduction

Over the past three decades, community-based conservation has gained legitimacy as a model for environmental governance that upholds local rights and knowledge (Young, Keene, & Doak, 2018). Yet despite growing global consensus on its effectiveness, questions remain about how external funding, especially philanthropic support, can be structured to genuinely strengthen community leadership and decision-making (Frey, 2018). This challenge is compounded at the land–sea interface, where conservation governance must navigate interconnected ecosystems, fragmented jurisdictions, and overlapping tenure systems, conditions that often leave coastal Indigenous peoples and small-scale fishing communities in precarious governance situations.

Since its establishment in 2010, the ICCA Consortium (hereafter the Consortium) along with its member organizations, has endeavored to shift the narrative on community-led conservation governance. The Consortium is a global association dedicated to supporting IPLCs who self-organize to govern and conserve their “territories of life” also known as ICCAs (Indigenous and Community Conserved Areas). As an international network composed of both member organizations and honorary individuals, the Consortium advocates for the recognition, support, and protection of territories where collective custodianship contributes significantly to

biodiversity conservation, cultural continuity, and social equity (Borrini-Feyerabend & Jaeger, 2024).

"Territories of life" refer to areas that sustain human life and well-being through the active and lived experiences of governance, management, and conservation by IPLCs (supporting citation). These territories often align with customary commons, whether terrestrial, freshwater, or marine—and persist regardless of formal legal recognition (Zanjani et al., 2023; Borrini-Feyerabend & Jaeger, 2024). In recent years the ICCA has intentionally used the term “territory” to communicate its deeper significance: for custodian communities, a territory embodies ecological, historical, cultural, political, and social values that extend well beyond its economic utility (Borrini-Feyerabend & Jaeger, 2024). It is a lived and living landscape or seascape, imbued with meaning, memory, and identity, linking a collective past with an envisioned future (supporting citation). According to Borrini-Feyerabend & Jaeger, 2024, perceiving and defending territory in this way also resists artificial separations between people and place, nature and culture, and governance and life itself (Zanjani et al., 2023; Borrini-Feyerabend & Jaeger, 2024).

From 2020 to 2023, the Consortium implemented a three-year initiative funded by the Oak Foundation as part of its Marine and Coastal Conservation programme. The project was designed to enhance the political and legal recognition, ecological stewardship, and self-determination of IPLCs across three particular coastal regions: Aysén and Los Lagos in southern Chile; the northern coastline of Tanzania; and Sabah, in Malaysian Borneo. These regions were selected by the Consortium for their exceptional biocultural diversity, their strong community engagement in territorial governance, and the increasing pressure they face from extractive industries, privatization of marine spaces, and weak institutional frameworks for recognizing community-led conservation.

The overarching aim of the funding from the Oak Foundation was to support grassroots action and advocacy that could contribute to long-term systemic change in conservation governance. Specific emphases included strengthening customary governance systems, securing collective tenure rights over marine and coastal areas, and ensuring the inclusion of Indigenous women and youth in decision-making processes (ICCA Consortium, 2021). The project also sought to improve the visibility and legitimacy of territories of life through documentation, storytelling, and legal empowerment activities, thereby influencing national policy and global discourse (Rubis & Theriault, 2019; Fernández-Llamazares & Cabeza, 2018).

The project was supported by a decentralized, collaborative structure, with national-level partners responsible for implementation in their respective countries. In Chile, the project was coordinated through Observatorio Ciudadano and co-led with regional Indigenous organizations and councils. In Tanzania, the Mwambao Coastal Community Network served as the primary implementing body, while in Malaysia, the project was coordinated by the Land Empowerment

Animals People (LEAP Spiral), working with Indigenous and coastal communities including the Suluk, Sungai and Tidong people. All these organizations are established and led by IPLCs of relevant communities. The Consortium provided overall coordination and technical support, in addition to strategic linkages at regional and international levels.

Over the three years, the grant supported a range of locally driven activities, including participatory mapping, action research, legal and policy analysis, documentation of traditional knowledge, and community organizing for environmental stewardship. It also facilitated international exchanges, regional dialogues, and engagement in multilateral processes, particularly those linked to the UN Convention on Biological Diversity (CBD), with a focus on amplifying community voices in shaping conservation targets, frameworks, and rights-based governance approaches.

This paper critically examines how funding from the Oak Foundation supported territories of life across three coastal regions in Chile, Malaysia, and Tanzania. In collaboration with key IPLC representatives involved in the project, we examined three years of reporting along with other supplementary materials, using two conceptual frameworks to assess how power, knowledge, and agency were distributed throughout the project. First, decolonial philanthropy, which challenges extractive funding models by advocating for community-defined priorities and more horizontal relationships (Ray, 2020). Second, intermediary governance, which highlights the role of national and regional partner organizations (e.g., LEAP, Mwambao, Costa Humboldt) as key interlocutors and implementers connecting funders and communities (Game & Meijaard, 2021; Mitlin et al., 2007). Building on these we addressed two main questions: How does philanthropic funding shape access to and governance of marine and coastal territories for IPLCs? What insights can be drawn from a retroactive, cross-regional analysis of funding outcomes?

To orient the reader, we begin by geographically situating the project. We then outline the methods, including materials used, data analysis and country-specific information. The *Synthesis and Interpretive Insights* section presents key findings and identifies the primary tool applied in each national context. The *Findings and Discussion*, we present cross-case analysis of Oak Foundation-funded conservation initiatives in Chile, Tanzania, and Malaysia. The paper concludes with practical recommendations for practitioners, donors, and policy makers.

2. Case Overview: Funding Practice Across Three Countries

This section provides a comparative overview of how the Oak Foundation's grant was implemented across Chile, Tanzania, and Malaysia, highlighting funding as a catalytic, political, and community-embedded process. Rather than functioning solely as a mechanism for financing conservation projects, the grant was intended to operate as an enabler of governance innovation, territorial defense, and the amplification of Indigenous and local community voices. The Oak Foundation awarded the Consortium a total of USD 1,035,455. In turn, the Consortium signed

three grant agreements – each valued at USD 150,000 - with Observatorio Ciudadano, Mwambao Coastal Community Network and LEAP Spiral. The remaining USD 585,455 was used as seed funding for the Consortium to support staff salaries, consultants and other contracted services and travel and conferences.

2.1 Chile: Legal Pluralism and Marine Territorial Governance

In Chile, the project aimed to support Indigenous Mapuche-Williche communities in the Los Lagos and Aysén regions in securing coastal rights through the Espacio Costero Marino de Pueblos Originarios (ECMPO, or Indigenous Peoples' Marine Coastal Areas) legal mechanism. ECMPOs are grounded in the Lafkenche Law (Law 20.249/2008), which provides Indigenous coastal communities with legal tools to assert recognition and governance over traditional and ancestral territories. When applying for ECMPO recognition, communities often go beyond the basic Lafkenche requirements, incorporating customary uses and spiritual understandings into their submissions to the Ministry of Economy's Undersecretariat for Fisheries and Aquaculture (SUBPESCA). Project funding enabled a community-led process of participatory mapping, cartographic memory work, and intergenerational knowledge sharing, resulting in ECMPO applications that meaningfully reflect ancestral occupation and marine stewardship.

The funding model served as an institutional bridge, supporting communities in navigating complex bureaucratic pathways while grounding their legal claims in culturally situated knowledge systems. The Oak Foundation supported the Consortium as the coordinating entity and Observatorio Ciudadano as the national partner, facilitating legal analysis and assistance with ECMPO applications, as well as providing community training on governance, mapping, and rights and supporting participation in national and international policy arenas (ICCA Consortium – Chile Node, 2021; Loncopán, 2021; Observatorio Ciudadano, 2021; ICCA Consortium, 2023).

This model recognized the community as an actor capable of co-producing territory with the state. In addition, national and international advocacy was supported through participation in UN mechanisms and regional Indigenous networks. In 2022, Costa Humboldt and Observatorio Ciudadano published recommendations for processing ECMPO applications. This included details of how legal knowledge and mapping outputs, generated and supported through the project, were used to formally submit ECMPO proposals (Correa et al., 2022)

Table 1. Key information extracted from narrative reports and supplementary project materials related to Mapuche-Williche communities in the Los Lagos and Aysén regions in Chile.

Theme	Recurrent Patterns and Dominant Narratives	Tensions or Barriers	How Theme Addresses Research Questions	Direct Result of Funding?	How Project Addressed Tensions
Legal Recognition and Access to Coastal/Marine Space	The ECMPO, as an established legal mechanism, is widely used by coastal Mapuche Williche communities in Chile to assert territorial rights. By employing key tools such as participatory mapping and community testimonies, ECMPOs can more effectively demonstrate ancestral ties and customary uses. Participatory mapping also serves to anchor youth in their ancestral territories.	Bureaucratic complexity of ECMPO process, with delays in application approval. Discrepancies between administrative processes and Indigenous worldviews including translation of community priorities into bureaucratic terms, which may distort meaning. Risk of commodifying rights to access through a highly legalistic framework. Lack of long-term support for the post-application phase (monitoring, enforcement, etc.)	Demonstrate s how funding enables IPLCs to engage with state-recognized marine governance mechanisms, influencing their access to and control over their territories.	The funding enabled IPLCs to engage in legal review and participatory mapping to strengthen their ECMPO applications, building on a mechanism that was already in place.	Project supported communities in submitting stronger applications and understanding legal processes; however, challenges with government delays continue to persist.
Women's Roles and Gendered Perspectives and Intergenerational Knowledge Transmission	Women are seen as caretakers of the sea, not just in terms of resource use, but as spiritual and emotional stewards. They are key transmitters of knowledge, especially intergenerational ecological	Limited visibility of women in formal ECMPO application processes, despite their informal leadership. Access to technical training and formal	Demonstrate s how funding helped surface gendered perspectives	Because gender was a deliberate focus in local activities and outputs, the funding helped highlight women's contributions. However, the project did not bring about structural changes in how curricula address local	Created platforms for women's storytelling and recognition, although broader legal support remained limited.

	knowledge about tides, lunar cycles, and coastal species. Rituals, prayers, and storytelling are led predominantly by women elders. Grandmothers are central in teaching practices of shellfish gathering, tide timing, and respectful harvest.	governance spaces remains limited. Youth engagement with traditional environments is constrained by outmigration and school curricula. Bureaucratic processes can marginalize or overlook experiential and oral knowledge systems.	in coastal governance.	knowledge, nor did it engage directly with educational policy.	Educational systems remained largely unchanged.
Cultural and Spiritual Connection to Land/Sea	The sea is seen as a sentient and sacred entity (“lof marino”), not just a source of food. Ceremonial offerings and silence before fishing are practiced as acts of reciprocity and care. Territories are described not only in geographical terms but through ancestral narratives, emotions, and identity.	Western legal systems often exclude the affective and spiritual dimensions of land-sea relationships, risking the erasure of Indigenous cosmologies in legal processes.	Demonstrate the need for translation of Indigenous knowledge into formats legible to state agencies.	Through mapping workshops, oral histories and non-Western knowledge formats were integrated into both cartographic products and legal documents. The project also supported legal intermediaries and Indigenous rights advisors in translating oral knowledge for formal applications.	State recognition of oral traditions as valid forms of ecological evidence in official ECMPO applications remains limited. Many community narratives were included symbolically but did not shift the state’s evidentiary standards.

2.2 Tanzania: Fisheries Governance and Gendered Economic Inclusion

In Tanzania, the project supported the Mwambao Coastal Community Network in strengthening Collaborative Fisheries Management Areas (CFMAs) and Beach Management Units (BMUs) across coastal communities. Funding from the Oak Foundation, channeled through the Mwambao Coastal Community Network, enabled community facilitators and village leaders from three CFMA villages in northern Tanzania to collaboratively draft and ratify Standard Operating Procedures (SOPs) for inter-village fisheries governance. These SOPs were co-developed through a series of community workshops and validation meetings, where fishers, Shehia Fisher Committee members, and district officers reached consensus on shared enforcement protocols, roles, and coordination mechanisms. The process was led by Mwambao staff, with community representatives, ensuring that the SOPs reflected customary norms while complying with formal CFMA by-laws. Since their adoption, local patrol teams have reported improved clarity in enforcement responsibilities and communication between villages.

A notable feature of the project was its support for gender-responsive livelihood development, particularly through Village Community Banks (VICOBA) and women's seaweed cooperatives. These initiatives extended conservation beyond ecological indicators into social and economic resilience, particularly for marginalized community members. International learning exchanges (e.g., Kenya-Tanzania forums) and involvement in Western Indian Ocean governance platforms further contributed to regional capacity building.

Table 2. Key information extracted from narrative reports and supplementary project materials for related to Tanzania

Theme	Recurrent Patterns and Dominant Narratives	Tensions or Barriers	How Theme Addresses Research Questions	Direct Result of Funding?	How Project Addressed Tensions
Community governance and fisheries management	Emergence of local governance structures; increased BMU coordination; slow policy uptake.	Inconsistent government support Legal ambiguity in Zanzibar	Illustrates how funding helped formalize IPLC structures to improve marine governance.	Training and SOPs were developed during project period.	The funding improved enforcement capacity, however, gaps in state support persist.
Livelihood diversification and restoration	Widespread use of restoration as entry point; economic inclusion strategies recurring across villages	Limited capital for long-term livelihood sustainability.	Restoration (e.g., mangrove planting, octopus no-take zones) became a socially legitimate and low-conflict entry point for discussing marine management. Once trust and relevance	The project resulted in institutional strengthening of BMUs and SOP development. It also explicitly supported: 1) VICOBA for	While economic initiatives increased participation and legitimacy, they did not always translate into stronger legal recognition of IPLC marine tenure. This highlights a partial

			were established, communities became more willing to engage in formal governance structures such as BMUs and CFMAs.	women's financial inclusion; 2) Sustainable seaweed farming as a climate-adapted income strategy; and 3) Community-led restoration (e.g., mangrove planting, temporary closures)	gap in how far funding translated to structural policy change. Limited capital for long-term sustainability remains a barrier.
Gender inclusion and leadership development	Training programs and leadership spaces consistently linked to gender visibility.	Cultural resistance to women's leadership roles.	Connects livelihoods to governance by showing how women-led finance groups enhance participation.	Yes. VICOPA initiatives were grant-funded.	The project enabled initial economic inclusion but longer-term scaling requires structural donor backing. Cultural acceptance for women's leadership is evolving and requires time (Tarimo & Dominico, 2024)
Community networking and platform development	Platform creation through SOPs and annual meetings;	Sustainability threatened by donor dependency.	Peer-to-peer learning enhanced legitimacy and awareness of regional governance challenges.	The grant supported regional learning such as a cross-border learning exchange with Kenya and participation in Western Indian Ocean Marine Science Association (WIOMSA) events; it also funded SOP development and regional dissemination.	The project reduced isolation. However, logistical and financial continuity remains a challenge.

2.3 Malaysia: Relational Seascapes and LMMA Recognition

In Malaysia, the project was implemented by LEAP Spiral in collaboration with IPLCs within the Lower Kinabatangan and Segama Wetlands, northeastern Sabah. Funding focused on the revitalization and formalization of Locally Managed Marine Areas (LMMAs) rooted in Indigenous cosmologies and customary seasonal use. This case demonstrates how funding facilitated the translation of traditional practices into recognized governance forms, even in the absence of robust national legal frameworks for Indigenous marine tenure.

The grant also supported national policy dialogues, peer learning across Southeast Asia, and contributions to international biodiversity events such as the Asia Parks Congress. Importantly,

storytelling, documentation of oral histories, and intergenerational marine walks became central to the methodology as a direct response to community definitions of territory as relational, spiritual, and dynamic.

Table 3. Key information extracted from narrative reports and supplementary project materials related to Malaysia

Theme	Recurrent Patterns and Dominant Narratives	Tensions or Barriers	How Theme Addresses Research Questions	Direct Result of Funding?	How Project Addressed Tensions
Locally Managed Marine Areas (LMMAs) and Marine Tenure	Reinforcement of Indigenous stewardship of mangroves; sustained local leadership engagement; strong cultural-spiritual framing of marine protection.	Limited legal protection for Indigenous marine governance; need for formal recognition by state bodies.	Highlights jurisdictional fragmentation as a barrier to access and governance in LMMAs.	Partially. The challenges surfaced through the implementation of the project however structural exclusions remain unresolved.	The project helped build visibility for marginalized groups like Suluk Sungai and Tidong peoples; however, formal protections remain lacking.
Community Learning, Regional Networking and Engagement in Global and National Advocacy	Growing cross-national knowledge exchange; recognition of cultural-ecological links; institutional memory building; Use of regional platforms to elevate local voices.	Scaling of peer learning beyond one-time events; Exclusion of remote communities from national and regional dialogues; Translation of advocacy into policy at national level remains limited; risks of tokenism remain.	Peer-to-peer learning enhanced legitimacy and awareness of regional governance challenges.	The project provided funding for participation in ICCA Southeast Asia Regional Assembly, Asia Parks Congress, and other regional environmental dialogues.	The project reduced isolation. However, logistical and financial continuity remains a challenge.
Gender, Youth and Intergenerational Transmission of Knowledge	Role modeling by senior women; environmental knowledge passed orally and through practice.	Cultural undervaluation of women's and youth's roles in marine planning; lack of formal education pathways.	Youth were empowered to act as bridges between tradition and policy engagement.	Youth-led documentation and training were a project focus.	Even though the project helped overcome some generational divides, policy traction is still evolving.

3. Methods

This study uses a retrospective case study design that draws on document analysis, thematic coding, cross-case comparison, and embedded participation (Taylor, Davison, & Harwood, 2023). The ICCA Consortium, serving as coordinator, framed the initiative within a rights-based

and decolonial approach. It facilitated collaborative agenda-setting by IPLCs centering priorities. As authors of this article, we hold long-standing relationships with the Consortium as staff and honorary members affording us continuous access to community insights. In Chile, Costa Humboldt and Observatorio Ciudadano partnered directly with communities to co-develop project activities. Community assemblies, oral history workshops, and participatory mapping processes were central to ensuring that activities responded to local territorial visions. In Tanzania, the Mwambao Coastal Community Network embedded participation through a long-established co-management framework in fishing villages. Project planning was undertaken collaboratively with Fisher Committees, Imams, and elders. In Malaysia, LEAP Spiral facilitated participatory spatial planning with Indigenous coastal communities in Sabah. The design and implementation of project activities including customary use, mapping, and language revitalization were led by community researchers and elders.

We reviewed three narrative reports from 2020–2023 submitted to the Oak Foundation by the Consortium as well as all supplementary materials and publications that were produced as part of the project. We then analyzed the objectives to identify recurring themes and keywords, such as access, governance, learning, networks, and legal instruments. We employed a multi-stage qualitative coding framework adapted from grounded theory and cross-case thematic analysis (Sterling et al., 2017; Bennett et al., 2019; Berbés-Blázquez et al., 2016, Kapos, 2009). Step 1 involved deductive coding of all narrative reports and supplementary project materials (including community publications, legal guides, meeting minutes, and policy documents), using predefined thematic categories aligned with the grant objectives: (1) tenure and governance, (2) knowledge-sharing and capacity-building, (3) organizational strengthening, and (4) gender and intergenerational leadership. In Step 2, data were categorized by country and triangulated through an Excel-based matrix to extract key activities, actor networks, and timelines. This enabled a clear mapping of implementation processes and community-specific pathways. Step 3 focused on thematic interpretation: identifying recurrent patterns, salient quotes as well as points of friction or tension.

To identify shared lessons and diverging experiences, we compared the cases through triangulation of findings across Chile, Malaysia, and Tanzania. Community collaborators contributed to interpreting findings, validating case summaries, and shaping the narrative. The first author shared drafts with collaborators and implemented edits and comments after receiving input. Data analysis focused on how community governance was enabled or constrained by funding structures, intermediary processes, and external events (e.g., COVID-19, delayed international fora). These disruptions influenced the pace, scope, and documentation of governance processes, limiting the comprehensiveness of outcomes assessments. As a result, the evidence base is affected by temporal delays, incomplete data collection, and uneven comparability across contexts. The analysis therefore prioritizes process-based insights and emergent dynamics over definitive impact assessment.

3.1 Synthesis and Interpretive Insights

In analyzing the implementation of the ICCA Consortium's Oak Foundation-funded initiative, identifying the primary tool used in each national context was a crucial methodological step. This involved systematically coding project documentation to determine the central mechanism through which rights-based conservation objectives were pursued (Table 5). Whether through legal mechanisms such as the ECMPO in Chile, BMUs in Tanzania, or community protocols in Malaysia, the identification of these tools illuminated the locally specific yet strategically significant pathways for IPLC empowerment. The exercise reflects a broader commitment to decolonial philanthropy, wherein the tools of governance and conservation are defined by communities themselves, rather than imposed externally (Domínguez & Luoma, 2020).

Such framing resonates with calls to center Indigenous jurisdiction in environmental governance (Arney et al., 2022) and challenges the top-down provisions historically associated with conservation funding (Rodriguez & Inturias, 2018). The focus on primary tools allowed the study to surface how communities navigate legal pluralism, jurisdictional fragmentation, and ecological stewardship at the land–sea interface. Moreover, by grounding the analysis in tools that are both culturally embedded and politically strategic, this approach contributes to emerging models of conservation that are structurally transformative rather than merely participatory (Dinerstein et al., 2019).

Through our coding process, we identified gendered economic empowerment in Tanzania, intergenerational knowledge transmission in Malaysia, and legal autonomy over marine territories in Chile as project focal areas (Table 5). Mwambao Coastal Community Network, LEAP Spiral, Observatorio Ciudadano and Costa Humboldt have long standing relationships with community members and are established and led by representatives from Williche, Mwambao working villages and the Suluk, Sungai and Tidong peoples. During the implementation of the projects community members held extensive discussions, workshops, events, etc., with the national implementing organizations through which the focal areas were decided based on actions, storytelling, and advocacy. This model of project design and implementation is in contrast to extractive funding logics and centers the self-determined priorities of IPLCs (Rodriguez & Inturias, 2018; Domínguez & Luoma, 2020). Each project focus reveals a layer of community-led innovation that aligns with broader goals of social and ecological justice. For instance, foregrounding gendered economic empowerment through VICOBA savings groups in Tanzania not only improved women's livelihoods but also positioned them as actors in marine conservation as evidenced by women taking on the role of treasurer in BMUs and their participation in various national and international training and conservation forums. This positioning challenges both patriarchal and colonial structures (Agarwal, 2020). Similarly, in Malaysia, the revival of oral knowledge systems among Suluk and Sungai and Tidong communities connects ecological stewardship with cultural sovereignty. Indigenous scholars emphasize that centering epistemic justice through such approaches is fundamental to advancing decolonial practices (Gazing Wolf et al., 2024). These focal points are

deeply embedded community strategies for resilience, autonomy, and resistance, which require funding models that are flexible, trust-based, and structurally redistributive (Domínguez & Luoma, 2020; Pyhälä, 2024).

Table 4. Comparative summary of community-led conservation strategies, outcomes, and funding modes across Chile, Tanzania, and Malaysia with quantitative and qualitative evidence drawn from project reports and grant documentation.

Aspect	Chile	Tanzania	Malaysia
Primary Tool	6 ECMPO territories were supported (4 approved, 2 in process) out of 81 national applications, covering ~1,000+ km ² . The projects highlight gender and cultural dimensions (e.g. ngen, protective roles, rituals) and are legally established, with follow-up fisheries & monitoring plans. Management plans now integrate <i>life plans</i> and traditional planning systems, alongside active coastal spatial planning, such as aquaculture zoning in the Caulín ECMPO.	• 3 villages mapped and developed CFMAs, by-laws, and SOPs. • Foot patrols are used; however, enforcement remains limited due to lack of patrol boats. • Increased awareness of FAO Small Scale Fisheries Guidelines.	• 4 of 7 villages adopted Locally Managed Marine Areas (LMMAs) with documented protocols. • Cast nets introduced to protect juvenile shrimp. • Community-based fisheries monitoring ongoing with Open Data Kit used by community members to track marine resource use, observe biodiversity, and monitor compliance with locally agreed-upon fishing protocols. • Ramsar management committee re-engaged in the area resulting in the government returning 8 acres of traditional territories to the communities of Kampung Bongon and Mumiang.
Governance Form	ECMPOs serve as legally recognized Indigenous frameworks under Chilean law, backed by the Indigenous Women's Network and alliances with artisanal fishers.	• Shehia Fisher Committees strengthened co-management and increased fisher participation in decision-making. • Annual learning exchanges solidify legitimacy. • National Task Team formed for SSF implementation.	• Customary marine governance linked to Islamic lunar calendar (e.g., Renggas). • Fishery protocols co-designed with community Imams. • Forestry Department accepted co-management plan for Kinabatangan-Segama Wetlands, but otherwise remains disengaged.

Project Focus	• The project supported life plans, biodiversity restoration, aquaculture regulation, and intergenerational ecological knowledge. In March 2023, the book: “Women of the Sea” was published, featuring dozens of Indigenous women involved in ECMPO governance and highlighting surveillance and biodiversity indicators.	• Women-led microenterprises supported. • Training on governance, legal rights, and leadership offered to Shehia Fisher Committees. • Monitoring for rule compliance is ongoing.	• Women supported to document cosmological and ecological knowledge. • Economic activities include: edible bird’s nests, vegetable farming, community tourism, and traditional seafood processing. These diversified incomes allow strategic focus on territorial governance, especially amid political instability.
Regional / Int’l Activity	ECMPO representatives participated in UN Ocean Conference (Lisbon) and CBD COP15 (Montreal). Discourse influenced global biodiversity framework’s 30x30 target. Also hosted Indigenous women’s gathering (March) and Aysén coastal alliance (August). Outcome: Network of Indigenous Women for the Defense of the Sea.	• Tanzania team attended WIOMSA & regional exchanges. • Delivered draft Plan of Action for SSF Guidelines. • Coordination with national authorities growing.	• Malaysia team co-hosted sessions at Asia Parks Congress, participated in ICCA SEA Assembly, and contributed to ICCA Southeast Asia report. • Presented at Sabah Climate Change Conference and involved in regional legal and governance analyses. • 12 community members participated in Intl. Indigenous Day events.

4. Discussion

In this section, we present the core findings derived from cross-case analysis of Oak Foundation-funded conservation initiatives in Chile, Tanzania, and Malaysia, each rooted in diverse coastal ecologies, legal systems, and community traditions. In Table 5 we provide cross-cutting insight for all cases in reference to common themes across the three national contexts.

Table 5. Cross-Cutting Interpretive Themes across Chile, Malaysia and Tanzania

Theme	Insight
Legal Pluralism & Hybrid Governance	All three countries showcase hybrid legal arrangements, where customary, national, and international legal norms intersect (e.g. ECMPO in Chile, CFMA in Tanzania, informal LMMA recognition in Malaysia). This highlights the critical role of legal pluralism in legitimizing Indigenous and community stewardship.
Knowledge Co-Production	The Project promoted knowledge production that was grounded in local contexts, multilingual, and intergenerational (e.g. participatory mapping in Chile, and youth-elder fieldwork in Malaysia). This ensured that traditional knowledge was documented, shared, and applied across generations.
Strategic Framing of Conservation	Each site framed conservation as culturally grounded (e.g. spiritual ties to mangroves or ancestral fishing rights), reframing dominant narratives of exclusionary or technocratic conservation.

Funding as Political Infrastructure	Community governance was fostered and supported, enabling platform building, peer learning, and durable advocacy.
Gendered Pathways of Governance	Women's leadership was central in all sites (e.g. sea gatherers in Chile, mangrove leaders in Malaysia, VICOBA in Tanzania), but formal governance still skews male. Funding enhanced visibility but structural pathways for wider participation of women remain limited.
Territory as Relational, Not Fixed	Conservation practice in all cases defined "territory" not as a bounded space but as a relational, lived seascape or "territory of life" (e.g. marine closures based on seasonal use; spiritual-marine rituals).

In all three contexts, the Oak Foundation's funding functioned as an infrastructural and political enabler, supporting community-defined conservation pathways, securing marine tenure, and creating platforms for advocacy and learning. In Chile, the ECMPO framework was used by Williche communities to assert marine tenure rights. As mentioned above, the ECMPO is a legal tool under Chilean fisheries law, but it is triggered and shaped by Indigenous communities through cultural knowledge, life plans, and territorial defense. In the case of the Williche, legal hybridization occurs as Indigenous governance practices (e.g., ngen, rituals, women's collectives) become institutionalized through state-recognized marine spatial planning. For example, the Caulín ECMPO integrates customary norms with aquaculture zoning and national regulations.

In Malaysia, Suluk and other coastal Indigenous peoples used funding to anchor conservation in customary practices. Communities apply customary protocols (e.g., Renggas rituals, Islamic lunar calendar-linked bans) in managing LMMAs and wetlands. These are not always formally recognized under national fisheries or land law but are increasingly acknowledged through collaborations with state bodies like the Sabah Forestry Department and Ramsar Site management authorities. The coexistence of non-state governance actors (e.g. Imams, village elders) with partial state recognition reflects a legally plural system, as seen in co-management plans that were endorsed by the Forestry Department even though the Department of Fisheries was only minimally engaged.

In Tanzania, coastal community networks were strengthened through community fisheries management areas (CFMAs). Legal recognition of CFMAs and Shehia Fisher Committees reflects a hybrid of customary marine tenure systems and state-sanctioned legal structures under the Fisheries Act of Tanzania. Community by-laws are developed locally, endorsed by district authorities, and enforced through both customary legitimacy and legal authority. Three villages created enforceable CFMA by-laws, while local patrols operate under community norms, backed by state recognition.

These outcomes align with Stephenson et al. (2021), who argue that small grants foster conservation and management equity when grounded in local priorities. However, international conservation investments often reflect donor priorities and geopolitical interests, which can misalign with community needs unless projects are explicitly co-designed (Lindsey et al., 2021; Qin et al. 2022). The Oak Foundation’s approach appears to have reduced some of the common tensions associated with international conservation funding, particularly in relation to community ownership and alignment with local priorities. By supporting locally rooted organizations and engaging with frameworks that recognize rights-based and culturally embedded governance, the initiative fostered conditions for greater local agency and flexibility. The Foundation’s stated values—including a focus on equity, Indigenous rights, and systemic approaches to environmental challenges—appear to have shaped a funding model that is more responsive to diverse local contexts than conventional conservation investments (Oak Foundation, 2021). This allowed the project to evolve beyond conservation impacts, encompassing broader cultural, legal, and governance significance.

Across all three national contexts, implementing communities faced significant tensions and barriers that shaped the trajectory of their conservation efforts. A major cross-cutting challenge was the mismatch between customary governance systems and state-led regulatory frameworks, often leading to bureaucratic delays, legal ambiguity, or outright exclusion from formal decision-making spaces. In Chile, for example, communities pursuing ECMPO designations faced extended administrative processes and conflicting interpretations of marine tenure laws. In Tanzania, while BMUs were recognized, local enforcement was hindered by weak institutional support and overlapping jurisdictional mandates. In Malaysia, Indigenous communities struggled with fragmented legal recognition, particularly at the land–sea interface, along with historical exclusion of their customary claims and limited government engagement in policy decisions. Access to funding itself was also a tension—while the Oak Foundation grant offered critical support. Community members sometimes viewed external funding as precarious or insufficiently flexible to match evolving grassroots priorities. Furthermore, gender and generational inequalities surfaced as internal barriers to inclusive participation, despite targeted efforts to support women and youth leadership. The COVID-19 pandemic disrupted planned activities, delayed community consultations, and restricted mobility and gatherings—especially in remote or politically sensitive areas. In several cases, the pandemic forced partners to restructure timelines, shift to digital modes of coordination, or pause fieldwork entirely, placing additional strain on already resource-constrained organizations and slowing momentum on governance, mapping, and enforcement processes. These tensions highlight the need for sustained structural reforms and more adaptive, community-anchored funding mechanisms that account for the political, legal, and cultural complexity of IPLC governance.

4.1 Inequities in Conservation Practice and the Legacy of Colonialism

Despite the project's emphasis on equity, participating communities continue to face challenges associated with extractive conservation paradigms including pressures from industrial fishing, externally driven conservation targets, and limited influence over state-led marine spatial planning processes. The regional and international engagements facilitated through the Consortium allowed for Indigenous-led dialogue, however centering Indigenous knowledge requires not just inclusion, but epistemic sovereignty (Cisneros, 2022; Gazing Wolf et al., 2024). High-income countries often drive conservation funding priorities in ways that reproduce asymmetries of power and reinforce colonial structures by framing local communities as mere implementers of pre-designed interventions rather than agents of their own environmental governance (Corbera, 2024; West, Igoe, & Brockington, 2006; Bullard, 1994). The Oak Foundation's flexibility partially addressed this, but further efforts are needed to transform funding from a transactional to a relational practice. In our study, communities across all three countries highlighted how rigid donor requirements and short funding cycles constrained their ability to manage conservation strategies that reflect lived realities and evolving priorities (visible in tables 1, 2 and 3). This is not unique to this project. For example, in Tanzania, participatory forest monitoring initiatives suffered under donor-driven constraints, with fixed timelines and narrow performance metrics undermining community ownership and responsiveness (Lindsey et al., 2021; Funder et al., 2013). Similarly, the importance of creating community-driven tools and standards that translate local priorities into formal governance language is visible in the following quote: "The SOPs allow us to move from informal to formal collaboration as a network", extracted from the Mwambao Community Network Forum (Mwambao Coastal Community Network, 2023).

The project saw substantial progress in Indigenous women's leadership, particularly through the 'Mujeres del Mar' networks. In Tanzania, Asha Masud Msabaha from Mwaboza Tanga participated in one of the projects' leadership training initiatives and later stated "I never thought I could lead. Now I am the treasurer of our BMU" (ICCA Consortium, 2023). However, systemic constraints such as male-dominated legal spaces, limited funding, and linguistic barriers persist. True decolonial practice demands not just representation but transformation of the institutions and logics through which conservation is governed (Bezeng & Imong, 2025; Dionne, 2025). The Oak Foundation's emphasis on gender and local languages provided entry points but requires scaling through coalition-building as well as policy reform. The Consortium and national partners note that "In many contexts, national policy reform is necessary, something beyond the scope of this funding period, but identified by national organizations as a priority for future phases" (ICCA Consortium, 2022).

4.2 The Politics of Sustainability

A critical tension across all three cases lies in the sustainability of funds. Grant-based funding often generates short-term impacts without long-term security unless governance mechanisms are legally and financially embedded (Stephenson et al., 2021). This was most evident in Tanzania, where CFMA structures proved vulnerable to shifting political will. While CFMAs are legally recognized under Tanzanian fisheries law, their functionality and authority often depend on the degree of support—or neglect—by district and national government actors. During the project period, changes in political leadership and ministerial priorities resulted in inconsistent enforcement of community by-laws, delayed approvals of management plans, and weakened legitimacy of Shehia Fisher Committees in the eyes of both communities and enforcement agencies (ICCA Consortium, 2022; 2023). Conversely, Chile’s ECMPO process afforded a more stable legal platform because it is anchored in national legislation. As stated in the Guide to recommendations for processing ECMPO applications “The manual outlines the step-by-step procedure to submit an Indigenous Peoples Marine Coastal Area application. This process combines technical tools and traditional knowledge.” (Observatorio Ciudadano, 2020).

In all three contexts, communities understood territory not as bounded space, but as relational, and spiritual, experienced and sustained through movement, rituals, and ecological rhythms. For example, as Leticia Caro from Mujeres del Mar (Arce, Vargas, & Coñuecar, 2023, p 13) explained “The Kawésqar territory is essentially a nomadic territory. Our ancestors traveled through large and diverse spaces, and today, in part of that vast ancestral territory, we have ECMPO requests. Our ECMPO request falls within three large spaces, which are distant from one another. That's where the nomadic space matters. For example, the regulations can't encompass that nomadic space, and they ask, "Why so much space and why so distant?" That's why it's important to understand the Kawésqar territory, to understand the reason for the request and the distance between the two, or the three territorial spaces within a single request”.

This challenges static, cartographic-based assumptions in marine conservation and the fragmentation of land-sea jurisdictions, reframing territory as a lived space. In Chile, Mapuche-Williche communities described kelp forests, whale routes, and navigational markers as parts of “ancestral seascapes,” and viewed ECMPOs as tools to protect this living heritage. The role of women in strengthening community commitments to their territories is a common subject in Mujeres del Mar. This is reflected in the following quote: “My territory has a coastal area composed primarily of various creatures that comprise marine life: algae, fish, crustaceans, mollusks, etc. But it is also composed of the *ngen* (owners or protective forces) that inhabit these territories. I think I should highlight the *ngen lafken* (protective forces of the sea), who, based on the oral stories told to us by our ancestors, are constantly present in this territory.” (Ingrid White, as quoted in Arce, Vargas, & Coñuecar, 2023, p16). In Tanzania, fishing grounds were entangled with seasonal migrations, gendered harvesting practices, and ancestral stewardship. Although SOPs sought to formalize these rhythms in legal documents, tensions emerged between state-

imposed boundaries and community-based ecological practices. In Malaysia, seascapes were understood through Suluk cosmologies involving spirits, taboos, and oral maps. These were not simply cultural expressions, but practical tools for governing access, use, and protection of marine areas.

5. Conclusion

Territories of life at the land–sea interface represent some of the most ecologically rich yet politically fragmented spaces in global conservation. These regions often fall between administrative mandates, sectoral policies, and competing legal frameworks, creating governance structures that tend to marginalize, devalue, or erase customary tenure systems. This is especially true in coastal zones, where the spatial fluidity of marine ecosystems and jurisdictional overlaps often complicate tenure recognition and stewardship (Fallon, Lankford & Weston, 2021; Schutter & Hicks, 2019; Breslow et al., 2016). Decolonial philanthropy, when practiced with integrity, can offer a counterbalance to this jurisdictional fragmentation by strengthening IPLC capacities to sustain self-determined conservation pathways that recognize the interdependence of land, sea, and culture (Bhati & Eikenberry, 2024). Rather than imposing technocratic solutions, this approach enables IPLCs to reaffirm their custodial roles over their territories of life and restructure governance frameworks from the ground up (Bhati & Eikenberry, 2024).

The findings from this project illustrate that supporting community agency in these liminal zones requires funding practices that not only tolerate but embrace cultural and legal pluralism, and political empowerment as cornerstones of effective conservation. At the same time, it is important to acknowledge that donors such as the Oak Foundation operate within broader structural constraints—including accountability to boards, legal compliance obligations, and external reporting pressures—that may limit how far they can go in advancing equity or long-term sustainability (Baylis Honey-Rosés, & Börner, 2016). In this initiative, however, there is evidence that the Oak Foundation’s flexible, relationship-based model allowed for local co-design, iterative adaptation, and support for hybrid governance systems—approaches rarely supported by conventional conservation donors. Nonetheless, tensions remained around scale, sustainability, and the integration of Indigenous legal systems into state frameworks, which continue to constrain transformative outcomes.

Based on our findings, we offer a set of pragmatic recommendations for practitioners, donors, and policy makers. We recommend that local conservation leaders, NGO facilitators, and community-based institutions engaged in governance and ecological stewardship embed financial resilience into local governance models such as LMMAs and CFMAs. Resilient financial strategies rooted in local institutions can reduce dependence on short-term, donor-driven funding (Cohen et al., 2019). This includes mechanisms such as locally controlled revolving funds, co-managed tourism revenues, and diversified livelihood streams.

Practitioners should also center youth and elders as co-leaders of conservation. Intergenerational co-leadership can help decolonize ecological science by bridging ancestral knowledge with contemporary innovations (Raymond-Yakoubian & Daniel, 2018; Gazing Wolf et al., 2024). However, such inclusion is often hindered by external project timelines, age-based hierarchies within communities, and the undervaluing of Indigenous epistemologies in technical decision-making (Reid et al., 2021).

Donors should redefine success based on IPLC visions as well as strengthened IPLC-led governance and network building. This can lead to trust-based philanthropy that acknowledges communities as political actors, not just beneficiaries (Bhati & Eikenberry, 2024; Qin et al., 2022). Rethinking philanthropic roles also involves shifting from “project” to “process” funding (Wong et al., 2020, Frey, 2018). Strong processes support long-term, open-ended, and relationally grounded initiatives even when outcomes are uncertain or non-linear (Wong et al., 2020). Donors should also make space for hybrid governance models that reflect Indigenous legal systems, customary practices, and context-specific innovation. Epistemological plurality in conservation funding can overcome rigid, technocratic templates that often marginalize Indigenous forms of governance (Brister, 2016).

Since legal pluralism in marine governance begins with formal recognition of customary tenure rights, policy makers need to formally recognize them, including those at the land–sea interface. This recognition should be embedded in legislation, spatial planning, and enforcement. Aswani et al. (2017) show that formalized customary marine tenure enhances compliance, biodiversity, and community wellbeing. However, ignoring Indigenous tenure leads to exclusion, conflict, and failed marine protection outcomes (Bennett et al., 2019). As Borrini-Feyerabend et al. (2021) note, co-evolutionary approaches to governance that blend legal traditions are more likely to sustain biodiversity while reinforcing social equity.

Chapter 6

Conclusion and Future Directions

Territories of life—lands and waters governed, managed, and cared for by IPLCs—are critical to safeguarding both biological and cultural diversity and to advancing equitable, place-based conservation for a healthy planet (Dawson et al., 2021; UNEP-WCMC & ICCA Consortium, 2021; ICCA Consortium, 2021; WWF et al., 2021). Across the five manuscripts that comprise this thesis, consistent findings reveal that despite their global significance, these territories remain vulnerable to overlapping challenges of ecological degradation, jurisdictional fragmentation, and political marginalization.

A major contribution of this thesis has been to provide an updated, holistic synthesis of the global state of ‘territories of life’—encompassing terrestrial, freshwater, and especially marine and coastal domains. This synthesis draws on both academic literature and community-based grey literature, including reports and Indigenous-authored materials, creating a broader and more inclusive evidence base. By integrating these diverse sources, the thesis identifies key legal, institutional governance, and developments, while also highlighting the persistent threats to the recognition, continuity, and resilience of these territories. Research co-created with IPLCs can reinforce self-determined processes of cultural revitalization, decolonization, and sustainable self-governance (Papadopoulos, 2021). From this synthesis, several key opportunities for action- and policy-oriented research emerge:

- Supporting IPLCs in documenting territories using culturally grounded methods such as story mapping (Hirt, 2012), safeguarding languages and cultural practices (Runtuboi, 2020; Whaanga et al., 2018) and contributing to platforms like the ICCA Registry.
- Developing adaptable communication tools and inclusive research spaces to support Indigenous scholars and foster youth leadership (Wilson, Breen, & DuPré, 2019).
- Strengthening legal and institutional frameworks through collaboration with policymakers and legal allies (Jonas, Kothari, & Shrumm, 2012).
- Advancing hybrid and collaborative conservation models that integrate Indigenous and Western knowledge systems (Fidler et al., 2022; Loch & Riechers, 2021).
- Promoting biocultural indicators rooted in IPLC values to inform global biodiversity governance (Clement, 2021).

The systematic review manuscript analyzed how academic literature on governance at the land–sea interface has evolved across disciplines, geographies, and conceptual frameworks, revealing not only emerging trends but also ongoing gaps—particularly in addressing jurisdictional fragmentation and IPLC rights. This analysis also highlighted how the separation of land and sea

in both policy and scholarly contexts continues to obscure the integrated governance approaches practiced by IPLCs.

Through spatial analysis of marine governance in Canada, this thesis identified overlapping jurisdictional responsibilities and gaps in recognition for Indigenous-led conservation initiatives. These findings not only confirm that marine and coastal territories of life are routinely misrepresented in national and global datasets (e.g., CPCAD, WDPA), but also that current systems of reporting and recognition fail to account for customary governance and Indigenous land-sea continuity. By quantifying these governance overlaps and proposing a framework for harmonized and inclusive marine accounting, this work contributes a practical tool for improving conservation policy alignment with Indigenous governance systems.

This thesis also examined the role of philanthropic funding in shaping governance outcomes at the land–sea interface. Through a comparative analysis of Oak Foundation-supported initiatives in Chile, Malaysia, and Tanzania, the research demonstrated that decolonial philanthropic approaches—particularly those grounded in community-defined priorities and long-term partnerships—can reinforce IPLC agency and enable context-specific conservation success (Ray, 2020; Mitlin et al., 2007). These findings offer practical lessons for donors, including the need for flexible funding structures, support for intermediary organizations, and strategies to embed financial resilience within local governance models (Cohen et al., 2019).

Beyond the contributions of individual manuscripts, the thesis as a whole foregrounds the ethical imperative and analytical value of weaving Indigenous and Western knowledge systems in ways that respect their mutual integrity and avoid subordinating one to the other. The use of “ethical space” (Indigenous Circle of Experts, 2018) as a conceptual and methodological anchor has helped guide reflections on how to engage in research that supports dialogue across epistemologies. By demonstrating how IK and Western science can offer complementary insights, without the need for assimilation, this thesis supports the case for pluralistic, relational approaches to knowledge co-production in environmental governance.

Ultimately, this thesis argues that holistic, rights-based, and inclusive governance of the land–sea interface will be essential to realizing the transformative potential of the Kunming-Montreal Global Biodiversity Framework and similar instruments. Legal pluralism that is anchored in the formal recognition of customary tenure is foundational to such efforts. Aswani et al. (2017) show that formalized customary marine tenure improves biodiversity outcomes and enhances community well-being, while its neglect leads to exclusion and failure (Bennett et al., 2019). Co-evolutionary approaches that blend legal traditions are more likely to succeed (Borrini-Feyerabend et al., 2021).

The findings of this dissertation point toward the need for more plural, flexible, and relational governance systems that can meaningfully respond to fragmentation at the land-sea interface. Concepts such as plural governance and polycentric governance highlight how authority can be distributed across multiple centers of decision-making, allowing diverse institutions to coexist

and collaborate without being forced into a single hierarchy. Such approaches resonate with pluriversal politics, which emphasize the legitimacy of multiple worldviews and governance logics coexisting within a shared territory. Together, these bodies of thought reinforce the argument advanced throughout the dissertation: that overcoming fragmentation requires not merely technical fixes, but governance arrangements that can hold multiple ontologies, legal institutions, and territorialities in productive tension rather than subsuming them into a singular framework.

In sum, this thesis has achieved its objectives by synthesizing global knowledge on territories of life, identifying structural and governance barriers to their recognition, applying spatial analysis to assess patterns of fragmentation, evaluating the impacts of philanthropic funding, and advancing frameworks for the integration of diverse knowledge systems. Collectively, these contributions offer both theoretical and practical insights for researchers, policymakers, and practitioners seeking to strengthen Indigenous-led conservation and governance, particularly across complex marine and coastal landscapes.

This dissertation has also revealed that while relational frameworks, such as territories of life, are powerful, they may not be universally applicable. Their usefulness can be shaped by ecological conditions, community histories, and political contexts, underscoring the need to remain attentive to the limits of any conceptual tool. While this dissertation critiques the problems associated with categorical fragmentation, it also recognizes that categories and boundaries can at times serve strategic purposes, especially when seeking formal recognition, asserting rights, or navigating policy systems that rely on formal classification. Future research should therefore explore how relational and categorical approaches can be productively combined rather than positioned as opposites or mutually exclusive.

Specific recommendations for future research include scaling up the spatial analysis presented in Chapter 4, which examines Canadian coastal and marine protected and conserved areas. Expanding this analysis to a global scale would provide valuable comparative insights into jurisdictional fragmentation, data representation, and recognition gaps that affect Indigenous-led conservation. A global-scale geospatial analysis of marine and coastal territories of life could reveal patterns of underrepresentation, governance exclusions and legal constraints across a wider range of geopolitical contexts in turn strengthening calls for reform at international and national levels.

Secondly, expanding the analysis of philanthropic support for territories of life beyond the Oak Foundation case studies in Chile, Malaysia, and Tanzania, would enrich and extend this research through a comparative examination of how different funding institutions define priorities, structure relationships with grantees, and measure conservation outcomes. Comparing funding strategies across organizations would help illuminate variations in their commitment to decolonial principles, legal pluralism, and long-term support for IPLC governance. Such

comparative insights could contribute to more robust frameworks for evaluating donor effectiveness, community empowerment, and the durability of conservation impacts.

Finally, and more broadly, future research in this field must continue to move beyond extractive data-gathering toward long-term, trust-based collaborations with IPLCs that honor knowledge sovereignty, prioritize community agency, and build legal and policy pathways for the recognition of territories of life on land and at sea.

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Appendix A: Supplementary material for Chapter 3

List of 129 articles included in the systematic review

1. Abernethy, P., Waters, S., Kulchyski, T., Rolston, D., Swinkels, H., Luttrell, G., & Pillsworth, L. (2021). Climate Change and *Vibrio cholerae* in Herring Eggs: The Role of Indigenous Communities in Public Health Outbreak Responses. *International Journal of Indigenous Health*, 16(2). <https://doi.org/10.32799/ijih.v16i2.33236>
2. Aburto, J. A., Gaymer, C. F., & Cundill, G. (2017). Towards local governance of marine resources and ecosystems on Easter Island. *Aquatic Conservation: Marine and Freshwater Ecosystems*, 27(2), 353–371. <https://doi.org/10.1002/aqc.2665>
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128. Winter, K. B., Rii, Y. M., Reppun, F. A. W. L., Hintzen, K. D., Alegado, R. A., Bowen, B. W., Bremer, L. L., Coffman, M., Deenik, J. L., Donahue, M. J., Falinski, K. A., Frank, K., Franklin, E. C., Kurashima, N., Lincoln, N. K., Madin, E. M. P., McManus, M. A., Nelson, C. E., Okano, R., ... Toonen, R. J. (2020). Collaborative research to inform adaptive comanagement: a framework for the He‘eia National Estuarine Research Reserve. *Ecology and Society*, 25(4), art15. <https://doi.org/10.5751/ES-11895-250415>
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Appendix B: Supplementary material for Chapter 3

Search Strategy: Keywords used for searching SCOPUS and Web of Knowledge

- **Indigenous Peoples & Conservation**
"Indigenous peoples" AND (coastal OR marine) AND conserve*
- **Local Communities & Conservation***
local community AND (coastal OR marine) AND conserve*
- **Governance and Community Participation**
conserve* AND "Indigenous peoples" AND local community* AND (coastal OR marine) AND governance
- **Jurisdictional Fragmentation in Coastal/Marine Conservation**
conserve* AND (marine OR coastal) AND NOT terrestrial AND jurisdiction*
- **Protected Areas in Coastal/Marine Contexts**
conserve* AND (marine OR coastal) AND NOT terrestrial AND "protected area" AND "Indigenous peoples" AND local community*

Appendix C: Supplementary material for Chapter 3

Governance thematic area data extraction and analysis Table 1

Citation	governance system/ management type	methodology	Location	case study	communality with other context
Enyew, E. L., Poto, M. P., & Tsiouvalas, A. (2021). Beyond Borders and States: Modelling Ocean Connectivity According to Indigenous Cosmovisions. <i>Arctic Review on Law and Politics</i> , 12, 207–221. https://doi.org/10.23865/arctic.v12.3290	need for an extraterritorial, ecocentric approach to governance, which is rooted in Indigenous knowledge and law	conceptual exploration	Arctic and Oceania	yes	Legal
Fischer, M., Maxwell, K., Nuunoq, Pedersen, H., Greeno, D., Jingwas, N., Graham Blair, J., Hugu, S., Mustonen, T., Murtomäki, E., & Mustonen, K. (2022). Empowering her guardians to nurture our Ocean's future. <i>Reviews in Fish Biology and Fisheries</i> , 32(1), 271–296. https://doi.org/10.1007/s11160-021-09679-3	importance of collaborative governance structures, co-management, and indigenous-led approach	Yarning	Australia	yes	NA
Stocker, L., & Kennedy, D. (2009). Cultural Models of the Coast in Australia: Toward Sustainability. <i>Coastal Management</i> , 37(5), 387–404. https://doi.org/10.1080/08920750902855998	comparative: marine protected areas, the National Strategy for Ecologically Sustainable Development, Australia's Oceans Policy, and the National Cooperative Approach to Integrated Coastal Zone Management.	case examples to illustrate how cultural models function as lenses through which to view coastal usages and activities	Australia	yes	NA

Vierros, M. (2017). Communities and blue carbon: the role of traditional management systems in providing benefits for carbon storage, biodiversity conservation and livelihoods. <i>Climatic Change</i> , 140(1), 89–100. https://doi.org/10.1007/s10584-013-0920-3	discusses traditional management systems and governance structures, emphasizing the importance of recognizing and strengthening pre-existing traditional management systems and ownership structures, including marine tenure systems in many parts of the world	the authors analyze Indigenous understandings of ocean connectivity as a legal and ecological continuum, rather than through fieldwork in one site.	The Arctic (including Inuit perspectives) and Oceania (including Pacific Islander worldviews).	yes	Legal
Ulrich, S. C., White, F. R., & Rennie, H. G. (2022). Characterising the regulatory seascape in Aotearoa New Zealand: Bridging local, regional and national scales for marine ecosystem-based management. <i>Ocean & Coastal Management</i> , 224, 106193. https://doi.org/10.1016/j.ocecoaman.2022.106193	suggest that the regulatory seascape is devolving towards greater polycentricity of management	The researchers recommend a more polycentric governance approach, which involves multiple centers of decision-making and authority, to address the ecological degradation and management challenges. This recommendation is made to align management and governance across different scales and interests	NZ	yes	NA

Vierros, M. K., Harrison, A.-L., Sloat, M. R., Crespo, G. O., Moore, J. W., Dunn, D. C., Ota, Y., Cisneros-Montemayor, A. M., Shillinger, G. L., Watson, T. K., & Govan, H. (2020). Considering Indigenous Peoples and local communities in governance of the global ocean commons. <i>Marine Policy</i> , 119, 104039. https://doi.org/10.1016/j.marpol.2020.104039	traditional management systems developed by Indigenous Peoples and local communities	examining evidence	global	yes	NA
Madarcos, J. R. V., Creencia, L. A., Roberts, B. R., White, M. P., Nayoan, J., Morrissey, K., & Fleming, L. E. (2021). Understanding Local Perceptions of the Drivers/Pressures on the Coastal Marine Environment in Palawan, Philippines. <i>Frontiers in Marine Science</i> , 8, 659699. https://doi.org/10.3389/fmars.2021.659699	community-based resource management	co-creation of survey/ workshops/ discussions	Palawan, Philippines	yes	Fisheries
Booth, H., Mourato, S., & Milner-Gulland, E. J. (2022). Investigating acceptance of marine tourism levies, to cover the opportunity costs of conservation for coastal communities. <i>Ecological Economics</i> , 201, 107578. https://doi.org/10.1016/j.ecolecon.2022.107578	marine tourism levies	online survey, stated preference approach, qualitative and quantitative data collection from marine tourism operators and tourists in Lombok and Pulau Weh to ground truth and validate the online CV	Lombok and Pulau Weh, Indonesia	yes	Conservation

Aheto, D. W., Kankam, S., Okyere, I., Mensah, E., Osman, A., Jonah, F. E., & Mensah, J. C. (2016). Community-based mangrove forest management: Implications for local livelihoods and coastal resource conservation along the Volta estuary catchment area of Ghana. <i>Ocean & Coastal Management</i> , 127, 43–54. https://doi.org/10.1016/j.ocecoaman.2016.04.006	community-based and co-management approaches	participatory GIS mapping and orthophotos/questionnaire	Volta Estuary Ghana	yes	NA
Lowe, J., Tejada, J. F. C., & Meekan, M. G. (2019). Linking livelihoods to improved biodiversity conservation through sustainable integrated coastal management and community based dive tourism : Oslob Whale Sharks. <i>Marine Policy</i> , 108, 103630. https://doi.org/10.1016/j.marpol.2019.103630	sustainable integrated coastal management (ICM) and community-based dive tourism	interviews, semi-structured interviews, and secondary data collection	Cebu Island, the Philippines.	yes	Conservation
Fallon, C., Lemire, M., Dumont, D., Parent, E., Figueroa, E., Cummings, I., Brousseau, J., Marquis, M., Paquet, N., Plante, S., & Witteman, H. O. (2022). Toward Food Sovereignty for Coastal Communities of Eastern Québec: Co-designing A Website to Support Consumption of Edible Resources from the St. Lawrence River, Estuary, and Gulf. <i>MDM Policy & Practice</i> , 7(1), 238146832210944. https://doi.org/10.1177/23814683221094477	ecosystem approach	co-design iterative process to develop and refine a prototype website, interview	Quebec, Canada	yes	NA
Begg, S. S., De Ramon N’Yeurt, A., & Begg, S. (2023). Interweaving resource management with indigenous knowledge to build community resilience in the Pacific Islands: case of the Waimanu Catchment in Viti Levu, Fiji. <i>Regional</i>	integrated catchment management (ICM) and the community capitals framework	participatory approach, including focus group discussions (FGDs)	Waimanu-Catchment, Fiji	yes	Fisheries

Environmental Change, 23(3), 86. https://doi.org/10.1007/s10113-023-02079-2		and participant observation			
Winter, K., Lincoln, N., Berkes, F., Alegado, R., Kurashima, N., Frank, K., Pascua, P., Rii, Y., Reppun, F., Knapp, I., McClatchey, W., Ticktin, T., Smith, C., Franklin, E., Oleson, K., Price, M., McManus, M., Donahue, M., Rodgers, K., ... Toonen, R. (2020). Ecomimicry in Indigenous resource management: optimizing ecosystem services to achieve resource abundance, with examples from Hawai'i. <i>Ecology and Society</i> , 25(2). https://doi.org/10.5751/ES-11539-250226	discusses ecosystem-based management and Indigenous resource management systems (ecomimicry)	Synthesis of Indigenous Knowledge and Ecological Science, Case-Based Narrative Approach	Hawaii, USA	yes	NA
McCarter, J., Sterling, E., Jupiter, S., Cullman, G., Albert, S., Basi, M., Betley, E., Boseto, D., Bulehite, E., Harron, R., Holland, P., Horning, N., Hughes, A., Jino, N., Malone, C., Mauli, S., Pae, B., Papae, R., Rence, F., ... Filardi, C. (2018). Biocultural approaches to developing well-being indicators in Solomon Islands. <i>Ecology and Society</i> , 23(1). https://doi.org/10.5751/ES-09867-230132	biocultural approaches	Collaborative mixed-methods approach to data collection, including catch per unit effort surveys, marine surveys, remote sensing, interviews, terrestrial surveys, and agro-biodiversity and ethnobotanical surveys	Solomon Islands	yes	NA
Aswani, S., van Putten, I., & Miñarro, S. (2017). Environmental and social recovery asymmetries to large-scale disturbances in small island	role of indigenous ecological knowledge and customary sea	community engagement with	Solomon Islands	yes	Development

communities. <i>Natural Hazards</i> , 86(1), 241–262. https://doi.org/10.1007/s11069-016-2685-2	tenure in managing marine ecosystems	scientific ecological assessment			
Berkes, F., Berkes, M. K., & Fast, H. (2007). Collaborative Integrated Management in Canada's North: The Role of Local and Traditional Knowledge and Community-Based Monitoring. <i>Coastal Management</i> , 35(1), 143–162. https://doi.org/10.1080/08920750600970487	Collaborative Integrated Management	collaborative and integrated process that incorporates indigenous knowledge and scientific knowledge	Canadian North	yes	NA
Aburto, J. A., Gaymer, C. F., & Cundill, G. (2017). Towards local governance of marine resources and ecosystems on Easter Island. <i>Aquatic Conservation: Marine and Freshwater Ecosystems</i> , 27(2), 353–371. https://doi.org/10.1002/aqc.2665	local decision-making system based on traditional laws and local governance, which can more rapidly respond to observed changes compared to centralized governance systems	a participatory process conducted together with a local organization leading marine conservation issues on the island	Easter Island	yes	NA
Aguirre, J. D., Bollard-Breen, B., Cameron, M., Constantine, R., Duffy, C. A. J., Dunphy, B., Hart, K., Hewitt, J. E., Jarvis, R. M., Jeffs, A., Kahui-McConnell, R., Kawharu, M., Liggins, L., Lohrer, A. M., Middleton, I., Oldman, J., Sewell, M. A., Smith, A. N. H., Thomas, D. B., ... Wilson, R. (2016). Loved to pieces: Toward the sustainable management of the Waitematā Harbour and Hauraki Gulf. <i>Regional Studies in Marine Science</i> , 8, 220–233. https://doi.org/10.1016/j.rsma.2016.02.009	co-governance: marine spatial planning as the most appropriate methodology for achieving successful long-term ecosystem-based management	quantitative	Waitematā Harbour and Hauraki Gulf, NZ	yes	Development

Strand, M., Rivers, N., & Snow, B. (2022). Reimagining Ocean Stewardship: Arts-Based Methods to 'Hear' and 'See' Indigenous and Local Knowledge in Ocean Management. <i>Frontiers in Marine Science</i> , 9, 886632. https://doi.org/10.3389/fmars.2022.886632	integrating Indigenous and local knowledge into decision-making processes and management approaches	arts-based participatory research methods	Algoa Bay, Eastern Cape Province, South Africa	yes	NA
González-Poblete, E., Kaczynski, V., & Norambuena, F. (2020). Marine coastal resources as an engine of development for the Lafkenche and Williche populations of southern Chile. <i>Ocean Development & International Law</i> , 51(1), 1–20. https://doi.org/10.1080/00908320.2019.1654248	coordination among public institutions and the creation of an institutional framework to apply the Lafkenche Law	literature review, semistructured interviews, content analysis method, and comparative analysis	Lafkenche and Williche, Chile	yes	Legal
Watts, P., Koutouki, K., Booth, S., & Blum, S. (2017). Inuit food security in Canada: Arctic marine ethnoecology. <i>Food Security</i> , 9, 421–440. https://doi.org/10.1007/s12571-017-0668-0	need for a cross-cultural, respect-based approach to resource management and the inclusion of traditional knowledge (TEK) or Inuit Qaujimajatuqangit	a reflexive and cross-cultural approach	Inuit, Canada	yes	NA
Beveridge, R., Moody, M., Murray, G., Darimont, C., & Pauly, B. (2020). The Nuxalk Sputc (Eulachon) project: Strengthening Indigenous management authority through community-driven research. <i>Marine Policy</i> , 115, 103854. https://doi.org/10.1016/j.marpol.2019.103854	Indigenous governance systems and management authority, Nuxalk governance institutions	series of conversations	BC, Canada	yes	NA
li-Anthawirriyarra Sea Rangers, Yanyuwa Families, Grech, A., Parra, G. J., Beasley, I., Bradley, J., Johnson, S., Whiting, S., & Marsh, H. (2014). Local assessments of marine mammals in cross-cultural environments. <i>Biodiversity and</i>	locally-based approach to assess the distribution of marine mammals	participatory mapping workshops	Northern Territory, Australia	yes	Conservation

Conservation, 23(13), 3319–3338. https://doi.org/10.1007/s10531-014-0783-6					
Winter, K., Lincoln, N., Berkes, F., Alegado, R., Kurashima, N., Frank, K., Pascua, P., Rii, Y., Reppun, F., Knapp, I., McClatchey, W., Ticktin, T., Smith, C., Franklin, E., Oleson, K., Price, M., McManus, M., Donahue, M., Rodgers, K., ... Toonen, R. (2020). Ecomimicry in Indigenous resource management: optimizing ecosystem services to achieve resource abundance, with examples from Hawai‘i. <i>Ecology and Society</i> , 25(2). https://doi.org/10.5751/ES-11539-250226	Collaborative, community-based approach that centers on reciprocal collaboration, Kūlana Noi‘i framework, which ensures that research is aligned with Indigenous perspectives, knowledge, and community priorities.	The methodological approach in this research involves a collaborative research framework that emphasizes reciprocal collaboration with Indigenous people and local communities (IPLCs) of place. The research process involves collaborative validation and includes workshops for communication between IPLCs and researchers	He‘eia National Estuarine Research Reserve (NERR) in Hawai‘i	yes	Conservation
Petina L. Pert, Rosemary Hill, Catherine J. Robinson, Diane Jarvis & Jocelyn Davies (2020) Is investment in Indigenous land and sea management going to the right places to provide multiple co-benefits?, <i>Australasian Journal of Environmental Management</i> , 27:3, 249-274, https://doi.org/10.1080/14486563.2020.1786861	Government-led, Market-based (PES), Indigenous-led, Co-governance, Legislative/Regulatory	mixed-methods approach to analyze the effectiveness of government investment in Indigenous land and sea management (ILSM) in	Australia	yes	NA

		delivering multiple co-benefits			
Anbleyth-Evans, J., ÑAnculef-Huaiquino, J., Coñuecar-Llancapani, Y., Leiva, F. A., Maulén, W. R., & Raymond, C. (2023). Mapuche Az-Mapu and Nature's Contribution to People: Eudemonic Values for Living Well. <i>Environmental Values</i> , 32(3), 291-314.	Az-Mapu	Intercultural dialogue, semi-structured interviews and ethnography	Chile, Mapuche Wiliche	yes	NA
Beveridge, R., Moody, M., Murray, G., Darimont, C., & Pauly, B. (2020). The Nuxalk Sputc (Eulachon) project: Strengthening Indigenous management authority through community-driven research. <i>Marine Policy</i> , 115, 103854. https://doi.org/10.1016/j.marpol.2019.103854	governance and management systems of the Gitga'at First Nation in managing their natural resources	collaborative design of a community-based social-ecological monitoring system	BC, Canada	yes	NA
McGreer, M., & Frid, A. (2017). Declining size and age of rockfishes (<i>Sebastes</i> spp.) inherent to Indigenous cultures of Pacific Canada. <i>Ocean & Coastal Management</i> , 145, 14–20. https://doi.org/10.1016/j.ocecoaman.2017.04.009	integrating Indigenous knowledge and traditional stewardship practices into the joint management of marine resources between Indigenous and federal governments	combination of Indigenous knowledge and scientific knowledge	Pacific Canada	yes	Conservation
Turner, N. J. (2020). From “taking” to “tending”: Learning about Indigenous land and resource management on the Pacific Northwest Coast of North America. <i>ICES Journal of Marine Science</i> , 77(7–8), 2472–2480. https://doi.org/10.1093/icesjms/fsaa095	Indigenous land and resource management systems	ethnobotanical research on the west coast of Canada, collaborating with knowledgeable elders and linguists	Pacific Canada	yes	NA

Wheaton, B., Waiti, J. T. A., Olive, R., & Kearns, R. (2021). Coastal Communities, Leisure and Wellbeing: Advancing a Trans-Disciplinary Agenda for Understanding Ocean-Human Relationships in Aotearoa New Zealand. <i>International Journal of Environmental Research and Public Health</i> , 18(2), 450. https://doi.org/10.3390/ijerph18020450	Indigenous environmental governance informed by Mātauranga Māori (Māori knowledge systems). Transdisciplinary governance, recognizing the interconnectedness of ecological health and human wellbeing. It emphasizes shared stewardship and co-learning between Western and Indigenous worldviews, relevant for marine and coastal ecosystem management in Aotearoa (New Zealand).	Transdisciplinary and Place-Based Approach, Case Study Method, Integration of Mātauranga Māori	NZ	yes	NA
Garcia Ch., M. C. (2024). The Sea Unites Us but It Is Governed to Keep Us Apart: Restoring the Creole Afro-Indigenous Sea Mobilities in the Southwestern Caribbean. <i>Island Studies Journal</i> , Early access. https://doi.org/10.24043/001c.92749	State-centric, colonial maritime boundary regimes (UNCLOS-based EEZ divisions). - Lacks recognition of ancestral marine tenure. - Imposes bureaucratic, legal, and military constraints on Creole mobilities. - Characterized by what the author terms “ocean immobility”. - Contestation and resistance through Indigenous and Afro-descendant activism advocating for ocean justice, decolonial governance, and Black Indigenous sea sovereignty.	Ethnographic research (2019 & 2021). - Fieldwork across five islands (e.g., Bluefields, Corn Island, San Andres, Providencia)	Southwestern Caribbean	yes	NA

Lilleyman, A., Pascoe, J., J. Robinson, C., Legge, S. M., Woinarski, J. C. Z., & Garnett, S. T. (2024). Imperilled birds and First Peoples' land and sea Country in Australia. <i>Emu - Austral Ornithology</i> , 124(1), 108–122. https://doi.org/10.1080/01584197.2023.2290008	- Indigenous-led and co-managed conservation, including Indigenous Protected Areas (IPAs) and ranger programs. - Systems influenced by Native Title legislation and recognition of First Peoples' land and sea rights. - Emphasis on collaborative stewardship involving governments and Indigenous communities.	Participatory mapping	Australia	yes	Conservation
Tholan, B., Basurto, X., Cohen, P. J., Franz, N., Himes-Cornell, A., Govan, H., Fakoya, K., Akintola, S. L., & Aceves-Bueno, E. (2024). Accounting for existing tenure and rights over marine and freshwater systems. <i>Npj Ocean Sustainability</i> , 3(1), 47. https://doi.org/10.1038/s44183-024-00084-4	Focus on customary, informal, and community-based tenure systems in marine and freshwater contexts. - Advocates for legal pluralism: recognition of multiple overlapping systems of tenure (customary, statutory, informal).	Conceptual synthesis and policy analysis	Global	no	Legal
Jarvis, D., Stoeckl, N., Addison, J., et al. (2018). Are Indigenous land and sea management programs a pathway to Indigenous economic independence? <i>The Rangeland Journal</i> , 40(4), 415. https://doi.org/10.1071/RJ18051	- Focus on Indigenous Land and Sea Management Programs (ILSMPs) in Australia. - Emphasizes community-led environmental stewardship, integrated with government funding schemes (e.g., Working on Country). - Promotes models of hybrid governance combining	Mixed methods approach	Australia	yes	NA

	traditional practices with state-supported mechanisms.				
Aswani, S. (2020). New Directions in Maritime and Fisheries Anthropology. <i>American Anthropologist</i> , 122(3), 473–486. https://doi.org/10.1111/aman.13380	- Emphasizes customary marine tenure systems, community-based resource management, and hybrid governance models. - Critiques top-down, technocratic fisheries governance, promoting participatory, culturally embedded, and ethnographically informed approaches.	Ethnographic review and synthesis	global	no	NA

Conservation Initiatives data extraction and analysis table 2

Citation	primary objectives of the MPA, LMMA, MPA network	methodology	Location	scale	communalit y with other context	governance type
Syakur, A., Wibowo, J. T., Firmansyah, F., Azam, I., & Linkie, M. (2012). Ensuring local stakeholder support for marine conservation: establishing a locally-managed marine area network in Aceh. <i>Oryx</i> , 46(4), 516–524. https://doi.org/10.1017/S0030605312000166	achieving sustainable economic development across the province, developing a comprehensive marine management network that meets biodiversity targets and coastal community aspirations, and empowering coastal communities to sustainably manage marine resources with local government support	systematic conservation planning analysis and participatory stakeholder planning	Aceh, Indonesia	Local	Governance	LMMA

Eger, S., & Doberstein, B. (2019). Shared governance arrangements and social connectivity: advancing large-scale coastal and marine conservation initiatives in the Dominican Republic. <i>International Journal of Sustainable Development & World Ecology</i>, 26(3), 210–225. https://doi.org/10.1080/13504509.2018.1559253	To assess the degree to which local actors are involved in coastal and marine conservation practices, with a focus on large-scale conservation initiatives (LCIs). To identify barriers and opportunities for achieving effective large-scale conservation.	semi-structured interviews with coastal and marine actors across different scales, including local to international contexts	Dominican Republic	National	Governance	
Ferse, S. C. A., Costa, M. M., Máñez, K. S., Adhuri, D. S., & Glaser, M. (2010). Allies, not aliens: increasing the role of local communities in marine protected area implementation. <i>Environmental Conservation</i>, 37(1), 23–34. https://doi.org/10.1017/S0376892910000172	importance of integrating local knowledge, norms, and rules concerning resource use into the governance of coastal ecosystems and marine resources. Additionally, the conservation objectives involve promoting the	participatory mapping of interests and resource use, the integration of local and scientific knowledge using spatial information technology, participatory modeling techniques, and	Oceana	international	Governance	

	active participation of stakeholders, developing alternative livelihood options based on ecosystem protection, and establishing a common understanding of resource management through collaboration between local communities, authorities, and researchers	game-based modeling exercises to reveal the rationales behind local agents' ecosystem-relevant behavior				
Araos, F., Anbleyth-Evans, J., Riquelme, W., Hidalgo, C., Brañas, F., Catalán, E., Núñez, D., & Diestre, F. (2020). Marine Indigenous Areas: Conservation Assemblages for Sustainability in Southern Chile. <i>Coastal Management</i> , 48(4), 289–307. https://doi.org/10.1080/08920753.2020.1773212	marine conservation, protection of indigenous tenures, and the collective control over marine resources.	mixed methods approach, combining document analysis, ethnography, interviews, and social network analysis	Chile	National	Legal	

Lucrezi, S. (2021). Stakeholders' perceptions of coastal development in relation to marine protected areas. <i>Journal of Coastal Conservation</i>, 25(4), 46. https://doi.org/10.1007/s11852-021-00834-3	preserving ecosystems at the land-sea interface, creating relationships with sectors involved in the coastal zone, ensuring their sustainable development, and working towards the incorporation of the conservation mandates of MPAs into institutional and policy arrangements for the coastal zone	phenomenology approach to qualitative research, allowing members of the study communities to voice their opinions and experiences about the phenomenon. Data were collected through unstructured face-to-face interviews and focus groups	southern Mozambique, particularly the Ponta do Ouro Partial Marine Reserve (PPMR)	Local	Governance	integrated coastal management
Lucas, E. Y., & Kirit, R. (2009). Fisheries–Marine Protected Area–Tourism Interactions in Moalboal, Cebu, Philippines. <i>Coastal Management</i>, 37(5), 480–490. https://doi.org/10.1080/08920750903218014	a conservation tool to conserve marine ecosystems and enhance food security for local communities. Additionally, the study emphasizes the importance of MPAs in	structured interviews, participant observation, social interaction, and informal interviews	Cebu, Philippines	Local	Fisheries	food security

	providing a sustainable environment for reef fish and other marine species to thrive,					
Diedrich, A. (2007). The impacts of tourism on coral reef conservation awareness and support in coastal communities in Belize. Coral Reefs, 26(4), 985–996. https://doi.org/10.1007/s00338-007-0224-z	increasing the health of corals, attracting tourism, and providing benefits to nearby villages	ethnographic methods, including participant observation, semi-structured interviews, key informants, secondary sources, and a household survey instrument	Belize	National	Governance	
Karnad, D. (2022). Incorporating local ecological knowledge aids participatory mapping for marine conservation and customary fishing management. Marine Policy, 135, 104841. https://doi.org/10.1016/j.marpol.2021.104841	conserving more ecological complexity than single-species approaches, preventing many types of human activities that threaten marine life within an area, increasing	participatory mapping and semi structured interviews	Sindhudurg and Ratnagiri districts, India	Local	Fisheries	

	biodiversity, species abundance, and ecosystem resilience, and controlling destructive fishing techniques such as trawl fishing					
Raycraft, J. (2019). Circumscribing communities: Marine conservation and territorialization in southeastern Tanzania. <i>Geoforum</i> , 100, 128–143. https://doi.org/10.1016/j.geoforum.2018.12.011	protect marine biodiversity, enable recovery of overexploited resources, and promote ecosystem resilience in the face of climate change	interviews with stakeholders from a single village using a convenience sampling method	Southeast Tanzania	Local	Legal	Territorialization is defined as a dynamic process of controlling space as a means of controlling people or resources
Rice, W. S., Sowman, M. R., & Bavinck, M. (2021). Informing a conservation policy-praxis disjuncture: A ‘commons’ perspective to tackling coastal-marine community-conserved area implementation in South Africa. <i>Biological Conservation</i> , 261, 109296. https://doi.org/10.1016/j.biocon.2021.109296	The study does not explicitly outline the main objectives for Marine Protected Areas (MPAs) in the study region. However, it emphasizes the need for greater understanding and	literature review, complemented by interviews	South Africa	National	Governance	

	alignment of conservation initiatives with social and ecological contexts and priorities, formalized and improved community participation, and increased partner support					
Bennett, N., & Dearden, P. (2018). Why local people do not support conservation: Community perceptions of marine protected area livelihood impacts, governance and management in Thailand [Preprint]. MarXiv. https://doi.org/10.31230/osf.io/zkude	conservation, education/research , and tourism/recreation , exclusionary towards local communities	interviews and household surveys	Andaman, Thailand	Local	Governance	negative impact of state governance leads to limited transparency, accountability, and participation in creation or management, as well as a lack of consideration of local values and development considerations

Vave, R. (2022). Five culturally protected water body practices in Fiji: Current status and contemporary displacement challenges. <i>Ambio</i> , 51(4), 1001–1013. https://doi.org/10.1007/s13280-021-01620-z	food security and biodiversity conservation	literature review on culturally protected water body (CPWB) types and history in Fiji, interviews with staff from Fiji's Ministry of iTaukei Affairs and the iTaukei Institute of Language and Culture (TILC), community interviews of iTaukei across Fiji, and various survey methods, including on-site interviews, off-site interviews, phone interviews, and Google survey forms	Fiji	National	Governance	co-management
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Satizábal, P., & Batterbury, S. P. J. (2018). Fluid geographies: Marine territorialisation and the scaling up of local aquatic epistemologies on the Pacific coast of Colombia. <i>Transactions of the Institute of British Geographers</i> , 43(1), 61–78. https://doi.org/10.1111/tran.12199	defense of collective territories from the destructive impacts of industrial fisheries, the reduction of fish stocks due to high bycatch and encroachment of industrial vessels on local fishing grounds, and the development of social and symbolic relations in each village	observation, interviews, and informal conversations	Colombia	National	Fisheries	Territorialization is defined as the process produced by the active negotiation between the state and non-state actors over access to and control of occupied landscapes.
Sloan, N. A. (2004). Northern Abalone: Using an Invertebrate to Focus Marine Conservation Ideas and Values. <i>Coastal Management</i> , 32(2), 129–143. https://doi.org/10.1080/08920750490276128	restoring northern abalone populations to enable aboriginal (then recreational) fisheries and ultimately getting the species delisted, monitor the efficacy of area protection	public awareness workshops, school curricula development, surveillance in support of enforcement, selecting long-term study sites for assessing abalone	Haida Gwaii, Canada	Local	Fisheries	

	and contribute to recovery research	rebuilding strategies				
Gina Elliott, Bruce Mitchell, Bonni. (2001). Community Participation in Marine Protected Area Management: Wakatobi National Park, Sulawesi, Indonesia. Coastal Management, 29(4), 295–316. https://doi.org/10.1080/089207501750475118	Eliminating the use of bombs and cyanide in the park. Conserving the coral reefs. Conserving mangrove and sea grass resources. Increasing and diversifying economic activity. Increasing tourism development in the park	Information gathering through individual and group interviews, field observation, and participatory appraisal techniques. Sampling at the village level was largely purposive and opportunistic. The research approach was based on previous studies in the Philippines .	Sulawesi, Indonesia	Local	Governance	need and importance of integrating effective community-based management strategies into the management plan for Wakatobi National Park
Mbatha, P. (2022). Unravelling the perpetuated marginalization of customary livelihoods on the coast by plural and multi-level conservation governance systems. Marine Policy, 143,	Plural conservation governance systems often fail to recognize local	case-study research approach and a combination of qualitative and	Kosi Bay in northern KwaZulu-	Local	Governance	negative impact of multi-level conservation

105143. https://doi.org/10.1016/j.marpol.2022.105143	customary systems, leading to conflicts and ambiguities in decision-making processes. This exclusionary approach has negative implications for the livelihood strategies of local communities, as conservation interventions are perceived to prioritize nature over the well-being of the people in the community. Additionally, the involvement of traditional authorities as intermediaries or agents of the state in conservation governance further exacerbates power struggles and	quantitative data collection methods, household surveys, focus group discussions, key informant interviews, oral history interviews, transect walks, and participant observation, triangulation of qualitative data	Natal, South Africa			governance systems
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	minimizes accountability, ultimately eroding or undermining customary and traditional livelihood practices of indigenous people					
Fernández, M., Rodríguez-Ruiz, M., Gelcich, S., Hiriart-Bertrand, L., & Castilla, J. C. (2021). Advances and challenges in marine conservation in Chile: A regional and global comparison. <i>Aquatic Conservation: Marine and Freshwater Ecosystems</i> , 31(7), 1760–1771. https://doi.org/10.1002/aqc.3570	preserving ocean biodiversity, fostering ecosystem services, mitigating and promoting adaptation to climate change, and providing protection to marine resources such as fish and other seafood	The methodology used in this study involves compiling a database of MPAs for local and regional analysis, sourcing data on MPA boundaries and attributes from the World Database on Protected Areas, and complementing the official information on MPAs and territorial user	Chile, South America	Comparative study	Governance	The current governance of natural resources in coastal ecosystems is noted to disrupt access to resources for coastal communities. This is due to the lack of a centralized agency responsible for the administration of protected areas in the ocean and on land, leading to

		rights for fisheries and for indigenous people in South America.				different agencies managing existing marine protected areas (MPAs) with little funding and not necessarily having conservation as a high priority. This disrupts access to resources for coastal communities due to the diversity of goals and responsibilities, such as enforcement of fisheries operations
Jones, R., Rigg, C., & Lee, L. (2010). Haida Marine Planning: First Nations as a Partner in Marine Conservation. Ecology and Society, 15(1), art12. https://doi.org/10.5751/ES-03225-150112	designation of protected areas for marine mammals, management of oil and gas development, and	application of traditional knowledge, collaborative marine planning, and	Haida Gwaii, Canada	Local	Governance	First Nations at a government-to-government level,

	the achievement of conservation results in planning	the development of an ecosystem-based management framework to address key marine resource issues in the Pacific region				
Augustine, S., & Dearden, P. (2014). Changing paradigms in marine and coastal conservation: A case study of clam gardens in the Southern Gulf Islands, Canada. <i>Canadian Geographies / Géographies Canadiennes</i> , 58(3), 305–314. https://doi.org/10.1111/cag.12084	long-term conservation of marine environments and biodiversity, with an emphasis on active management and further engagement of First Nations as rights-holders. The study suggests that a values-based paradigm to conservation should be given more emphasis, aiming to protect	case study approach, focusing on the re-introduction of clam gardens in the Gulf Islands National Park Reserve (GINPR) as an example of the values-based paradigm to marine conservation. The study also draws on scientific literature and international	Southern Gulf Islands, Canada	Local	Governance	

	ecological integrity while allowing the re-introduction of cultural practices, such as clam gardens, and promoting the expansion of conservation values in the landscape	agreements related to marine conservation to support its arguments				
Gaymer, C. F., Stadel, A. V., Ban, N. C., Cárcamo, P. F., Ierna, J., Jr., & Lieberknecht, L. M. (2014). Merging top-down and bottom-up approaches in marine protected areas planning: Experiences from around the globe. <i>Aquatic Conservation: Marine and Freshwater Ecosystems</i> , 24(S2), 128–144. https://doi.org/10.1002/aqc.2508	integrating top-down and bottom-up approaches to stakeholder and community engagement in the planning and implementation of MPAs. The study aims to address community resistance to MPA proposals from centralized agencies, recognize the inherent rights and traditional knowledge of	case study analysis	Scott Islands marine National Wildlife Area in Canada's Pacific Ocean, Locally Managed Marine Areas in Fiji, the proposed Long Island Marine Managed Area in the Bahamas, England's	international	Governance	

	indigenous communities, and achieve broader biodiversity conservation objectives through the establishment of larger open ocean MPAs		Marine Conservation Zones planning, and Motu Motiro Hiva Marine Park in the Easter Island Ecoregion, Chile			
Mulrennan, M., & Scott, C. (2000). Mare Nullius : Indigenous Rights in Saltwater Environments. Development and Change, 31(3), 681–708. https://doi.org/10.1111/1467-7660.00172	recognize and reinforce indigenous institutions for managing marine spaces and resources, reconnect fractured jurisdictional domains, and bring about social equity, environmental protection, and self-determined regional development	integrated and effective strategy for long-term land, sea, and resource management, emphasizing the recognition of indigenous customary ownership and jurisdiction in the coastal zone, including offshore islands, reefs, seas, seabed,	Torres Strait, Australia	Local	Governance	

		and associated resources				
Aswani, S., & Lauer, M. (2006). Benthic mapping using local aerial photo interpretation and resident taxa inventories for designing marine protected areas. <i>Environmental Conservation</i> , 33(3), 263–273. https://doi.org/10.1017/S0376892906003183	incorporating indigenous ecological knowledge into the design of MPAs, identifying marine substrates and related resident taxa on aerial photos, and using this information to assist in the biological and social design of MPAs in Oceania	participatory approach to design and establish MPAs in the Roviana and Vonavona region of the Western Solomon Islands. The methodology involves incorporating indigenous ecological knowledge into geographical information systems (GIS) for the design of MPAs, as well as employing conventional quadrat field dive surveys to measure the accuracy of	Roviana and Vonavona region of the Western Solomon Islands	Local	Governance	

		substrate identification by local informants and to identify the dominant abiotic and/or biotic benthic features at each sampled site				
Aburto, J. A., Gaymer, C. F., & Govan, H. (2020). A large-scale marine protected area for the sea of Rapa Nui: From ocean grabbing to legitimacy. <i>Ocean & Coastal Management</i> , 198, 105327. https://doi.org/10.1016/j.ocecoaman.2020.105327	protection of entire ecosystems, the link to adjacent ecosystems, and the maintenance of ecosystem services. Additionally, the MPAs aim to sustain or increase fish catches and contribute to the resilience of socio-ecological systems in the face of climate change	participant observation, analysis of meeting minutes and records, interviews with key stakeholders, and reference to historical and published documentation	Rapa Nui, Easter Island, Chile	Local	Governance	co-governance
Gould, J., Smyth, D., Rassip, W., Rist, P., & Oxenham, K. (2021). Recognizing the	establishing and managing a	authors sharing their collective	Australia	National	Governance	collaborative governance in

contribution of Indigenous Protected Areas to marine protected area management in Australia. <i>Maritime Studies</i>, 20(1), 5–26. https://doi.org/10.1007/s40152-020-00212-z	comprehensive, adequate, and representative system of MPAs to contribute to the long-term ecological viability of marine and estuarine systems, maintain ecological processes and systems, and protect Australia’s biological diversity at all levels	experience in the planning and dedication of Indigenous Protected Areas (IPAs) in Australia.				the context of Indigenous Protected Areas (IPAs) in Australia
Bennett, N. J., Katz, L., Yadao-Evans, W., et al. (2021). Advancing Social Equity in and Through Marine Conservation. <i>Frontiers in Marine Science</i>, 8, 711538. https://doi.org/10.3389/fmars.2021.711538	- Enhance social equity in marine conservation. - Promote recognitional, procedural, distributional, and contextual equity. - Emphasize local leadership, inclusive governance, and environmental justice.	- Normative and conceptual framework development. - Synthesizes extensive literature and case examples.	Global	International	Legal	- Advocates for pluralistic governance: - Indigenous-led, - Community-based, - Co-managed, and - Rights-based approaches.

	- Encourage community-led, Indigenous-led, and co-management models of marine protection.					
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Legal Mechanisms and Policies data extraction and analysis table 3

Citation	Legal Mechanism	methodology	Location	specific law/ legislative mechanism	communality with other context	Recommendations
Bell-James, J. (2023). From the Silo to the Landscape: The Role of Law in Landscape-scale Restoration of Coastal and Marine Ecosystems. <i>Journal of Environmental Law</i> , 35(3), 419–436. https://doi.org/10.1093/jel/eqad027	Blue Carbon methodology, which is a legislative instrument	The study discusses the Blue Carbon methodology, which is a legislative instrument that enables a particular type of coastal wetland restoration project to generate carbon credits. It highlights that the Blue Carbon methodology has opened the door for some restoration projects in the coastal zone to receive carbon credits, providing a clear economic incentive to proponents that has been missing to date. The study also	Australia	yes	Governance	need for legal mechanisms that facilitate restoration, such as national-scale laws setting out restoration targets or standards, mechanisms to coordinate government agencies, and the resolution of granular legal details to implement restoration into law

		emphasizes that the Blue Carbon methodology required the consideration and resolution of numerous complex legal issues, and it provides the first opportunity for a category of coastal restoration projects to attract a financial benefit. However, it also points out that the Blue Carbon methodology is deliberately narrow and has a strong carbon focus due to its location within the Emissions Reduction Fund (ERF), which has led to a focus on fine details rather than the big picture. discourse analysis				
Dutra, L. X. C., Bayliss, P., McGregor, S., Christophersen, P., Scheepers, K., Woodward,	The Commonwealth Environmental Protection and	Diagnostic Framework, Qualitative Modeling, Bayesian	Kakadu National Park, Australia	yes	Governance	Focusing on joint activities to deal with impacts from rising seas, fostering local job opportunities by activities related to country,

E., Ligtermoet, E., & Melo, L. F. C. (2017). Understanding climate-change adaptation on Kakadu National Park, using a combined diagnostic and modelling framework: a case study at Yellow Water wetland. <i>Marine and Freshwater Research</i> , 69(7), 1146–1158. https://doi.org/10.1071/MF16166	Biodiversity Conservation Act 1999 (EPBC Act) is mentioned as part of the legal framework that establishes the cooperative approach to the protection and conservation of Kakadu National Park resources, co-management of the national park with Indigenous peoples	Belief Networks, Semiquantitative Assessment				and creating an environment of creativity and innovation to enhance the adaptive capacity of indigenous communities and park staff to better manage future sea-level rise impacts
Engen, S., Hausner, V. H., Gurney, G. G., Broderstad, E. G., Keller, R., Lundberg, A. K., Murguzur, F. J. A., Salminen, E., Raymond, C. M., Falk-Andersson, J., & Fauchald, P. (2021). Blue justice: A survey for eliciting perceptions of environmental justice among coastal planners' and small-scale fishers in Northern-Norway. <i>PLOS ONE</i> , 16(5), e0251467.	sectoral legislation, such as the Marine Resource Act and the Aquaculture Act, which restrict local autonomy.	survey	Northern Norway	no	Development	Blue justice is defined as a just and inclusive blue economy where concerns related to recognition, procedure, and distributional justice are at the forefront of the blue economy agenda. application of justice framework

https://doi.org/10.1371/journal.pone.0251467						
Klain, S. C., Beveridge, R., & Bennett, N. (2018). Ecologically sustainable but unjust? Negotiating equity and authority in common-pool marine resource management [Preprint]. MarXiv. https://doi.org/10.31230/osf.io/5dyce	emphasizes the need to address historical injustices, power imbalances, and inequities in the distribution of rights and benefits while maintaining the sustainability of marine resources	a mixed-methods approach, including secondary document reviews, observations of a meeting, semi-structured interviews, and key-informant informational meetings to gather data	British Colombia, Canada	no	Conservation	reconfiguration of current institutions and allocations to address inequities, as well as the identification of enablers and barriers to the proposed transformation . They also advocate for increased flexibility in the application of analytical tools and an extension of the range of methods used, contexts explored, and temporal and spatial scales analyzed
Winter, K. B., Vaughan, M. B., Kurashima, N., Giardina, C., Quiocho, K., Chang, K., Akutagawa, M., Beamer, K., & Berkes, F. (2021). Empowering Indigenous agency through community-driven collaborative management to achieve effective conservation: Hawai‘i as an example. <i>Pacific Conservation Biology</i> , 27(4), 337–344. https://doi.org/10.1071/PC20009	the UN Declaration on the Rights of Indigenous Peoples, which recognizes Indigenous peoples’ right to their ‘lands, territories and resources which they have traditionally owned, occupied or otherwise used or acquired’ It also highlights conflicts arising	examines the cultural values and practices of Indigenous communities in Hawai‘i, such as kua‘āina, hoa‘āina, aloha ‘āina, mālama ‘āina, and kia‘i ‘āina	Hawaii, USA	yes	Conservation	pathways to equitable and productive collaborative partnerships, a better understanding of laws protecting Indigenous rights and practices, recognition of varied forms of Indigenous agency, and meaningful sharing of power. They also suggest that government agencies should proactively engage with Indigenous Peoples and Local Communities (IPLCs) to build comprehensive collaborative management arrangements.

	from differing legal interpretations between Indigenous perspectives and US government institutions, particularly in relation to resource management and conservation					
Mulalap, C. Y., Frere, T., Huffer, E., Hviding, E., Paul, K., Smith, A., & Vierros, M. K. (2020). Traditional knowledge and the BBNJ instrument. Marine Policy, 122, 104103. https://doi.org/10.1016/j.marpol.2020.104103	areas beyond national jurisdiction (BBNJ instrument), between areas beyond national jurisdiction (ABNJs)	discourse analysis	Fiji	yes	Conservation	need for robust institutional arrangements allowing for representative, meaningful, and rights-based participation of traditional knowledge holders, and the incorporation of traditional knowledge in the design, decision-making, implementation, and monitoring of relevant conservation and sustainable use measures under the instrument
Snook, J., Cunsolo, A., Ford, J., Furgal, C., Jones-Bitton, A., & Harper, S. (2022). “Just because you have a land claim, that doesn’t mean everything’s going to fall in place”: An Inuit social struggle for	The land claims agreement for Nunatsiavut outlines the roles and responsibilities for fisheries management	in-depth interviews	Inuit, Canada	no	Fisheries	locally-identified well-being indicators for monitoring the wide-ranging impacts of the fisheries in Nunatsiavut

fishery access and well-being. Marine Policy, 140, 105071. https://doi.org/10.1016/j.marpol.2022.105071	through the Torngat Joint Fisheries Board, covering jurisdictional boundaries within tidal waters and defining adjacent waters					
Tsiouvalas, A., & Evans, J. (2023). From “Common Pools” to “Fish Pools”: Shifting Property Institutions in Traditional Waters of Norway and Canada. Ocean Development & International Law, 54(2), 135–162. https://doi.org/10.1080/00908320.2023.2200218	legal framework of ocean commons governance in domestic jurisdictions of Norway and Canada, as well as the interplay with international legal commitments, including the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) and the International Labour Organization (ILO) Convention	Snowball citation review	Norway and Canada	yes	Fisheries	rethinking aquaculture development through the lens of "ocean commons" to provide valuable insights for the establishment of sustainable and inclusive resource management systems in light of indigenous rights

	no. 169 on the Rights of Indigenous and Tribal Peoples					
Anbleyth-Evans, J., Leiva, F. A., Rios, F. T., Cortés, R. S., Vreni Häussermann, & Aguirre-Munoz, C. (2020). Toward marine democracy in Chile: Examining aquaculture ecological impacts through common property local ecological knowledge. <i>Marine Policy</i> , 113, 103690. https://doi.org/10.1016/j.marpol.2019.103690	need for new laws to assess nutrient loading, antibiotics, and invasive species introduction, and the importance of fisher local ecological knowledge in filling ecological knowledge gaps	semi-structured interviews, participatory cartography, focus groups, participant observation,	Chile	no	Fisheries	inclusion of fisher local ecological knowledge (LEK) in marine governance, the delineation of coastal zones for fisheries, aquaculture, tourism, and other uses equitably, and the development of a democratic system for marine governance in Chile
Macpherson, E., Jorgensen, E., Paul, A., Rennie, H., Fisher, K., Talbot-Jones, J., Hewitt, J., Allison, A., Banwell, J., & Parkinson, A. (2023). Designing Law and Policy for the Health and Resilience of Marine and Coastal Ecosystems—Lessons From (and for) Aotearoa New Zealand. <i>Ocean Development & International Law</i> , 54(2), 200–252.	need for an overarching ecosystem-based management "anchor" and fundamental marine principles to manage ocean ecosystems and respect Māori rights and authority	an interdisciplinary and intercultural approach, involving researchers across law, governance, planning, etc. interactive workshops	New Zealand	no	Fisheries	an ecosystem-based approach to marine management, emphasizing the need for an overarching ecosystem-based management "anchor" to align and bind sectoral frameworks affecting marine environments. They also suggest the introduction of clear guidelines for managing adverse effects on fish habitats of significance and the development of a national fisheries policy framework that reflects science and Māori/Tiriti rights

https://doi.org/10.1080/00908320.2023.2224116						
Davis, A., & Jentoft, S. (2001). The challenge and the promise of indigenous peoples' fishing rights: From dependency to agency. <i>Marine Policy</i> , 25(3), 223–237. https://doi.org/10.1016/S0308-597X(01)00014-8	International Labor Organization (ILO) convention no. 169 regarding indigenous peoples, which Norway was among the first nations to ratify. It also discusses the Norwegian Constitution and international law regarding indigenous peoples, including the UN Convention on Political and Social Rights	comparative study	Eastern Canadian Mi'kmaq and North Norwegian Saami	yes	Fisheries	the potential for an alliance between indigenous and non-indigenous coastal zone fishers to develop alternative approaches to fisheries management that enhance local agency and ecological sustainability
Capistrano, R. C. G., & Charles, A. T. (2012). Indigenous rights and coastal fisheries: A framework of livelihoods, rights and equity. <i>Ocean & Coastal Management</i> , 69, 200–209.	The Philippines: National Integrated Protected Areas System (NIPAS) Act, The Indigenous Peoples Rights Act (IPRA)	policy review of international frameworks related to indigenous peoples' rights, the development of a conceptual framework, and a case study approach	Mi'kmaq communities on Canada's Atlantic coast, and the Philippines the	yes	Fisheries	importance of recognizing and respecting indigenous rights, the need for open and respectful dialogue between governments and indigenous communities, and the role of partnerships among stakeholders in supporting indigenous communities and their

https://doi.org/10.1016/j.ocecoaman.2012.08.011	Canada: the Sparrow decision confirmed the treaty rights of aboriginal people to	using examples from Canada and the Philippines	Tagbanuas of Coron Island			aspirations in fisheries management
Pérez-Álvaro, E. (2023). Understanding climate change impacts on underwater cultural heritage. <i>Journal of Maritime Archaeology</i> , 18(1), 79–92. https://doi.org/10.1007/s40152-023-00320-6	United Nations Declaration on the Rights of Indigenous Peoples, the Convention on Biological Diversity, the Code of Ethical Conduct to Ensure Respect for the Cultural and Intellectual Heritage of Indigenous and Local Communities, and the Akwé: Kon Voluntary Guidelines	discourse analysis	Latin America	yes	Conservation	advocating for the inclusion of the Indigenous concept of intangible cultural heritage, exploring the possibilities of combining intangible cultural heritage with underwater cultural heritage, and emphasizing the importance of language for Indigenous communities in the application of international instruments and treaties
Kerr, S., Colton, J., Johnson, K., & Wright, G. (2015). Rights and ownership in sea country: implications of marine renewable energy for	UN Convention of the Law of the Sea (UNCLOS) in the context of indigenous rights	literature and document review, as well as selective interview techniques with indigenous and marginalized coastal	international	yes	Development	need for compromise and modification of positions to balance rights and interests in the marine environment. They also emphasize the importance of early, comprehensive, and

indigenous and local communities. Marine Policy, 52, 108–115. https://doi.org/10.1016/j.marpol.2014.11.002	and public participation	communities in Scotland, Canada, New Zealand, and Australia. The study aimed to analyze indigenous maritime rights, explore aboriginal claims to offshore resources, and document past and current use of marine resources by aboriginal groups				genuine consultation and engagement in the context of marine renewable energy development
von der Porten, S., Lepofsky, D., McGregor, D., & Silver, J. (2016). Recommendations for marine herring policy change in Canada: Aligning with Indigenous legal and inherent rights. Marine Policy, 74, 68–76. https://doi.org/10.1016/j.marpol.2016.09.007	The specific legal pressures being applied by coastal Indigenous nations on the Department of Fisheries and Oceans (DFO) include the demand for recognition as the stewards of their lands and resources, as well as a fair share in harvesting rights. Coastal Indigenous nations are	data collection through interviews, meetings, and gathering of documents, audio and video recordings, and media	Canada	no	Fisheries	changes to federal herring policy in Canada to better reflect emergent legal precedents, accommodate gains in Indigenous influence over decision-making, and support the self-determination goals of coastal Indigenous nations

	challenging federal management authority on policy and management, demanding recognition as the stewards of their lands and resources, and demanding a fair share in harvesting rights. These demands are emblematic of a broader global phenomenon of Indigenous struggles being pursued by Indigenous nations to reinstate self-determination, as well as inherent and legal rights to traditional homelands and resources					
Bennett, N. (2018). Coastal and Indigenous community	the legal framework in the	discourse analysis	Canada	no	Fisheries	need for updated laws, policies, and planning processes that

access to marine resources and the ocean: A policy imperative for Canada [Preprint]. MarXiv. https://doi.org/10.31230/osf.io/pyu2a	context of Fisheries and Oceans Canada's (DFO) mandate and its role in shaping the extent to which coastal community access is considered in policy and practice. It also mentions the need to revise relevant legislations, such as the Oceans Act and the Fisheries Act, creating an important window for policy change					explicitly incorporate access considerations, the importance of involving coastal and Indigenous communities in decision-making and policy processes regarding access to marine resources, and the necessity for more investment in social science, interdisciplinary research, and Indigenous knowledge
Hiriart-Bertrand, L., Silva, J. A., & Gelcich, S. (2020). Challenges and opportunities of implementing the marine and coastal areas for indigenous peoples policy in Chile. <i>Ocean & Coastal Management</i> , 193, 105233. https://doi.org/10.1016/j.ocecoaman.2020.105233	specific legal framework, the Marine and Coastal Areas for Indigenous Peoples (MCAIP) policy in Chile, which aims to recognize the rights of indigenous communities to marine resource	qualitative methodology, involving field visits, informal conversations with indigenous leaders and community representatives, and participation in the development of the Marine and Coastal Areas for Indigenous	Chile	yes	Governance	recommend increasing financial resources, enhancing the capacity of state institutions to comply with time frames, and providing support to deal with the tensions that emerge due to the interaction between knowledge systems. They also emphasize the importance of bridging organizations, such as NGOs, local governments, and universities, in providing technical support and facilitating

	uses. The policy establishes principles for the establishment of MCAIP based on recommendations provided by the ILO C169 Convention, including gratuity, respect of previous rights granted, exclusivity for groups or associations of indigenous communities, voluntary process, and association	Peoples (MCAIP) application portfolio.				communication between stakeholders
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Fisheries thematic area data extraction and analysis table 4

Citation	Fishery type	Methodology	Location	Governance/ Management type	Communi- ty with other contexts	If communality with the legal context exists, what are the legal mechanisms?
Castelo Branco Araujo, F., & de Aguiar Portela Moita, E. (2018). The Problems of Under-Inclusion in Marine Biodiversity Conservation: the Case of Brazilian Traditional Fishing Communities. Asian Bioethics Review, 10(4), 261–278. https://doi.org/10.1007/s41649-018-0068-6	artisanal fishing, shell fishing, and family farming	reconstructing the legal development of marine protected areas and their relation to traditional coastal fishing communities, pointing out conflicts and using the concepts of under-inclusion and under-citizenship to explain the mechanism of exclusion in Brazil's legal system.	Brazil	IPLC led	conservation and legal	legal development of Brazilian marine protected areas, the Federal Constitution recognizing the rights of indigenous peoples to the lands traditionally occupied by them, and the national legal order contemplating preservationist and conservationist positions by creating different restriction levels for conservation units aimed at preserving the activities carried out in local communities, instruments for the participation of communities, such as public consultation and deliberative councils to discuss matters of

						interest to the conservation units
Calvo-Ugarteburu, G., Raemaekers, S., & Halling, C. (2017). Rehabilitating mussel beds in Coffee Bay, South Africa: Towards fostering cooperative small-scale fisheries governance and enabling community upliftment. <i>Ambio</i> , 46(2), 214–226. https://doi.org/10.1007/s13280-016-0823-4	the harvesting of marine invertebrates such as mussels	participatory and co-management approach, involving the participation of resource users and a thorough understanding of the local context to negotiate appropriate small-scale fisheries governance approaches	Coffee Bay, South Africa	state led	Governance	
Adams, M. S., Connors, B., Levi, T., Shaw, D., Walkus, J., Rogers, S., & Darimont, C. (2021). Local Values and Data Empower Culturally Guided Ecosystem-Based Fisheries Management of the Wuikinuxv Bear–Salmon–Human System. <i>Marine and Coastal Fisheries</i> , 13(4), 362–378. https://doi.org/10.1002/mcf2.10171	ecosystem-based fishery management approach, particularly focusing on the Wuikinuxv Bear–Salmon–Human system	The researchers apply a methodology that involves Indigenous harvest goals and data from locally driven wildlife research to inform ecosystem-based fisheries management, guided by cultural values of respect for and reciprocity with wildlife	Canada	co-led	Governance	
Butler, J. R. A., Busilacchi, S., & Skewes, T. (2019). How resilient is the Torres Strait	traditional fisheries in the context of the Torres Strait Treaty,	a qualitative assessment of the Torres Strait Treaty's	Torres Strait, Australia	IPLC led	Legal	Torres Strait Treaty

Treaty (Australia and Papua New Guinea) to global change? A fisheries governance perspective. Environmental Science & Policy, 91, 17–26. https://doi.org/10.1016/j.envsci.2018.10.005	focusing on marine resources shared by Traditional Inhabitants from Western Province, Papua New Guinea, and the Torres Strait Islands of Australia	management mechanisms	and Papua New Guinea			
Bennett-Jones, L., Gnanalingam, G., Flack, B., Scott, N., Chambers, P., & Hepburn, C. (2022). Constraints to effective comanagement of New Zealand’s customary fisheries: experiences of the East Otago Taiāpure. Ecology and Society, 27(4), art38. https://doi.org/10.5751/ES-13576-270438	customary fisheries	qualitative methodology, drawing on historical and contemporary literature, as well as case study analysis of the East Otago Taiāpure to explore the challenges and potential solutions related to co-management of customary fisheries	East Otago Taiāpure, New Zealand	co-led	Governance and Legal	the legislation governing the Taiāpure, which restricts management to regulations such as minimum sizes, temporary closures, and bag limits, despite the range of protection mechanisms that traditionally existed. The study also mentions the proposal to close the fishery entirely and the challenges of implementing the wading regulation, which reflects the limitations of colonial mechanisms in addressing the needs of

						Indigenous customs and practices
Steyn, E., Fielding, P., & Schleyer, M. (2008). The artisanal fishery for East Coast rock lobsters <i>Panulirus homarus</i> along the Wild Coast, South Africa. <i>African Journal of Marine Science</i> , 30(3), 497–506. https://doi.org/10.2989/AJMS.2008.30.3.5.639	species specific artisanal fishery	surveys, interviews, questionnaires, mapping	South Africa	state led	Governance	
García-Quijano, C. G. (2007). Fishers' Knowledge of Marine Species Assemblages: Bridging between Scientific and Local Ecological Knowledge in Southeastern Puerto Rico. <i>American Anthropologist</i> , 109(3), 529–536. https://www.jstor.org/stable/4496726	tropical marine fisheries	Hierarchical cluster analysis	Southeastern Puerto Rico	state led	Governance	
Vásquez-Carrillo, C., & Peláez-Ossa, M. (2021). Insights into the ecology of sea turtles and the fisheries of eastern Guajira from the traditional knowledge of fishermen. <i>Fisheries Research</i> ,	traditional and commercial fisheries	individual, private, structured, open-ended question interviews	Guajira, Colombia	state led	Development	

238, 105915. https://doi.org/10.1016/j.fishres.2021.105915						
Ferguson, C. E., Bennett, N. J., Kostka, W., Richmond, R. H., & Singeo, A. (2022). The tragedy of the commodity is not inevitable: Indigenous resistance prevents high-value fisheries collapse in the Pacific islands. <i>Global Environmental Change</i> , 73, 102477. https://doi.org/10.1016/j.gloenvcha.2022.102477	sea cucumber fisheries in the context of resistance to the high-value seafood trade	exploratory multiple case study methodology	Pacific Islands	state led	Governance	
Van Holt, T. (2012). Landscape Influences on Fisher Success: Adaptation Strategies in Closed and Open Access Fisheries in Southern Chile. <i>Ecology and Society</i> , 17(1). https://doi.org/10.5751/ES-04608-170128	highlights that the syndicate presidents in the study region face enormous pressure to harvest entire quotas, and experienced fishers, especially those syndicates with low-quality locos, usually harvest the entire quota despite low prices. This context sheds light on the challenges faced by local communities in	mixed-methods approach, combining qualitative and quantitative data collection and analysis	Chile	state led	Development and Governance	

	managing and harvesting resources					
Ban, N. C., Eckert, L., McGreer, M., & Frid, A. (2017). Indigenous knowledge as data for modern fishery management: a case study of Dungeness crab in Pacific Canada. <i>Ecosystem Health and Sustainability</i> , 3(8), 1379887. https://doi.org/10.1080/20964129.2017.1379887	Crab fishery	combined Indigenous ecological knowledge with simulation modeling to inform modern fishery management	British Colombia, Canada	IPLC led	Governance	
Fache, E., & Pauwels, S. (2020). Tackling coastal “overfishing” in Fiji: advocating for indigenous worldview, knowledge, and values to be the backbone of fisheries management strategies. <i>Maritime Studies</i> , 19(1), 41–52. https://doi.org/10.1007/s40152-020-00162-6	coastal and reef fisheries	anthropological research	Fiji	co-led	Governance	
Deepananda, K. H. M. A., Amarasinghe, U. S., & Jayasinghe-Mudalige, U. K. (2015). Indigenous knowledge in the beach seine fisheries in Sri Lanka: An indispensable factor in community-based	community-based coastal fisheries management in Southern Sri Lanka	semi-structured interviews, participant observation, focus group discussions,	Sri Lanka	state led	Governance	

fisheries management. <i>Marine Policy</i> , 57, 69–77. https://doi.org/10.1016/j.marpol.2015.03.028		and key informant interviews				
Steel, J. R., Atlas, W. I., Ban, N. C., Wilson, K., Wilson, J., Housty, W. G., & Moore, J. W. (2021). Understanding barriers, access, and management of marine mixed-stock fisheries in an era of reconciliation: Indigenous-led salmon monitoring in British Columbia. <i>FACETS</i> , 6, 592–613. https://doi.org/10.1139/facets-2020-0080	First Nations' Food, Social, and Ceremonial (FSC) fisheries	mixed-methods sampling approach, combining qualitative and quantitative data collection method	British Columbia, Canada	IPLC led	Legal	the constitutionally protected harvesting Rights of Indigenous people
Bodwitch, H., Song, A. M., Temby, O., Reid, J., Bailey, M., & Hickey, G. M. (2022). Why New Zealand's Indigenous reconciliation process has failed to empower Māori fishers: Distributional, procedural, and recognition-based injustices. <i>World Development</i> , 157, 105894. https://doi.org/10.1016/j.worlddev.2022.105894	Māori fisheries, which are small-scale fisheries led by Indigenous peoples in New Zealand	a multi-dimensional framework, drawing on environmental justice literatures, ethnographic research, participant observation, interviews, and discussions with various stakeholders	New Zealand	IPLC led	Governance and Legal	The specific legal mechanisms discussed in the study include Indigenous-state treaty settlements and co-governance agreements

Hauzer, M., Dearden, P., & Murray, G. (2013). The effectiveness of community-based governance of small-scale fisheries, Ngazidja island, Comoros. <i>Marine Policy</i> , 38, 346–354. https://doi.org/10.1016/j.marpol.2012.06.01	small-scale, community-managed fisheries, where local fishing associations govern the use of marine resources through customary rules and informal enforcement mechanisms. These fisheries are essential to food security, income generation, and cultural identity in coastal communities of the Comoros	qualitative and ethnographic, incorporating multiple data collection techniques to assess governance structures, fishing practices, and community perceptions of fisheries management, GIS data was used to visualize fishing territories and identify areas subject to local fishing regulations.	Comoros islands	IPLC led	Legal	Customary Regulations Functioning as De Facto Law Since there are no formal laws governing small-scale fisheries, customary regulations created by village fishing associations act as the primary governance mechanism. These include: Gear restrictions (e.g., banning gillnets, dynamite, and night fishing with lanterns). Spatial restrictions (e.g., locally determined fishing zones). Species restrictions (e.g., bans on using certain fish as bait). Social taboos regulating overfishing and waste. Compliance with these customary regulations is high due to community participation in decision-making and peer enforcement mechanisms.
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Fache, E., & Pauwels, S. (2020). Tackling coastal “overfishing” in Fiji: advocating for indigenous worldview, knowledge, and values to be the backbone of fisheries management strategies. <i>Maritime Studies</i> , 19(1), 41–52. https://doi.org/10.1007/s40152-020-00162-6	Subsistence-based (for local food security), Culturally embedded (linked to ritual, kinship, and spiritual practices), Partially commercial (fish are sometimes sold in markets or sent to urban relatives), Customarily managed through taboo areas, rituals, and social norms.	interviews with various categories of people, and participatory data-collection methods	Fiji	IPLC led	Legal	Legal Pluralism in Fisheries Governance
von der Porten, S., Corntassel, J., & Mucina, D. (2019). Indigenous nationhood and herring governance: strategies for the reassertion of Indigenous authority and inter-Indigenous solidarity regarding marine resources. <i>AlterNative: An International Journal of Indigenous Peoples</i> , 15(1), 62–74. https://doi.org/10.1177/1177180118823560	- Focus on Indigenous nationhood and self-determination in marine governance. - Critiques Canada’s colonial fisheries governance. - Emphasizes Indigenous-led governance strategies rooted in ceremony, kinship,	- Qualitative analysis of Indigenous resurgence practices. - Combines legal-political critique, community testimony, and decolonial theory. - Integrates perspectives from Indigenous scholars and knowledge holders.	Pacific Coast of Canada	IPLC led	Governance	Reinforces themes of cultural resurgence, legal pluralism, and decolonial resistance found in other marine contexts.

	and relational accountability. - Advocates inter-Indigenous solidarity and non-state governance models.					
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Development thematic area data extraction and analysis table 5

Citation	Development type	methodology	Location	communality with other context	Specific law/ legislative mechanism mentioned	Effects on Indigenous Peoples and Local Communities	Coupled Jurisdictional Fragmentation (CJF) and Development
Tulloch, V. J. D., Adams, M. S., Martin, T. G., Tulloch, A. I. T., Martone, R., Avery-Gomm, S., & Murray, C. C. (2022). Accounting for direct and indirect cumulative effects of anthropogenic pressures on salmon- and herring-linked land and ocean ecosystems. <i>Philosophical Transactions of the Royal Society B: Biological Sciences</i> , 377(1854), 20210130. https://doi.org/10.1098/rstb.2021.0130	Focused on cross-realm (land-sea) ecological relationships in salmon- and herring-linked ecosystems. Incorporates direct and indirect cumulative risks from anthropogenic pressures (e.g., forestry, fisheries, climate change).	Qualitative Risk Assessment Framework based on prior models	Central Coast region, British Columbia, Canada, Includes Hailzaqv, Kitasoo Xai'xais, Nuxalk, and Wuikinuxv First Nations territories	Fisheries	The study critiques the fragmentation of Canadian environmental governance, where: Federal agencies manage marine environments. Provincial agencies manage terrestrial ecosystems.	Indigenous holistic stewardship is undermined by fragmented state jurisdiction that treats land and sea separately.	The study directly criticizes the fragmentation of environmental governance in Canada: Federal agencies govern marine areas (e.g., Fisheries and Oceans Canada). Provincial agencies govern terrestrial ecosystems (e.g., Ministry of Forests). This

							separation creates "institutional blind spots" where: Species like salmon and herring that span ecosystems fall through the cracks. Cumulative impacts (e.g., forestry on rivers, fishing on marine food webs) are not holistically addressed. The study calls this disjointedness a key reason for misalignment between pressures and protection efforts. Solution
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							offered: Use cross-realm risk assessments to provide a unified picture. Empower Indigenous governance, which already treats the land-sea system as interconnected. Push for policy and planning frameworks that cross traditional jurisdictional boundaries.
Pafi, M., Flannery, W., & Murtagh, B. (2023). Picturing the coast: unravelling community perceptions of seascapes, Blue Growth and coastal change. <i>Maritime Studies</i>, 22(3), 28.	Blue Growth Initiatives: The article explores coastal developments driven by Blue Growth policies, which include	Qualitative and participatory	West Coast of Ireland	Governance	Judicial review and planning appeals: Used by communities as resistance tactics	By using ecosystem service valuation and scenario modeling, the study supports the protection	The Adriatic Sea represents a classic example of jurisdictional

https://doi.org/10.1007/s40152-023-00315-3	offshore renewable energy, marine tourism, aquaculture, and property development.				against imposed developments like the offshore test site and hotel. Property rights and licensing laws: Contested especially in cases like seaweed harvesting, where multinational licenses conflict with customary local use.	of local socio-economic activities and sustainable livelihoods.	fragmentation
van Putten, E. I., Aswani, S., Boonstra, W. J., De la Cruz-Modino, R., Das, J., Glaser, M., Heck, N., Narayan, S., Paytan, A., Selim, S., & Vave, R. (2023). History matters: societal acceptance of deep-sea mining and incipient conflicts in Papua New Guinea. <i>Maritime Studies</i> , 22(3),	Mining	Narrative Media Analysis	Papua New Guinea	Governance and Legal	The following national legislative frameworks in Papua New Guinea govern DSM activities: Mining Act	Lack of Free, Prior, and Informed Consent (FPIC), State-Led Investment Without Adequate Local Inclusion,	Rapid development (like Deep-Sea Mining or DSM) C/JF it can create regulatory vacuums or contradictions that make it

32. https://doi.org/10.1007/s40152-023-00318-0					1992 Mining Safety Act 1977 Mineral Resources Authority Act 2005 Environment Act 2000	Fragmented Legal and Regulatory Structures	difficult to ensure coherent oversight, environmental protection, or equitable benefit-sharing.
van der Ploeg, J., Sukulu, M., Govan, H., Minter, T., & Eriksson, H. (2020). Sinking Islands, Drowned Logic; Climate Change and Community-Based Adaptation Discourses in Solomon Islands. <i>Sustainability</i> , 12(17), 7225. https://doi.org/10.3390/su12177225	Pacific Island Nations: Shares climate vulnerability discourse with other Pacific atoll nations. Global Displacement Narrative: Mirrors broader narratives of climate-induced displacement (e.g., Kiribati, Tuvalu).	Ethnographic Fieldwork	Malaita Province, Solomon Islands		Paper notes a lack of legal enforcement or accountability for coastal degradation (e.g., mangrove destruction, overfishing, and logging).	Cultural Alienation and Epistemic Displacement, Projects focusing on "climate resilience" often ignore more pressing non-climate vulnerabilities, such as: Logging and deforestation, Collapsing fisheries governance, Poor education and healthcare, Undermined Autonomy and	Confused governance, undermining accountability and delaying critical service delivery in health, water, and infrastructure.

						Ineffective Law Enforcement	
Nuttall, M. (2020). Water, ice, and climate change in northwest Greenland. WIREs Water, 7(3), e1433. https://doi.org/10.1002/wat2.1433	Climate change	Ethnographic & Participatory Observation	Northwest Greenland – Coastal Areas	Governance and conservation	Protected Marine Areas Initiatives: These are being promoted by conservation and Inuit organizations to legally protect marine ecosystems while integrating indigenous co-management. Indigenous Rights within Conservation Governance: There is no single law cited, but the article references legal	Marginalization of Inuit Knowledge, Disempowerment in Governance, Cultural Dislocation, Persistence of Colonial Legacies	Governance of climate-impacted marine and ice environments involves multiple overlapping entities: The Kingdom of Denmark, The Government of Greenland Inuit Circumpolar organizations International conservation NGOs These bodies have conflicting interests: economic growth (e.g., resource extraction)

					mechanisms that are evolving to recognize indigenous rights in the governance of the Arctic's marine spaces.		vs. environmental conservation vs. Indigenous rights.
Bennett, N. J., Blythe, J., White, C. S., & Campero, C. (2021). Blue growth and blue justice: Ten risks and solutions for the ocean economy. <i>Marine Policy</i> , 125, 104387. https://doi.org/10.1016/j.marpol.2020.104387	The paper critiques the “blue growth” model and proposes a more just and inclusive vision for ocean-based economic development.	Qualitative Literature Review + Risk Analysis	Global Focus	Fisheries	Not mentioned	Displacement and Loss of Access, Legal Invisibility and Power Imbalance, Undermining of Local Institutions	Disconnected Policy Silos and Jurisdictional Blind Spots that result in IPLCs are often not recognized as legal stakeholders even when directly affected by policies
Aswani, S., Ferse, S. C. A., Stäbler, M., & Chong-Montenegro, C. (2020). Detecting change in local ecological knowledge: An	Focuses on assessing changes in Local Ecological Knowledge (LEK)	Ethnographic fieldwork and semi-	Solomon Islands	Governance and conservation	– Customary Marine Tenure (CMT) is the	Loss of Local Ecological Knowledge (LEK),	In Roviana Lagoon, marine resource

application of an index of taxonomic distinctness to an ethnoichthyological classification in the Solomon Islands. Ecological Indicators, 119, 106865. https://doi.org/10.1016/j.ecolind.2020.106865	related to fish species to support marine resource governance.	structured interviews			prevailing legal-cultural mechanism in the region. – No national statutory law is directly applied, but the study supports reinforcing CMT as a legal basis for local fisheries governance. – Results can inform national co-management policies and marine spatial planning.	Alienation from Resource Decision-Making, Reduced Adaptive Capacity, Knowledge Invisibility in Policy	governance is subject to dual authority systems: Customary Marine Tenure (CMT) by Indigenous communities (traditional knowledge and clan-based rights). State fisheries and environmental policies, largely developed and enforced through external or centralized government bodies.
Barnett, J., Konlechner, T., Waters, E., Minnapinni, M. W., Jarillo, S., Austral, B., De Santis, J., Head, L., Rioli, C., & King, A. (2023).	Climate Change Adaptation / Local	Co-designed Participatory Research	Tiwi Islands, Northern	conservation and legal	Native Title: Tiwi are legal owners and custodians of	Exclusion from Strategic Planning, Cultural and	Multiple and Overlapping Governance Systems,

“Winga Is Trying to Get in”: Local Observations of Climate Change in the Tiwi Islands. <i>Earth’s Future</i>, 11(3), e2022EF002808. https://doi.org/10.1029/2022EF002808	Environmental Monitoring		Territory, Australia		their lands. – Office of Township Leasing (leases between Commonwealth Government and Traditional Owners). – Management via Tiwi Land Council, Tiwi Marine and Land Rangers, and anticipated Indigenous Protected Area (IPA). – Tied to broader Australian legal frameworks around Indigenous	Sovereignty Erosion, Jurisdictional Disempowerment	Fragmented Climate Response Architecture, Tensions Between Leasehold and Customary Land Tenure
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					land governance.		
Abernethy, P., Waters, S., Kulchyski, T., Rolston, D., Swinkels, H., Luttrell, G., & Pillsworth, L. (2021). Climate Change and Vibrio cholerae in Herring Eggs: The Role of Indigenous Communities in Public Health Outbreak Responses. International Journal of Indigenous Health, 16(2). https://doi.org/10.32799/ijih.v16i2.33236	Public Health Emergency Response / Climate Change Adaptation	Qualitative Case Study	Coastal British Columbia (BC), Canada	Governance	– While not citing specific statutes, the article underscores the need for formalized emergency protocols that recognize: • Indigenous governance • Traditional food systems • Cultural safety in health response frameworks. – Addresses institutional gaps between provincial health authorities and Indigenous	Cultural Erosion and Food Insecurity, Undermining Indigenous Governance, Fragmented Risk Communication	Lack of coordination between: Provincial health authorities Federal food safety agencies First Nations governance structures

					governance systems.		
Varea, R., Varea, R., Kant, R., & Farrelly, T. (2022). Qi no tu i baba ni qwali (living down by the river): Impacts of flooding and mining on ecosystems and livelihoods. <i>Frontiers in Marine Science</i> , 9, 954062. https://doi.org/10.3389/fmars.2022.954062	flooding and mining	Ethnographic and participatory methods guided by Fijian Indigenous worldviews	Fiji	Governance	– Mining Act [Cap 146]: Crown ownership of minerals, minimal community consultation. – Environment Management Act (2005): Requires Environmental Impact Assessments (EIAs), but lacks meaningful inclusion of marine socio-ecological complexity. – Native Lands Act [Cap 133]: Protects Indigenous land titles. – Climate	Loss of Sovereignty and Autonomy, Cultural Erosion, Marginalization in Development and Vulnerability Amplification	Overlapping and Conflicting Legal Regimes and Policy and Development Incoherence

					Change Act (2021): Establishes Fiji's climate response and National Ocean Policy. – Legal duality of customary law vs. state statutory control over marine resources (iqoliqoli).		
Huntington, H. P., Olsen, J., Zdor, E., Zagorskiy, A., Shin, H. C., Romanenko, O., Kaltenborn, B., Dawson, J., Davies, J., & Abou-Abbsi, E. (2023). Effects of Arctic commercial shipping on environments and communities: context, governance, priorities. Transportation Research Part D: Transport and Environment, 118, 103731. https://doi.org/10.1016/j.trd.2023.103731	commercial shipping routes in the Arctic and its impacts on both the natural environment and human communities	Comparative and Synthesis Review	Arctic	Governance and Legal	– Discusses International Maritime Organization (IMO) Polar Code and its limitations. – Highlights regional shipping governance frameworks in Canada (Northern Marine	Environmental and Cultural Harm, Weak or Absent Participation, Limited Capacity to Respond to Emergencies and Erosion of ITK	Disjuncture Between National and Indigenous Priorities, inconsistent Application of International Law

					Transportation Corridors), Russia, and Scandinavia. – Addresses the lack of enforceable Arctic-wide shipping regulations that center community rights and environmental protection.		
Kiruba-Sankar, R., Saravanan, K., Adamala, S., Selvam, K., Kumar, K. L., & Praveenraj, J. (2023). First report of marine debris in Car Nicobar, a remote oceanic Island in the Nicobar archipelago, Bay of Bengal. <i>Regional Studies in Marine Science</i> , 61, 102845. https://doi.org/10.1016/j.rsma.2023.102845	presence and impact of marine debris in a remote tribal territory	transect sampling method	Bay of Bengal, India	Governance	– Implicitly tied to India's Coastal Regulation Zone (CRZ) and Solid Waste Management Rules (2016). – Lacks detailed integration with tribal autonomy protections (e.g.,	– Debris pollutes traditional coastal spaces, affecting livelihoods (fishing, harvesting), health, and cultural practices of the Nicobarese people. – Exacerbates post-tsunami vulnerability	– Demonstrates fragmentation between national environmental regulation and local tribal governance. – Island's tribal status (Scheduled Tribe, protected under Indian

					Andaman and Nicobar Protection of Aboriginal Tribes Regulation, 1956). – Highlights need for tailored marine debris management policies for remote tribal islands.	and limits recovery of local ecological systems crucial to food and water security.	law) leads to governance duality: state environmental roles vs. local customary practices. – Lack of localized waste infrastructure shows developmental neglect and policy marginalization of Indigenous island communities.
Petheram, L., Stacey, N., & Fleming, A. (2015). Future sea changes: Indigenous women's preferences for adaptation to climate change on South Goulburn Island, Northern Territory (Australia). <i>Climate and Development</i> , 7(4), 339–352.	Community-based adaptation (CBA) to climate change.	Participatory and visual techniques	Australia	Governance	The paper does not cite binding legal mechanisms for Indigenous adaptation	Limited understanding of western climate science terms and timelines (e.g., “future” had little cultural anchoring). Deep concern	Local customary law, federal climate governance, and state-level development programs exist in

https://doi.org/10.1080/17565529.2014.951019						among elders about ecological changes and loss of customary practices. Fear of cultural and food system disruption (e.g., declining access to bushfoods and coastal resources).	parallel without integration. Development decisions (e.g., aquaculture or climate investment) were often made without meaningful community involvement. Planning processes failed to reflect Indigenous framings of temporality and identity, resulting in fragmented and culturally alien responses to climate risk. Highlights the need to co-design adaptation
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							strategies, respecting both local ecological knowledge and scientific approaches.
Whitney, C. K., Frid, A., Edgar, B. K., Walkus, J., Siwallace, P., Siwallace, I. L., & Ban, N. C. (2020). “Like the plains people losing the buffalo”; perceptions of climate change impacts, fisheries management, and adaptation actions by Indigenous peoples in coastal British Columbia, Canada. <i>Ecology and Society</i> , 25(4), art33. https://doi.org/10.5751/ES-12027-250433	Indigenous-led adaptation to climate change	Semi structured interviews (n=50) across four First Nations in British Columbia: Heiltsuk, Nuxalk, Kitasoo/Xai'xais, and Wuikinuxv. Community-partnered research co-designed with Indigenous authors and leaders. Participatory, inductive qualitative	Canada: nations: Heiltsuk (Bella Bella), Kitasoo/Xai'xais (Klemtu), Nuxalk (Bella Coola), Wuikinuxv (Wuikinuxv).	Fisheries	The paper does not cite any binding legal mechanisms	Decline in traditional marine food species (e.g., salmon, herring roe). Disruption to food sovereignty, ceremonial life, and language linked to marine harvesting. Emotional distress and intergenerational fear over cultural disconnection.	Fragmentation between Indigenous customary law and federal regulatory regimes. Lack of alignment between Indigenous adaptive priorities and state mechanisms (e.g., MPAs, climate projections). Exclusion from climate planning processes contributes to

		coding to extract emergent adaptation themes.					mistrust and policy ineffectiveness. Participants expressed a need to "decolonize" fisheries management and elevate traditional ecological knowledge (TEK).
Obie, M. (2018). Exploitation of coastal and marine resources along Tomini Bay: Livelihood base versus concession rights. Masyarakat, Kebudayaan Dan Politik, 31(1), 36. https://doi.org/10.20473/mkp.V3I1.12018.36-45	extractive coastal and marine resource development, particularly related to state-issued concessions for marine and coastal exploitation	Qualitative ethnographic research	Sulawesi, Indonesia	Governance	The Indonesian government grants coastal concessions under national spatial and marine development regulations. The study highlights a failure to recognize "hak ulayat	Displacement of Bajo communities from ancestral fishing zones. Loss of access to traditional livelihoods due to fishing bans and marine privatization. Marginalization in policy processes and development decisions.	Multiple overlapping authorities (central government, local governments, corporations) govern the same marine areas with contradictory priorities. Customary marine governance

					laut" (customary marine rights), despite legal provisions under: Undang-Undang Desa (Village Law). Law No. 27/2007 on coastal zone management. Law No. 32/2009 on environmental protection and management. However, these laws are often not implemented equitably, favoring corporate interests.	Erosion of social structures and increased community conflict.	systems are not harmonized with formal spatial planning. The absence of legal integration
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Kramer, D. B., Stevens, K., Williams, N. E., Sistla, S. A., Roddy, A. B., & Urquhart, G. R. (2017). Coastal livelihood transitions under globalization with implications for trans-ecosystem interactions. PLOS ONE, 12(10), e0186683. https://doi.org/10.1371/journal.pone.0186683	Socioeconomic development driven by globalization, including infrastructural development	Mixed-methods	Nicaragua	Fisheries	Autonomous communal land rights under Nicaraguan law, specifically for Indigenous and Afro-descendant groups in the RACCS. Local governance provides communal decision-making over natural resource access, although enforcement is weak. Land tenure system: Land sales are prohibited, but use rights can be transferred	Ethnic communities studied: Miskito, Garifuna, Kriol, and Mestizo populations (collectively known as "Costeños"). Disproportionate vulnerability: Indigenous groups rely on subsistence livelihoods and communal land. Market expansion and Mestizo migration threaten land access and cultural practices. Livelihood resilience is tied to food self-sufficiency and forest	Uneven development benefits across communities. Conflicts over land tenure and marine resource access. Governance challenges in aligning conservation, market access, and traditional livelihoods.
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					informally, contributing to land insecurity.	product gathering. Transition risks include loss of ecological knowledge, resource over-extraction, and cultural marginalization .	
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