

# Asia and the Pacific Regional Expert Workshop on Ocean Accounts (proposed) August 1-3, 2018; Bangkok, Thailand

*Draft concept note, for discussion (April 7, 2018)*

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## Review note:

This version is an initial draft and will benefit from your input. A basic knowledge of the System of Environmental-Economic Accounting ([SEEA](#)) will help with understanding the issues. We would appreciate your views on:

- The overall design of the workshop
- The choice of topics (Are there others? Can any of the ones suggested be combined?)
- The topic briefs

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## 1. Objective

The main objective of the workshop is to apply statistical, scientific and policy expertise to develop practical guidance for countries on a feasible set of core ocean accounts. Measuring the ocean economy is one component of these accounts. However, to ensure the lasting benefits of the ocean, other topics (conditions including ecosystems, coastal and dependent communities, climate change, disaster risk, etc.) should also be addressed.

The second objective is to provide cross-disciplinary training on the three main perspectives on the ocean (statistical, scientific and policy). To this end, each day will begin with a keynote lecture on one of these topics.

The results of the workshop will support regional case studies and feed into the revision of the SEEA for 2020.

## 2. Background

One could think of statistics as sets of indicators. However, to compare one indicator with another, we need a measurement framework. Frameworks provide common concepts, classifications and methods to ensure the data collected from multiple sources is coherent<sup>1</sup> and can be harmonized.

Much data exists on the ocean. However, there is little experience in applying international statistical standards to harmonize that information:

- The System of National Accounts (SNA) defines marine fisheries as an industry, but other aspects of the ocean economy are embedded in other industries (e.g., tourism, transportation, energy).
- The System of Environmental Economic Accounting Central Framework (SEEA-CF) provides guidance on measuring the stocks, supply and use of natural inputs related to the ocean (e.g., aquatic resources, minerals, energy) as well as residuals (air emissions, solid wastes, wastewater) that impact the ocean, but is not spatially detailed.
- The SEEA-Experimental Ecosystem Accounting (SEEA-EEA) provides guidance on delineating ecosystems, their condition, services and benefits, but there has been little experience in applying this to the ocean.
- The SEEA-Agriculture, Forestry and Fisheries (SEEA-AFF) provides guidance on measuring the stocks, supply and use of food (fish and other aquatic resources) as well as on measuring the environmental impact of these industries (e.g., land use, carbon emissions, waste production).
- The Disaster-Related Statistics Framework (DRSF) provides guidance on compiling relevant statistics that are compatible with existing national statistical systems. It builds upon commonly-accepted definitions towards improving the quality of the underlying statistics. Many disasters (hydro-meteorological events, tsunamis) are ocean-related. The DRSF is currently under consultation.
- The Intergovernmental Panel on Climate Change (IPCC) provides guidelines for national greenhouse gas inventories. Work is underway on a “Special Report on the Ocean and Cryosphere in a Changing Climate”. This is expected to be completed by September 2019.

None of these frameworks have been applied at the level of detail (e.g., large vs small fishing operations, male/female fishers, coastal communities, technologies used, point sources of pollution) that would support the measurement of ocean-related issues implied in SDG14 (Annex 1).

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<sup>1</sup> “Coherence” implies the capacity to integrate data. Common concepts, classifications and methods allow data to be interoperable. That is, a statistic on the economy (e.g., GDP) can be divided by a statistic on population only if they both measure a national total for the same period.

ESCAP has committed to developing guidance for countries on producing “ocean accounts”—that is, standardized data of national, regional and global importance, so that it can be integrated and thereby provide a comprehensive view (See **Annex 3**). The core of this guidance will be the extension, adaptation and testing of existing statistical frameworks. Where these frameworks are insufficient, we will seek to develop new components that can be linked to existing ones.

This is part of an overall ESCAP Ocean Accounts Partnership. By creating partnerships on international, regional, and national levels, we will combine forces to strengthen the capacity of member States to address SDG14. The guidance developed as part of this process will be an important coordination tool to foster communication among international, regional and national agencies.

### **3. Approach**

The recommended approach to the workshop is to solicit input in advance from experts on ten main issues where additional work is required to develop guidance on measurement. Each issue will be the subject of one presentation (by a group of experts), a plenary discussion, and focussed group analysis and recommendations. Based on the discussions and recommendations of the workshop, ESCAP will develop a draft guidance document.

Side-events and poster sessions may be organized to discuss certain topics in more detail.

#### **3.1 Keynote lectures**

Each day will begin with a keynote lecture providing overviews of the key concepts. The three suggested topics are ocean statistics, ocean science and ocean governance.

#### **3.2 Issue presentations**

Short “concept briefs” (see **Annex 4** for initial briefs) will guide collaborations of experts (2 or more per issue) in developing short (20 minute) presentations for the workshop. Each presentation will:

- consider guidance already in the SNA, SEEA and other relevant frameworks,
- identify the issue in more detail,
- describe alternative approaches with examples,
- suggest criteria for selecting one approach over another, and
- recommend which approach should be selected for the guidance document.

Discussion of the issues (30 minutes) will focus on points of clarification and alternative approaches.

#### **3.3 Group analysis**

Each day will cover 3 or 4 of the listed issues. After the issues have been discussed in plenary, participants will be randomly divided into three groups:

- (1) Statistics (including data management): Which approach is most feasible?
- (2) Science (including economics, sociology): Which approaches are most coherent with existing concepts and knowledge?
- (3) Governance (including institutional settings, policy): Which approaches are most amenable to being applied to making decisions?

Each group will consider the issues of the day from that perspective and will narrow the options developed in plenary to one or two main recommendations on each issue. The recommendations will be further focussed in plenary after the group reports. The objective is to recommend “generic” approaches that could be applied in any country, not to provide a shopping list of possible approaches.

#### 4. Issue concept briefs

Each of these briefs will be expanded to about one page in preparation for the experts to develop presentations (See **Annex 4** for more detail):

- Issue 1. Spatial units and ecosystem classification
  - Objective: Recommend standard approach to delineating spatial units coherent with international methods and SEEA.
- Issue 2. Ecosystem services
  - Objective: Review ecosystem services classifications with respect to the ocean and recommend adaptations or expansions if required.
- Issue 3. Disaster risk and climate change (split?)
  - Objective: To review existing frameworks for disaster risk and climate change statistics. To suggest where linkages to the ocean exist and where they need to be developed.
- Issue 4. Links to social concerns
  - Objective: To develop guidelines on integrating social concerns into Ocean Accounts.
- Issue 5: Links to economic concerns (split into ES valuation and SNA?)
  - Objective: To integrate economic concerns into Ocean Accounts. One issue (a) is to ensure that standard economic accounts (SNA) fully include the direct economic benefits of the ocean. The other issue (b) is to augment standard economic accounts with additional (non-SNA) benefits of marine resources.
- Issue 6: Global data availability
  - Objective: To review sources of global data that could be applied to national, regional or global Ocean Accounts.
- Issue 7: Progress on measuring SDG14
  - Objective: Review efforts to develop metadata (measurement standards) for SDG14-related indicators. Can these be linked to specific components of the ocean accounts?
- Issue 8: Ocean governance
  - Objective: To review international, and selected regional and national governance mechanisms with respect to their information needs. This issue could also include initiatives on new technologies and sustainable management approaches.
- Issue 9: Modelling the ocean
  - Objective: To review sources of global data that could be applied to national, regional or global Ocean Accounts.
- Issue 10: (Placeholder for one additional theme or sub-division of one of the broad themes)

#### 5. Timelines

- Early March 2018: Draft concept note (this note); share with potential partners
- End-March: Final draft concept note; distribute to potential participants
- Early April: Identify lead and contributing authors for each issue presentation
- Mid-April to mid-June: Lead and contributing authors draft issues presentations (e.g., in a PowerPoint format) with support from ESCAP
- August 1-3: Workshop
- Early September: Circulate draft outcome document

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## Annexes

### 1. Ocean-related SDG indicators and links to ocean accounts

| Target  | Indicator  | Custodian                        | Link to ocean accounts  |
|---|--|----------------------------------|---|
| 2.3 By 2030, double the agricultural productivity and incomes of small-scale food producers, in particular women, indigenous peoples, family farmers, pastoralists and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities for value addition and non-farm employment | 2.3.1 Volume of production per labour unit by classes of farming/pastoral/forestry enterprise size   | FAO                              | This includes aquaculture and marine fishery as well. Would require disaggregation of SNA into large/small producers, male/female fishers. This could be an application of linking the SAM to the SEEA.       |
|   | 2.3.2 Average income of small-scale food producers, by sex and indigenous status   | FAO                              |   |
| 9.4 By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities   | 9.4.1 CO <sub>2</sub> emission per unit of value added   | UNIDO, IEA                       | GHG emissions are a driver of climate change and ocean acidification. (SEEA Air Emissions, Material Flows, SNA)   |
| 13.2 Integrate climate change measures into national policies, strategies and planning  | 13.2.1 Number of countries that have communicated the establishment or operationalization of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production (including a national adaptation plan, nationally determined contribution, national communication, biennial update report or other) | UNFCCC                           | The ocean is an essential component of climate resilience. (SEEA Air Emissions)   |
| 14.1 By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution  | 14.1.1 Index of coastal eutrophication and floating plastic debris density   | UNEP (with FAO, UNESCO-IOC, IMO) | Indicator is a narrow interpretation of the target (Marine pollution of all kinds). Could be expanded. (SEEA Ecosystem Condition Accounts, Water Emissions, Solid Wastes, Agriculture Forestry and Fisheries) |

| Target   | Indicator  | Custodian                   | Link to ocean accounts  |
|--|--|-----------------------------|---|
| 14.2 By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans  | 14.2.1 Proportion of national exclusive economic zones managed using ecosystem-based approaches  | UNEP (with FAO, UNESCO-IOC) | Protection also requires enforcement. (SEEA Aquatic Resources, Ecosystem Extent, Environmental Protection Expenditures, Agriculture Forestry and Fisheries)   |
| 14.3 Minimize and address the impacts of ocean acidification, including through enhanced scientific cooperation at all levels  | 14.3.1 Average marine acidity (pH) measured at agreed suite of representative sampling stations  | UNEP (with FAO, UNESCO-IOC) | See 14.1 above. (SEEA Air Emissions, Land, Ecosystem Condition, Biodiversity)   |
| 14.4 By 2020, effectively regulate harvesting and end overfishing, illegal, unreported and unregulated fishing and destructive fishing practices and implement science-based management plans, in order to restore fish stocks in the shortest time feasible, at least to levels that can produce maximum sustainable yield as determined by their biological characteristics  | 14.4.1 Proportion of fish stocks within biologically sustainable levels  | FAO                         | Requires good understanding of fish stocks, locations, reproduction rates, illegal and unreported fishing. Comparing scientific measures of stocks and known harvests could identify unreported fishing. (SEEA Agriculture, Forestry and Fisheries, Aquatic Resources, Ecosystem Extent, Environmental Protection Expenditures) |
| 14.5 By 2020, conserve at least 10 per cent of coastal and marine areas, consistent with national and international law and based on the best available scientific information   | 14.5.1 Coverage of protected areas in relation to marine areas   | UNEP-WCMC, UNEP             | See 14.2 above. (SEEA Land, Ecosystem Extent)   |
| 14.6 By 2020, prohibit certain forms of fisheries subsidies which contribute to overcapacity and overfishing, eliminate subsidies that contribute to illegal, unreported and unregulated fishing and refrain from introducing new such subsidies, recognizing that appropriate and effective special and differential treatment for developing and least developed countries should be an integral part of the World Trade Organization fisheries subsidies negotiation <sup>3</sup> | 14.6.1 Progress by countries in the degree of implementation of international instruments aiming to combat illegal, unreported and unregulated fishing | FAO                         | See 14.4 above.   |
| 14.7 By 2030, increase the economic benefits to small island developing States and least developed countries from the sustainable use of marine resources, including through sustainable management of fisheries, aquaculture and tourism  | 14.7.1 Sustainable fisheries as a proportion of GDP in small island developing States, least developed countries and all countries                     | FAO, UNEP, World Bank       | See 14.4 above.   |

| <b>Target</b>   | <b>Indicator</b>  | <b>Custodian</b>                                    | <b>Link to ocean accounts</b>  |
|---|---|---|--|
| 14.a Increase scientific knowledge, develop research capacity and transfer marine technology, taking into account the Intergovernmental Oceanographic Commission Criteria and Guidelines on the Transfer of Marine Technology, in order to improve ocean health and to enhance the contribution of marine biodiversity to the development of developing countries, in particular small island developing States and least developed countries | 14.a.1 Proportion of total research budget allocated to research in the field of marine technology  | UNEP, World Bank                                    | SEEA Environmental Protection Expenditures, Environmental Goods and Services Sector.                                       |
| 14.b Provide access for small-scale artisanal fishers to marine resources and markets   | 14.b.1 Progress by countries in the degree of application of a legal/ regulatory/ policy/ institutional framework which recognizes and protects access rights for small-scale fisheries   | FAO   | Not addressed in SEEA. Expenditures on programs could be tracked using SEEA Environmental Protection Expenditure Accounts. |
| 14.c Enhance the conservation and sustainable use of oceans and their resources by implementing international law as reflected in the United Nations Convention on the Law of the Sea, which provides the legal framework for the conservation and sustainable use of oceans and their resources, as recalled in paragraph 158 of “The future we want”  | 14.c.1 Number of countries making progress in ratifying, accepting and implementing through legal, policy and institutional frameworks, ocean-related instruments that implement international law, as reflected in the United Nations Convention on the Law of the Sea, for the conservation and sustainable use of the oceans and their resources | UN-DOALOS, FAO, UNEP, ILO, other UN Oceans agencies | Not addressed in SEEA. Expenditures on programs could be tracked using SEEA Environmental Protection Expenditure Accounts. |
| 15.5 Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species   | 15.5.1 Red List Index   | IUCN, UNEP, CITES                                   | SEEA Ecosystem Condition (Biodiversity) Accounts.  |
| 15.9 By 2020, integrate ecosystem and biodiversity values into national and local planning, development processes, poverty reduction strategies and accounts  | 15.9.1 Progress towards national targets established in accordance with Aichi Biodiversity Target 2 of the Strategic Plan for Biodiversity 2011–2020  | UNEP-SCBD, UNEP                                     | SEEA Ecosystem Services Supply and Use Accounts.   |

## 2. Regional Seas recommended indicators (1 Oct. 2016)

| No. | Category of indicator   | Possible regional Seas Coordinated Indicator   | SDG  | TWAP indicators  |
|-----|---|--|------|--|
| 1   | Total inputs of nitrogen and phosphorus from agriculture, sewage and atmospheric nitrogen | Chlorophyll a concentration as an indicator of phytoplankton biomass   | 14.1 | Chlorophyll time series; DIN, DIP (modelled data) (both concentration and flux)  |
| 2   | Inputs of marine chemical pollution<br>Trends for selected priority chemicals             | Trends for selected priority chemicals including POPs and heavy metals   | 14.1 | POPs (Persistent Organic Pollutants) status  |
| 3   | Overall levels of marine litter<br>Quantification of beach litter items                   | Quantification and classification of beach litter items  | 14.1 | Marine Plastic Litter  |
| 4   | Ocean warming   | Annual mean sea surface temperature (25m below the surface)  | 14.3 | Sea Surface Temperature (SST)  |
| 5   | Fish landings   | Fish catches within EEZs (tonnes) – total capture production   | 14.4 | Fish landings and Landed Value, Fishing effort, Fish stock status, Primary Production required, Marine Trophic Index, Fishing in Balance Index |
| 6   | Aquaculture   | Application of risk assessment to account for pollution and biodiversity impacts   | 14.4 |  |
| 7   | Aquaculture   | Destruction of habitat due to aquaculture  | 14.4 |  |
| 8   | Population pressure / urbanization  | Length of coastal modification and km <sup>2</sup> of coastal reclamation  | 14.2 | Rural/ Urban population, %poor,  |
| 9   | Eutrophication status   | Locations and frequency of algal blooms reported   | 14.1 | Index of coastal eutrophication  |
| 10  | Pollution hot spots   | 1) Concentration of Status of selected pollutant contamination in biota and sediments and temporal trends<br>2) Number of hotspots | 14.1 | Floating plastic debris  |
| 11  | Ocean acidification   | 1) Aragonite saturation<br>2) pH<br>3) Alkalinity  | 14.3 | Pteropods at risk  |
| 12  | Level of exploitation of commercial fisheries   | FAO stock status: % stocks overfished compared to MSY  | 14.4 | Catch Stock Status, Marine Trophic Index, Fishing in Balance Index   |
| 13  | Species replacement as a consequence of capture fisheries                                 | Marine trophic index   | 14.5 | Marine trophic index   |
| 14  | Endangered species  | Distribution of Red List Index species   | 14.5 |  |
| 15  | Loss of critical habitat  | Trends in critical habitat extent and condition  | 14.5 | Mangrove status; Reefs at Risk Index; seagrass; salt marshes   |

| No. | Category of indicator                          | Possible regional Seas Coordinated Indicator  | SDG  | TWAP indicators  |
|-----|--|---|------|--|
| 16  | National Action Plans to reduce input from LBS | % National action plans ratified / operational  | 14.1 | Transboundary Legal Instruments  |
| 17  | Waste water treatment facilities               | 1) % coastal urban population connected to sewage facilities<br>2) % of waste water facilities complying with adequate standards<br>3) % of untreated waste water                                 | 14.1 |  |
| 18  | Incentive to reduce marine litter at source    | 1) % port waste reception facilities available<br>2) Incentives to reduce land based sources<br>3) Amount of recycled waste on land (%)   | 14.5 |  |
| 19  | Climate change adaptation                      | 1) % national adaptation plans in place<br>2) Sector based national adaptation plans<br>3) Number of existing national and local coastal and marine plans incorporating climate change adaptation | 14.2 | Transboundary Legal Instruments  |
| 20  | Fish harvested within safe ecological limits   | Fisheries measures in place (by-catch limits, area-based closures, recovery plans, capacity reduction measures) and multilateral/bilateral fisheries management arrangements                      | 14.4 | Catch Stock Status, Marine Trophic Index, Fishing in Balance Index; Fishery Production Potential of LMEs |
| 21  | Critical marine habitat under protection       | % Marine protected areas designated   | 14.5 | Change in Protected Area Coverage  |
| 22  | National ICZM in place                         | National ICZM guidelines and enabling legislation adopted   | 14.2 |  |

### 3. An Ocean Account

An Ocean Account is envisioned, as its core, as an expansion of the SEEA-EEA (**Figures 1 and 2**), linked to:

- spatially-detailed information from other SEEA accounts (CF and AFF),
- functionally disaggregated information from the SNA,
- disaggregation of beneficiary/household types, and
- contextual information on policies, technologies and management practices.

These accounts could be compiled for national territories, but regional and global data may also be available for international waters/high seas. It would also be feasible to compile and account for a sub-national area, such as a bay or specific coastline.

The guidelines will provide the “standards”, but compiling the accounts requires collaboration among data providers, data users and other stakeholders. In the case of the SEEA, such accounts are compiled at the national level and are used in national planning. Collaboration among neighbouring countries to compile comparable accounts would support the analysis of transboundary issues. A partnership to compile ocean accounts at the global level would be instrumental in developing a comprehensive global assessment.

As in the SEEA-EEA, the **Ocean Asset** is a combination of **Extent** and **Condition**. That is, the provision of physical services from a given location depends on the type and condition of that location. It would be beneficial to designate certain areas, services and species as Critical Natural Capital<sup>2</sup>.

**Ocean Extent:** would map not only ocean ecosystem types (distinguishing benthic from pelagic), but also other spatial features including locations of protected areas, fishing zones, minerals, ocean communities, coastal and marine infrastructure, depths, shipping lanes, upwelling areas (among others).

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<sup>2</sup> Critical Natural Capital are designated ecosystems, services and species that are set aside from being traded off for financial capital (Saner & Bordt, 2017).

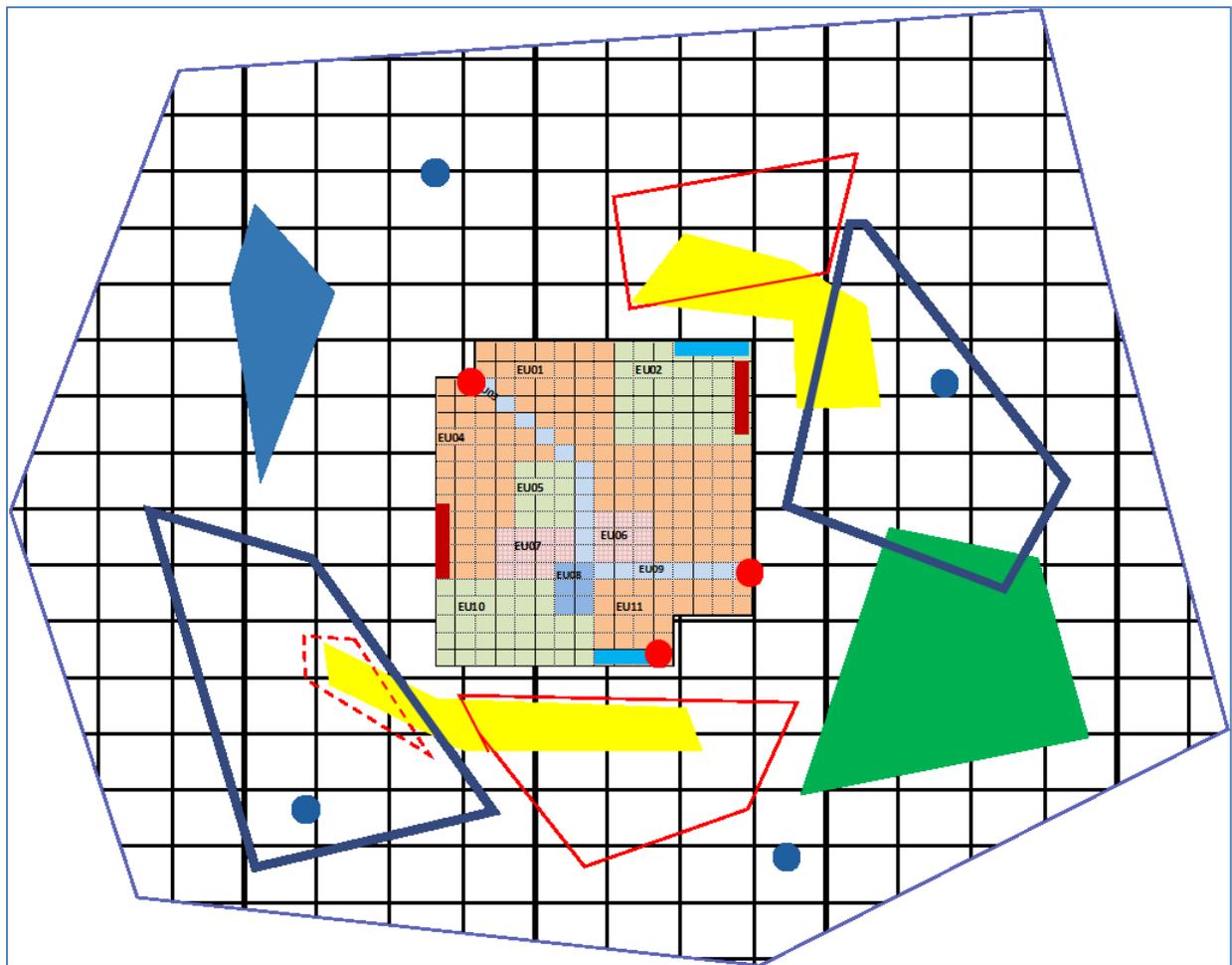
Figure 1 A stylized set of ocean accounts

| Drivers  |          |            | Ocean Assets:  |                                   |   |               |                 | Ocean Services Supply (physical)  |  |  |  |
|--|----------|------------|--|-----------------------------------|---|---------------|-----------------|---|--|--|--|
| Specific units   | Industry | % to ocean | Ocean Extent   |                                   | Minerals (T)  | Energy (MTOE) | Fish stocks (T) | Service   | Ecosystem Types (ha)   |  |  |
| SEEA Air emissions   |          |            | Beginning of period  |                                   |   |               |                 | Provisioning  |  |  |  |
| SEEA Effluents <sup>1</sup>  |          |            | + additions  |                                   |   |               |                 | Regulating and maintenance  |  |  |  |
| SEEA Solid wastes <sup>1</sup>   |          |            | - reductions   |                                   |   |               |                 | Cultural  |  |  |  |
| <sup>1</sup> would benefit from spatial disaggregation   |          |            | End of period  |                                   |   |               |                 | Abiotic: Minerals, energy, medium for transport                                 |  |  |  |
| Ocean governance   |          |            | Ocean Conditions   |                                   |   |               |                 | Ocean Services Use (physical)   |  |  |  |
| Specific units   | Industry |            | Specific units   | Ecosystem Types <sup>2</sup> (ha) | Minerals (T)  | Energy (MTOE) | Fish stocks (T) | Service   | Beneficiary type <sup>3</sup>                                    |  |  |
| Policies, plans and regulations  |          |            | Acidification (pH)   |                                   |   |               |                 | Provisioning  |  |  |  |
| Institutions   |          |            | Eutrophication (BOD)   |                                   |   |               |                 | Regulating and maintenance  |  |  |  |
| Management practices   |          |            | Plastics (T)   |                                   |   |               |                 | Cultural  |  |  |  |
| Technologies   |          |            | Temperature (°C)   |                                   |   |               |                 | Abiotic: Minerals, energy, medium for transport                                 |  |  |  |
| SEEA EPE   |          |            | Accessibility/quality  |                                   |   |               |                 | <sup>3</sup> Disaggregated by coastal/urban/rural, high/low income, male/female |  |  |  |
| - research   |          |            | <sup>2</sup> Including critical natural capital areas, settlements, coastal infrastructure, protected areas, fishing zones, designated tourist areas, coral reefs, mangroves, coastal beaches... |                                   |   |               |                 |   |  |  |  |
| - enforcement  |          |            |  |                                   |   |               |                 |   |  |  |  |
| SEEA EGSS  |          |            |  |                                   |   |               |                 |   |  |  |  |
| - technologies   |          |            |  |                                   |   |               |                 |   |  |  |  |
| Note: This is a stylistic representation of the SEEA-EEA with additional components required for including sources of land-based pollution, abiotic services (such as minerals, energy and medium for transport), expenditures and governance. This is not as comprehensive as described in the text. Much of the data on flows of land-based pollution, ecosystem types, and condition would be derived from detailed maps and aggregated as shown in the tables for reporting. |          |            |  |                                   | SNA for some services <sup>5</sup>  |               |                 |   | Ocean Services Supply (Monetary <sup>4</sup> )                   |  |  |
|  |          |            |  |                                   | <sup>5</sup> Would benefit from disaggregation by large/small enterprise and linkage to employment by beneficiary type. |               |                 |   | Service  |  |  |
|  |          |            |  |                                   |   |               |                 |   | Ecosystem Types (ha)   |  |  |
|  |          |            |  |                                   |   |               |                 |   | Provisioning   |  |  |
|  |          |            |  |                                   |   |               |                 |   | Regulating and maintenance                                       |  |  |
|  |          |            |  |                                   |   |               |                 |   | Cultural   |  |  |
|  |          |            |  |                                   |   |               |                 |   | Abiotic: Minerals, energy, medium for transport                  |  |  |
|  |          |            |  |                                   |   |               |                 |   | <sup>4</sup> Only some services can be valued in monetary terms. |  |  |
|  |          |            |  |                                   |   |               |                 |   | Ocean Services Use (Monetary <sup>4</sup> )                      |  |  |
|  |          |            |  |                                   |   |               |                 |   | Service  |  |  |
|  |          |            |  |                                   |   |               |                 |   | Beneficiary type   |  |  |
|  |          |            |  |                                   |   |               |                 |   | Provisioning   |  |  |
|  |          |            |  |                                   |   |               |                 |   | Regulating and maintenance                                       |  |  |
|  |          |            |  |                                   |   |               |                 |   | Cultural   |  |  |
|  |          |            |  |                                   |   |               |                 |   | Abiotic: Minerals, energy, medium for transport                  |  |  |

**Ocean Condition:** would map water quality measurements (acidification, eutrophication, plastics, coral bleaching, other pollutants), but also other biophysical conditions (e.g., biodiversity, temperature, currents, frequency of storms, sea level, population and infrastructure exposed to natural hazards) required for the interpretation of ocean services.

**Ocean Services (physical supply and use):** would include relevant ecosystem services (materials, aquatic resources, coastal protection, carbon sequestration, recreation, climate regulation), but also abiotic services such as minerals, energy, and medium for transport). The concept of “beneficiary” would ideally be disaggregated for population target groups (coastal/urban/rural; male/female; high/low income). SEEA-AFF provides guidance on measuring stocks and flows of aquatic resources and their contribution to nutrition.

Figure 2. A spatial representation of Ocean Accounts



Legend:

|   |  |   |   |
|---|--|---|---|
|  | Terrestrial ecosystem types<br>(from Land Account) |  | Ocean ecosystem types                         |
|  | Coastal infrastructure                             |  | Marine protected area                         |
|  | Coastal communities                                |  | Mining areas                                  |
|  | Point source of pollution                          |  | Fishing area                                  |
|  | Ocean spatial units                                |  | Water quality, condition measurement location |

**Ocean Services (value):** would include monetary values of the physical services, but also measures of ocean integrity and social values. Some of the monetary values can be estimated from the SNA (e.g., fishery industry) but would require disaggregation (e.g., large/small scale fishing operations). As in the SEEA-EEA, it is possible to:

- estimate the future flow of ecosystem services to estimate a monetary value of the asset given different scenarios (e.g., restrict fishing/allow unrestricted fishing),
- use these values to estimate the resource “rent” or return on investment given the expected future conditions (e.g., what would be the future value of ocean services with additional investment in pollution reduction?),
- develop economic production functions that include the contribution of the ocean to other economic activities (e.g., food, tourism, energy), and
- include the contribution of the ocean to national wealth (the National Balance Sheet).

To provide a comprehensive view of the ocean, other datasets could also be linked:

- Ocean Drivers (of change) not spatially detailed:
  - SEEA Air Emissions (GHGs and others)
  - SEEA-AFF provides additional guidance on environmental impacts of agriculture, forestry and fishery industries (land use, GHG emissions, water consumption, energy consumption)
- Ocean Drivers (of change) spatially detailed:
  - SEEA Water Emissions (effluents) would require locating point sources and determining which flowed into the ocean;
  - SEEA Solid Wastes (distinguishing plastics, hazardous wastes) would require locating point sources of waste disposal;
  - SEEA Minerals and Energy Assets: to estimate physical quantities and monetary value of ocean mineral and energy assets; and
  - SEEA Material Flows: to link harvesting/exploitation/capture of ocean assets with economic units supplying and using them. This may not be required if the Ocean Services Supply/Use Accounts are sufficiently detailed.
- Ocean Governance (could be spatially detailed if sub-national):
  - National legislation, regulations and institutions in place for sustainable management of the ocean including effectiveness of enforcement. The SEEA Environmental Activities Accounts provide guidance on measuring environmental protection expenditures (including research); and
  - Management practices and technologies in use (including community-based approaches).

## 4. Issue briefs

Many of the following issues has been considered from a scientific, economic or policy perspective (e.g., the [OECD Ocean Economy and Innovation](#) initiative, and the [First Global Integrated Marine Assessment](#)). However, many of these initiatives suggest the need for a comprehensive statistical framework to help standardize and integrate the wealth of data and knowledge that exist. Implicit in the further development of these issue briefs is the need to consider current initiatives that could benefit from and contribute to strengthening ocean data and statistics for sustainable management.

### 4.1 Spatial units and ecosystem type classification

1. Objective: Recommend standard approach to delineating spatial units coherent with international methods and SEEA.
2. Existing guidance: The SEEA-EEA delineates basic spatial units (BSUs) as a pixel of land cover from satellite imagery that can be aggregated to higher levels (Ecosystem Accounting Unit, EAU) by common properties and proximity.
3. Issue in more detail: Delineating spatial units in coastal and marine areas would benefit from a recognition of distinct benthic (sea bottom) and pelagic (surface) ecosystems. Many countries have delineated coastal and marine ecosystem based on ecological and physical properties or management areas within their EEZs. Higher level reporting units in the SEEA are terrestrial (catchment area) and administrative (state, province). Are there equivalents for the ocean?
4. Alternative approaches: South Africa (SANBI) coastal and marine (benthic and pelagic) ecosystems. Many international organizations (e.g., [One Shared Ocean](#)) are applying delineation of Large Marine Ecosystems (LMEs) plus separate statistics for open seas. Earth observation is being applied to delineate important coastal and marine ecosystems. Can it be applied nationally or globally? Would a global grid system be appropriate? Would ocean mapping benefit from standard approaches (i.e., equivalent to/application of National Spatial Data Infrastructure)? Mapping and modelling the ocean may benefit from recent advances in three-dimensional visualization (e.g., voxel or vertical pixel).

### 4.2 Ecosystem Services

1. Objective: Review ecosystem services classifications with respect to the ocean and recommend adaptations or expansions if required.
2. Existing guidance: The SEEA-EEA bases its examples on the Common International Classification of Ecosystem Services (CICES). The European Environment Agency (March 2016) concluded that the CICES did not cover all ocean-related ecosystem services (e.g., tidal and wave power generation, receiving discharge, placement of infrastructure, medium for transport, medium for cultivation...). Biodiversity is generally treated as an ecosystem condition.
3. Issue in more detail: The concept of “ecosystem services” is often portrayed as a “boundary object”—intentionally imprecise to foster communication between the multiple disciplines (Bordt, 2018). However, statistical measurement requires precise definitions and classifications. Work is ongoing to develop an international statistical classification (UNCEEA research agenda). A review of ocean-related ecosystem services research would support the adaptation of such classifications to the ocean. (“Which ecosystems provide which services?” in Bordt, 2017).
4. Alternative approaches: The US has developed the Final Ecosystem Goods and Services – Classification System (FEGS-CS). FEGS-CS and CICES have different scopes and approaches (Bordt, 2015). The CICES has since been updated based on, among other inputs, reviews of its applicability to ocean and marine ecosystem services. In the development of the SEEA-EEA, the importance of tracking ecosystem function (e.g., primary production, nutrient

cycling, decomposition) was recognized, but not incorporated. This may be an opportunity to prototype a more inclusive ecosystem services classification.

### 4.3 Climate Change and Disaster Risk (could be divided into two)

1. Objective: To review existing frameworks for (a) disaster risk and (b) climate change statistics. To suggest where linkages to the ocean exist and where such linkages need to be developed.
2. Existing guidance:
  - a. Disaster risk: The SEEA-EEA provides a spatial framework for delineating ecosystems (e.g., mangroves, coastal beaches) that mitigate or are affected by ocean-related disasters. The Sendai Framework provides several disaster-related definitions and indicators. The Disaster-Related Statistical Framework (DRSF) provides guidance on measuring disaster risk and impacts
  - b. Climate change: The SEEA Central Framework provides guidance on calculating GHG emissions. The SEEA-EEA includes guidance on tracking biocarbon (Carbon Account) as a component of ecosystem condition. The UN Economic Commission for Europe has developed a set of key climate-change related indicators, many of which can be derived from the SEEA.
3. Issue in more detail:
  - a. Case studies using the DRSF have been conducted and could be investigated for standard measures that could be used in an Ocean Account.
  - b. COP23 recently recognized the important role of the ocean in mitigating climate change (Fiji Ocean Pathway). The appropriateness of the existing IPCC framework to measuring ocean carbon and its sources should be investigated. It would be useful to review plans for the forthcoming (2019) IPCC “Special Report on the Ocean and Cryosphere in a Changing Climate”.
4. Alternative approaches: One area of investigation could be to determine a core set of statistics common to the three themes (ocean, climate change and disaster risk); for example, delineating coastal communities, infrastructure and ecosystems, and linking ocean conditions (e.g., frequency of storms, currents, phytoplankton distributions) to climate and disaster risk.

### 4.4 Links to Social Concerns

1. Objective: To develop guidelines on integrating social concerns into Ocean Accounts.
2. Existing guidance: The SEEA-CF considers the supply, use and activities (expenditures) by economic units (businesses, governments and households). Businesses are generally disaggregated by industry sector. However, there is no guidance on disaggregating households or individuals by target demographics (age, income, sex, urban/rural/coastal, disability status, indigenous status, industry of employment) required for many of the ocean-related SDG targets (**Annex 1**). The SEEA-EEA similarly treats beneficiaries of ecosystem services as one aggregate. These both parallel the classification of economic units in the SNA. The Social Accounting Matrix (SAM) is an approach for disaggregating economic activities (generally employment) in the SNA by these target demographics.
3. Issue in more detail: Many related statistics are collected using household and business surveys, but have not been linked to existing frameworks (SNA, SAM, SEEA). Ocean Accounting could establish approaches for linking disaggregated social data with location (upland/coastal), ecosystem condition (degraded/pristine) and sources of natural inputs (coastal/marine fisheries, aquaculture). The approach has been incorporated into the [Poverty Environment Accounting Framework](#). This issue links with disaster risk and climate change, since disaggregated demographic data is one of the common requirements.

4. Alternative approaches: Many countries have ongoing large-sample household surveys and Censuses that could be exploited. Ideally, respondents to these are georeferenced. Many case studies exist that link target populations with environmental conditions in specific locations, but few (if any) at the national level. These could be reviewed in terms of good practices. Alternative data sources (spatial, crowdsourcing, big data, analytics) could be explored.

#### **4.5 Links to Economic Concerns (could be divided into two)**

1. Objective: To integrate economic concerns into Ocean Accounts. One issue (a) is to ensure that standard economic accounts (SNA-based) fully include the direct economic benefits of the ocean. The other issue (b) is to augment standard economic accounts with additional (non-SNA) benefits of marine resources.
2. Existing guidance: The SNA is based on a standard industrial classification that includes the fishery as an aggregate industry. The International Standard Industrial Classification of All Economic Activities (ISIC Rev. 4) includes categories for marine fishing (0311), marine aquaculture (0321), sea and coastal water transport (501), and other ocean-related industries. The SEEA-CF provides guidance on measuring the physical supply and use of minerals and energy, and aquatic resources. SEEA-AFF provides additional examples of the supply and use of aquatic resources for food. Work is [ongoing](#) to expand the Tourism Satellite Accounting approach to include a broader view on the impacts, conditions and beneficiaries of tourism activities. The SEEA-EEA provides guidance on valuing ecosystem services that is coherent with the SNA. (See Ecosystem Services, above).
3. Issue in more detail:
  - a. Including direct benefits in standard economic accounts: The SEEA approach to linking up measures of physical natural stocks (e.g., timber stocks), their supply to the economy, and their use within the economy has been used to correct for undercounting in the SNA. This is done by (i) expanding the scope of measurement beyond the main industry and (ii) by comparing these changes in stocks with the supply implied in the SNA. An example of (i) is that the logging industry does not account for non-timber forest products (NTFP) such as fuelwood, bark and sap. NTFPs may be derived from household surveys and correct for undercounting in the SNA. An example of (ii) is that a physical assessment of timber stocks may imply a certain reduction due to logging. The SNA, based on industry surveys, would not capture all that reduction. The difference could be illegal or unreported logging. This approach could be applied to fish stocks as well, but would require an understanding of the spatial dynamics of fish stocks.
  - b. Accounting for non-SNA benefits: The SEEA-EEA discourages monetization of non-SNA ecosystem services such as most regulating and maintenance services, and some cultural services. Monetization of non-SNA services is often done in ecological economics using approaches such as contingent valuation. The rationale for not monetizing regulating and maintenance services (such as water purification and coastal protection) is that they are not traded on the market but are essential to long-term ecosystem integrity. Many cultural services, as well, are not traded on the market (e.g., spiritual significance of an area). Approaches that could be explored include the development of non-monetary aggregates of non-SNA benefits (e.g., contribution to ecosystem integrity, social preferences) and the designation of Critical Natural Capital.
4. Alternative approaches: Comprehensive Wealth Accounting can take a longer-term perspective on maintaining natural resource stocks. It can do so by comparing future returns on investment on the exploitation of natural resources. For example, countries may be investing in the fishing industry while at the same time polluting the waters. Comprehensive

Wealth Accounting would calculate whether the net “rent” or return on investment is positive or negative. TEEB has a plan for TEEB-Oceans. IPBES has also considered assessing the ocean. The Natural Capital Coalition is developing an ocean supplement. The guidance on ocean accounts would benefit from and contribute to these initiatives.

#### 4.6 Global Data Availability

1. Objective: To review sources of global data that could be applied to national, regional or global Ocean Accounts.
2. Existing guidance: UN Oceans has produced an [inventory](#) of the mandates of its members. These members and other communities have also produced ocean data portals and conducted global assessments of specific topics. [The First Global Integrated Marine Assessment](#) provides a wealth of knowledge on many of the issues discussed here and suggests further work on integrating existing data and filling gaps for the next UN World Ocean Assessment.
3. Issue in more detail: ESCAP is developing an inventory of spatially-detailed global data with the intent of identifying ongoing global ocean measurement activities compatible with the Ocean Accounts. The intent is not simply to list the data sources, but to assess and eventually integrate the data into a pilot global ocean account. It is not expected that the global data would be sufficiently detailed (spatially and temporally) or comprehensive for national analysis. However, it could provide a starting point for countries with incomplete national data.
4. Alternative approaches: One alternative would be to build a global database from country-level detailed data. This is already being done for some global datasets (e.g., fish catch) and other topics (e.g., FAO Soil and Land Cover). The [Ocean Health Index](#) uses country-level and open seas data to assess national performance.

#### 4.7 Progress on Measuring SDG14

1. Objective: Review efforts to develop metadata (measurement standards) for SDG14-related indicators. Can these be linked to specific components of the ocean accounts?
2. Existing Guidance: [Metadata](#) for most SDG14 indicators are still under development.
3. Issue in more detail: Metadata for 14.4.1 (proportion of fish stocks within biologically sustainable levels; custodian FAO) and 14.5.1 (protected areas, custodians UNEP-WCMC, Bird Life International and IUCN) is reasonably mature, well applied and data exist for many countries. UN Environment has been developing metadata for 14.1.1 (coastal eutrophication and floating plastic debris), 14.2.1 (proportion managed using ecosystem-based approaches) and 14.5.1 (protected areas). The UN Environment Regional Seas Working group has also suggested a complementary indicator set (**Annex 2**).
4. Alternative approaches: Many other indicators on ocean state, ecosystems, their services and governance are collected across many international, regional and national stakeholders (See Global Data Availability). One objective of the Ocean Accounts is to provide a coherent measurement framework to support the production of SDG14 indicators. However, other indicators may be of national relevance and provide a coherent picture of the dynamics, tipping points, and services. One outcome of the workshop could be to agree on a “dashboard” (e.g., 30 indicators) of existing indicators as “core ocean indicators” that would include social, environmental and economic measures based on the ocean accounts.

#### 4.8 Ocean Governance (International, Regional and National)

1. Objective: To review international, and selected regional and national governance mechanisms with respect to their information needs. This issue could also include initiatives on new technologies and sustainable management approaches.

2. Existing guidance: SDG 14 implies a set of sustainable practices [14.2, 14.4, 14.7], policy directions [14.6, 14.b, 14.c], technologies [14.a].
3. Issue in more detail: This session will, in part, review ESCAP's work on good practices for the sustainable management of the ocean. It will also review new technologies that will have implications for measurement. For example, if community-based quotas are in place, how should they be measured? This would also be an opportunity to discuss the data/policy linkage: applications of integrated statistics in policy. It would also be an opportunity to review how stakeholders (government, business, civil society) can deliberate on producing and interpreting data and supporting common policy initiatives.
4. Alternative approaches: This presentation will likely follow a keynote lecture on ocean governance and at least two national case studies. It is an opportunity to better understand the links between data and policy. For example, assessing data requirements implied in the policy. ESCAP is developing a tool (based on EquiFrame) to assess the requirements of a policy for disaggregated social, economic and environmental data.

#### **4.9 Modelling the Ocean**

1. Objective: To review existing modelling approaches to the ocean and recommend areas for testing.
2. Existing guidance: The SEEA-EEA Expert Forum (UNSD, 2015) suggested a review of ecosystem services models with the intent of better understanding opportunities for applying them for official statistics. A review was initiated, but not completed (Bordt, Jackson and Ivanov, 2015). The SEEA-EEA does include a section on biophysical modelling, but this is limited to applying simple equations for interpolation and extrapolation.
3. Issue in more detail:
  - a. The term "modelling" for the purposes of this paper is intended to include any quantitative or qualitative approach used in the absence of measured data. This would include estimation, interpolation, projection and scenario approaches.
  - b. Other than estimating or projection the provision of ecosystem services, models have also been developed to estimate fish stock dynamics, economic production/consumption, ocean and climate dynamics and potential impacts from natural disasters.
  - c. As with the ecosystem services-related models reviewed, it is expected that other models could support the accounting approach in two ways: (a) estimating accounts data where data are unavailable and (b) using accounts data and classifications in models. It was envisioned that modelling and accounting could be mutually reinforcing. Projection models are generally out of the scope of the SEEA itself, but the calculation of asset values depends on assumptions about the future stream of services. It has been suggested that to accomplish this, a baseline future scenario would be required. For example, estimating a future stream of services based on expected changes in the extent and condition of the stock.
  - d. Better linking accounts with models is one approach to linking individual models together. For example, models focussing on stocks could be linked to models on production and consumption if concepts and classifications are aligned. Another advantage is that the accounts could provide a coherent database for more comprehensive models.
4. Alternative approaches: Options to be explored include (a) using modelling approaches to estimate missing data in accounts, (b) using accounts to provide data to models, (c) using scenario approaches to estimate future conditions, and (d) other projection approaches.

#### **4.10 (Placeholder for one additional theme or sub-division of one of the broad themes)**

- Could also have a session on outstanding issues:

- Data/knowledge gaps (see [World Ocean Assessment](#) Summary, Section VI.)
- Definition of ES (from concordance paper)
- Issues for testing, research
- Collaboration on data inventory, pre-assessments
- Additional national case studies

## 5. Provisional agenda

### Asia and the Pacific Regional Expert Workshop on Ocean Accounts

UN Conference Centre, Bangkok, Thailand

August 1-3, 2018

| Begin | End   | Day 1  | Suggested lead (tbd) |
|-------|-------|--|----------------------|
| 08:30 | 09:00 | Registration   |                      |
| 09:00 | 09:15 | Opening, Intro   |                      |
| 09:15 | 09:30 | Overview   |                      |
| 09:30 | 10:30 | Training (Statistics)                                      |                      |
| 10:30 | 11:30 | <b>Issue 1. Spatial units and ecosystem classification</b> |                      |
| 11:30 | 12:30 | Lunch  |                      |
| 12:30 | 13:00 | Case study: Indonesia                                      |                      |
| 13:00 | 14:00 | <b>Issue 2. Ecosystem Services</b>                         |                      |
| 14:00 | 15:00 | <b>Issue 3. Disaster risk and climate change</b>           |                      |
| 15:00 | 16:30 | Breakout groups  |                      |
| 16:30 | 17:00 | Report of breakout groups                                  |                      |
| Begin | End   | Day 2  |                      |
| 08:30 | 09:30 | Training (Ocean Science 101)                               |                      |
| 09:30 | 10:30 | <b>Issue 4. Links to Social Concerns</b>                   |                      |
| 10:30 | 11:30 | <b>Issue 5: Links to Economic Concerns</b>                 |                      |
| 11:30 | 12:30 | Lunch  |                      |
| 12:30 | 13:00 | Case study: Fiji   |                      |
| 13:00 | 14:00 | <b>Issue 6: Global Data Availability</b>                   |                      |
| 14:00 | 15:00 | <b>Issue 7: Progress on Measuring SDG14</b>                |                      |
| 15:00 | 16:30 | Breakout groups  |                      |
| 16:30 | 17:00 | Report of breakout groups                                  |                      |
| Begin | End   | Day 3  |                      |
| 08:30 | 09:30 | Training (Ocean Governance)                                |                      |
| 09:30 | 10:30 | <b>Issue 8: Ocean Governance</b>                           |                      |
| 10:30 | 11:30 | <b>Issue 9: Modelling the ocean</b>                        |                      |
| 11:30 | 12:30 | Lunch  |                      |
| 12:30 | 13:00 | Pre-assessments for additional case study countries        |                      |
| 13:00 | 14:00 | <b>Issue 10:</b>   |                      |
| 14:00 | 15:30 | Breakout groups  |                      |
| 15:30 | 16:00 | Report of breakout groups                                  |                      |
| 16:00 | 16:30 | Summary of responses to issue papers                       |                      |
| 16:30 | 17:00 | Wrap-up and closing  |                      |

Lunch could include posters & training (e.g., group work on SEEA Water in breakout rooms).