

Traditional Knowledge

Incorporates traditional knowledge into ocean accounts, applying principles for respectful engagement with Indigenous Peoples and Local Communities (IPLCs).

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OUTCOME

After completing this Circular, readers will be able to incorporate traditional knowledge into ocean accounts, applying principles for respectful engagement with Indigenous Peoples and Local Communities (IPLCs), approaches for integrating traditional knowledge with scientific data, and the ethical frameworks that must govern such integration. The guidance recognises that methods for incorporating traditional knowledge into statistical frameworks are still developing and require particular sensitivity to cultural protocols, intellectual property rights, and the self-determination of knowledge holders.

Important Note: This Circular addresses an emerging and sensitive area of ocean accounting practice. Traditional knowledge systems are diverse, context-specific, and embedded in cultural frameworks that may not align neatly with standardised accounting approaches. The guidance provided here should be understood as provisional principles rather than prescriptive methods, and practitioners should expect that approaches will continue to evolve as experience accumulates and as Indigenous Peoples and Local Communities articulate their own frameworks for knowledge sharing. Each engagement with traditional knowledge holders must be tailored to the specific cultural context and conducted with respect for the rights and protocols of knowledge-holding communities. No single set of guidelines can substitute for the sustained, context-sensitive relationship building that ethical traditional knowledge work demands.

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ABOUT THIS CIRCULAR

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1. Outcome

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1.1 Why traditional knowledge matters for ocean accounting

¶1 Ocean accountants need to engage with traditional knowledge for three principal reasons:

¶2 **First, gap-filling in data-sparse regions.** Many coastal and marine areas lack adequate scientific monitoring infrastructure, particularly in remote islands, polar seas, and developing coastal states. Traditional knowledge holders who have sustained relationships with these environments over generations hold observational knowledge that can inform ecosystem condition assessments, document historical baselines, and identify environmental changes not captured by sparse monitoring networks. For example, Indigenous observations of sea ice dynamics in Arctic marine areas have extended observational records by decades, whilst Pacific Island community knowledge of reef condition provides spatially detailed information unavailable from satellite remote sensing alone¹. This gap-filling function is particularly relevant to ecosystem condition accounts (**TG-3.1 Asset Accounts** Section 3.5.2) and biophysical indicator selection (**TG-2.1 Aggregate Biophysical Indicators of Environmental State**).

¶3 **Second, validation and contextualisation of scientific data.** Traditional knowledge provides independent lines of evidence that can validate or contextualise remote sensing classifications, model outputs, and short-term field surveys. When traditional ecological knowledge converges with scientific monitoring, confidence in both knowledge systems is strengthened. Divergence identifies areas that warrant further investigation and may reveal phenomena not captured by conventional monitoring². Cross-validation is particularly valuable for ecosystem extent accounts where benthic habitat classifications must be validated against on-water observations.

¶4 **Third, spatial unit delineation informed by tenure systems.** Indigenous marine tenure systems often reflect ecologically meaningful boundaries developed through generations of resource management practice. In some contexts, customary marine areas provide more ecologically coherent spatial units for ecosystem accounting than administrative boundaries or uniform grid cells. Documentation of customary tenure also supports governance accounts (**TG-3.7 Governance Accounts**), which record the de facto management arrangements that shape ecosystem outcomes.

¶5 The Kunming-Montreal Global Biodiversity Framework (GBF) Target 21 calls for ensuring that “the best available data, information and knowledge are accessible to decision makers, practition-

ers and the public to guide effective and equitable governance, integrated and participatory management of biodiversity”³. Traditional knowledge is explicitly recognised as essential to achieving this target. The 2030 Agenda for Sustainable Development similarly recognises the role of Indigenous peoples in sustainable development, including SDG Target 2.3 which calls for doubling “the agricultural productivity and incomes of small-scale food producers, in particular women, indigenous peoples, family farmers, pastoralists and fishers”⁴. For ocean accounting, Target 14.b emphasises providing “access for small-scale artisanal fishers to marine resources and markets,” an objective that requires understanding the traditional knowledge and customary practices that underpin small-scale fisheries.

¶6 This Circular builds upon the broader framework for social accounting established in **TG-3.5 Social Accounts**, which addresses wellbeing, equity, and qualitative approaches for documenting human dimensions of ocean-society relationships. The governance dimensions of traditional knowledge systems connect to the institutional documentation frameworks in **TG-3.7 Governance Accounts**. Data collection methods involving community participation are addressed in **TG-4.4 Citizen Science and Community-Based Monitoring**, which provides complementary guidance on working with non-official data sources. The accounts developed using this guidance may inform thematic accounts for coral reefs (**TG-6.1 Coral Reef Ecosystem Accounting**), mangroves (**TG-6.2 Mangrove and Coastal Wetland Accounting**), and seagrass ecosystems (**TG-6.3 Seagrass Ecosystem Accounting**), where traditional knowledge of ecosystem condition and change can complement scientific monitoring.

2. Requirements

¶1 Essential prerequisites:

- ¶2 **TG-0.1 General Introduction to Ocean Accounts**: foundational understanding of Ocean Accounts components and environmental-economic accounting frameworks
- ¶3 **TG-3.5 Social Accounts**: broader framework for documenting human dimensions of ocean-society relationships

¶4 ⓘ Framework Position

¶5 This Circular addresses how traditional and indigenous knowledge systems can be incorporated into ocean accounts. It sits at the intersection of social accounts (TG-3.5) and governance accounts (TG-3.7), linking community-held knowledge to ecosystem condition assessment and resource management documentation. In the Ocean Accounts Framework (Figure 0.1.2), this Circular primarily relates to edges E6 (social activities influencing social conditions) and E4 (social activities interacting with SNA assets), whilst also informing the environmental stock and flow measurements that depend on observational data from knowledge holders.

¶6 **Scope.** TG-3.6 owns the account treatment of traditional and indigenous knowledge: the co-production principles, the cultural services account, and how knowledge-holder observation enters condition variables. It cross-refers to **TG-3.14** for FPIC and Indigenous Data Sovereignty, **TG-4.4** for community-based monitoring protocols, and **TG-3.1** for the condition account the variables enter.

3. Guidance Material

3.1 Principles for Engagement

¶1 Engagement with Indigenous Peoples and Local Communities (IPLCs) for the purpose of incorporating traditional knowledge into ocean accounts must be grounded in respect for human rights, recognition of Indigenous peoples’ self-determination, and adherence to established international principles. The guidance in this section draws on frameworks established by the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP), the Convention on Biological Diversity (CBD), the Biodiversity Beyond National Jurisdiction (BBNJ) Agreement, and the Taskforce on Nature-related Financial Disclosures (TNFD). It is supplemented by guidance from the statistical

community, including the United Nations Fundamental Principles of Official Statistics, which affirm that statistical agencies should coordinate with other agencies to achieve consistency and efficiency in the statistical system⁵, and the UNSD guidance on strengthening the integration of diverse knowledge systems in official statistics⁶.

3.1.1 The significance of traditional knowledge holders

¶1 Traditional knowledge encompasses⁷:

- ¶2 Observational knowledge of species, habitats, and ecological relationships accumulated over generations
- ¶3 Understanding of seasonal patterns, environmental change, and ecosystem dynamics
- ¶4 Practices for sustainable resource use developed through long experience
- ¶5 Governance systems for managing common resources and resolving conflicts
- ¶6 Spiritual and cultural relationships with marine environments
- ¶7 Oral histories documenting environmental change over time

¶8 This knowledge can provide insights not available from short-term scientific monitoring, particularly regarding long-term baselines, rare events, and relationships that require sustained local observation to understand. For ocean accounting, traditional knowledge may inform ecosystem condition assessments (see **TG-3.1 Asset Accounts** Section 3.5.2), ecosystem service identification (see **TG-2.4 Ecosystem Goods and Services**), and understanding of human-ocean relationships that are not captured in standard economic or environmental data.

¶9 Experience from multiple regions demonstrates the practical value of traditional knowledge for marine ecosystem assessment. In the Pacific Islands, customary marine tenure systems have long provided the basis for community-based fisheries management, and traditional ecological knowledge of reef systems has informed both national conservation strategies and regional environmental monitoring⁸. In the Arctic, Indigenous observations of sea ice dynamics, marine mammal behaviour, and shifting species distributions have contributed to understanding environmental change in ways that complement satellite-based monitoring⁹. In Southeast Asia and the Indian Ocean, local fisher knowledge of spawning aggregations, seasonal current patterns, and habitat changes has contributed to marine spatial planning and stock assessments¹⁰. In each case, traditional knowledge has yielded practical contributions where institutional arrangements supported respectful engagement.

3.1.2 International frameworks for engagement

¶1 Several international instruments establish the framework for engagement with traditional knowledge holders:

¶2 **United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP)**: Adopted in 2007, UNDRIP affirms Indigenous peoples' rights to self-determination, to maintain their cultural practices and institutions, and to control their traditional knowledge. Article 31 states that "Indigenous peoples have the right to maintain, control, protect and develop their cultural heritage, traditional knowledge and traditional cultural expressions"¹¹. Article 26 recognises Indigenous peoples' rights to "the lands, territories and resources which they have traditionally owned, occupied or otherwise used or acquired"¹².

¶3 **Convention on Biological Diversity (CBD)**: Article 8(j) requires 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"¹³. The Nagoya Protocol on Access and Benefit Sharing establishes specific requirements for access to traditional knowledge associated with genetic resources, including requirements for prior informed consent and fair and equitable benefit sharing¹⁴.

¶4 **Kunming-Montreal Global Biodiversity Framework:** Target 21 specifically calls for ensuring “the full, equitable, inclusive, effective and gender-responsive representation and participation in decision-making, and access to justice and information related to biodiversity by indigenous peoples and local communities, respecting their cultures and their rights over lands, territories, resources, and traditional knowledge”¹⁵. Target 3 calls for conserving at least 30% of marine and coastal areas “recognizing indigenous and traditional territories, where applicable”¹⁶. Target 5 calls for ensuring sustainable use of wild species “while respecting and protecting customary sustainable use by indigenous peoples and local communities”¹⁷.

¶5 **ILO Convention 169:** The Indigenous and Tribal Peoples Convention establishes that governments shall “consult the peoples concerned, through appropriate procedures and in particular through their representative institutions, whenever consideration is being given to legislative or administrative measures which may affect them directly”¹⁸.

¶6 **Agreement on Biodiversity Beyond National Jurisdiction (BBNJ Agreement):** The 2023 BBNJ Agreement, adopted under the United Nations Convention on the Law of the Sea, includes provisions specifically relevant to traditional knowledge in areas beyond national jurisdiction. Article 7 provides that the agreement shall be interpreted and applied in a manner that “does not undermine relevant legal instruments and frameworks and relevant global, regional and sectoral bodies” and recognises the “relevant traditional knowledge of Indigenous Peoples and local communities.” Part II of the agreement, on marine genetic resources and benefit sharing, establishes that “the collection of marine genetic resources of areas beyond national jurisdiction shall be ... with due regard for the interests and rights of ... Indigenous Peoples and local communities”¹⁹. For ocean accounting that extends to high seas areas, these provisions establish the principle that traditional knowledge must be respected even in areas beyond national jurisdiction.

3.1.3 Free, Prior and Informed Consent (FPIC)

¶1 Free, Prior and Informed Consent (FPIC) is the foundational principle for engagement with Indigenous Peoples and Local Communities regarding the use of their traditional knowledge. The TNFD recommends that organisations describe “whether engagement has been based on free, prior and informed consultation and participation and how Free Prior and Informed Consent (FPIC) has been obtained”²⁰.

¶2 FPIC requires that consent be:

- ¶3 **Free:** Given voluntarily, without coercion, intimidation, or manipulation
- ¶4 **Prior:** Sought sufficiently in advance of any activities, allowing adequate time for consultation and decision-making according to the community’s own processes
- ¶5 **Informed:** Based on full disclosure of the purpose, nature, and implications of the proposed engagement, including potential risks and benefits
- ¶6 **Consent:** Documented agreement from the appropriate decision-making bodies according to the community’s own governance structures

¶7 For ocean accounting purposes, FPIC should be sought before:

- ¶8 Collecting traditional knowledge for use in accounts
- ¶9 Integrating traditional knowledge with scientific data
- ¶10 Publishing or sharing information derived from traditional knowledge
- ¶11 Making decisions that affect marine areas of cultural significance

¶12 FPIC is an ongoing process rather than a single event at the outset. Communities may withdraw consent, and continued engagement requires continued communication and agreement.

¶13 The process for obtaining FPIC should be documented and included in the metadata for any accounts that incorporate traditional knowledge. This documentation supports the transparency

requirements that apply across all ocean accounting work, as described in **TG-0.7 Quality Assurance Principles**.

3.1.4 Principles for respectful engagement

¶1 Building on the international frameworks, practitioners should adhere to the following principles when engaging with traditional knowledge holders:

¶2 **Recognise community protocols:** Each community has its own protocols for sharing knowledge, including who may speak on behalf of the community, what knowledge may be shared, and under what conditions. Practitioners must invest time in understanding and respecting these protocols before seeking to access traditional knowledge²¹.

¶3 **Build long-term relationships:** Meaningful engagement with traditional knowledge holders cannot be achieved through brief consultations or one-time data collection exercises. Practitioners should invest in building sustained relationships based on trust and mutual benefit²². This principle of sustained engagement distinguishes traditional knowledge work from standard data collection and has implications for resource allocation and institutional commitment.

¶4 **Respect knowledge ownership:** Traditional knowledge belongs to the communities that hold it, not to researchers or agencies that document it. Even when knowledge is shared, intellectual property rights remain with the knowledge holders²³. This principle applies regardless of whether knowledge has been formally registered or protected under intellectual property law.

¶5 **Ensure equitable benefit sharing:** Communities should benefit from the use of their knowledge, whether through direct compensation, capacity building, access to results, or other forms of reciprocity²⁴. The TNFD recommends describing “how equitable Access and Benefit Sharing has been attained, particularly as it relates to Indigenous Peoples and Local Communities”²⁵. Benefit sharing connects to the broader equity considerations addressed in **TG-3.5 Social Accounts**, Section 3.7.

¶6 **Support community priorities:** Engagement should respond to community priorities and concerns, not solely to the data needs of accounting agencies. Where possible, accounting efforts should be designed to serve community information needs as well as national statistical requirements.

3.2 Knowledge Integration Approaches

¶1 The integration of traditional knowledge with scientific data and accounting frameworks presents methodological challenges. Traditional knowledge is typically embedded in integrated worldviews, transmitted orally, and expressed in languages and concepts that may not have direct equivalents in Western scientific frameworks. Integration approaches must respect the integrity of traditional knowledge whilst enabling meaningful contribution to ocean accounts.

¶2 Experience to date suggests that successful integration has been achieved through iterative, relationship-based approaches rather than through standardised data collection protocols. In Fiji, community-based ecosystem assessments have combined traditional indicators of reef health (e.g., presence of particular species, water clarity at specific times of year) with scientific monitoring data to produce fuller condition accounts²⁶. In the Torres Strait, collaborative mapping of sea country has combined Indigenous spatial knowledge with satellite-derived habitat maps to improve the accuracy of ecosystem extent accounts²⁷. These examples indicate the potential for traditional knowledge to contribute practically to ocean accounting compilations, whilst also demonstrating that integration methods must be adapted to each context. The GOAP Secretariat may wish to facilitate documentation of additional case studies as implementation experience accumulates.

3.2.1 Complementary rather than supplementary

¶1 Traditional knowledge does more than fill gaps in scientific monitoring, and treating it solely as a gap-filling data source understates its contribution. The SEEA Ecosystem Accounting framework recognises that cultural services involve “experiential and intangible services related to the perceived or actual qualities of ecosystems whose existence and functioning contribute to a range of cultural benefits”²⁸. Traditional knowledge can inform understanding of these experiential and intangible dimensions that may not be captured by conventional measurement approaches.

¶2 Approaches to integration include:

¶3 **Parallel documentation:** Traditional knowledge and scientific data can be documented in parallel, each using methods appropriate to its nature, with explicit acknowledgement of their different epistemological foundations (the different ways each knowledge system establishes what counts as valid knowledge). This approach respects the integrity of each knowledge system whilst enabling comparison and synthesis.

¶4 **Cross-validation:** Where traditional knowledge and scientific monitoring address similar questions (e.g., species abundance, environmental change), cross-validation can strengthen confidence in findings. Convergent results from different knowledge systems provide stronger evidence than either alone. Divergent results may indicate important phenomena that warrant further investigation²⁹.

¶5 **Gap identification:** Traditional knowledge can help identify phenomena, relationships, or changes that are not captured by existing monitoring, prompting development of new scientific approaches. Traditional knowledge holders often have long-term observational baselines that extend well beyond the period of scientific record. The SEEA biophysical modelling guidance notes that “using a more recent reference condition (e.g. 1990) is another option” but acknowledges that this “fails to recognize the management of indigenous peoples”³⁰. Traditional knowledge can extend baselines to pre-industrial or pre-colonial conditions, though such historical reconstruction requires careful methodological consideration. This is particularly relevant for ecosystem condition accounts, where understanding of historical baselines is essential (see **TG-2.1 Aggregate Biophysical Indicators of Environmental State**).

¶6 **Contextualisation:** Traditional knowledge can provide essential context for interpreting scientific data, including understanding of historical conditions, ecosystem variability, and local factors that affect observations.

¶7 *Table 3.6.1: Traditional knowledge integration principles*

TK Integration Stage	Considerations	Example Applications
Engagement	Free, prior, informed consent	Community consultation protocols
Data collection	Respect for cultural protocols	Seasonal calendars, species knowledge
Validation	TK as complementary evidence	Corroboration of scientific observations
Attribution	Recognition of knowledge holders	Documentation, co-authorship
Benefit sharing	Fair distribution of benefits	Capacity building, data sovereignty

3.2.2 Co-production approaches

¶1 Knowledge co-production involves the collaborative generation of knowledge by scientists and traditional knowledge holders working together as partners. Co-production goes beyond consultation or data extraction to involve Indigenous Peoples and Local Communities in all stages of the research process, from question formulation to interpretation of results³¹.

¶2 Table 3.2.2 below summarises four elements of co-production.

Element	Description
Joint problem definition	Research questions and accounting priorities are developed collaboratively, reflecting both scientific interests and community priorities; communities may identify questions that would not occur to outside researchers.
Multiple ways of knowing	Traditional knowledge and scientific knowledge represent different but equally valid ways of understanding the world; neither is simply validated by the other, and both contribute distinct insights.
Shared governance	Decision-making about research design, data management, and dissemination is shared between scientific and community partners, often formalised through research agreements or memoranda of understanding.
Two-way capacity building	Capacity building flows in both directions, with scientists learning from knowledge holders and communities gaining skills in documentation, analysis, and communication.

¶3 For ocean accounting, co-production approaches may be particularly valuable for:

- ¶4 Identifying culturally significant marine areas and their management needs
- ¶5 Understanding ecosystem services that have cultural or spiritual dimensions
- ¶6 Documenting long-term environmental change
- ¶7 Developing locally appropriate indicators of ecosystem condition

¶8 These applications connect to the indicator development processes described in **TG-2.1**

Aggregate Biophysical Indicators of Environmental State.

3.2.3 Documentation methods

¶1 Documentation of traditional knowledge requires methods that are appropriate to its oral and contextual nature. Standard survey instruments developed for scientific data collection may be inappropriate for traditional knowledge, which is often embedded in narratives, ceremonies, and practices rather than expressed as discrete data points.

¶2 Appropriate methods are summarised in Table 3.2.3 below.

Method	Description
Participatory mapping	Collaborative mapping exercises document spatial knowledge about marine areas, including locations of cultural significance, seasonal resource availability, and areas of environmental change. ³²
Oral history documentation	Structured or semi-structured interviews document knowledge holders' observations and experiences, preserving the narrative context that gives meaning to the knowledge.
Participant observation	Extended engagement with communities enables understanding of how traditional knowledge is embedded in practice, revealing knowledge that may not be articulated in response to direct questions.
Community-led documentation	Communities document their own knowledge using methods they control, sharing results with accounting agencies according to agreed protocols.

¶3 All documentation should include clear provenance information, noting who provided the knowledge, under what circumstances, and what conditions govern its use. This approach aligns with the quality assurance principles described in **TG-0.7 Quality Assurance Principles** and the guidance on non-official data sources in **TG-4.4 Citizen Science and Community-Based Monitoring**.

3.2.4 Data sovereignty and ownership

¶1 Data sovereignty refers to the right of communities to control data about themselves, their lands, and their knowledge. For Indigenous Peoples, data sovereignty is an expression of self-determination, enabling communities to make decisions about what data are collected, how they are stored, and who can access them³³.

¶2 The **CARE Principles for Indigenous Data Governance**, developed by the Global Indigenous Data Alliance, provide a framework for operationalising data sovereignty in research and statistical contexts. The four principles are³⁴:

- ¶3 **Collective benefit:** Data ecosystems should be designed and function in ways that enable Indigenous Peoples to derive benefit from the data. This includes supporting Indigenous governance, self-determination, and collective wellbeing.
- ¶4 **Authority to control:** Indigenous Peoples' rights and interests in Indigenous data must be recognised, and their authority to control such data must be empowered. This includes recognising Indigenous governance structures and self-determined governance processes.
- ¶5 **Responsibility:** Those working with Indigenous data have a responsibility to share how those data are used to support Indigenous Peoples' self-determination and collective benefit. This requires building respectful relationships and expanding the use of data for Indigenous innovation.
- ¶6 **Ethics:** Indigenous Peoples' rights and wellbeing should be the primary concern at all stages of the data life cycle. This includes minimising harm, maximising benefit, and prioritising justice in relation to Indigenous values and collective interests.

¶7 The CARE Principles complement the FAIR Principles (Findable, Accessible, Interoperable, Reusable) that guide open data practice more broadly. For ocean accounting, both sets of principles should be considered, as open data objectives must be balanced with Indigenous data sovereignty rights.

¶8 Principles for data sovereignty in ocean accounting include:

¶9 **Community ownership:** Data derived from traditional knowledge remain the property of the knowledge-holding community, even when documented by external parties. Agencies should not claim ownership of traditional knowledge they have recorded.

¶10 **Control over access:** Communities should determine who can access data derived from their traditional knowledge and under what conditions. This may include restrictions on commercial use, requirements for attribution, or limitations on sharing with third parties.

¶11 **Capacity to benefit:** Communities should have the capacity to access and use their own data for their own purposes, including through provision of data in accessible formats and support for community data management.

¶12 **Right to refuse:** Communities retain the right to refuse to share knowledge, to withdraw previously shared knowledge from use, or to restrict uses they have not explicitly authorised.

¶13 Practical implementation of data sovereignty may involve:

- ¶14 Research agreements that specify data ownership, access, and use conditions
- ¶15 Community-controlled data repositories where traditional knowledge is stored under community governance
- ¶16 Tiered access systems that distinguish between knowledge that can be shared publicly and knowledge that is restricted
- ¶17 Ongoing community review of how their knowledge is being used in accounts

¶18 These considerations connect to the broader data infrastructure for ocean accounting described in Section 4 of the Technical Guidance.

3.3 Ethical Considerations

¶1 Working with traditional knowledge in ocean accounting raises ethical considerations that extend beyond standard research ethics protocols. These considerations arise from the colonial history of research with Indigenous peoples, the ongoing power imbalances between scientific institutions and local communities, and the distinctive characteristics of traditional knowledge as a form of cultural property.

3.3.1 Historical context and power relations

¶1 Scientific research has historically extracted knowledge from Indigenous peoples and local communities without consent, attribution, or benefit sharing. This extractive approach has contributed to the erosion of traditional knowledge systems and to distrust between communities and research institutions. Practitioners working with traditional knowledge must acknowledge this history and actively work to establish different relationships based on equity and respect³⁵.

¶2 The TNFD framework recognises that human rights considerations are integral to nature-related assessment, calling for organisations to “describe the organisation’s human rights policies and engagement activities, and oversight by the board and management, with respect to Indigenous Peoples, Local Communities, affected and other stakeholders”³⁶. Engagement with IPLCs is a human rights issue as well as a methodological one, and this framing should inform all traditional knowledge work in ocean accounting.

¶3 Power imbalances may manifest in:

- ¶4 Whose questions drive research agendas
- ¶5 Whose standards define data quality
- ¶6 Who controls how knowledge is interpreted and presented
- ¶7 Who benefits from the use of traditional knowledge
- ¶8 Whose voices are heard in decision-making

¶9 Addressing these imbalances requires sustained attention and willingness to share power and resources with community partners. This connects to the equity considerations addressed in **TG-3.5 Social Accounts**, Section 3.7, which discusses distributional dimensions of ocean benefits and burdens.

3.3.2 Avoiding misappropriation

¶1 Misappropriation of traditional knowledge occurs when knowledge is used in ways that violate community protocols, infringe intellectual property rights, or harm the interests of knowledge holders. The history of traditional knowledge misappropriation indicates the serious consequences that can result. In the marine context, the documentation and publication of traditional fishing grounds and sacred marine sites without community consent has in some cases led to increased external pressure on these areas, undermining the management systems that traditional knowledge holders sought to protect³⁷. In other instances, traditional ecological knowledge about medicinal marine organisms has been used in commercial bioprospecting without acknowledgement or benefit sharing. Safeguards are therefore needed at every stage of engagement.

¶2 Practices that may constitute misappropriation include:

- ¶3 Using traditional knowledge without consent
- ¶4 Failing to acknowledge the source of traditional knowledge
- ¶5 Using knowledge for purposes beyond those consented to
- ¶6 Sharing knowledge with third parties without authorisation
- ¶7 Claiming intellectual property rights over traditional knowledge
- ¶8 Commercialising knowledge without benefit sharing

¶9 To avoid misappropriation, practitioners should:

- ¶10 Obtain FPIC before accessing traditional knowledge
- ¶11 Document the conditions under which knowledge was shared
- ¶12 Restrict use of knowledge to authorised purposes
- ¶13 Maintain attribution in all derived products
- ¶14 Share benefits equitably with knowledge-holding communities
- ¶15 Establish clear agreements regarding intellectual property

3.3.3 Protecting sacred and sensitive knowledge

¶1 Traditional knowledge often includes information that is sacred, secret, or sensitive. Some knowledge may be restricted to particular individuals, clans, or genders. Other knowledge is associated with ceremonies that should not be discussed publicly, or relates to sites and practices that communities wish to protect from outside attention.

¶2 Practitioners must be aware that:

- ¶3 Not all traditional knowledge is intended for sharing
- ¶4 Communities may not disclose the existence of restricted knowledge
- ¶5 Knowledge shared may come with conditions that are not fully articulated
- ¶6 Documentation and publication can harm knowledge that should remain oral

¶7 Approaches for protecting sensitive knowledge include:

- ¶8 Asking explicitly what knowledge may be documented and shared
- ¶9 Respecting indications that some topics are not open for discussion
- ¶10 Establishing review processes where communities approve all uses of their knowledge before publication
- ¶11 Creating restricted-access categories for sensitive information in data management systems
- ¶12 Being willing to exclude certain knowledge from accounts when sharing would violate protocols

¶13 Some aspects of human-ocean relationships may therefore be impossible to document in published accounts. Practitioners should accept these limitations as necessary for ethical practice, and should not treat them as obstacles to complete accounting.

3.3.4 Maintaining cultural integrity

¶1 Integration of traditional knowledge into accounting frameworks risks decontextualisation, whereby discrete data points are extracted from the integrated worldviews that give them meaning. Such decontextualisation can distort the knowledge and obscure the cultural frameworks that are essential to understanding it.

¶2 To maintain cultural integrity:

- ¶3 Present traditional knowledge in ways that preserve its context and meaning
- ¶4 Avoid forcing traditional knowledge into categories derived from Western scientific frameworks when these categories are inappropriate
- ¶5 Include narrative and qualitative elements alongside quantified data (see the qualitative approaches discussed in **TG-3.5 Social Accounts**, Section 3.9)
- ¶6 Acknowledge the limitations of accounting frameworks in representing traditional knowledge
- ¶7 Involve knowledge holders in reviewing how their knowledge is presented

¶8 The SEEA EA emphasises that ecosystem accounting supports ongoing learning and analysis, and that compilation of accounts forms part of an iterative process rather than its conclusion³⁸. This iterative framing is particularly relevant for traditional knowledge, where understanding deepens through sustained engagement over time.

3.4 Compilation Procedure for Integrating Traditional Knowledge

¶1 This section provides step-by-step guidance on the compilation process for integrating traditional knowledge into ocean accounts. The procedure follows a phased approach that prioritises relationship-building, ethical review, and quality assurance for mixed-method data. The timelines indicated below are illustrative. Actual engagement timelines will vary substantially depending on

community readiness, agency capacity, and cultural context. In some cases, relationship building alone may require years rather than months.

3.4.1 Phase 1: Pre-engagement assessment (Months 1-3)

¶1 Step 1.1: Identify relevant communities and knowledge holders

¶2 Review the ecosystem accounting area to identify Indigenous Peoples and Local Communities with traditional knowledge relevant to the marine areas under consideration. Sources may include:

- ¶3 Existing literature on Indigenous marine tenure systems
- ¶4 Government records of customary fishing rights
- ¶5 NGO documentation of community-based conservation
- ¶6 Previous ethnographic or anthropological research

¶7 Step 1.2: Assess institutional readiness

¶8 Evaluate whether the compiling agency has:

- ¶9 Sufficient resources for sustained engagement (minimum 12-18 months)
- ¶10 Personnel with cultural competence or willingness to develop it
- ¶11 Leadership commitment to ethical engagement principles
- ¶12 Budget for fair compensation of knowledge holders
- ¶13 Data management systems capable of implementing data sovereignty protocols

¶14 If institutional readiness is inadequate, defer traditional knowledge engagement until capacity can be strengthened.

¶15 Step 1.3: Identify potential knowledge contributions

¶16 Based on preliminary review, identify the specific accounting gaps where traditional knowledge could contribute:

- ¶17 Ecosystem extent: Habitat boundaries, historical extent baselines
- ¶18 Ecosystem condition: Species abundance trends, water quality observations, phenological shifts
- ¶19 Ecosystem services: Cultural services, provisioning services (traditional harvest), regulating services informed by local observation
- ¶20 Spatial units: Customary marine tenure areas as potential ecosystem asset boundaries

¶21 This scoping exercise should be preliminary only. Final determination of what knowledge will be shared must emerge through community engagement.

3.4.2 Phase 2: Relationship building and FPIC (Months 4-9)

¶1 Step 2.1: Establish initial contact

¶2 Contact community leadership through appropriate channels (government liaisons, existing relationships, or community-designated contact points). Request permission to discuss the ocean accounts program and potential collaboration.

¶3 Step 2.2: Community briefing

¶4 Present information about the ocean accounts program in accessible language and format, explaining:

- ¶5 What ocean accounts are and how they will be used
- ¶6 What types of information the agency hopes communities might share
- ¶7 How traditional knowledge would be documented and stored
- ¶8 What benefits might accrue to the community from participation
- ¶9 What risks or sensitivities might arise

¶10 Provide materials in local languages where possible. Allow adequate time for community deliberation according to their own decision-making processes.

¶11 **Step 2.3: Negotiate terms of engagement**

¶12 If the community expresses interest in participating, negotiate terms covering:

- ¶13 What knowledge may be shared and what restrictions apply
- ¶14 How knowledge holders will be compensated for their time
- ¶15 How the community will be acknowledged in publications
- ¶16 What review processes will be established for community approval of outputs
- ¶17 How data sovereignty will be implemented
- ¶18 What benefit-sharing arrangements will apply
- ¶19 Under what circumstances the community may withdraw consent

¶20 **Step 2.4: Formalise agreement**

¶21 Document terms in a memorandum of understanding or research agreement signed by community representatives and agency officials. The agreement should specify:

- ¶22 Scope of knowledge to be documented
- ¶23 Data ownership and access conditions
- ¶24 Attribution and acknowledgement requirements
- ¶25 Compensation arrangements
- ¶26 Review and approval procedures
- ¶27 Dispute resolution mechanisms
- ¶28 Duration of agreement and conditions for renewal or termination

3.4.3 Phase 3: Knowledge documentation (Months 10–15)

¶1 **Step 3.1: Select documentation methods**

¶2 In consultation with the community, select appropriate documentation methods from those described in Section 3.2.3. Methods should align with community preferences and the nature of the knowledge being documented.

¶3 **Step 3.2: Conduct knowledge documentation**

¶4 Implement the agreed documentation methods, adhering to:

- ¶5 Community protocols for knowledge sharing
- ¶6 Compensation arrangements for knowledge holders' time
- ¶7 Cultural protocols regarding who may speak on what topics
- ¶8 Restrictions on recording or documentation in certain contexts

¶9 Documentation should capture not only the knowledge content but also provenance metadata including:

- ¶10 Identity of knowledge holders (with consent for attribution)
- ¶11 Date and location of documentation
- ¶12 Context in which knowledge was shared
- ¶13 Any restrictions or conditions on use
- ¶14 Relationships between knowledge holders and the marine areas being discussed

¶15 **Step 3.3: Community review**

¶16 Provide documented knowledge back to the community for review. Correct any errors, remove any information the community determines should not have been included, and clarify any ambiguities. This review process is distinct from the final output review, and it ensures the documentation accurately reflects what knowledge holders intended to communicate.

3.4.4 Phase 4: Quality assurance for mixed-method data (Months 16–18)

¶1 Step 4.1: Assess fit-for-purpose for accounting

¶2 Evaluate documented traditional knowledge against accounting requirements, considering:

- ¶3 **Spatial coverage:** Does the knowledge pertain to specific ecosystem assets or spatial units in the accounting area?
- ¶4 **Temporal relevance:** Does the knowledge provide baselines, trends, or current observations aligned with accounting periods?
- ¶5 **Measurement units:** Can the knowledge be expressed in or translated to units compatible with accounting tables (hectares, species counts, qualitative condition classes, etc.)?
- ¶6 **Uncertainty:** What is the confidence level in the knowledge? How might uncertainty be characterised and communicated?

¶7 Step 4.2: Identify cross-validation opportunities

¶8 Where traditional knowledge and scientific data address similar questions, plan for cross-validation:

- ¶9 Convergent findings strengthen confidence in both knowledge systems
- ¶10 Divergent findings signal areas requiring further investigation
- ¶11 Document both convergence and divergence transparently

¶12 Step 4.3: Develop integration approach

¶13 Based on the assessment, select the appropriate integration approach from Section 3.2.1:

- ¶14 **Parallel documentation:** Traditional knowledge recorded in supplementary tables alongside scientific data
- ¶15 **Cross-validation:** Traditional knowledge used to validate scientific classifications or model outputs
- ¶16 **Gap-filling:** Traditional knowledge fills spatial or temporal gaps in scientific monitoring
- ¶17 **Contextualisation:** Traditional knowledge provides interpretive context for scientific data

¶18 Most compilations will use a combination of these approaches for different knowledge types.

¶19 Step 4.4: Quality documentation

¶20 Document quality dimensions following **TG-0.7 Quality Assurance Principles:**

- ¶21 **Accuracy:** Characterise uncertainty in traditional knowledge observations
- ¶22 **Coherence:** Assess consistency with other data sources where overlap exists
- ¶23 **Relevance:** Confirm alignment with policy and decision-maker needs
- ¶24 **Timeliness:** Note the time period to which knowledge pertains
- ¶25 **Accessibility:** Describe access conditions including data sovereignty restrictions
- ¶26 **Metadata:** Provide complete provenance documentation

3.4.5 Phase 5: Integration into accounts and community review (Months 19–21)

¶1 Step 5.1: Integrate into accounting tables

¶2 Incorporate traditional knowledge into the relevant account types:

- ¶3 **Extent accounts:** Use traditional knowledge for historical baseline estimates, habitat boundary validation, or identification of previously unmapped ecosystem types
- ¶4 **Condition accounts:** Incorporate traditional indicators alongside scientific metrics, noting the knowledge source for each indicator
- ¶5 **Services accounts:** Document cultural services, validate provisioning service estimates, or contextualise regulating service assessments

- ¶6 **Monetary accounts:** Where appropriate, traditional knowledge may inform valuation of cultural services or historical resource rent calculations

¶7 **Step 5.2: Draft supplementary documentation**

¶8 Prepare supplementary text explaining:

- ¶9 How traditional knowledge was obtained (summarising the FPIC process without disclosing sensitive details)
- ¶10 What knowledge was incorporated and from which communities
- ¶11 What restrictions or conditions apply to use of the knowledge
- ¶12 How quality assurance was conducted for traditional knowledge contributions
- ¶13 What limitations or uncertainties users should be aware of

¶14 **Step 5.3: Community review of outputs**

¶15 Provide draft accounts and supplementary documentation to the community for review. The community should assess:

- ¶16 Whether their knowledge is accurately represented
- ¶17 Whether any sensitive information has inadvertently been included
- ¶18 Whether attribution and acknowledgement are appropriate
- ¶19 Whether the integration respects the integrity of their knowledge

¶20 Revise accounts based on community feedback. If the community determines that publication would violate protocols, respect that determination even if it means removing substantial content from accounts.

¶21 **Step 5.4: Final approval**

¶22 Obtain written community approval before publication. Archive the approval documentation as part of the accounts metadata.

3.4.6 Ongoing engagement and benefit sharing

¶1 Traditional knowledge integration is not complete upon publication of accounts. Ongoing responsibilities include:

- ¶2 Provide communities with copies of published accounts in accessible formats
- ¶3 Share information about how accounts are being used in policy or decision-making
- ¶4 Fulfil any benefit-sharing commitments (capacity building, data access, etc.)
- ¶5 Maintain communication to support continued consent for use of knowledge
- ¶6 Consult the community before any new uses of their knowledge
- ¶7 Support community-led monitoring or data management initiatives where feasible

3.5 Cultural Services and Traditional Knowledge

¶1 Traditional knowledge relates closely to the cultural ecosystem services recognised in the SEEA Ecosystem Accounting framework. Cultural services include “recreation-related services, visual amenity services, education, science and research services, spiritual, artistic and symbolic services at the most detailed level”³⁹. For many Indigenous Peoples and coastal communities, marine ecosystems provide cultural services that are central to identity, spiritual practice, and intergenerational knowledge transmission.

3.5.1 Cultural services in ocean contexts

¶1 Marine cultural services that may be informed by traditional knowledge include:

¶2 **Spiritual and ceremonial connections:** Marine areas may be sites of spiritual significance, associated with ancestral beings, creation stories, or ongoing ceremonial practice. Traditional knowl-

edge holders can identify these sites and articulate their significance, though this knowledge may be sensitive and subject to restrictions on sharing. The SEEA EA recognises that “there may be traditional harvests undertaken by indigenous groups” and that “if the harvest is retained for subsequent consumption, then the quantity of the associated biomass should be included as part of biomass provisioning services. At the same time, there would be a connection to the measurement of cultural services. In these instances, flows of cultural services should be recorded in addition to biomass provisioning services”⁴⁰.

¶3 **Customary resource use:** The gathering of marine resources for customary purposes contributes to cultural continuity and intergenerational knowledge transmission. Understanding these practices requires engagement with traditional knowledge holders who can explain the cultural dimensions that distinguish customary use from commercial extraction. This connects to the discussion of ocean sector employment in **TG-3.5 Social Accounts**, Section 3.6.2.

¶4 **Place-based knowledge and identity:** For coastal communities, marine environments are often central to collective identity. Traditional place names, navigation knowledge, and environmental knowledge contribute to sense of place and cultural identity that cannot be captured in conventional ecosystem service metrics.

¶5 **Educational and intergenerational transmission:** Marine environments serve as sites for education and knowledge transmission, where younger generations learn from elders through observation and practice. This educational service depends on the continued health of marine ecosystems and continuity of cultural practices.

¶6 For guidance on the broader framework for cultural ecosystem services, see **TG-2.4 Ecosystem Goods and Services**. The full mapping of cultural service categories to traditional knowledge contributions is provided in Table 3.6.3 below.

3.5.2 Cultural ecosystem services framing for traditional knowledge contributions

¶1 The cultural-service framing established in the international classifications (the Millennium Ecosystem Assessment (MEA), the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), the Common International Classification of Ecosystem Services (CICES) v5.1, and SEEA Ecosystem Accounting Chapter 6) provides a structured entry point for incorporating traditional knowledge into ocean accounts, whilst leaving the integrity of the knowledge itself unchanged. The MEA defines cultural services as the non-material benefits people obtain from ecosystems⁴¹. IPBES recognises analogous non-material contributions, including supporting identities, learning and inspiration, and physical and psychological experiences⁴². CICES v5.1 organises cultural services into direct in-situ interactions and indirect interactions⁴³. SEEA EA defines cultural services as “experiential and intangible services related to the perceived or actual qualities of ecosystems whose existence and functioning contribute to a range of cultural benefits”⁴⁴ and notes (para. 6.97) the joint recording of customary harvest as both biomass provisioning and cultural service flows⁴⁵.

¶2 Traditional knowledge holders are often the principal source of information on five categories of cultural service that are otherwise difficult to observe. Each of these connects a biophysical condition signal (documented in **TG-2.1 Aggregate Biophysical Indicators of Environmental State** and **TG-3.1 Asset Accounts** Section 3.5.2) to a social or cultural dimension recorded under **TG-3.5 Social Accounts**, Section 3.9. Practitioners may consider this framing as a candidate organising structure. Specific indicator sets, units, and beneficiary classes should be co-designed with knowledge holders and need not follow the categories below rigidly.

¶3 **Recreation and customary use as a cultural service.** Recreation in the CICES and SEEA EA senses includes structured market-based activities (tourism, recreational fishing) and also non-market customary practices such as gleaning of invertebrates, seasonal harvest of finfish, and gathering of marine plants. Where customary practices have strong cultural and social dimensions (intergenerational transmission, gendered roles, ceremonial timing), SEEA EA permits joint recording

as a cultural service alongside biomass provisioning⁴⁵. Traditional knowledge holders can articulate which specific harvest practices carry these cultural dimensions, which species or sites are involved, and which condition signals (target species abundance, habitat extent, water clarity) most directly affect the continuity of the practice. Worked numeric examples illustrating coral reef recreation, mangrove ecotourism, and invertebrate gleaning are presented in the case studies under **TG-5.1 Australia** through **TG-5.10 Vietnam**. This Circular is method-agnostic on valuation and does not endorse specific parameter values.

¶4 **Sense of place and named features.** Sense of place is recognised by IPBES under “supporting identities”⁴² and by CICES under spiritual and symbolic interactions⁴³. Traditional knowledge often comprises detailed place-based vocabularies (named reefs, passages, anchorages, and seasonal grounds) that may have no equivalent in scientific gazetteers. Practitioners may consider recording the existence and number of such named features (with community consent), the proportion of community members reporting strong attachment to them, and any documented changes in their physical state. The condition–wellbeing linkage is direct but often non-linear: a culturally significant feature may retain its identity value across a wide range of biophysical conditions yet become a focus of community concern when condition crosses a locally recognised threshold.

¶5 **Customary stewardship and customary tenure.** Customary tenure systems (locally managed marine areas, taboo zones, seasonal closures) are recognised in CBD GBF Targets 3 and 5 and in the BBNJ Agreement. Where present, these systems are themselves cultural and institutional outcomes of long-term human–ocean relationships. Traditional knowledge holders may identify the spatial extent, governance arrangements, and current status of customary tenure, information that contributes to the cultural-service account of the present Circular and to the governance account under **TG-3.7 Governance Accounts**. Practitioners may consider recording the presence, extent, and observed enforcement of customary tenure as a candidate indicator, with the spatial details treated under data sovereignty protocols where required.

¶6 **Intergenerational transmission of marine knowledge.** SEEA EA recognises education, science, and research as a cultural service category⁴⁴. For many coastal communities, the marine environment is the principal site of intergenerational learning, and the continuity of that learning is itself an indicator of cultural-service supply. Traditional knowledge holders are the only authoritative source on whether transmission is occurring, declining, or interrupted. Practitioners may consider recording, in close consultation with communities, whether elders report that customary practices are being taught to younger generations, and whether this transmission is constrained by condition decline, access restrictions, or social change.

¶7 **Spiritual and ceremonial connections and non-use values.** Some cultural services arise without direct economic interaction: the value attached to the existence of a sacred site, an ancestral being, or a species of cultural significance. The MEA and IPBES both recognise these dimensions. SEEA EA is cautious about including pure existence values in monetary ecosystem service accounts but supports their recording in supplementary or qualitative form⁴⁴. For traditional knowledge contributions, the protocols in Section 3.3.3 of this Circular apply: some spiritual and ceremonial dimensions may not be appropriate for public documentation and may be recorded only under restricted-access arrangements or excluded by community decision.

¶8 *Table 3.6.3: Cultural ecosystem service categories and candidate traditional knowledge contributions*

Cultural service category (per SEEA EA / CICES v5.1)	Candidate TK contribution	Linked condition signal (TG-2.1 / TG-2.3)	Linked social-account dimension (TG-3.5 Section 3.9)
Physical and experiential interactions (recreation, customary harvest)	Identification of culturally significant harvest practices, species, sites, and seasonal calendars	Target species abundance; habitat extent; water clarity	Recreation and nature-based tourism; customary and subsistence use
Spiritual, symbolic and other interactions	Identification of sacred sites, ancestral narratives, ceremonial use (subject to community protocols)	Condition of named features; integrity of cultural seascapes	Sense of place, cultural identity, spiritual values
Education and intergenerational transmission	Assessment of transmission status; identification of teaching sites and practices	Continued ecosystem functioning at teaching sites	Education and intergenerational transmission
Heritage and identity	Traditional place names; navigation knowledge; named feature inventories	Persistence of recognisable seascape features	Sense of place; non-use values

¶9 The cultural-service framing above is offered as a candidate scaffolding only. Practitioners may consider it where it supports community priorities and aligns with the protocols agreed under Section 3.4. Where the cultural-service vocabulary is unfamiliar or culturally inappropriate, the substantive content (named places, harvest practices, transmission status) may be recorded in narrative form following the qualitative approaches in **TG-3.5 Social Accounts**, Section 3.9. In all cases, the integrity of the underlying traditional knowledge takes precedence over fit with classification schemes; accounting frameworks should adapt to the knowledge, not the reverse.

3.5.3 Connections to governance accounts

¶1 Traditional knowledge systems often include customary governance institutions that regulate access to marine resources and mediate conflicts. These customary systems may operate alongside or in tension with formal legal frameworks. Governance accounts should document customary governance arrangements where they influence marine management outcomes.

¶2 The TNFD defines Local Communities partly in terms of their governance characteristics, noting that they may have “a set of social rules (e.g. that regulate land conflicts/sharing of benefits) and organisational-specific community/traditional/customary laws and institutions”⁴⁶. For ocean accounting, documentation of these customary institutions can inform understanding of actual governance arrangements in marine areas.

¶3 **TG-3.7 Governance Accounts** provides guidance on documenting customary governance alongside formal legal frameworks, including in Section 3.2.2 on customary law and Section 3.1.2 on multi-level governance structures that incorporate co-management arrangements.

4. Worked Example

¶1 This section presents a hypothetical worked example illustrating how traditional knowledge might be incorporated into ocean accounts for a Pacific Island context. The example is entirely fictional and is designed to demonstrate the accounting structures and engagement processes described in this Circular. It is not based on any specific community or knowledge system, and should not be taken as representative of any particular Indigenous People or Local Community. In practice, every engagement with traditional knowledge holders must be tailored to the specific cultural context and conducted in accordance with the principles set out in Section 3.1.

4.1 Scenario: Mangrove cultural value assessment in a hypothetical Pacific

Island community

¶1 **Setting.** A national statistical office (NSO) in a Pacific Island State is compiling ecosystem accounts for a coastal lagoon system that includes 850 hectares of mangrove forest. Scientific monitoring data (satellite imagery, field surveys) provide information on mangrove extent and biophysical condition. However, the NSO recognises that the mangroves also provide cultural services to the adjacent community of approximately 2,500 people who have customary tenure over the lagoon, and that these cultural dimensions are not captured by existing scientific data.

¶2 **Objective.** To incorporate traditional knowledge contributions into the cultural services component of the ecosystem accounts for the lagoon system, following the principles and processes described in this Circular.

4.2 FPIC process steps applied to the assessment

¶1 The NSO follows the FPIC process described in Section 3.1.3. The steps below illustrate how FPIC principles translate into practice for this hypothetical case:

FPIC Step	Action Taken	Timeline
1. Free – Initial contact (see §3.1.3)	NSO contacts community leadership through existing government liaison channels; requests a meeting to discuss the project	Month 1
2. Prior – Community briefing (see §3.1.3)	NSO staff visit the community, explain the ocean accounts programme, and describe what information they hope the community might share; materials provided in local language	Month 2
3. Prior – Community deliberation (see §3.1.3)	Community leadership consults with elders, clan heads, and knowledge holders using their own decision-making processes; NSO is not present during deliberation	Months 3–5
4. Informed – Conditions negotiated (see §3.1.3)	Community agrees to participate, subject to conditions: (a) sacred site locations will not be published or georeferenced in public accounts; (b) all outputs will be reviewed by community before release; (c) community members who contribute knowledge will be compensated for their time; (d) the community will be acknowledged as knowledge holders in all publications	Month 6
5. Consent – Agreement documented (see §3.1.3)	A memorandum of understanding is signed between the NSO and the community governance body, recording the terms of engagement and data use conditions	Month 6
6. Ongoing consent (see §3.1.3)	At each subsequent stage, the NSO confirms that the community is comfortable proceeding; the community retains the right to withdraw	Ongoing

4.3 Cultural services account template

¶1 Based on the engagement process, the NSO compiles a supplementary cultural services account for the mangrove lagoon system. The account uses a parallel documentation approach (Section 3.2.1), recording scientific and traditional knowledge contributions side by side:

¶2 *Table 4.1: Cultural services account – mangrove lagoon system (hypothetical)*

Cultural service category (per SEEA EA)	Scientific data contribution	Traditional knowledge contribution	Recording in accounts
Spiritual, artistic, and symbolic	Not available from scientific monitoring	Elders identify three areas within the mangrove system associated with ancestral narratives and ongoing ceremonial practice; one area is designated as restricted (not to be published)	Supplementary note: "Three culturally significant areas identified by community knowledge holders; spatial details held under community data sovereignty protocols per MOU dated [date]"
Recreation-related (customary use)	Satellite data show access trails to mangrove areas	Community members describe traditional gleaning practices: collection of shellfish, crabs, and medicinal plants from specific mangrove zones, following seasonal calendars	Supplementary table: seasonal calendar of customary harvest activities (4 species groups, 12-month cycle), compiled from community workshops
Education, science, and research	Monitoring data cover 15 years (2010–2025)	Elders provide oral history observations spanning approximately 60 years, noting changes in species composition, water clarity, and mangrove extent since the 1960s	Supplementary note: "Community observations extend the baseline for condition assessment by approximately 45 years; key reported changes include [summary of reported changes, reviewed and approved by community]"
Heritage and cultural identity	Not captured in biophysical monitoring	Community identifies 12 traditional place names within the lagoon system, each associated with specific ecological features and use practices; 7 medicinal species identified by traditional healers	Supplementary table: traditional place names and associated ecological features (12 entries); medicinal species inventory (7 entries, common names and uses, with community consent for publication)

4.4 Traditional knowledge inputs to condition accounts

¶1 In addition to the cultural services account, traditional knowledge may contribute to ecosystem condition assessment. The following illustrative entries show how TK observations might appear alongside scientific indicators in a condition account:

¶2 *Table 4.2: Condition variable inputs from traditional knowledge (illustrative)*

Condition variable (per SEEA EA)	Scientific indicator	TK-informed indicator	Integration notes
Species composition	Species richness from field survey (35 fish species, 2024)	Elders report that 5 fish species commonly present 40 years ago are now rarely seen; 2 new species have appeared in last decade	Cross-validation: 3 of the 5 reported absent species are confirmed absent in 2024 survey; the 2 new species are confirmed present; findings converge
Ecosystem extent	Satellite-derived mangrove extent: 850 ha (2024)	Community reports that mangroves extended approximately 200 m further seaward in the 1970s; a specific area of 40 ha was lost to coastal development in the 1990s	Gap identification: satellite record begins 2000; TK extends baseline to 1960s; reported loss of 40 ha is consistent with land use records

Condition variable (per SEEA EA)	Scientific indicator	TK-informed indicator	Integration notes
Water quality	Turbidity measurements from 3 monitoring stations (monthly since 2018)	Fishers report that water clarity has declined noticeably since a road construction project upstream in 2015; traditionally, the bottom was visible at 3 m depth in the lagoon centre	Contextualisation: TK provides pre-monitoring baseline and identifies likely cause of observed turbidity increase

4.5 Benefit-sharing and capacity building outcomes

¶1 As part of the agreed benefit-sharing arrangements, the NSO provides:

1. ¶2 **Financial compensation:** Knowledge holders who participated in documentation workshops receive hourly compensation at local professional rates (40 person-hours total)
2. ¶3 **Capacity building:** The NSO conducts a 2-day training workshop for 15 community members on basic ecosystem accounting concepts and how community knowledge contributes to national accounts
3. ¶4 **Data access:** The community receives a complete copy of the lagoon ecosystem accounts in print and digital formats, along with spatial data layers showing mangrove extent and condition
4. ¶5 **Ongoing engagement:** The NSO establishes an annual reporting schedule where accounts updates are shared with the community, and the community provides feedback on whether their knowledge continues to be appropriately represented

4.6 Key observations from the worked example

¶1 This hypothetical example illustrates several important points about traditional knowledge integration:

1. ¶2 **FPIC is a process, not an event.** The engagement timeline spans at least six months before substantive knowledge exchange begins, and consent is maintained on an ongoing basis.
2. ¶3 **Not all knowledge appears in published accounts.** The sacred site locations are recorded under community data sovereignty protocols and do not appear in public accounts. This is consistent with the principle in Section 3.3.3 that some aspects of human-ocean relationships cannot be documented in published accounts.
3. ¶4 **TK contributions appear as supplementary notes and tables, not as modifications to core SEEA accounts.** The core extent and condition accounts retain their scientific basis, whilst TK contributions are recorded in supplementary tables that provide additional context, extended baselines, and culturally significant information.
4. ¶5 **Cross-validation strengthens both knowledge systems.** Where TK observations and scientific data converge (e.g., on species disappearances), confidence in both is increased. Where they diverge, this signals areas for further investigation.
5. ¶6 **The cultural services account captures dimensions that scientific monitoring cannot.** Spiritual significance, traditional place names, and customary use practices are inherently qualitative and community-specific; they can only be documented through respectful engagement with knowledge holders.
6. ¶7

Benefit-sharing is concrete and ongoing. The example includes specific financial, capacity-building, and data-access benefits that continue beyond the initial engagement period.

¶8 Compilers should note that this example represents a favourable scenario in terms of community willingness to engage and clarity of governance structures. In practice, engagement may encounter challenges not illustrated here, including community disagreement about knowledge sharing, capacity constraints within the NSO, language barriers, and political sensitivities. The principles in Section 3.1 provide guidance for working through these challenges.

5. Compilation Considerations

5.1 Capacity and resources

¶1 Working with traditional knowledge requires substantial investment in relationship building, culturally appropriate methods, and sustained engagement. Agencies considering incorporation of traditional knowledge into ocean accounts should secure adequate:

- ¶2 Time for relationship building before data collection begins (minimum 6-12 months)
- ¶3 Personnel with cultural competence and community engagement skills
- ¶4 Resources for fair compensation of knowledge holders
- ¶5 Capacity for ongoing community engagement, not one-time data extraction
- ¶6 Commitment from leadership to ethical engagement principles
- ¶7 Budget for translation and interpretation services where needed
- ¶8 Legal review capacity for research agreements and data sovereignty arrangements

¶9 Resource planning for traditional knowledge engagement should recognise that timelines and costs differ substantially from conventional data collection. Agencies should anticipate that the relationship-building phase alone may require six to twelve months before substantive knowledge exchange can begin. Budget allocations should include provision for community liaison officers, travel to community locations, translation and interpretation services, compensation for knowledge holders' time, and community review of outputs. Many agencies have underestimated these requirements, leading to inadequate engagement that fails to meet ethical standards or to produce reliable contributions to accounts. Where resources are insufficient for ethical engagement, it may be more appropriate to defer traditional knowledge integration until adequate support can be secured, rather than proceeding with superficial consultation that risks eroding community trust.

5.2 Limitations and uncertainties

¶1 The incorporation of traditional knowledge into ocean accounts involves uncertainties:

- ¶2 Traditional knowledge may address different questions and use different concepts than those in accounting frameworks
- ¶3 Knowledge varies among individuals and communities, and aggregation may obscure important local variation
- ¶4 Not all traditional knowledge can or should be documented
- ¶5 Integration with scientific data involves translation between incommensurable knowledge systems (knowledge systems based on fundamentally different assumptions and methods)
- ¶6 Methods for validation and quality assurance are not well established

¶7 Accounts incorporating traditional knowledge should clearly document these limitations and avoid overstating the precision or completeness of traditional knowledge contributions.

¶8 The quality assurance framework in **TG-0.7 Quality Assurance Principles** provides general guidance on uncertainty characterisation. For traditional knowledge, uncertainty characterisation

should address the cultural and contextual dimensions noted above, not only measurement uncertainty in the statistical sense.

5.3 Reporting and attribution

¶1 When traditional knowledge contributes to ocean accounts, the contribution should be clearly acknowledged:

- ¶2 Credit knowledge-holding communities in account documentation
- ¶3 Distinguish traditional knowledge contributions from scientific data sources
- ¶4 Note any restrictions on use or sharing that apply to traditional knowledge components
- ¶5 Provide copies of relevant accounts to contributing communities
- ¶6 Recognise individual knowledge holders where they have consented to attribution

¶7 These practices align with the metadata and provenance documentation requirements discussed in **TG-4.4 Citizen Science and Community-Based Monitoring**, Section 3.3.

5.4 Connections with related circulars

¶1 This Circular connects to several other components of the Technical Guidance:

- ¶2 **TG-3.5 Social Accounts:** Provides the broader framework for documenting human dimensions of ocean-society relationships, including wellbeing indicators and qualitative approaches
- ¶3 **TG-3.7 Governance Accounts:** Addresses documentation of customary governance systems alongside formal legal frameworks
- ¶4 **TG-4.4 Citizen Science and Community-Based Monitoring:** Provides complementary guidance on community-based data collection and integration with official statistics
- ¶5 **TG-2.4 Ecosystem Goods and Services:** Addresses cultural ecosystem services that may be informed by traditional knowledge
- ¶6 **TG-0.7 Quality Assurance Principles:** Provides general quality framework applicable to all data sources
- ¶7 **TG-6.1 Coral Reef Ecosystem Accounting, TG-6.2 Mangrove and Coastal Wetland Accounting, TG-6.3 Seagrass Ecosystem Accounting:** Thematic accounts where traditional knowledge of ecosystem condition can complement scientific monitoring

Implementation Considerations

¶1 For minimum institutional capacity, data infrastructure, and human skills requirements for compiling these accounts, see TG-0.8 Implementation Readiness Assessment. For guidance on adapting these methods to sub-national scales, see TG-3.11 Sub-National Ocean Accounts.

6. References and Further Reading

- ¶1 United Nations Declaration on the Rights of Indigenous Peoples (2007)
- ¶2 Convention on Biological Diversity, Article 8(j) and Nagoya Protocol
- ¶3 Kunming-Montreal Global Biodiversity Framework (2022), Targets 3, 5, 21
- ¶4 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 (BBNJ Agreement, 2023)
- ¶5 TNFD Recommendations and Guidance on Engagement with Indigenous Peoples, Local Communities and Affected Stakeholders (2023)
- ¶6 SEEA Ecosystem Accounting, Chapter 6 (Ecosystem Services)
- ¶7 ILO Convention 169 on Indigenous and Tribal Peoples
- ¶8 Global Indigenous Data Alliance, CARE Principles for Indigenous Data Governance (2019)

- ¶9 United Nations Fundamental Principles of Official Statistics (2014)
- ¶10 SEEA Guidelines on Biophysical Modelling for Ecosystem Accounting, Section 5.7 (Reference Conditions)
- ¶11 Millennium Ecosystem Assessment (2005), *Ecosystems and Human Well-being: Synthesis*
- ¶12 IPBES (2019), *Global Assessment Report on Biodiversity and Ecosystem Services*
- ¶13 Common International Classification of Ecosystem Services (CICES) v5.1 (Haines-Young and Potschin, 2018)

¶14 **Authors:** [To be confirmed] **Reviewers:** [To be confirmed] **Last Updated:** February 2026

FOOTNOTES

1. ¶1 Huntington, H.P. et al. (2004). Matching traditional and scientific observations to detect environmental change: a discussion on Arctic terrestrial ecosystems. *Ambio* 33(7): 18-23.
2. ¶2 Tengoe, M. et al. (2017). Weaving knowledge systems in IPBES, CBD and beyond. *Current Opinion in Environmental Sustainability* 26-27: 17-25.
3. ¶3 Convention on Biological Diversity, Kunming-Montreal Global Biodiversity Framework (2022), Target 21.
4. ¶4 United Nations, Transforming our world: the 2030 Agenda for Sustainable Development, SDG Target 2.3.
5. ¶5 United Nations Fundamental Principles of Official Statistics (2014), Principle 8: Coordination among statistical agencies.
6. ¶6 See also UNSD and UNESCO Institute for Statistics discussions on integrating Indigenous knowledge into statistical frameworks, and the Pacific Community (SPC) regional guidance on cultural statistics.
7. ¶7 This characterization draws on Convention on Biological Diversity (2018), Glossary of Relevant Terms, definition of "Traditional knowledge."
8. ¶8 Vierros, M. et al. (2010). Traditional Marine Management Areas of the Pacific in the Context of National and International Law and Policy. United Nations University – Institute of Advanced Studies.
9. ¶9 Huntington, H.P. et al. (2004). Matching traditional and scientific observations to detect environmental change: a discussion on Arctic terrestrial ecosystems. *Ambio* 33(7): 18-23. Whilst focused on terrestrial ecosystems, the methodological framework for integrating traditional and scientific observations applies equally to marine contexts.
0. ¶10 Johannes, R.E. (1998). The case for data-less marine resource management: examples from tropical nearshore finfisheries. *Trends in Ecology and Evolution* 13(6): 243-246.
1. ¶11 United Nations Declaration on the Rights of Indigenous Peoples (2007), Article 31.
2. ¶12 United Nations Declaration on the Rights of Indigenous Peoples (2007), Article 26.
3. ¶13 Convention on Biological Diversity (1992), Article 8(j).
4. ¶14 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 (2010).
5. ¶15 Convention on Biological Diversity, Kunming-Montreal Global Biodiversity Framework (2022), Target 21.
6. ¶16 Convention on Biological Diversity, Kunming-Montreal Global Biodiversity Framework (2022), Target 3.
7. ¶17 Convention on Biological Diversity, Kunming-Montreal Global Biodiversity Framework (2022), Target 5.
8. ¶18 International Labour Organization, Indigenous and Tribal Peoples Convention, 1989 (No. 169), Article 6.
9. ¶19 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 (2023), Articles 7 and 13.
0. ¶20 TNFD Recommendations (2023), Governance Disclosure C.
1. ¶21 TNFD Guidance on engagement of Indigenous Peoples, Local Communities and affected stakeholders.
2. ¶22 Johnson, N. et al. (2016). The contributions of community-based monitoring and traditional knowledge to Arctic observing networks. *Arctic* 69(Suppl. 1): 28-40.
3. ¶23 United Nations Declaration on the Rights of Indigenous Peoples (2007), Article 31.
4. ¶24 Nagoya Protocol (2010), Articles 5-7.
5. ¶25 TNFD Recommendations (2023), Governance Disclosure C.
6. ¶26 Jupiter, S.D. et al. (2014). Locally-managed marine areas: multiple objectives and diverse strategies. *Pacific Conservation Biology* 20(2): 165-179.
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