

OA and Marine Spatial Planning

Provides guidance on using Ocean Accounts to inform marine spatial planning (MSP), including spatial data requirements, ecosystem service mapping.

Version 0.9.1 **Status** Draft **Stability** Applied

Last updated September 2026 **Responsible officer** Dr Jordan Gacutan

Drafting AI-assisted drafting from GOAP Secretariat source materials; source list to be published at the close of consultation.

OUTCOME

This Circular sets out how a marine spatial planning process uses Ocean Accounts: which account each stage of the planning cycle draws on, what a planner reads out of it, and how the results are presented for deliberation. Compilation of the accounts themselves is treated in Sections 2 to 4, to which this Circular refers rather than restating. Specific applications include (1) delineating spatial zones based on ecosystem service supply and demand patterns, (2) resolving conflicts between competing ocean uses – fisheries, aquaculture, shipping, offshore energy, tourism – by quantifying overlapping spatial footprints and ecosystem dependencies, (3) prioritising areas for protection or restoration based on ecosystem condition and service flow accounts, and (4) evaluating proposed spatial allocations through scenario analysis that projects changes in ecosystem extent, condition, economic outputs and service flows. Section 3.5 gives an eight-step application procedure from defining the planning area to monitoring an adopted plan, and Section 3.4.2 sets out what the accounts can and cannot settle: the framework quantifies the ecological cost of a spatial allocation alongside its economic benefit, but the choice between allocations remains a political decision, and intrinsic, relational and customary values are not captured by an exchange-value account.

CONTENTS

1. Outcome	3
2. Requirements	3
3. Guidance Material	3
3.1 What is marine spatial planning?	3
3.2 Information needs for MSP	4
3.3 Ocean accounts data for spatial planning	5
3.4 Integrating accounts into MSP processes	8
3.5 Application procedure for MSP practitioners	10
3.6 Case examples	15
4. Acknowledgements	16
5. References	16

ABOUT THIS CIRCULAR

RECOMMENDED CITATION

OA and Marine Spatial Planning (2026) (GOAP Technical Guidance on Ocean Accounting, TG-1.2, v0.9.1). GOAP Secretariat.
<https://guidance.oceanaccounts.org/circulars/section-1/1-2-marine-spatial-planning/>

© 2026 Global Ocean Accounts Partnership. Licensed under CC BY-NC 4.0.

DRAFT

1. Outcome

¶1 This Circular sets out how a marine spatial planning process uses Ocean Accounts: which account each stage of the planning cycle draws on, what a planner reads out of it, and how the results are presented for deliberation. Compilation of the accounts themselves is treated in Sections 2 to 4, to which this Circular refers rather than restating.

¶2 Specific applications include (1) delineating spatial zones based on ecosystem service supply and demand patterns, (2) resolving conflicts between competing ocean uses – fisheries, aquaculture, shipping, offshore energy, tourism – by quantifying overlapping spatial footprints and ecosystem dependencies, (3) prioritising areas for protection or restoration based on ecosystem condition and service flow accounts, and (4) evaluating proposed spatial allocations through scenario analysis that projects changes in ecosystem extent, condition, economic outputs and service flows.

¶3 Section 3.5 gives an eight-step application procedure from defining the planning area to monitoring an adopted plan, and Section 3.4.2 sets out what the accounts can and cannot settle: the framework quantifies the ecological cost of a spatial allocation alongside its economic benefit, but the choice between allocations remains a political decision, and intrinsic, relational and customary values are not captured by an exchange-value account.

2. Requirements

- ¶1 **TG-0.1 General Introduction to Ocean Accounts** – provides foundational understanding of the Ocean Accounts Framework, including the spatial data framework and ecosystem asset concepts essential for marine spatial planning applications.
- ¶2 **TG-3.1 Asset Accounts** – provides methods for compiling ecosystem extent and condition accounts, including the Ecosystem Condition Typology (ECT) framework, reference condition establishment, and composite condition index construction used throughout this Circular.
- ¶3 **TG-3.3 Economic Activity Relevant to the Ocean** – provides methods for spatially allocating economic activity data to Basic Spatial Units, required for spatial conflict identification in Step 3. Practitioners should compile TG-3.3 accounts before undertaking spatial conflict analysis; where TG-3.3 accounts are not yet available, Step 3 may proceed using proxy activity data with appropriate caveats.
- ¶4 **TG-4.1 Remote Sensing and Geospatial Data** – provides remote sensing resolution thresholds and spatial data methods for BSU delineation and ecosystem extent mapping used in Sections 3.3.1 and 3.3.2.

¶5 Readers approaching Section 1 for the first time should begin with **TG-1.0 Ocean Accounting and the Blue/Ocean Economy**, the framing circular for the section, which sets out the ocean economy terminology used throughout, what an ocean account can and cannot certify about a blue economy claim, and the map from a policy question to the circular that answers it. It is recommended reading, not a prerequisite.

3. Guidance Material

3.1 What is marine spatial planning?

¶1 **Marine Spatial Planning (MSP)** is a public process of analysing and allocating the spatial and temporal distribution of human activities in marine areas to achieve ecological, economic, and social objectives that are usually specified through a political process¹. MSP emerged in the early 2000s as ocean space came under proactive, integrated, and spatially explicit governance, in place

of the earlier reactive, sector-by-sector approach. The move to integrated governance responded to growing conflicts between ocean uses and to the recognition that cumulative impacts require integrated responses. MSP serves as an ‘implementation mechanism’ through which high-level policy commitments (such as the Sustainable Development Goals and Convention on Biological Diversity targets) are translated into spatial management action within national marine jurisdictions².

¶2 MSP is at root a spatial process. It requires decisions about where different activities may occur, where they should be excluded, and how multiple uses can be accommodated within the same marine area. These decisions must account for the distribution of marine ecosystems, the spatial footprint of human activities, and the connections between adjacent areas, both marine and terrestrial. The United Nations Educational, Scientific and Cultural Organization (UNESCO) has promoted MSP globally, and the Intergovernmental Oceanographic Commission provides technical guidance on planning approaches³.

¶3 For UNCLOS maritime zone definitions (territorial sea, EEZ, continental shelf, ABNJ), see **TG-0.6 Glossary** (Exclusive Economic Zone entry). These zones define the geographic scope within which national MSP processes operate. UNCLOS Articles 56 and 61-62 grant coastal states sovereign rights over natural resources and responsibility for conservation and management of living resources within their exclusive economic zone⁴.

¶4 The UN-GGIM Working Group on Marine Geospatial Information has identified MSP as a key application area requiring integrated marine geospatial information management⁵. Effective MSP depends on the availability of consistent, interoperable spatial data that can be integrated across hydrographic, oceanographic, biological, and socioeconomic domains to support evidence-based planning decisions.

3.2 Information needs for MSP

¶1 Marine spatial planners require information across several domains to make informed decisions about the allocation of ocean space. The information needs of MSP can be organised into four broad categories: ecological, economic, social, and governance information.

¶2 **Ecological information** encompasses the distribution and condition of marine ecosystems, the habitats they provide, and the ecological processes that maintain ecosystem functioning. Planners need to know where different ecosystem types occur (coral reefs, seagrass meadows, mangroves, pelagic systems, benthic habitats), their current condition relative to reference states, and how they are connected through species movements, larval dispersal, and nutrient flows. The IUCN Global Ecosystem Typology provides a standardised classification of marine ecosystem functional groups that can support consistent spatial mapping across jurisdictions⁶.

¶3 **Economic information** includes the location and intensity of economic activities, their dependencies on marine ecosystem services, and their impacts on marine ecosystems. Key activities include fisheries (both commercial and artisanal), aquaculture, shipping and ports, offshore energy (oil, gas, wind, wave), mining, tourism and recreation, and coastal development.

¶4 **Social information** captures the distribution of benefits and costs across different community groups, including indigenous and traditional uses, subsistence activities, recreational values, and cultural connections to marine places. Equity considerations are recognised as central to legitimate MSP processes: who benefits and who bears costs from different spatial allocations.

¶5 **Governance information** documents existing management arrangements, protected area designations, customary tenure systems, and regulatory frameworks that constrain or enable spatial planning decisions. Documentation extends to jurisdictional boundaries, existing use rights, and the institutional arrangements through which planning decisions are made and implemented.

¶6 A central challenge for MSP is integrating these diverse information types within a coherent spatial framework. Data often come from different sources, use inconsistent spatial units, and lack

the temporal alignment needed for integrated analysis. Through their application of accounting principles and spatial frameworks, Ocean Accounts offer a structured approach to that integration.

¶7 Table 1 maps the typical phases of an MSP process to their core information needs and identifies which Ocean Account components can supply the required data. Planners can use this matrix to identify which accounts to prioritise for compilation given the current stage of their MSP process and to communicate data requirements to the statistical agencies responsible for account production⁷.

¶8 **Table 1: MSP planning phases, information needs, and Ocean Account sources**

MSP Phase	Information Need	Ocean Account Source
Baseline assessment	Ecosystem distribution and condition	Extent accounts, condition accounts
Zoning design	Activity-ecosystem overlap and conflicts	Economic accounts, extent accounts
Impact prediction	Service flow changes under scenarios	Service flow accounts, condition accounts
Trade-off analysis	Quantified costs and benefits of alternatives	Monetary accounts, service flow accounts
Monitoring and review	Condition and use changes over time	Time-series condition and extent accounts
Cross-border integration (trans-boundary planning)	Comparable spatial and ecological baselines across jurisdictions	Standardised BSU framework; harmonised extent and condition accounts
Stakeholder and knowledge integration	Open, common evidence base reducing information asymmetry across actors	All accounts (extent, condition, services, economic); standardised classifications

¶9 The first five rows of Table 1 map sequential MSP planning phases to their core information needs. The final two rows capture cross-cutting integration dimensions that operate across all phases. Cross-border integration is supported because a standardised BSU framework and harmonised accounting classifications enable comparable spatial and ecological baselines between neighbouring jurisdictions sharing marine areas². Publishing accounts under common classifications supports stakeholder and knowledge integration: information asymmetry between government, industry, indigenous and local knowledge holders, and the wider public is reduced, and deliberation proceeds from a shared evidence base. A fuller five-dimension integration framework (policy and sector, cross-border, stakeholder, knowledge, and temporal integration) is set out in Gacutan et al. (2022)², to which practitioners are referred for the conceptual underpinning of these rows.

3.3 Ocean accounts data for spatial planning

¶1 The Ocean Accounts Framework provides several components essential for MSP. The spatial data framework, ecosystem extent accounts, ecosystem condition accounts, ecosystem services accounts, and governance accounts each contribute essential information for spatial planning decisions.

3.3.1 The spatial data framework

¶1 The spatial foundation of Ocean Accounts is built on **Basic Spatial Units (BSUs)**, the smallest units at which information is compiled and from which aggregations can be made⁸. BSUs are defined to be exhaustive and mutually exclusive within the ecosystem accounting area (EAA), so that every location within the EAA is assigned to exactly one BSU. For marine applications, BSUs may be differentiated into coastal and marine units, with depth layers enabling three-dimensional representation of ocean systems.

¶2 Figure 1.2.2 sets out how the three spatial units relate. The ecosystem accounting area fixes the territory the account covers; ecosystem assets divide it into contiguous areas each assigned to a single ecosystem type; and the BSU grid tessellates it so that extent is obtained by summing cells of the same class.

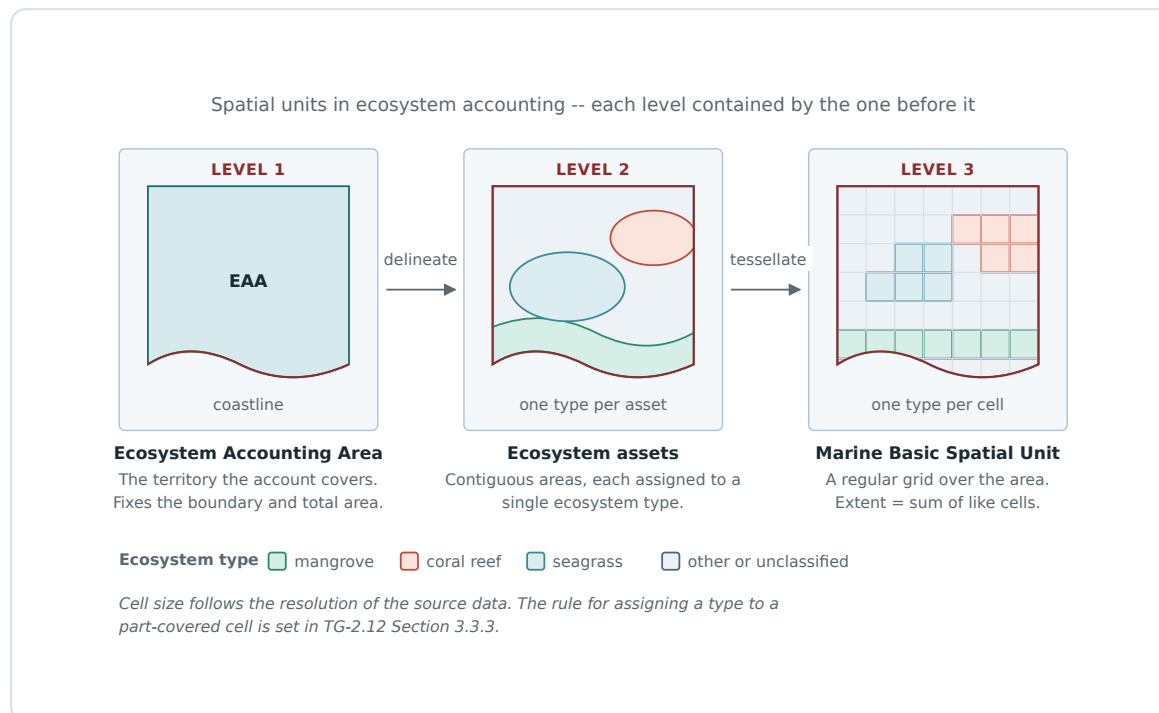


Figure 1.2.2 The accounting area fixes the territory; ecosystem assets divide it by type; the grid tessellates it so extent can be summed.

Source: Adapted from Rahayu et al. (2024), *Optimising Marine Basic Spatial Units (MBSU) for Ocean Accounting using empirical data from Saleh Bay, Indonesia*, One Ecosystem 9: e125578, Figure 1, licensed CC BY 4.0. Definitions follow SEEA EA 2024.

¶3 The resolution at which BSUs are compiled is set by **TG-2.12 Spatial Data Frameworks** Section 3.3, which is normative for minimum mapping units and BSU resolution, and constrained by the sensor and product thresholds in **TG-4.1 Remote Sensing and Geospatial Data**. An MSP process is not usually in a position to specify that resolution: it receives accounts already compiled at whatever resolution the national data infrastructure supports.⁹

¶4 The question for a planner is therefore an adequacy question, asked at Step 1 of the application procedure in Section 3.5:

- ¶5 Can the accounts distinguish the narrowest use zone the plan needs to allocate?
- ¶6 Can they distinguish the habitat patches whose loss or protection the plan turns on?
- ¶7 Where pelagic and benthic uses are allocated separately, do the accounts carry a depth stratum, or do they collapse both into one cell?

¶8 Where the answer is no, the plan should say so explicitly and either allocate at a coarser grain than the accounts support – documenting the limitation to stakeholders – or commission supplementary survey to the specification in TG-2.12 Section 3.3. Refining the grid mid-process is a compilation decision with consequences for the extent time series, and must be recorded as a methodological revision rather than treated as ecosystem change.

¶9 The delineation of marine BSUs presents specific challenges not encountered in terrestrial ecosystem accounting. Marine ecosystems are inherently three-dimensional, with distinct communities at different depth strata. Pelagic (water column) and benthic (seafloor) ecosystems may occupy the same horizontal location but represent distinct functional units. The BSU framework enables consistent spatial referencing across multiple data types: economic activities, ecosystem types, and

condition indicators can all be assigned to BSUs. Planners can then examine how different variables co-occur and interact within the same spatial framework.

3.3.2 Ecosystem extent accounts

¶1 **Ecosystem extent accounts** record the area of each ecosystem type within each BSU over time¹⁰. For marine applications, extent accounts capture the spatial distribution of ecosystem types such as coral reefs, seagrass meadows, mangroves, kelp forests, coastal wetlands, and various pelagic and benthic marine ecosystems. The accounts track changes in extent through additions (ecosystem restoration, natural expansion) and reductions (ecosystem conversion, degradation).

¶2 Extent accounts provide MSP with baseline information on where different ecosystem types occur and how their distribution is changing. The ecosystem classification used in extent accounts should align with internationally recognised typologies. The IUCN Global Ecosystem Typology provides a hierarchical classification with realm (marine), biome (e.g., marine shelf), and ecosystem functional group (e.g., tropical coral reefs) levels that can be adapted to national contexts¹¹. See **TG-3.1 Asset Accounts** Section 3.4.1 for detailed guidance on ecosystem extent account compilation methods.

Ecosystem extent by designated use

¶1 A particularly useful analytical output for MSP is the cross-tabulation of ecosystem extent by designated use category. This approach overlays ecosystem extent data with the spatial footprint of designated marine use zones to reveal how different ecosystem types are distributed across management and activity areas. The resulting matrix records, for each ecosystem type, how much of its extent falls within fishery zones, port areas, tourism zones, marine protected areas, and areas not currently designated for specific uses. This information is directly relevant to spatial planning because it makes explicit the relationship between ecological assets and human use allocations, a relationship that is often obscured when ecological and economic data are compiled separately.

¶2 Table 2 illustrates this approach using simplified example data from an ESCAP pilot exercise in the Pacific region¹². Values are recorded in hectares (ha), consistent with SEEA EA para 4.15, which requires ecosystem extent accounts to be compiled in area units.

¶3 **Table 2: Example cross-tabulation of ecosystem extent by designated use category (ESCAP pilot exercise, hectares)**

Ecosystem type	Fishery (ha)	Port (ha)	Tourism (ha)	Marine Protected Area (ha)	Not in designated use area (ha)	Total (ha)
Mangroves	650	220	870	870	220	2,830
Seagrasses	440	0	0	1,100	1,320	2,860
Coral reefs	350	0	175	1,225	1,050	2,800

¶4 Cross-tabulations are compiled in area units consistent with SEEA EA para 4.15. Where a first compilation has used BSU counts because individual BSU area is not yet standardised, **TG-3.1 Asset Accounts** Section 3.5.1 sets out the conversion to area units and how the resulting revision is recorded in the extent account.¹³

¶5 The cross-tabulation reveals patterns relevant to spatial planning. In this example, coral reefs are predominantly located within marine protected areas, which suggests existing protection measures are well targeted. Mangroves are more evenly distributed across use categories, including port and tourism zones, and are therefore more exposed to development pressures. Seagrass ecosystems have substantial extent outside any designated use area, which may represent either a gap in spatial planning coverage or areas where formal designation has not yet occurred. The table can be expanded to include additional ecosystem types and use categories, extended over multiple

accounting periods to reveal trends in spatial allocation, and supplemented with condition data to indicate how ecosystem quality varies across use zones.

3.3.3 Condition, services and governance accounts

¶1 The remaining account types are compiled elsewhere in the Technical Guidance. What matters for MSP is what a planner reads out of each and at which step of the planning process.

Account	What an MSP process reads out of it	Where it is compiled
Ecosystem condition ¹⁴	Which areas hold high ecological integrity and are protection priorities; which are degraded and are restoration candidates or better suited to lower-sensitivity uses; how condition is likely to respond to each scenario	Variables and reference conditions: TG-3.1 Section 3.5.2. Normalisation, aggregation and scenario projection: TG-2.1 Sections 3.4 and 3.6
Ecosystem services ¹⁵	Which areas generate which services, and where the benefits land – the service providing area and the service benefiting area are usually not the same place, and a spatial allocation can move one without moving the other	TG-3.2 Sections 3.1 and 3.3; indicator selection in TG-2.4
Governance	Jurisdictional and administrative boundaries, including overlapping authorities; existing use rights, designations and customary tenure; which institution regulates which use in which location; transboundary instruments where the planning area abuts another jurisdiction	TG-3.7 ; indicators in TG-2.13

¶2 Two points bear directly on spatial allocation.

¶3 **Service providing and service benefiting areas are spatially distinct.** A mangrove stand supplies coastal protection to the settlements behind it, not to itself. A decision to permit aquaculture in that stand reduces extent in one location and reduces protection in another, and only the supply-use articulation in TG-3.2 makes the second consequence visible. Allocations that look locally efficient can be regressive once the benefiting area is identified, and the distributional question – who loses the service – is a planning question rather than an accounting one.

¶4 **Governance accounts are an emerging account type.** Compilation methodology is still developing, and a full governance account is not a precondition for MSP. Practitioners should compile at minimum a spatial layer of policy and management designations that can be cross-tabulated against ecosystem extent, as in Table 2. That single cross-tabulation makes the policy-ecology relationship explicit, and it is what carries most of the analytical weight in transboundary settings under UNCLOS and in jurisdictions where customary or indigenous tenure coexists with statutory regimes.

3.4 Integrating accounts into MSP processes

¶1 The integration of Ocean Accounts into MSP processes can occur at multiple stages of the planning cycle: situation assessment, goal setting, spatial analysis, plan development, implementation, and monitoring. MSP aligns strategic targets across policies and manages human activities in ocean space, whilst OA provides a structured, standardised evidence base that informs each stage of that process².

3.4.1 Situation assessment

¶1 In the initial assessment phase, MSP processes characterise the current state of the marine area: its ecosystems, uses, and governance arrangements. Ocean accounts provide a structured compilation of this information within a consistent spatial framework. Ecosystem extent accounts record what ecosystems are present and where, and condition accounts indicate their integrity. Economic

accounts document current activities and their spatial footprint, whilst services accounts demonstrate how ecosystems contribute to human wellbeing.

3.4.2 Trade-off analysis

¶1 A central function of MSP is to weigh trade-offs between competing objectives: economic development versus environmental protection, one sector versus another, and current uses versus future options. The SEEA AFF notes that “data that are in a common framework can be used to assess trade-offs between alternative scenarios using various modelling techniques”¹⁶. In the MSP context, planners can examine how different spatial allocations would affect ecosystem extent, condition, and services, as well as economic outputs and social benefits. The accounting framework does not resolve trade-offs, which remain political decisions. It provides a transparent evidence base for deliberation.

¶2 To illustrate, consider a simplified trade-off between designating a coastal area as an aquaculture zone versus maintaining it as an undesignated mangrove ecosystem. Using accounts data, planners can compare the economic output from aquaculture production (recorded in economic accounts) against the value of ecosystem services that the mangrove currently provides: coastal storm protection (estimated via avoided damage costs), carbon sequestration (estimated via social cost of carbon), and nursery habitat supporting adjacent fisheries (estimated via the contribution of mangrove-dependent species to commercial catch). See **TG-1.9 Safe Usage of Monetary Valuation** for the valuation level at which avoided damage cost estimates sit and their appropriate use in ocean accounting contexts. Both methods are illustrative approximations pending country-specific calibration¹⁷. Even where the mangrove’s annual service flows exceed the projected net returns from aquaculture, the allocation decision involves distributional effects, employment, food security, and other policy considerations. The accounts ensure that ecological costs of conversion are quantified alongside economic benefits, so that deliberation is informed without an outcome being prescribed.

¶3 OA trade-off analysis captures quantitative and instrumental values: physical measurements (hectares, tonnes, people protected) and monetary exchange values. It may not fully represent intrinsic, relational, or non-material values, including the cultural, spiritual, and traditional use connections to marine places held by indigenous communities, coastal peoples, and other stakeholders. Where such values are relevant to the planning decision, OA trade-off analyses should be complemented by participatory valuation or deliberative assessment methods². The accounting structure also allows planners to examine partial conversion scenarios, where a portion of the mangrove is converted whilst the remainder is protected, and to assess how service flows change at different conversion thresholds.

3.4.3 Scenario development and evaluation

¶1 MSP typically involves developing and evaluating alternative spatial scenarios before selecting a preferred plan. For each scenario, planners can project:

- ¶2 Changes in ecosystem extent (what areas would be converted or protected)
- ¶3 Changes in ecosystem condition (how would ecosystem integrity be affected)
- ¶4 Changes in ecosystem services (how would service flows be altered)
- ¶5 Changes in economic outputs (how would production and employment be affected)
- ¶6 Distribution of benefits and costs (who would gain and who would lose)

¶7 The accounting framework ensures that these projections are internally consistent, so that projected changes in ecosystem extent are reflected in projected changes in services. The use of OA to support scenario and trade-off analysis in MSP is a core integration use case identified in the peer-reviewed MSP-OA literature². Scenario projections should where possible be accompanied by uncertainty ranges for condition and service flow indicators. See **TG-0.7 Quality Assurance**

Principles Section 3.4 for the four categories of uncertainty that apply to ocean accounts, including uncertainty in ecosystem dynamics and in future prices and values.

3.4.4 Monitoring and evaluation

¶1 After plan adoption, ongoing monitoring is essential to assess whether the plan is achieving its objectives. Extent accounts indicate whether ecosystems are being maintained or lost, condition accounts indicate whether ecosystem integrity is improving or declining, and services accounts reveal whether ecosystem contributions to wellbeing are being sustained. The temporal dimension of accounts, which record stocks and flows at regular intervals, aligns naturally with monitoring requirements. Annual or periodic account compilation creates time series that reveal trends and enable adaptive management responses.

3.5 Application procedure for MSP practitioners

¶1 The following procedure guides MSP practitioners in incorporating ocean accounts data into spatial planning decision-making. It assumes that extent, condition, and service flow accounts have been compiled (or are in the process of compilation) by the national statistical office or designated ocean accounting agency. Figure 1.2.1 illustrates the eight steps grouped into Scoping, Analysis, and Decision & Monitoring phases. It shows which ocean account types feed each step and how monitoring closes the adaptive-management cycle.

DRAFT

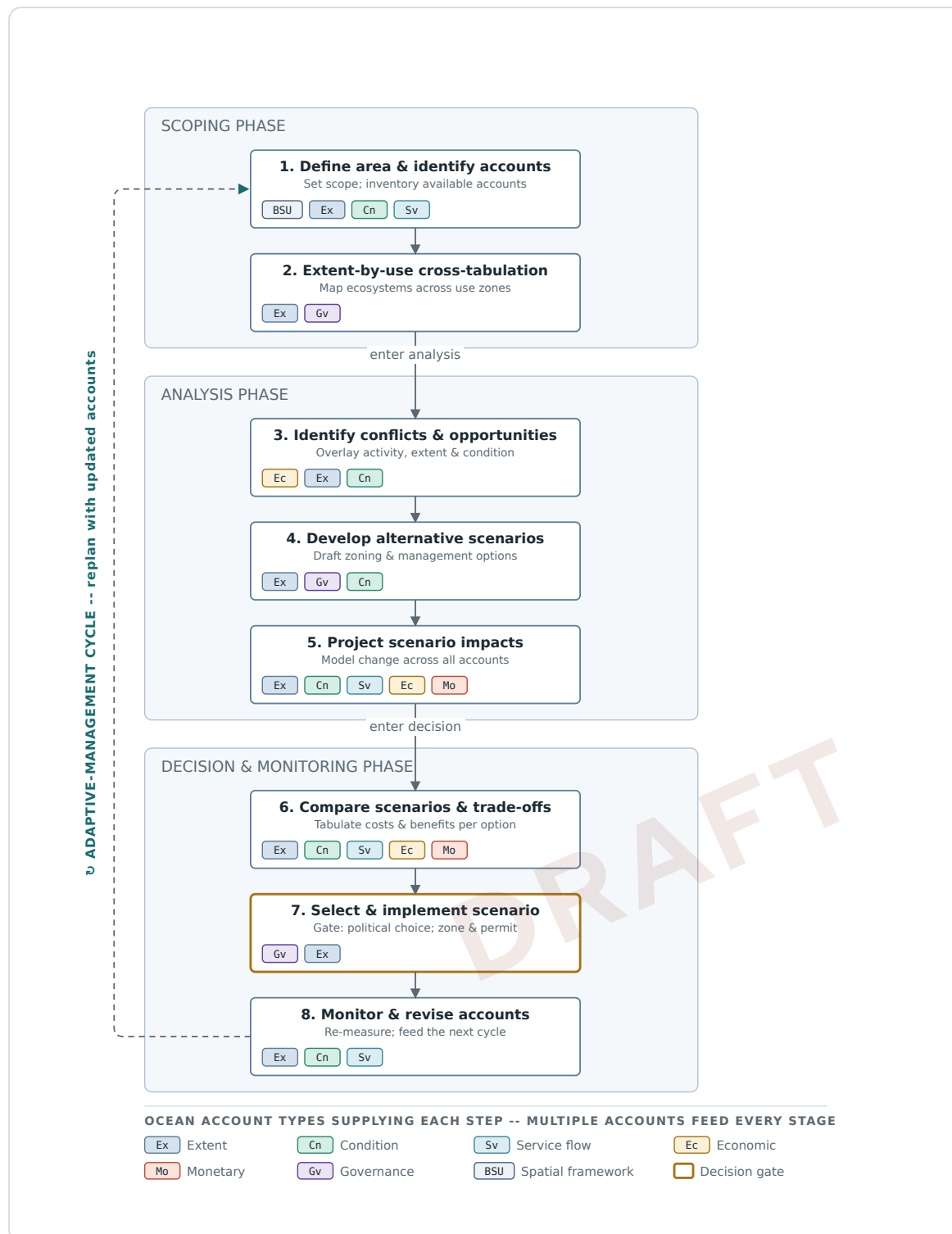


Figure 1.2.1 Eight MSP steps in Scoping, Analysis, and Decision & Monitoring phases draw on multiple ocean account types at every stage. [a] Colour chips = account types supplying each step. [b] Dashed return = adaptive-management cycle from monitoring to scoping.

Source: TG-1.2 §3.5 (eight-step application procedure), Table 1 (§3.2, MSP phases and Ocean Account sources), and §3.4 (integrating accounts across the planning cycle).

Adapted from: IOC/UNESCO MSP step-by-step guide (Ehler & Douvère 2009), which frames MSP as a continuous, adaptive cycle; EU Maritime Spatial Planning Directive 2014/89/EU, Annex I.

Step 1: Define the planning area and identify available accounts

¶1 Establish the geographic scope of the MSP process and identify which ocean accounts are available for that area. The planning area should align with jurisdictional boundaries (e.g., state

or provincial waters, exclusive economic zone) and should be defined using the same coordinate reference system as the accounts. Contact the national statistical office or ocean accounting coordinator to determine:

- ¶12 Which ecosystem types have been mapped within the planning area (extent accounts)
- ¶13 What condition indicators have been compiled and at what spatial resolution (condition accounts)
- ¶14 Which ecosystem services have been quantified, in physical or monetary terms (service flow accounts)
- ¶15 What time periods are covered (annual accounts, multi-year series)
- ¶16 What spatial resolution (BSU size and geometry) is used in the accounts

¶17 Where accounts cover only part of the planning area (for example, where extent accounts exist for coastal waters but not the full EEZ, or where condition accounts are available for coral reefs but not pelagic ecosystems), practitioners should document coverage gaps and use proxy or interim data for unaccounted areas where available. Data limitations should be communicated transparently to planning stakeholders. See SEEA EA Chapter 14 for guidance on graduated account implementation and methods for progressing from partial to full coverage. If accounts are not yet available for the planning area, this step should identify priority accounts to compile based on the MSP information needs identified in Table 1.

Step 2: Compile extent-by-use cross-tabulation

¶1 Using the ecosystem extent accounts and a spatial layer of current or proposed use designations (fishery zones, aquaculture zones, shipping lanes, protected areas, etc.), compile a cross-tabulation table similar to Table 2. Record values in hectares consistent with SEEA EA para 4.15. This reveals the current spatial distribution of ecosystems across use categories and identifies:

- ¶12 Ecosystem types with high exposure to extractive or development activities
- ¶13 Ecosystem types with low representation in protected areas
- ¶14 Areas where multiple uses overlap with high-value ecosystems
- ¶15 Gaps where ecosystems are not currently subject to any designated use

¶16 This matrix forms the baseline for evaluating alternative spatial allocations.

Step 3: Identify spatial conflicts and opportunities

¶1 Overlay economic activity data from ocean accounts (fishing effort, aquaculture production, shipping traffic, tourism visitation) with ecosystem extent and condition data to identify spatial conflicts (locations where human activities and sensitive ecosystems co-occur) and spatial opportunities (locations where condition is high and activities are low, making them candidates for protection, or where condition is degraded and restoration efforts could yield co-benefits). For guidance on mapping economic activities to spatial units, see **TG-3.3 Economic Activity Relevant to the Ocean**, which provides methods for allocating supply-use table outputs to Basic Spatial Units. Note that this step depends on availability of TG-3.3 accounts. Where these are not yet compiled, spatial conflict identification may proceed using proxy activity data (e.g., vessel monitoring records, permit data, site survey estimates) with appropriate documentation of data limitations.

¶2 Spatial conflicts may include:

- ¶3 Fishing effort concentrated in areas with declining fish stocks (condition accounts show degradation)
- ¶4 Aquaculture zones overlapping with mangrove or seagrass extent (extent accounts show habitat loss)
- ¶5 Shipping lanes crossing marine protected areas or whale migration corridors (seascape connectivity variables from condition accounts)

- ¶6 Offshore energy development in high-biodiversity areas (compositional state variables from condition accounts)

Step 4: Develop alternative spatial scenarios

¶1 Based on the conflict and opportunity analysis, develop two or more alternative spatial scenarios that differ in how ocean space is allocated. Each scenario should specify:

- ¶2 Spatial boundaries of use zones (aquaculture, fishing, shipping, energy, tourism, protection)
- ¶3 Management intensity within each zone (e.g., no-take protected area versus multi-use management)
- ¶4 Areas designated for restoration or conservation priority

¶5 Scenarios should be designed to address identified conflicts while advancing planning objectives (e.g., protecting 30% of marine area, maintaining fisheries yield, supporting coastal livelihoods)¹⁸.

Step 5: Project scenario impacts using accounts

¶1 For each scenario, use the accounts to project changes in key variables. This requires translating spatial allocations into quantitative changes:

- ¶2
Extent changes: If a scenario converts mangrove to aquaculture, estimate the hectares of mangrove extent lost and the corresponding increase in aquaculture area. Record these as reductions (conversions from mangrove) and additions (conversions to aquaculture).
- ¶3
Condition changes: If a scenario establishes a no-take marine protected area, estimate the expected improvement in condition over time based on ecological recovery rates from the literature or from condition time series in similar protected areas. If a scenario permits increased fishing effort, estimate the expected decline in condition based on pressure–condition relationships. Note that ocean accounts do not record the immediate impact of a management action on ecosystem condition: the efficacy of a management decision is traceable over successive accounting periods as condition variables in the ECT are updated. For example, MPA establishment reduces fishing pressure on compositional state variables (e.g., fish community diversity, coral cover); improvement in the composite condition index may take 3–5 years or more to be observable in the accounts depending on ecosystem recovery rates. The six-step procedure for projecting a condition trajectory under a management scenario is set out in **TG-2.1** Section 3.6.2; see **TG-3.1 Asset Accounts** Section 3.5.2 for ECT variable selection.
- ¶4
Service flow changes: If mangrove extent declines, estimate the change in coastal protection services (beneficiaries at risk), carbon sequestration (tonnes CO₂), and nursery habitat (change in juvenile fish recruitment). Use the supply–use framework from ecosystem services accounts to allocate changes in service supply to benefiting areas and sectors. **TG-3.2 Flows from Environment to Economy** Section 3.3 gives the supply–use table structure, the compilation method, and a worked example of which table entries change under a spatial conversion scenario.
- ¶5
Economic output changes: Use economic accounts to estimate changes in production and employment from different spatial allocations. For example, if aquaculture zones expand, project increased aquaculture output; if fishing zones contract, project reduced catch (or, if condition improves, potentially increased sustainable yield over the medium term).

¶6 These projections need not be precise (MSP is inherently a forward-looking exercise with uncertainty), but they should be consistent within the accounting framework, so that changes in one account are reflected in related accounts.

Step 6: Compare scenarios and present trade-offs

¶1 Present the projected impacts of each scenario in a summary table or dashboard that enables comparison across scenarios. Table 3 provides an illustrative template.

¶2 **Table 3: Illustrative scenario comparison for MSP using ocean accounts data**

Indicator	Baseline (Current)	Scenario A: Conservation Priority	Scenario B: Development Priority	Scenario C: Balanced Allocation
Extent (hectares)				
– Mangrove	12,500	13,000 (+4%)	10,000 (-20%)	11,800 (-6%)
– Seagrass	8,000	8,500 (+6%)	7,200 (-10%)	7,800 (-3%)
– Coral reef	3,500	3,500 (0%)	3,200 (-9%)	3,400 (-3%)
Condition (index 0-1) ¹⁹				
– Coastal ecosystems	0.62	0.72 (+16%)	0.54 (-13%)	0.65 (+5%)
Services (annual)				
– Coastal protection (people protected)	45,000	50,000 (+11%)	38,000 (-16%)	44,000 (-2%)
– Carbon sequestration (tonnes CO ₂)	25,000	28,000 (+12%)	20,000 (-20%)	24,000 (-4%)
– Fish provisioning (tonnes)	12,000	13,500 (+13%)	11,000 (-8%)	12,800 (+7%)
Economic output (million USD)				
– Fisheries	45	48 (+7%)	42 (-7%)	47 (+4%)
– Aquaculture	20	18 (-10%)	32 (+60%)	24 (+20%)
– Tourism	30	35 (+17%)	28 (-7%)	32 (+7%)
Protected area coverage (%)	15%	32%	12%	22%

¶3 This comparison reveals trade-offs across scenarios. Scenario A (Conservation Priority) achieves high protection coverage and improved ecosystem condition ²⁰. It supports long-term service flows and tourism but constrains aquaculture expansion. Scenario B (Development Priority) maximises aquaculture output but results in ecosystem extent loss, condition decline, and reduced service flows, with potential long-term costs to coastal protection and fisheries sustainability. Scenario C (Balanced Allocation) seeks a middle path, with moderate protection expansion, modest ecosystem improvements, and accommodation of some aquaculture growth. The choice among scenarios remains a policy decision informed by national priorities, stakeholder input, and international commitments.

Step 7: Select and implement a preferred scenario

¶1 Following stakeholder consultation and political decision-making, select a preferred scenario and translate it into spatial management regulations: zoning maps, use permits, protection designations, and monitoring requirements. The accounts compiled during the planning process establish the baseline against which future monitoring will measure progress.

Step 8: Monitor and revise using updated accounts

¶1 After plan implementation, continue compiling extent, condition, and service flow accounts at regular intervals (annually or biennially). Use the time-series data to assess whether the spatial plan is achieving its intended outcomes:

- ¶2 Are protected ecosystems maintaining or improving condition?
- ¶3 Are use zones delivering expected economic outputs without exceeding sustainable limits?

- ¶4 Are service flows to beneficiaries being sustained or enhanced?

¶5 Where monitoring reveals deviations from expected trajectories, apply adaptive management (adjusting use intensity, expanding or contracting zones, or implementing restoration interventions), informed by updated accounts data. See **TG-1.3 Marine Spatial Management (including MPAs)** for detailed guidance on using accounts for MPA effectiveness monitoring and adaptive management.

3.6 Case examples

3.6.1 Ecosystem extent mapping for spatial zoning

¶1 Several countries have applied ecosystem extent mapping approaches consistent with SEEA EA principles to support marine spatial planning. Australia's National Marine Ecosystem Classification provides a hierarchical classification of marine ecosystems that can be mapped at national scales and used to ensure that MSP processes consider the full range of ecosystem types within their jurisdiction²¹. Similarly, the European Union's MAES (Mapping and Assessment of Ecosystems and their Services) initiative has developed marine ecosystem maps that inform spatial planning under the EU Maritime Spatial Planning Directive²².

¶2 By establishing consistent ecosystem classifications and spatial representations, these mapping efforts enable planners to identify where particular ecosystem types occur, assess their representation within existing protected areas, and target spatial allocations to achieve conservation objectives.

3.6.2 Ecosystem services valuation for spatial allocation

¶1 The valuation component of Ocean Accounts, whilst acknowledged to have methodological challenges, can inform MSP decisions by making explicit the economic values at stake in different spatial allocations. Coral reef ecosystems, for example, provide coastal protection services whose value can be estimated using avoided damage cost methods, and tourism services whose value can be estimated from visitor expenditure data²³.

¶2 When these values are mapped spatially, planners can identify high-value service areas and assess how different development scenarios would affect aggregate service values. Such analyses should not be the sole basis for planning decisions, but they provide useful information for deliberation, particularly in contexts where ecosystem service values might otherwise be overlooked.

3.6.3 Marine Protected Area planning

¶1 Marine Protected Areas (MPAs) represent a specific application of spatial planning where Ocean Accounts data are directly relevant. MPA network design requires information on:

- ¶2 Ecosystem representation (are all ecosystem types included?)
- ¶3 Ecosystem condition (are areas of high integrity prioritised?)
- ¶4 Connectivity (are areas connected to allow species movement?)
- ¶5 Threat exposure (are areas exposed to pressures that protection can address?)

¶6 Extent and condition accounts provide systematic data for addressing these questions. Several Pacific Island countries have used ecosystem accounting approaches to inform MPA network design, integrating ecological data with socioeconomic information on fishing effort and community dependence to identify areas where protection can achieve conservation benefits while minimising social costs²⁴.

¶7 For detailed guidance on using accounts to monitor MPA effectiveness and track ecosystem recovery, see **TG-1.3 Marine Spatial Management (including MPAs)**.

3.6.4 Resolving spatial conflicts between offshore energy and fisheries

¶1 Offshore renewable energy development creates spatial conflicts with existing ocean uses, particularly fisheries and shipping. In the North Sea, multiple countries have applied spatial analysis combining fisheries effort data (from vessel monitoring systems), wind farm footprints, and ecosystem condition indicators to identify areas where wind energy development would minimise displacement of fishing activity while avoiding high-biodiversity habitats²⁵. Whilst not always framed explicitly as ocean accounts, these analyses apply accounting principles (spatially explicit activity data, ecosystem condition baselines, and trade-off assessment) to inform spatial allocation decisions. As offshore wind capacity expands globally, integrating fisheries accounts, energy accounts, and ecosystem condition accounts within a common spatial framework will become important for resolving use conflicts. For detailed guidance on accounting for offshore energy activities and their spatial interactions with marine ecosystems, see **TG-6.9 Offshore Energy Thematic Methods**.

4. Acknowledgements

¶1 **Authors:** [To be confirmed]

¶2 **Reviewers:** [To be confirmed]

5. References

1. ¶1 Ehler, C. & Douvère, F. (2009). *Marine Spatial Planning: A Step-by-Step Approach toward Ecosystem-based Management*. Intergovernmental Oceanographic Commission and Man and the Biosphere Programme. IOC Manual and Guides No. 53. UNESCO.
2. ¶2 Gacutan, J., Galparsoro, I., Pınarbaşı, K., Murillas, A., Adewumi, I.J., Praphotjanaporn, T., Johnston, E.L., Findlay, K.P., & Milligan, B.M. (2022). Marine spatial planning and ocean accounting: Synergistic tools enhancing integration in ocean governance. *Marine Policy*, 136, 104936 (DOI: 10.1016/j.marpol.2021.104936).
3. ¶3 UNESCO-IOC. (2021). *MSPglobal: Marine Spatial Planning Programme*. Intergovernmental Oceanographic Commission of UNESCO.
4. ¶4 UNCLOS Article 56 establishes the rights and duties of the coastal State in the exclusive economic zone; Articles 61-62 address conservation and utilization of living resources.
5. ¶5 UN-GGIM. (2022). *Operational Framework for Integrated Marine Geospatial Information Management (IGIF-H)*. Working Group on Marine Geospatial Information, p.5.
6. ¶6 Keith, D.A., Ferrer-Paris, J.R., Nicholson, E. and Kingsford, R.T. (eds.) (2020). *The IUCN Global Ecosystem Typology 2.0: Descriptive profiles for biomes and ecosystem functional groups*. Gland, Switzerland: IUCN. See also Keith, D.A., et al. (2022). A function-based typology for Earth's ecosystems. *Nature*, 610, 513-518.
7. ¶7 Ehler, C. & Douvère, F. (2009). *Marine Spatial Planning: A Step-by-Step Approach toward Ecosystem-based Management*. IOC Manual and Guides No. 53, UNESCO. The phased structure of MSP is widely adopted in national planning processes and aligns with the iterative account compilation cycle described in SEEA EA Chapter 14.
8. ¶8 United Nations. (2021). *System of Environmental-Economic Accounting–Ecosystem Accounting*, para 3.21.
9. ¶9 SEEA EA para 3.23: “The resolution of BSUs will depend on the analytical needs and data availability in each country.”
0. ¶10 SEEA EA Chapter 4: Ecosystem extent accounts.
1. ¶11 Keith, D.A., et al. (2020). *IUCN Global Ecosystem Typology 2.0: Descriptive Profiles for Biomes and Ecosystem Functional Groups*. IUCN.
2. ¶12 ESCAP. (2022). *Ocean Accounts in the Pacific: Implementation Progress and Lessons Learned*. UN Economic and Social Commission for Asia and the Pacific. The example values are illustrative, derived from the pilot exercise methodology and expressed in hectares consistent with SEEA EA para 4.15.
3. ¶13 SEEA EA para 4.15 notes that extent accounts may be compiled in area units appropriate to the scale of analysis, including hectares and square kilometres.
4. ¶14 SEEA EA Chapter 5: Ecosystem condition accounts.
5. ¶15 SEEA EA Chapter 6: Ecosystem services accounts.
6. ¶16 United Nations. (2020). *System of Environmental-Economic Accounting for Agriculture, Forestry and Fisheries*, para 1.12.
7. ¶17 This illustrative example draws on methods described in United Nations (2021), *Monetary Valuation of Ecosystem Services and Assets for Ecosystem Accounting: Interim Version*, and applies them to a simplified MSP context. Actual trade-off analyses would require locally compiled accounts data and may involve more complex modelling of service flow dependencies.
8. ¶18 This reflects Kunming-Montreal Global Biodiversity Framework Target 3 (GBF, 2022), which calls for effective conservation and management of at least 30% of the world's land, inland waters, coastal areas, and oceans by

2030. MPA extent accounts compiled using this Circular can directly support national Target 3 progress tracking. See TG-1.3 for guidance on using accounts to monitor MPA effectiveness.

9. ¶19 The condition index (0–1 scale) is an illustrative composite derived from ECT variables using the aggregation method in TG-3.1 Section 3.4.2. Practitioners should follow TG-3.1 for variable selection and may use a locally appropriate normalisation method. Condition projections under each scenario are forward estimates subject to uncertainty; scenario comparison tables should where possible include uncertainty ranges for condition and service flow indicators. See TG-0.7 Section 3.4 for the four categories of uncertainty that apply to ocean accounts. Percentage changes rounded to nearest whole number. Values are illustrative and not drawn from a single empirical dataset. 20
0. ¶20 The condition projections in this table represent end-of-scenario-period values, not immediate post-intervention values. Under Scenario A (Conservation Priority), the condition improvement from 0.62 to 0.72 reflects cumulative recovery across the scenario time horizon (e.g., 5–10 years) following MPA establishment, traceable through successive annual account compilations rather than observable immediately.
1. ¶21 Butler, A., et al. (2019). *Marine ecosystem classification for the Australian marine environment*. Report to Parks Australia.
2. ¶22 Maes, J., et al. (2020). Mapping and Assessment of Ecosystems and their Services: An EU ecosystem assessment. *Publications Office of the European Union*.
3. ¶23 United Nations. (2021). *Monetary Valuation of Ecosystem Services and Assets for Ecosystem Accounting: Interim Version*.
4. ¶24 ESCAP. (2022). *Ocean Accounts in the Pacific: Implementation Progress and Lessons Learned*. UN Economic and Social Commission for Asia and the Pacific.
5. ¶25 Adapted from spatial planning approaches documented in national MSP processes for the North Sea region, including Germany, Denmark, and the Netherlands. Whilst not always explicitly framed as ocean accounts, these analyses apply accounting principles of spatial data integration and trade-off assessment.

DRAFT