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Traditional knowledge and the BBNJ instrument

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A B S T R A C T

Indigenous Peoples and local communities (IPLCs) are the holders of a vast amount of traditional knowledge of the ocean and its resources. In this article, we discuss the potential for this knowledge and the IPLCs holding such knowledge to be recognized by the international community in the development and implementation of an international legally binding instrument under the United Nations Convention on the Law of the Sea on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction (BBNJ instrument), drawing on three main types of traditional knowledge of particular relevance to the BBNJ instrument: traditional knowledge based on the connectivity of species and marine processes (both active and passive) between areas beyond national jurisdiction (ABNJs) and coastal waters; traditional knowledge emerging from environmental management best practices in coastal waters that can be models for similar measures in ABNJs; and traditional knowledge derived from traditional instrument-free navigation between coastal communities and across ABNJs.

1. Introduction

Indigenous Peoples and local communities (IPLCs) are the holders of a vast amount of traditional knowledge of the ocean and its resources. In this article we discuss the potential for this knowledge to be recognized by the international community in the development and implementation of an international legally binding instrument under the United Nations Convention on the Law of the Sea on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction (the BBNJ instrument).

In the negotiations for the BBNJ instrument, the group known as the Pacific Small Island Developing States (PSIDS) [1]—comprising the Pacific Island States with Permanent Missions to the United Nations—i.e., the Federated States of Micronesia, Fiji, Kiribati, Nauru, Palau, Papua New Guinea, Marshall Islands, Samoa, Solomon Islands, Tonga, Tuvalu, and Vanuatu—along with Cook Islands and Niue—and a growing number of like-minded delegations have advocated for the incorporation of traditional knowledge and its holders—i.e., IPLCs—in the text of the BBNJ instrument, as well as in the institutional arrangements that the instrument will empower and/or establish. We underscore the relevance of traditional knowledge and the rights of its holders to the BBNJ instrument and the achievement of its core objectives. First, we propose working definitions for traditional knowledge, Indigenous Peoples, and local communities, drawing on definitions in existing international instruments and other documents and highlighting their application in current major international instruments and processes, including in terms of institutional arrangements. Second, with a focus on the Pacific region, we discuss three categories of traditional knowledge that have particular relevance to the BBNJ instrument: traditional knowledge based on the connectivity of species and marine processes (both active and passive) between areas beyond national jurisdiction (ABNJs) and coastal waters; traditional knowledge emerging from environmental management best practices in coastal waters that can be models for similar measures in ABNJs; and traditional knowledge derived from traditional instrument-free navigation between coastal communities and across ABNJs. Finally, we explore how the BBNJ instrument and related subsidiary and/or subsequent processes can specifically incorporate traditional knowledge and its holders, including suggestions for each major element of the BBNJ instrument, taking into consideration the development of the draft texts of the BBNJ instrument to date.

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2. Traditional knowledge and its holders in international law and discourse: working definitions and applications

There is no definitive, internationally accepted definition of traditional knowledge in international law and discourse. However, various international instruments, institutions, and processes dealing, inter alia, with the natural environment (including, but not limited to, the conservation and sustainable use of biological diversity) have referenced the concept of traditional knowledge in their respective contexts. We tease out possible working definitions as well as examine their applications in major international instruments and processes.

2.1. Indigenous peoples and local communities: holders of traditional knowledge

In international law and discourse, references to traditional knowledge in instruments, institutions, and processes are typically associated with references to the groups of people who hold traditional knowledge—specifically, Indigenous Peoples and local communities (IPLCs). The seminal 1986 Martinez Cobo Study defines Indigenous Peoples as "having a historical continuity with pre-invasion and pre-colonial societies that developed on their territories [and] consider themselves distinct from other sectors of the societies now prevailing on those territories, or parts of them" [2]. The Study laid the foundation for the adoption by the United Nations General Assembly of the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) in 2007 [3]. While technically a political declaration rather than a legally binding instrument, a number of regional and international human rights treaty bodies have cited UNDRIP in their interpretations of Indigenous Peoples' rights,[1] lending further weight to the Declaration and its incorporation of the results of the Study. Convention 169 of the International Labor Organization, adopted in 1989 as a key precursor to UNDRIP and addressing labor rights of Indigenous Peoples, contains a legally binding definition of Indigenous Peoples as "peoples in independent countries who are regarded as indigenous on account of their descent from the populations which inhabited the country… At the time of conquest or colonization or the establishment of present State boundaries and who, irrespective of their legal status, retain some or all of their own social, economic, cultural and political institutions" [4].

Several core international human rights treaties and their treaty bodies affirm the rights of Indigenous Peoples to own, develop, control, and use their traditional territories and resources, as well as obligate States to ensure and protect those rights.[2] Additionally, various seminal non-binding international instruments also acknowledge the crucial role that Indigenous Peoples play in environmental management and decision-making, especially for the purposes of sustainable development.[3]

The acronym IPLCs encompasses not just "Indigenous Peoples" but also "local communities." "Local communities," unlike Indigenous Peoples, do not necessarily have a history of being invaded or colonized by external entities. However, like Indigenous Peoples, local communities have cultural values, practices, and systems developed through multiple generations and poised to be passed to future generations. This is the approach taken in the Convention on Biological Diversity (CBD), which, among other things, identifies and regulates the activities of "indigenous and local communities," including in its article 8(j) [5]; and whose Contracting Parties have attempted to define the participation of local communities in its work [6].

In sum, then, an IPLC is 1) a people descended from a population that inhabited a country at a time of its conquest or colonization by another country, currently consider themselves distinct from other (perhaps more dominant) populations in that country, and retain at least some of their original socio-economic, cultural, and/or political institutions, which they have rights to enjoy and perpetuate; or 2) a community that has long-standing historic, cultural, and/or political roots in a country and is not typically considered subservient to any other population in the country (although it might have been in the past). We acknowledge, however, that conceptualizations of indigeneity are contested and highly context-specific and that "Indigenous" is a term with which individuals and communities self-identify.[4] Our definition of IPLCs here is a working one for purposes of this article and the consideration of the BBNJ instrument.

2.2. A working definition of traditional knowledge

A number of major international legal instruments address and—to a certain extent—define the concept of traditional knowledge. Article 8(j) of the CBD obligates its Contracting Parties to "respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity and promote their wider application with the approval and involvement of the holders of such knowledge, innovations and practices and encourage the equitable sharing of the benefits arising from the utilization of such knowledge, innovations and practices." This Article does not explicitly define traditional knowledge, but the so-called Article 8(j) Working Group makes use of an informal working definition, as follows:

Traditional knowledge refers to the knowledge, innovations and practices of indigenous and local communities around the world. Developed from experience gained over the centuries and adapted to the local culture and environment, traditional knowledge is transmitted orally from generation to generation. It tends to be collectively owned and takes the form of stories, songs, folklore, proverbs, cultural values, beliefs, rituals, community laws, local language, and agricultural practices, including the development of plant species and animal breeds. Sometimes it is referred to as an oral tradition for it is practiced, sung, danced, painted, carved, chanted and performed down through millennia. Traditional knowledge is mainly of a practical nature, particularly in such fields as agriculture, fisheries, health, horticulture, forestry and environmental management in general [7].

The Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity, in operationalizing Article 8(j) of the CBD, contains numerous provisions regulating access to the traditional knowledge of IPLCs associated with genetic resources, including in terms of requiring the prior informed consent of IPLCs before accessing that traditional knowledge [8].

Looking beyond the CBD and its Nagoya Protocol, several other international instruments also address traditional knowledge as an important resource for IPLCs. Article 9.2(a) of the International Treaty

[1] Bodies include the Committee on the Rights of the Child; the Committee on Economic, Social and Cultural Rights; the Committee on the Elimination of Racial Discrimination; and the Inter-American Court of Human Rights.

[2] See, e.g., International Convention on the Elimination of All Forms of Racial Discrimination, Mar. 7, 1966, 660 U·N T.S. 195; see also the provisions on economic self-determination for indigenous peoples in International Covenant on Civil and Political Rights, Dec. 16, 1966, 999 U·N T.S., and International Covenant on Economic, Social, and Cultural Rights, Dec. 11, 1966, 993 U·N T.S. 3.

[3] See, e.g., United Nations Conference on the Human Environment, June 5–16, 1972, Stockholm Declaration, Principle 22 (June 16, 1972); United Nations Conference on Environment and Development, June 3–14, 1992, Rio Declaration on Environment and Development, Principle 22, U.N. Doc. A/CONF.151/26 (Aug. 12, 1992) [hereinafter Rio Declaration]; id., Agenda 21, Chapter 26.

[4] United Nations *Declaration on the Rights of Indigenous Peoples* (UNDRIP) (2007), Article 33 (1), states that "Indigenous peoples have the right to determine their own identity or membership in accordance with their customs and traditions."

on Plant Genetic Resources for Food and Agriculture addresses traditional knowledge associated with plant genetic resources as an important component of food security and the rights of farmers [9]. Article 18.2(b) of the United Nations Convention to Combat Desertification in Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa links traditional knowledge to efforts to combat climate change and its impacts [10]. Article 31 of UNDRIP declares that Indigenous Peoples "have the right to maintain, control, protect and develop their cultural heritage, traditional knowledge and traditional cultural expressions" [11]. And, Principle 22 of the Rio Declaration on Environment and Development treats traditional knowledge as critical for sustainable development.

International instruments and processes addressing intellectual property rights (IPRs) have attempted to formulate robust working definitions of traditional knowledge, at least in the context of IPRs. The World Intellectual Property Organization (WIPO), through its Intergovernmental Committee on Intellectual Property and Genetic Resources, Traditional Knowledge and Folklore, adopted in 2012 a "Glossary of Key Terms Related to Intellectual Property and Genetic Resources, Traditional Knowledge and Traditional Cultural Expressions". The Glossary defines traditional knowledge as "knowledge resulting from intellectual activity in a traditional context, and includes know-how, practices, skills, and innovations. Traditional knowledge can be found in a wide variety of contexts, including: agricultural knowledge; scientific knowledge; technical knowledge; ecological knowledge; medicinal knowledge, including related medicines and remedies; and biodiversity-related knowledge" [12]. WIPO also considers traditional knowledge to be a body of knowledge "developed, sustained and passed on from generation to generation within a community, often forming part of its cultural and spiritual identity" [13].

In sum, then, drawing from the various references and working definitions of traditional knowledge discussed above, the concept of traditional knowledge can be defined as a living body of knowledge, practices, skills, and innovations, including intangible cultural heritage such as dance, story, and song, passed down through generations continuously and in locally meaningful contexts by IPLCs who act as the creators, developers, preservers, guardians, and custodians. Traditional knowledge can be agricultural (including how to attain optimal yield from cultivated land), aqua-cultural (including fisheries-related), environmental (including conservation-related), and medicinal (including how to use plant and animal resources and products for curative purposes); and it can feature knowledge associated with genetic resources of plant and animal life. This body of knowledge and associated custodianship, particularly as relating to the ocean and its resources, predates the establishment of current national borders and continues to inform resource access and use of marine areas and resources throughout the world. As such, it has precedent and great relevance for consideration under the BBNJ instrument.

2.3. Applications of traditional knowledge in existing international law and discourse

Traditional knowledge and its holders have been institutionalized to a significant extent in numerous major international instruments and processes of relevance to the BBNJ instrument. Of particular note is the work under the CBD with respect to ecologically or biologically significant areas (EBSAs) which directly incorporate traditional knowledge and its holders. EBSAs are areas in the ocean—including areas beyond national jurisdiction, within national jurisdiction, and straddling both—that play important roles in protecting and bolstering the healthy functioning of the ocean and the many ecosystem services it provides [14]. In the EBSA process, CBD Contracting Parties hold regional workshops to identify maritime areas that meet criteria for EBSA designation and lay the groundwork for future efforts by relevant and competent national, regional, and international entities to impose special conservation and management measures on those areas.[5] In accordance with Decision XI/17 of the CBD Conference of the Parties, CBD Contracting Parties, other Governments, competent intergovernmental organizations, and relevant IPLCs are invited to use guidance from the CBD on integrating traditional knowledge (with the approval and involvement of the holders of that knowledge) in any future descriptions of maritime areas qualifying as EBSAs as well as future conservation and management measures for those areas [15], including extensive work done by the CBD Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) on the matter.[6] Furthermore, in the same Decision, the CBD Conference of the Parties called for the development of training materials on the use of traditional knowledge into the description and identification of EBSAs. A training manual on this topic was produced and presented to SBSTTA at its 20th meeting in 2016 [16].

Traditional knowledge and the rights of knowledge holders feature prominently in another set of standards adopted by the CBD COP: "The Akwé: Kon Voluntary Guidelines for the Conduct of Cultural, Environmental and Social Impact Assessment regarding Developments Proposed to Take Place on, or which are Likely to Impact on, Sacred Sites and on Lands and Waters Traditionally Occupied or Used by Indigenous and Local Communities" (Akwé: Kon Voluntary Guidelines) [17]. The Akwé: Kon Voluntary Guidelines, in building on Article 8(j) of the CBD, aim to advise relevant entities on incorporating "cultural, environmental… And social considerations of indigenous and local communities into new or existing impact-assessment procedures".[7] The Guidelines specifically call on Contracting Parties, IPLCs, developers, and decision-makers to collaborate and, among other things, "take into account the traditional knowledge, innovations and practices of indigenous and local communities as part of environmental, social and cultural impact-assessment processes, with due regard to the ownership of and the need for the protection and safeguarding of traditional knowledge, innovations and practices".[8] Impact-assessment processes would be triggered "whenever developments are proposed to take place on, or which are likely to impact on, sacred sites and on lands and waters traditionally occupied or used by indigenous and local communities".[9] In other words, the Guidelines acknowledge the importance of the traditional knowledge of IPLCs and their rights as traditional knowledge holders in environmental impact assessments for activities in places occupied by IPLCs, places and resources that IPLCs use and those that are sacred to them. This could include areas beyond national jurisdiction which IPLCs have used in the past, continue to use and/or have sacral value for IPLCs. These areas include, amongst others, long standing open ocean voyaging routes across the high seas along which IPLCs continue to rely on traditional knowledge of navigation and seafaring, including knowledge of the

[5] Regions covered by the workshops include the Arctic, the Eastern Tropical and Temperate Pacific, the Mediterranean, the North Pacific, the North-west Atlantic, the South-Eastern Atlantic, the Southern Indian Ocean, the Western South Pacific, and the Wider Caribbean and Western Mid-Atlantic.

[6] Identifying specific elements for integrating the traditional, scientific, technical and technological knowledge of indigenous and local communities, and social and cultural criteria and other aspects for the application of scientific criteria for identification of ecologically or biologically significant marine areas (EBSAs) as well as the establishment and management of marine protected areas, Report adopted by the Subsidiary Body on Scientific, Technical and Technological Advice of the Convention on Biological Diversity at its sixteenth session, held in Montreal, Canada, from 30 April to 5 May 2012, UNEP/CBD/SBSTTA/16/INF/10 (Apr. 3, 2012).

[7] 2.

[8] 3(c).

[9] 1.

weather, environment and marine biological diversity, and to which IPLCs may attach significant sacral value.

Building on the foundation established by the CBD, multiple provisions in the Nagoya Protocol regulate access to and benefits from traditional knowledge associated with genetic resources, including requiring that the prior and informed consent or approval and involvement of an IPLC is secured and that mutually agreed terms have been established before accessing that IPLC's relevant traditional knowledge associated with genetic resources[10] that multiple Parties cooperate along with their IPLCs to implement an ABS system for shared traditional knowledge associated with genetic resources[11]; and that Parties take steps to raise awareness of the importance of traditional knowledge associated with genetic resources, including organizing meetings of IPLCs, promoting voluntary codes of conduct developed with IPLCs, and involving IPLCs in the implementation of the Nagoya Protocol.[12] As long as the IPLC has traditional knowledge that, in some way, facilitates an understanding of genetic material so as to unlock its value—even if that secondary understanding of the genetic material is achieved by outside entities rather than that IPLC, and even if the genetic material is not "owned" by that IPLC—then that traditional knowledge falls under the access and benefit sharing regime of the CBD and its Nagoya Protocol. Such traditional knowledge can provide scientists with leads to, or be the basis for an initial screening process for, particular genetic properties in life forms in nature [18].

There are other examples of the incorporation of traditional knowledge and its holders outside of the CBD context but still of relevance to the BBNJ instrument. In the preamble to the Paris Agreement, Parties acknowledge that they "should, when taking action to address climate change, respect, promote, and consider their respective obligations on… The rights of indigenous peoples [and] local communities" [19]. Toward that end, per paragraph 136 of the decision adopting the Paris Agreement, the Parties to the United Nations Framework Convention on Climate Change (UNFCCC) established in 2015 a Local Communities and Indigenous Peoples Platform (LCIPP) [20]. The three overall objectives of the LCIPP, per paragraph 5 of a 2017 decision by the Parties to the UNFCCC, are to "strengthen the knowledge, technologies, practices and efforts of [IPLCs] related to addressing and responding to climate change," generate the exchange of experience and sharing of best practices and lessons learned with respect to mitigation and adaptation, and "enhance the engagement of [IPLCs] in the UNFCCC process" [21]. In order to operationalize the LCIPP, Parties to the UNFCCC established the Facilitative Working Group (FWG) for the LCIPP per paragraph 3 of a 2018 decision, with membership comprising of an equal number of representatives from States and from Indigenous Peoples organizations—a landmark achievement in international law and discourse with respect to participation of holders of traditional knowledge [22]. To the extent that the BBNJ instrument will address linkages between ocean management and the impacts of climate change and ocean acidification (which know no cartographic boundaries), the examples of the LCIPP and its FWG are instructive.

Another example is the Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean (CAOFA). In 2018, the Arctic Ocean States—Canada, Denmark (representing Greenland), Norway, the Russian Federation, and the United States—along with major distant-water fishing entities—China, Iceland, Japan, South Korea, and the European Union—signed the CAOFA, which, among other things, establishes a moratorium on commercial fishing in the ABNJ of the Central Arctic Ocean for 16 years as a precautionary measure [23]. Due in part to the active participation of IPLC representatives from the Arctic in its negotiations, CAOFA has references in its preamble as well as in articles 4 (4) and 5 (2) to the IPLCs of the Arctic and the importance of involving them and their "indigenous and local knowledge" in the work under CAOFA, including in formal scientific bodies and similar mechanisms established by the CAOFA. The work under CAOFA is of direct relevance to the BBNJ instrument, as currently envisioned.

3. Major types of traditional knowledge of relevance to the BBNJ instrument

There are numerous examples around the world of IPLCs understanding and managing the natural environment using traditional knowledge although it should be noted that much of this knowledge is undocumented, held by traditional knowledge holders and transmitted through culturally appropriate mechanisms. This part of the article highlights several (non-exhaustive) examples, with a focus on the Pacific region (where much work has taken place with respect to marine biological diversity, the rights of Nature, and traditional knowledge [24]) along with select examples from other regions, as organized around three major types of traditional knowledge: traditional knowledge based on the connectivity of species and marine processes (both active and passive) between areas beyond national jurisdiction (ABNJs) and coastal waters; traditional knowledge emerging from environmental management best practices in coastal waters that can be models for similar measures in ABNJs; and traditional knowledge derived from traditional instrument-free navigation between coastal communities and across ABNJs that is still utilized in voyaging in various parts of the world. The examples reveal, among other things, the interconnected nature of the natural environment (from highlands to shores to the deep ocean), a keen awareness among IPLCs of the need to balance sustainable use with ambitious conservation, the importance of involving all stakeholders (including IPLCs with relevant traditional knowledge) in environmental governance practices, the profound cultural and spiritual values associated by IPLCs with the natural environment, and the necessity of interacting with the natural environment with caution and respect. Connected to the discussion below, part 4 of this article highlights several possible examples for incorporating each of the three major types of traditional knowledge in the BBNJ instrument.

3.1. Connectivity

Connectivity has important implications for a BBNJ instrument in regard to area-based management, environmental impact assessment and the discovery and understanding of marine genetic resources. IPLCs on the coast are connected to ABNJs through ecological and oceanographic pathways that include traditional knowledge, cultural practices, stewardship activities and subsistence use of migratory species that cross jurisdiction boundaries. Traditional knowledge of highly migratory species can be particularly valuable in understanding their life histories and patterns of migration, and, as a result, in identifying areas that are of special importance to them. Highly migratory species of cultural, social and economic significance to IPLCs include sea turtles, whales and other cetaceans, fish, seals and other pinnipeds and seabirds. This list is by no means exhaustive [25].

IPLCs in the Pacific have traditional knowledge about highly migratory species that range between the open ocean (i.e., areas beyond national jurisdiction) and their coastal waters. Traditional knowledge of IPLCs of Pacific islands has been (and can be) used—sometimes in conjunction with formal scientific studies, and sometimes by itself—to understand the life cycles, migratory patterns, feeding habits, and habitat preferences for sea turtles, whales, sharks, and highly migratory fish stocks that range in and out of IPLCs' national waters. In the Cook Islands, traditional experts and elders have been involved in establishing protected areas for, among other things, large highly migratory marine mammals that range in and out of their waters, particularly whales—a duty that involves, among other things, a keen traditional understanding of the life cycles, migratory patterns, and other biological characteristics of those whales [26]. Additionally, a number of IPLCs of the Pacific

[10] Art. 7.
[11] Art. 11.
[12] Art. 21.

islands have developed complex traditional taxonomies for highly migratory marine species that provide information about their mobility patterns and life cycles, among other biological attributes. The IPLCs of Kiribati and Tuvalu have local names for sharks, jacks, bonefish, and certain species of tuna that range from just offshore to the open ocean, and for whose migratory patterns and feeding patterns those IPLCs have traditional knowledge [27]. IPLCs of Solomon Islands have developed such knowledge with respect to skipjack tuna, island bonito, and yellowfin tuna, which are subject to complex taxonomies. Interestingly, knowledge of tuna in the Solomon Islands also includes important aspects of their feeding habits, some of which are still not well known by science: for example, the people of Marovo Lagoon can accurately predict the movement of skipjack and yellowfin tuna with reference to the deep-sea surface presence of "micronekton", free-swimming small fish and crustaceans (2–20 cm) of the open sea [28]. The Marovo category of *inabuku* corresponds closely to micronekton and includes at least a dozen known and named varieties, each of which serves to Marovo people as a predictive and reliable indicator of tuna migrations [29]. Islanders' knowledge of such ocean connectivities at the level of highly migratory tuna species and the micronekton which the fish forage and feed upon range spatially far beyond the nearshore deep-sea zone, and demonstrates that ocean-related knowledge held by ILPCs defy the distinction between ocean under national jurisdiction and the high seas beyond.

The literature also indicates that similar forms of detailed knowledge of fish, mammals and other ocean creatures exists among ILPCs of the Arctic and Atlantic, and may range far out to sea or, in the case of the Arctic, across remote transitional zones of sea and ice [30–32].

3.2. Environmental management best practices

Several island groups in the Pacific traditionally manage their natural environments using what is essentially an ecosystem-based approach rooted in specific cultures. In Hawaii, there is the *ahupua'a* concept establishing management units, each of which extends from the mountaintop to the ocean [33]. Each unit is supposed to contain everything that an individual or community needs for sustenance, shelter, household goods, medicine, spiritual practice, and other vital cultural needs. This concept has echoes in the *vanua* of Fiji [34], the *tapere* of the Cook Islands [35], the *puava* of Solomon Islands [36], and the *tabinau* of Yap in the Federated States of Micronesia [37]. Indeed, for the *tabinau* concept from Yap, an individual has traditional authority—and the attendant environmental management responsibilities—based on the location of the landowner's estate as well as how far the landowner can see the ocean into the distance from the estate.

Customary marine tenure systems are particularly well-developed in the Pacific islands. IPLCs in the Pacific have strict traditional norms, regulations and guidelines for accessing and exploiting marine resources under their ownership and management, including limiting entry to certain groups of people and closing off marine areas to some or all forms of exploitation for certain periods for conservation purposes as well as for religious/spiritual reasons (e.g., a *tabu* after the death of a high-ranking traditional leader) [38]. In Fiji, coastal communities and clans are traditional custodians of fishing grounds called *qoliqoli*, which divide Fiji's coastal waters into "parcels" which cannot be fished except by Indigenous Fijians who register with their clans having authority over the grounds or those who ask for permission from chiefs of clans or areas that have authority over the grounds [39]. Building on this system of traditional custodianship, local communities and the tourism sector in Fiji have also entered into Marine Conservation Agreements, in which at least one party (usually resource owners and communities with access rights) take certain actions, refrain from taking certain actions, or transfer certain rights in exchange for explicit economic incentives, with the aim of achieving, among other things, the sustainable management of ecosystems and resources [40]. This process presumes that the chiefs and communities have sufficient traditional knowledge about the health of the fish stocks and other resources in their *qoliqoli* so as to allow them to make informed, conservation-minded decisions about allowing (limited) fishing in the grounds. Similar approaches are known from many locations including Solomon Islands [41] and Palau [42].

IPLCs in Pacific islands employ area-based management measures not just to solidify and perpetuate traditional authority, but to also limit extractive activities for the sake of conservation as well as for religious purposes. Regulatory measures invoking the Pacific-wide principle of *tabu* are deployed in the waters of Vanuatu [43], Kiribati [44], and Fiji [45]. Papua New Guinea has a similar *masalai* system for its waters [46]. In Palau, high-ranking chiefs and other traditional leaders, in consultation with their respective communities, deploy *bul*, which can close off a maritime area to all fishing and other extractive activities during certain times of the year (e.g., during fish spawning periods) [42]. *Bul* has recently been invoked on a national (and by its implication global) level in terms of the closure of 80% of Palau's exclusive economic zone to fishing through a National Marine Sanctuary; an interesting example of the expanded role in the present of traditional management mechanisms [47]. In the Yap island group in the Federated States of Micronesia, fishing grounds over which high-ranking chiefs have authority are closed to all extractive activities for months (if not an entire year) after the chiefs pass away, out of respect for the chiefs as well as a form of communal mourning and sacrifice [48]. Similarly, the Māori and other Polynesian peoples (e.g. Tahiti) impose a *rāhui* on a marine area (as well as on land, in forests, and other ecosystems) to restrict access to and/or use of that particular area or particular resources therein for a certain period of time, usually for conservation or rehabilitation purposes or out of respect for the passing of an important individual [49]. Also, IPLCs in Vanuatu establish refuges in their waters on a group-by-group basis that limit the use of certain extractive tools (e.g., gill nets) and close off the waters to takings of certain resources (e.g., trochus, sea cucumbers), sometimes up to seven years at a time, usually to commemorate the death of a high-ranking traditional leader or as part of ritual cycles attuned to the ecosystem [50]. And, in Tokelau, IPLCs engage in the *inati* system for communal fishing, which sometimes targets highly migratory deep ocean fish such as tuna in accordance with the season as well as in accordance with the distributional needs of the IPLC conducting the fishing [51].

Such longstanding conservation and management measures have evolved over the last couple of decades into so-called locally managed marine areas (LMMAs) in the Pacific, which arise out of close consultations with (if not are managed by) IPLCs that rely on the managed areas for sustenance, health benefits, and other goods and services. Today, LMMAs cover more than 12,000 square kilometers of marine space in the Pacific and involve about 500 IPLCs in 15 Pacific island countries. LMMAs employ a wide range of area-based management measures, include *tabu* (i.e., no-take zones), temporary or permanent seasonal/rotational harvest schedules, and reserves/refuges for certain types of species (e.g., turtles, trochus shell) [52]. In connection with work on LMMAs, IPLCs in Pacific islands have used their traditional knowledge about their marine environments to identify and adapt to climate change impacts and other major environmental stressors, an important skill that can be of use in the open ocean as well as in national waters [53]. Outside of the Pacific islands context, but for the same purpose of adaptation, clam gardens have been constructed by the Indigenous Peoples of the Pacific Northwest (USA and Canada) in their waters to increase bivalve habitat and productivity [54].

3.3. Traditional navigation

The Pacific islands were settled millennia ago by seafarers who traversed the open ocean in voyaging canoes using intricate understandings of the natural environment in the ocean and heavenly bodies to guide their voyages long before the introduction of modern navigational instruments [55]. In those voyages, the navigators developed traditional knowledge about the behavioral patterns and biological characteristics of marine species in the open ocean that proved

invaluable to their voyages as sources of sustenance as well as spiritual and religious totems [56]. While much of this knowledge has long been closely held by traditional navigation societies and resistant to documentation, such knowledge included locations of spawning and aggregation sites for marine creatures as well as behavioral differences based on temporal changes (e.g., feeding patterns during the daytime compared to nighttime, as well as during full-moon nights compared to moonless nights). The navigators also developed traditional knowledge about the movements, feeding practices and terrestrial connections of seabirds, and about certain types of marine plant life that they relied on for sustenance, medicine, and other crucial needs during their voyages. And, traditional navigation also likely generated knowledge of sunken seamounts far away from any dry land and the specific organisms there. More broadly speaking, and as documented, the navigators developed traditional knowledge about ocean currents and wave patterns, which aided them in steering their canoes as well as guided them to food sources during their oceanic voyages, and which are currently threatened by ocean circulation changes due to warming temperatures [57]. Today, many IPLCs in the Pacific continue or have revived this ancient art of traditional navigation, including in the Federated States of Micronesia [58], the Marshall Islands [59], Solomon Islands [60], Hawai'i [61], and Fiji [62], to name a few Pacific island groups with active traditional voyaging societies.

As research into open ocean organisms of potential commercial interest continues, it could be argued that the traditional knowledge of coastal and seafaring Indigenous Peoples has the potential to be important in understanding where such organisms might be found and what the properties of such organism might be. For example, certain types of *Sargassum* weed are used in Chinese medicine [63]. Jellyfish are well known by coastal fishermen, and they have traditionally been used for food in Asia [64] and as medicine, lubricant, food, and fertilizer in Scandinavia [65]. Local ecological knowledge of algal blooms has been used to document and manage them in Australia [66]. It is certain that the Pacific navigators, for example, know where the highly productive areas of the ocean are, and where certain types of organisms, for example bioluminescent plankton and jellyfish, are likely to congregate. They would also have observed how the environment has changed over time as indicated by oral traditional knowledge, and how this might impact the range of certain genetic resources of interest.

4. Incorporating and operationalizing traditional knowledge and its holders in the BBNJ instrument

The BBNJ instrument can recognize traditional knowledge as part of a suite of scientific, technical, and other relevant knowledge used in decision-making and governance processes across the instrument, both as a cross-cutting matter as well as in each of the four elements of the BBNJ package. As discussed above, traditional knowledge about marine life and ecosystem processes helps inform formal scientific understandings, particularly for the sake of conservation and sustainable use of marine biodiversity, as seen in the various examples from the Pacific cited here and in the relevant literature [67,68]. In that regard, the revised draft text of the BBNJ instrument [69], which reflects discussions held in the first three scheduled substantive sessions of the intergovernmental conference (IGC), has encouraging language on the consideration of traditional knowledge and its holders in the instrument; the text has nearly 30 references to such traditional knowledge and its holders, spanning all four major Parts of the text as well as cross-cutting elements, although a number of questions and issues remain to be addressed.

As a general matter, there appears to be growing recognition among negotiators that the relevant traditional knowledge of IPLCs should be incorporated as a complement to the best available scientific information in the implementation of the BBNJ instrument. This consideration of relevant traditional knowledge and best available scientific information on equal footing is captured in a number of provisions (some still bracketed) throughout the revised draft text, including as a general principle/approach in Article 5(i), as complementary bases for the identification of areas requiring protection through the establishment of area-based management tools (ABMTs) in Article 16 (1), and as complementary bases for the identification and evaluation of impacts in an environmental impact assessment (EIA) in Article 32 (1). The qualifier "relevant" with respect to traditional knowledge of IPLCs appears to indicate that the traditional knowledge of IPLCs under consideration should be applicable in the context of a particular measure, activity, or related matter. For instance, it would likely not be relevant to consider the traditional knowledge of Pacific IPLCs in the design of an ABMT in the Northern Atlantic. It also bears mentioning that for the February 28, 2020 compilation of textual proposals for the revised draft text, Australia, New Zealand, Norway, and the PSIDS jointly submitted two proposals for the preamble and Article 5 recognizing the existing rights of Indigenous Peoples and local communities in the context of the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction and requiring that States Parties respect, promote, and consider their respective obligations pertaining to such rights when implementing the BBNJ instrument [70]. This appears to be an attempt to ensure, among other things, that the seeking, transmission, and utilization of relevant traditional knowledge under the BBNJ instrument are done in culturally sensitive ways that honor the rights of holders of such traditional knowledge. It remains to be seen whether the proposals will gain much traction beyond their proponents, given the charged nature that discussions of rights tend to engender, particularly in the context of a legally binding instrument.

In Part II on marine genetic resources (MGRs), a new Article 10bis in the revised draft text requires that traditional knowledge of IPLCs associated with MGRs collected in ABNJs shall only be accessed with the prior and informed consent or approval and involvement of those IPLCs, and that such access shall be on mutually agreed terms. Article 10bis was originally a joint proposal by Australia, Maldives, New Zealand, Norway, and the PSIDS, with the aim of addressing, among other things, traditional knowledge about MGRs of ABNJs derived from instrument-free traditional navigation by IPLCs over the high seas, including traditional knowledge about the locations of seamounts and the biodiversity present there as well as about algae and other plant life encountered in ABNJs that can subsequently be collected for their genetic properties. A subsequent proposal from the same proponents, as captured in the February 28, 2020 compilation of textual proposals for the revised draft text, refined Article 10bis to reference *freedom* of consent, in line with current terminology in international environmental law and processes; as well as clarify that the utilization of such traditional knowledge shall also be on mutually agreed terms in order to more fully capture the possibility of benefit-sharing for holders of such traditional knowledge.

In Part III on ABMTs, the revised draft text contains language in multiple Articles on the relevant traditional knowledge of IPLCs with respect to the identification, establishment, and implementation of ABMTs. An intervention from the European Union and its Member States in the first substantive session of the IGC acknowledging the relevance of the traditional knowledge of IPLCs for the identification of ABMTs [71] was a major breakthrough in the consideration of such traditional knowledge in the negotiations, joining the PSIDS and (to a certain extent) Canada in advocating for such consideration. Tellingly, none of the textual proposals for the revised draft text in the February 28, 2020 compilation calls for the deletion of all references to traditional knowledge in the Part on ABMTs, signaling growing consensus of the relevance of such traditional knowledge. Indeed, more so than other Parts of the text, the Part on ABMTs appears to represent the clearest basis for the consideration of all three major types of traditional knowledge discussed in this article. In addition to the above-mentioned text in Article 16 (1), there are references to relevant traditional knowledge and its holders in Article 17 on the development of proposals for ABMTs, in Article 18 on the consultations for and assessments of

ABMT proposals, and in Article 21 on monitoring and review of ABMTs once established. The language indicates that holders of relevant traditional knowledge must be consulted whenever deciding whether to establish an ABMT in an ABNJ that will affect or otherwise involve certain marine species or processes that are the bases of that traditional knowledge. Holders of relevant traditional knowledge can provide insights into where to site ABMTs and what types of ABMTs to establish, including whether to include seasonal measures, based on their traditional experiences with relevant species and processes in or in connection with ABNJs (e.g., traditional knowledge about fish spawning sites, gathering spots for certain marine plant life, habitats and migration paths used by highly migratory species such as whales, tuna, sea turtles, and eels with cultural significance for holders of traditional knowledge). Even if an ABMT is proposed for the conservation of a particular ecosystem or species for which no IPLCs have direct traditional knowledge, those IPLCs can still participate by sharing best practices from their management of similar species or adjacent ecosystems in accordance with traditional knowledge bases.

In Part IV on EIAs, the revised draft text reflects two elements of relevance. First, there is a recognition that activities in ABNJs can potentially harm or otherwise impact the marine creatures, processes, and environments that are the subjects of traditional knowledge in areas both within and beyond national jurisdictions. Second, there appears to be some understanding that activities in the Ocean can have not just physical impacts on BBNJ, but also impacts on activities and resources of significant socio-cultural value, including for IPLCs. There is therefore space for the BBNJ instrument to consider all three major types of traditional knowledge in the Part on EIAs, particularly traditional knowledge based on connectivity as well as environmental best practices of holders of such traditional knowledge, keeping in mind the IPLCs' understanding of the ocean as a vast interconnected space.

As such, the Part on EIAs contains language in multiple Articles mandating that IPLCs who hold relevant traditional knowledge participate in the scoping, conduct, and decision-making pertaining to EIAs, including by requiring in Article 34 that those holders be consulted as stakeholders in the EIA process; requiring in Article 32 that relevant traditional knowledge of IPLCs be a basis for the identification and evaluation of impacts in EIAs; and requiring in Article 35 that the content of an EIA include a description of potential cultural impacts of an assessed activity as well as any measures to avoid, prevent, and mitigating such cultural impacts, among other impacts. (It should be noted, however, that the consideration of "cultural" impacts could run the risk of misusing the qualifier "cultural" to fit an unrelated agenda. An explicit reference to the IPLCs and/or their relevant traditional knowledge of IPLC could avoid that.) Similarly, the language in Article 27 (based on a PSIDS proposal) requiring EIAs for areas that are culturally connected to areas that are ecologically or biologically significant or vulnerable could serve as a hook to reflect the relevant traditional knowledge of IPLCs in the Part on EIAs, with the caveat that this Article remains highly contested. The BBNJ instrument can also mandate the carrying-out of strategic environmental assessments that incorporate/mainstream relevant traditional knowledge of IPLCs, so that such knowledge is reflected in whole policies/programs/processes with direct relevance to BBNJ. The current text on strategic environmental assessments in Article 28, however, does not quite reflect this element and could benefit from a redrafting to better incorporate such relevant traditional knowledge.

Finally, in Part V on capacity building and transfer of marine technology (CBTMT), holders of relevant traditional knowledge are recognized in the revised draft text as participants in and beneficiaries of capacity building and marine technology transfer initiatives. This appears to reflect a growing understanding in the negotiations of the need to, among other things, sensitize science to the relevance of traditional knowledge as well as foster greater cooperation between scientists and holders of traditional knowledge. For example, Article 43 (2) of the revised draft text mandates cooperation in the carrying out of CBTMT under the BBNJ instrument, including partnerships with holders of traditional knowledge. Conceivably, such CBTMT initiatives could support the deployment and enhancement of traditional marine management practices (especially in light of climate change and other new environmental stressors), including in consultation with relevant regional institutions; and the establishment of repositories devoted at least in part to storing and disseminating traditional knowledge about the conservation and sustainable use of marine biological diversity and the effective management of marine environmental spaces. The special fund envisioned under Article 52 (5) of the revised draft can also provide supplemental support to such initiatives carried out by IPLCs. Additionally, Article 46 (1) (b) of the revised draft text identifies awareness-raising with respect to the relevant traditional knowledge of IPLCs as a type of CBTMT to be facilitated. In this context, IPLCs are not just beneficiaries of CBTMT but also participate in advancing knowledge relevant to the BBNJ instrument, including allowing IPLCs holders to share their best practices regionally and globally through the implementation of programs and opportunities. However, such dissemination and awareness-raising must be conducted so as to not undermine the rights and interests of IPLCs who hold such traditional knowledge, including abiding by the principle of free, prior and informed consent.

To capture these important considerations, any institutional arrangements established and empowered by the BBNJ instrument should provide for the participation of holders of traditional knowledge relevant to the activities regulated by those arrangements and institutions. How can traditional knowledge holders and/or their legitimate representatives be identified under the instrument? Once they are, how can their inputs and recommendations be heard and incorporated in a formal manner and with sensitivity to the fact that traditional knowledge is largely undocumented and transmitted intergenerationally by knowledge holders in culturally appropriate ways?

The first step is to determine who these experts or holders of traditional knowledge are.[13] Existing instruments provide a mix of self-identification, establishment of criteria, and in some cases, agreement by State Parties, as discussed above. Self-identification in most cases relates to constituencies that have officially organized in order to participate in relevant fora. They consist of either people of a same clan, of a same sub-region, or in some instances IPLCs of one country/Party to an agreement.

However, not all IPLCs with relevant traditional knowledge on BBNJ are already organized. It is very likely that only a small minority is. Identifying relevant groups or individuals is important to maximize the relevance and effectiveness of measures and decisions implemented. The CBD SBSTTA guidelines on the inclusion of traditional knowledge and its holders in the description and identification of EBSAs [16] aim to address issues of lack of representativity of traditional knowledge holders due to fragmentation (some Indigenous Peoples territories span several countries), capacity and capability, cost, and little knowledge from the scientific community on how to involve IPLCs in assessments, among others. For the BBNJ instrument, working with existing networks of IPLCs and traditional knowledge experts could be useful, in particular starting from existing lists used for regional workshops on CBD EBSAs, the work of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, or the United Nations Permanent Forum on Indigenous Issues. Experts and knowledge holders from these networks could also help in identifying other relevant individuals or groups from a certain country, region, basin, or culture group. State Parties could also provide support in identification of relevant IPLCs.

The current revised draft text does not provide for any guidance on how holders of relevant traditional knowledge will be identified or

[13] The Cook Islands Traditional Knowledge Act 2013 provides an example at the national level of a process for the identification of holders of traditional knowledge. See https://www.wipo.int/edocs/lexdocs/laws/en/ck/ck002en.pdf.

designated or how to ensure that these holders are legitimate. This may be left to a later stage, once the BBNJ instrument enters into force, perhaps through the work of a subsidiary body established by the Conference of the Parties (COP) to the BBNJ instrument under Article 48 (4) (d).

Once identified, representatives of IPLCs and/or traditional knowledge experts could be included in national delegations to attend meetings of bodies established by the BBNJ instrument, such as a COP or a scientific and technical body. However, the positions and inputs of these representatives and experts may not be counted as those of IPLCs but as States' positions.

Another option is to recognize IPLC constituencies or organizations, as well as traditional knowledge experts, as observers to the work under the BBNJ instrument. To enhance the meaningful consideration of traditional knowledge holders and experts, a list of all experts or constituencies classified by regions and subregions or areas of expertise relevant to the BBNJ instrument could be elaborated.[14] This list could be available through the Secretariat, the scientific and technical body, and/or the clearing house mechanism. Article 51 (4) (d) of the revised draft text, for instance, envisions the clearing house mechanism promoting linkages to existing databases of experts in relevant traditional knowledge of IPLCs, although no explicit guidance is provided on specific databases to be linked and how this linkage will be kept up-to-date. Once these relevant experts and traditional knowledge holders are identified and known, they could be invited to collaborate and provide input on projects and any other activities of the BBNJ instrument, including assessments of planned projects or activities, in relevant subsidiary bodies, including the scientific and technical body, as well as in the COP.

Permanent seats for holders and/or experts of traditional knowledge could also be envisioned in the scientific and technical body of the BBNJ instrument, ideally drawing on available/recognized listings of relevant holders and/or experts. This would ensure that there is adequate consideration of traditional knowledge in the work under the BBNJ instrument and that the relevant holders and experts of traditional knowledge are consulted. The revised draft text currently recognizes expertise in relevant traditional knowledge of IPLCs as part of the multidisciplinary expertise of the scientific and technical body of the BBNJ instrument, although there is little guidance in the text on how such expertise will be identified.

The BBNJ instrument could also consider the constitution of a working group or a platform focused on traditional knowledge and with representatives of IPLCs and individual experts of traditional knowledge. This is a model akin to the LCIPP and its FWG, as discussed above. This working group/platform could be coordinated by the Secretariat of the BBNJ instrument and be regularly consulted to provide advice and comments on measures, decisions and other matters under consideration by the COP and other bodies of the BBNJ instrument. Such a working group/platform could be explicitly identified in Article 48 (4) (d) as one of the possible subsidiary bodies to be established by the COP, should a list of subsidiary bodies be reflected in the BBNJ instrument.

Regardless of the specific mechanisms by which IPLCs can be formally recognized and consulted in the institutional arrangements of the BBNJ instrument, traditional knowledge holders have the right to share in benefits arising from the utilization of their knowledge in ABNJs. More broadly, incorporating traditional knowledge of the ocean, its processes and resources in the BBNJ instrument acknowledges the value of this knowledge for the conservation and sustainable use of BBNJ and ensures that the BBNJ instrument is implemented in a more effective matter of relevance to the international community as a whole. Furthermore, involving traditional knowledge holders and safeguarding their interests will contribute to making ocean governance more inclusive and equitable.

[14] In the United Nations Permanent Forum on Indigenous Issues as well as in other international bodies and processes, Indigenous Peoples (including representatives and experts therefrom) are typically grouped into seven sociocultural regions: Africa; Asia; Central and South America and the Caribbean; the Arctic; Central and Eastern Europe, Russian Federation, Central Asia and Transcaucasia; North America; and the Pacific.

5. Conclusion

The traditional knowledge of IPLCs, being a living body of knowledge, practices, skills, and innovations passed down through generations continuously and in locally meaningful contexts by IPLCs who act as creators, developers, preservers, guardians, and custodians, has a significant role to play in the conservation and sustainable use of marine biological diversity, including beyond national jurisdiction. As we have demonstrated, several general types of such traditional knowledge are relevant to the BBNJ instrument: traditional knowledge about highly migratory marine species of cultural significance to IPLCs, traditional knowledge about environmental management best practices in coastal waters that can be models for similar approaches in areas beyond national jurisdiction, and traditional knowledge derived from long-standing instrument-free traditional navigation over the high seas. Through examples primarily (but not exclusively) focused on the Pacific, we have explained how traditional knowledge and its holders have a critical role as part of a suite of science, technical, and other relevant knowledge used in decision-making and governance processes under the BBNJ instrument. We have reinforced our assertions with a survey of multilateral environmental agreements and processes where traditional knowledge and its holders have been incorporated, particularly in connection with the ocean.

The current draft of the BBNJ instrument, as revised after the third session of the IGC, contains dozens of references (bracketed and otherwise) to traditional knowledge and IPLCs across all major Parts of the draft, representing a significant opportunity to advance recognition under international law of the contribution of traditional knowledge and its holders to ocean governance and marine ecosystem management. To operationalize such references, the BBNJ instrument must provide for robust institutional arrangements allowing for representative, meaningful, and rights-based participation of traditional knowledge holders in the design, decision-making, implementation and monitoring of relevant conservation and sustainable use measures under the instrument. Although key questions remain for some delegations pertaining to the extent to which the BBNJ instrument should reference traditional knowledge and/or its holders, it is notable that the number of delegations that have voiced support in the IGC for substantive references to traditional knowledge and its holders has grown as the IGC has progressed, swelling beyond the initial PSIDS champions of such references to gain the support of the Group of 77 and China (representing over 130 developing countries), numerous developed countries, and observers. (Indeed, there is currently no delegation that is calling for the universal deletion of references to traditional knowledge in the BBNJ instrument.) For the BBNJ instrument to achieve its lofty goals of conservation and sustainable use, it is key that the instrument makes use of all relevant knowledge, including the traditional knowledge of IPLCs.

CRediT authorship contribution statement

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editing.

References

[1] F. Manoa, The new pacific diplomacy at the united Nations: the rise of the PSIDS, The New Pacific Diplomacy, 2016, pp. 89–98.
[2] U.N. Economic & Social Council, Subcommission on prevention of discrimination & protection of minorities, Study of discrimination against indigenous populations, at 379, U.N. Doc. E/CN, 1987 (*prepared by* Jose Martinez Cobo) .4/Sub.2/1986/7/Add.4.
[3] G.A. Res. 61/295, U.N. Doc. A/RES/61/295 (Oct. 2, 2007).
[4] Convention (No. 169) Concerning indigenous and tribal people in independent countries art. 1(1), June 27, 1989, 1650 U.N.T.S. 383.
[5] Convention on Biological Diversity, June 5, 1992, 1760 U.N.T.S.79 [hereinafter CBD].
[6] Report of the Expert Group Meeting of Local Community Representatives within the Context of Article 8(j) and Related Provisions of the Convention on Biological Diversity, Sept. 4, 2011, UNEP/CBD/WG8J/7/8/Add.1*.
[7] Secretariat of the Convention on Biological Diversity, Traditional Knowledge and the Convention on Biological Diversity, accessed, https://www.cbd.int/doc/publications/8j-brochure-en.pdf. (Accessed 7 June 2020).
[8] Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity articles 7, 10, 12, and 16, available at: https://treaties.un.org/doc/source/docs/UNEP_CBD_COP_DEC_X_1-E.pdf, Oct. 29, 2010.
[9] International Treaty on Plant Genetic Resources for Food and Agriculture art. 9.2 (a), S. Treaty Doc. No. 110-10, http://www.fao.org/AG/cgrfa/itpgr.htm, Nov. 3, 2001.
[10] United Nations Convention to Combat Desertification in Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa art. 18.2(b), June 17, 1994, 1954 U.N.T.S. 3.
[11] G.A. Res. 61/295, U.N. Doc. A/RES/61/295, art. 31 (Oct. 2, 2007).
[12] World Intellectual Property Organization, Glossary of key terms related to intellectual property and genetic resources, traditional knowledge and traditional cultural expressions, 2012 at pg. 42 WIPO/GRTKF/IC/22/INF/8 Annex Apr. 27,.
[13] World Intellectual Property Organization, Traditional knowledge, accessed, https://www.wipo.int/tk/en/tk/. (Accessed 7 June 2020).
[14] Convention on Biological Diversity, Ecologically or Biologically Significant Marine Areas: Special areas in the world's oceans, accessed, https://www.cbd.int/ebsa/. (Accessed 7 June 2020).
[15] Decision adopted by the Conference of the Parties to the Convention on Biological Diversity at its eleventh session, held in Hyderabad, India, from 8 October to 19 October 2012, 24, UNEP/CBD/COP/DEC/XI/17 (Dec. 5, 2012).
[16] UNEP/CBD/SBSTTA/20/INF/21: Training Manual on the Incorporation of Traditional Knowledge into the Description and Identification of EBSAs.
[17] Decision adopted by the Conference of the Parties to the Convention on Biological Diversity at its seventh session, held in Kuala Lumpur, Malaysia, from 9 February to 20 February and 27 February 2004, Annex, UNEP/CBD/COP/DEC/VII/16 (13 Apr. 2004) .
[18] S. Laird, R. Wynberg, Access and Benefit-Sharing in Practice: Trends in Partnerships across Sectors, vol. 38, CBD Technical Series, 2008.
[19] Paris Agreement, Dec. 12, 2015.
[20] United Nations Framework Convention on Climate Change, 21st Meeting of the Conference of the Parties, Decision 1/CP.21.
[21] United Nations Framework convention on climate change, 23rd meeting of the conference of the Parties, Decision 2/CP.23.
[22] United Nations Framework convention on climate change, 24th meeting of the conference of the Parties, Decision 2/CP.24.
[23] Proposal for a Council Decision on the conclusion, on behalf of the European Union, Of the agreement to prevent unregulated high seas fisheries in the central Arctic Ocean held in brussels on 12 June 2018, annex, COM, 453 final, at, https://eur-lex.europa.eu/resource.html?uri=cellar:2554f475-6e25-11e8-9483-01aa75ed71a1.0001.02/DOC_2&format=PDF, 2018. (Accessed 7 June 2020).
[24] C. Payri, E. Vidal, Noumea (Eds.), Biodiversity, a Pressing Need for Action in Oceania, Presses Universitaires de Nouvelle-Calédonie, 2019.
[25] M.K. Vierros, A.L. Harrison, M.R. Sloat, G.O. Crespo, J.W. Moore, D.C. Dunn, Y. Ota, A.M. Cisneros-Montemayor, G.L. Shillinger, T.K. Watson, H. Govan, Considering Indigenous Peoples and local communities in governance of the global ocean commons, Mar. Pol. 119 (2020) 104039.
[26] Cook Islands 4th National Report to the Convention on Biological Diversity 2011.
[27] J.A. Drew, Use of traditional ecological knowledge in marine conservation, Conserv. Biol. 19 (4) (2005) 1286–1293.
[28] C.E. Menkes, et al., Seasonal oceanography from physics to micronekton in the south-west Pacific, Deep-Sea Res. II 113 (2015) 125–144.
[29] E. Hviding, Reef and Rainforest: an Environmental Encyclopedia of Marovo Lagoon, Solomon Islands/Kiladi oro vivineidi ria tingitonga pa idere oro pa goana pa Marovo No. 1, UNESCO. Knowledges of Nature Series, Paris, 2005.
[30] M.M. Freeman, Contemporary inuit exploitation of the sea-ice environment, in: A. Cooke, E. van Alsbine (Eds.), Sikumiut: People Who Use the Sea-Ice, Canadian Arctic Resource Committee, Ottawa, 1984, pp. 73–96.
[31] M. Ramires, et al., Fishers' knowledge about fish trophic interactions in the southeastern Brazilian coast, J. Ethnobiol. Ethnomed. 11 (2015) 19–30.
[32] R.E. Johannes, et al., Ignore Fishers' knowledge and miss the boat, Fish Fish. 1 (2008) 257–271.
[33] Y. Kaneshiro, et al., Hawai'i's mountain-to-sea ecosystems: social–ecological microcosms for sustainability science and practice, EcoHealth 2 (2005) 349–360.
[34] A. Ravuvu, Vaka I Taukei: the Fijian Way of Life, Institute of Pacific Studies, Suva, 1983.
[35] R. Dixon, I uta i tai — a preliminary account of ra'ui on Mangaia, Cook Islands, in: T. Bambridge (Ed.), The Rahui: Legal Pluralism in Polynesian Traditional Management of Resources and Territories, ANU Press, Canberra, 2016, pp. 79–104.
[36] E. Hviding, Knowing and managing biodiversity in the pacific islands: challenges of conservation in the Marovo Lagoon, Int. Soc. Sci. J. 58 (1) (2006) 69–85. Issue 187.
[37] S.G. Lingenfelter, Yap: Political Leadership and Cultural Change in an Island Society, University of Hawai'i Press, Honolulu, 1975.
[38] Maritime institutions in the western pacific, in: K. Ruddle, T. Akimichi (Eds.), Osaka: Senri Ethnological Studies 17, National Museum of Ethnology, 1984.
[39] P. Clarke, S.D. Jupiter, Law, custom and community-based natural resource management in Kubulau District (Fiji), Environ. Conserv. 37 (2010) 98–106.
[40] S. Mangubhai, H. Sykes, E. Lovell, G. Brodie, S. Jupiter, R. Lal, S. Lee, E. M. Loganimoce, C. Morris, Y. Nand, I. Qauqau, B. Rashni, Fiji: coastal and marine ecosystems, in: C. Sheppard (Ed.), World Seas: an Environmental Evaluation Volume II: the Indian Ocean to the Pacific, Elsevier, 2019, pp. 765–792.
[41] E. Hviding, Contextual flexibility: present status and future of customary marine tenure in Solomon Islands, Ocean Coast Manag. 40 (1998) 253–269.
[42] R. Putney, Customary marine tenure and traditional ecological knowledge in Palau. Master's Theses, San Jose State University ScholarWorks, 2008, p. 3493.
[43] F.R. Hickey, Traditional marine resource management in Vanuatu: acknowledging, supporting and strengthening indigenous management systems, SPC Trad. Mar. Res. Manag. Knowledge Info. Bullet. 20 (2006) 11–23.
[44] Kiribati National Biodiversity Strategies and Action Plan 2016-2020.
[45] LMMA Network, Tabu in Fiji, accessed, http://lmmanetwork.org/what-we-do/traditional-practices/tabu-in-fiji/, 2016. (Accessed 7 June 2020).
[46] G. Koczberski, G.N. Curry, J. Warku, C. Kwam, Village-based marine resource use and rural livelihoods: kimbe bay, west new britain, Papua New Guinea. TNC Pacific Island Countries Report, 2006. No. 5/06.
[47] Marine Spatial Planning Programme-Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and cultural organization, Palau, http://msp.ioc-unesco.org/world-applications/oceania/palau/. (Accessed 7 June 2020).
[48] A. Smith, P. Dalzell, Fisheries Resources and Management Investigations in Woleai Atoll, Yap State, Federated States of Micronesia. South Pacific Commission Inshore Fisheries Research Project Technical Document, no. 4, 1993.
[49] The Rahui, in: T. Bambridge (Ed.), Legal Pluralism in Polynesian Traditional Management of Resources and Territories, ANU Press, Canberra, 2016.
[50] F.R. Hickey, R.E. Johannes, Recent evolution of village-based marine resource management in Vanuatu, SPC Trad. Mar. Res. Manag. Knowledge Info. Bullet. 14 (2002) 8–21.
[51] Atoll Elders from Atafu, in: A. Hooper (Ed.), Echoes at Fishermen's Rock: Traditional Tokelau Fishing vol. 4, Knowledges of Nature UNESCO, 2012.
[52] H. Govan, W. Aalbersberg, A. Tawake, J. Parks, Locally-Managed Marine Areas: A Guide to Supporting Community-Based Adaptive Management. Locally-Managed Marine Area Network, Fiji, Suva, 2008.
[53] H.L. McMillen, T. Ticktin, A. Friedlander, S.D. Jupiter, R. Thaman, J. Campbell, J. Veitayaki, et al., Small islands, valuable insights: systems of customary resource use and resilience to climate change in the pacific, Ecol. Soc. 19 (4) (2014) 44.
[54] C.M. Neudorf, N. Smith, D. Lepofsky, G. Toniello, O.B. Lian, Between a rock and a soft place: using optical ages to date ancient clam gardens on the Pacific Northwest, PloS One 12 (2) (2017), e0171775.
[55] R. Feinberg, DeKalb, Ill., in: Seafaring in the Contemporary Pacific Islands: Studies in Continuity and Change, Northern Illinois University Press, 1995.
[56] T. Gladwin, East Is a Big Bird: Navigation and Logic on Puluwat Atoll. Cambridge, Mass, in: Also, Lewis DH 1994. We, the Navigators: the Ancient Art of Landfinding in the Pacific, second ed., Harvard University Press, Honolulu, 1970. University of Hawai'i Press; 1994.
[57] B.R. Finney, Traditional navigation and nautical cartography in Oceania, in: D. Woodward, G.M. Lewis (Eds.), Cartography in the Traditional African, American, Arctic, Australian, and Pacific Societies, University of Chicago Press, Chicago, Ill, 1998, pp. 443–492.
[58] E. Metzgar, Carolinian voyaging in the new millennium, Micrones. J. Humanit. Soc. Sci. 5 (1/2) (2006) 293–305.
[59] J. Genz, Navigating the revival of voyaging in the Marshall Islands: predicaments of preservation and possibilities of collaboration, Contemp. Pac. 23 (1) (2011) 1–34.
[60] M. George, Polynesian navigation and Te lapa — "the flashing, Time Mind 5 (2) (2012) 135–173.
[61] B.R. Finney, Sailing in the Wake of the Ancestors: Reviving Polynesian Voyaging, Bishop Museum Press, Honolulu, Hawai'i, 2003.
[62] Global Environment Facility, Heart of the Spirit: Traditional Fiji Voyaging Bridges Ancestral Wisdom and Renewable Energy, Inspires Youth and Proves Carbon-Neutral Travel Is Possible, 2018 accessed, https://www.thegef.org/news/heart-spirit-traditional-fijian-voyaging-bridges-ancestral-wisdom-and-renewable-energy-inspires. (Accessed 7 June 2020).
[63] L. Liu, M. Heinrich, S. Myers, S.A. Dworjanyn, Towards a better understanding of medicinal uses of the brown seaweed Sargassum in Traditional Chinese Medicine: a phytochemical and pharmacological review, J. Ethnopharmacol. 142 (3) (2012) 591–619.
[64] L. Brotz, A. Schiariti, J. López-Martínez, J. Álvarez-Tello, Y.H.P. Hsieh, R.P. Jones, E. Laaz, Jellyfish fisheries in the Americas: origin, state of the art, and perspectives on new fishing grounds, Rev. Fish Biol. Fish. 27 (1) (2017) 1–29.

[65] I. Stranberg, Jellyfish in north European folk biology. Swedish Dialects and Folk Traditions, 2009.
[66] T.A. Schlacher, S. Lloyd, A. Wiegand, Use of local ecological knowledge in the management of algal blooms, Environ. Conserv. 37 (2) (2010) 210–221.
[67] K. Ruddle, Introduction to the collected works of R.E. Johannes, publications on marine traditional knowledge and management, SPC Trad. Mar. Res. Manag. Knowledge Info. Bullet. 23 (2008) 13–24.
[68] R.E. Johannes, Words of the Lagoon: Fishing and Marine Lore in the Palau District of Micronesia, University of California Press, Berkley, California, 1981.
[69] United Nations, Revised draft text of an agreement under the United Nations Convention on the Law of the Sea on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction for the Fourth Session of the Intergovernmental conference on an international legally binding instrument under the United Nations Convention on the Law of the Sea on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction, published on 18 November 2019, A/CONF.232/2020/3, https://undocs.org/en/a/conf.232/2020/3, 7 June 2020.
[70] United Nations, Textual proposals submitted by delegations by 20 February 2020, for consideration at the fourth session of the Intergovernmental conference on an international legally binding instrument under the United Nations Convention on the Law of the Sea on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction (the Conference), in response to the invitation by the President of the Conference in her Note of 18 November 2019 (A/CONF.232/2020/3), accessed, https://www.un.org/bbnj/sites/www.un.org.bbnj/files/textual_proposals_compilation_-_28_feb_2020.pdf. (Accessed 7 June 2020).
[71] European Union, Interventions by the EU and its Member States Area-Based Management Tools, incl. Marine Protected Areas at the first session of the Intergovernmental Conference on an internationally binding instrument under the United Nations Convention of the Law of the Sea on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction, accessed, http://statements.unmeetings.org/media2/20305727/eu-interventions-on-abmt.docx. (Accessed 7 June 2020).