

SEEA Experimental Ecosystem Accounting Revision

Discussion document on the SEEA EA indicators in Ch.14

29 November 2020

Background

1. This document proposes pathways forward for SEEA EA chapters 14 based on initial feedback received from the recent Forum on indicators. The following points are made with respect to taking forward Chapter 14 on indicators.
 - a. Section 14.1, 14.2 and 14.3 were considered to be focused on the appropriate issues in terms of providing an introduction, a discussion on the role of accounting with respect to indicators and, section 14.3 proposals for indicators from each of the ecosystem accounts. A general observation is that the content of Chapter 14 is not intended to be exhaustive with respect to every possible indicator but rather to provide a clear message on the potential for accounting to underpin the derivation of coherent indicators.
 - b. Further work is required to finalise the indicators from each of the ecosystem accounts, taking into consideration the discussion at the Forum and also any feedback from the Global Consultation process. It will be appropriate to involve each of the working groups in finalising the indicators for each of the accounts.
 - c. It is proposed that Section 14.4 should be focused on describing links to reporting frameworks. The core text for this section should be general and limited to using SDG, post-2020 biodiversity, climate change (UNFCCC) and land degradation (UNCCD) frameworks as examples. Other reporting initiatives (e.g. RAMSAR) could be mentioned but not to be discussed in detail. Such detail is likely best included in another reference document. It is proposed that indicators lists related to SDG and post-2020 biodiversity indicators could be included in an annex (or included in a separate document depending on the timing of finalisation of those indicators).
 - d. The detail on specific indicators from thematic accounts should be included in Chapter 13 but a general discussion on indicators from a thematic perspective could be integrated into Section 14.4. Based on these points, it is proposed to organise the structure of section 14.4 as follows:
 - SEEA EA links to global reporting framework – mainly on SDGs, post-2020 GBF, climate change and land degradation (UNCCD)
 - SEEA EA links to national reporting framework (e.g. State of Environment) and including a general discussion on the DPSIR
 - Other themes – covering oceans, urban areas, protected areas, wetlands, etc

2. The purpose of this document is to advance the discussion on the selection of indicators from each of the core account. Pending incorporation of views of the SEEA EEA Technical Committee, the SEEA EEA indicator working group and comments from the global consultation, a re-drafted chapter will be circulated with other chapters for finalization in January.

Selection of the SEEA EA indicators in Chapter 14

3. The aspiration of Chapter 14 in the SEEA EA is to identify a limited set of indicators derived from the SEEA EA framework that are and are relevant for national and global policy. Main content of the section related to indicator cover the followings:
 - a. Value-added of using SEEA EA in deriving a wide-range of indicators
 - b. Identification of a selected number of indicators that can be derived from the cores accounts of the SEEA EA
 - c. Highlighting potential indicators in the monitoring framework of the post-2020 Global Biodiversity Framework (GBF) and Sustainable Development Goals (SDGs) that could be linked to SEEA EA, and a brief elaboration on the linkage of SEEA EA indicator to various indicator initiatives
4. The underlying conceptual basis of the proposed indicators is based on chapter 3-11 of the SEEA EA. Majority of indicators presented are output indicators that can be directly generated from the SEEA EA accounts for tracking national and global progress. It also contains indicators that have been developed and implemented by the scientific communities, but nevertheless can be derived from the ecosystem accounts using additional further compilation and analysis.

Indicators from ecosystem extent accounts

5. The ecosystem extent account describes the extent of the various ecosystem types presented in an accounting area and how the extent changes within the accounting period. The ecosystem types are based on the IUCN Global Ecosystem Typology (GET), which provides a top level of 4 realms, a 2nd level of 24 biomes and a 3rd level of 89 ecosystem functional groups. Depending on the application, alternative aggregations may be developed to align with the reporting requirements at the national and international level. The following indicators from ecosystem extent account in Table 1 were proposed in Ch.14 and discussed at the SEEA EA Forum in Nov 2020.

Table 1: Potential indicators on ecosystem extent in Ch.14

Extent indicators	Spatial unit	Disaggregation	Unit of measurement
Percentage of ecosystem accounting area covered by specific types, including: urban areas (IUCN GET T7.4) agricultural areas (IUCN GET T7.1, T7.2, T7.3)	Ecosystem accounting area	Ecosystem type	Hectares; % of opening

forests (IUCN GET T1, T2) wetlands (IUCN GET F1, F2, TF1, FM1, MFT1)			
Change of area covered by specific ecosystem types during an accounting period, including: urban areas (IUCN GET T7.4) agricultural areas (IUCN GET T7.1, T7.2, T7.3) forests (IUCN GET T1, T2) wetlands (IUCN GET F1, F2, TF1, FM1, MFT1)	Ecosystem accounting area	Ecosystem type	%
Percentage of area unchanged (opening stock – reduction),	Ecosystem accounting area	Ecosystem type	Hectares; % of opening
Percentage of area changed (additions + reductions),	Ecosystem accounting area	Ecosystem type	Hectares; % of opening

6. The forum discussed the above proposed indicators in terms of their feasibility, reliability and representativity. There was a specific suggestion at the Forum to include an ecosystem extent index that measure extent at the end of the accounting period as a proportion of historical extent. However, the issue on how to determine the historical reference extent remains unresolved that will require further discussion. Hence, rather than considering an historical extent index as an additional indicator, it was suggested to incorporate this issue in the description on determining the opening stock when measures changes in the chapter.
7. There are strong demand to identify indicators for natural ecosystem and protected area coverage in the global monitoring framework. Such indicators are proposed as the headline indicators in the GBF monitoring framework . Consider their relevance, it is suggested to consider the inclusion of these two indicators as the indicators from the extent accounts.

Table 2: Headline indicators related to ecosystem extent in the GBF monitoring framework

<i>Proposed goal or target</i>	<i>Proposed indicators</i>	<i>Possible disaggregations</i>	<i>Links to relevant Sustainable Development Goals</i>
Goal A. The area, connectivity and integrity of natural ecosystems increased by at least [X%] supporting healthy and resilient populations of all species while reducing the number of species that are threatened by [X%] and maintaining genetic diversity	A.0.1 Extent of selected natural ecosystems (forest, savannahs and grasslands, wetlands, mangroves, saltmarshes, coral reef, seagrass, macroalgae and intertidal habitats)	By ecosystem type	6.6.1, 11.3.1, 15.1.1, 15.3.1
Target 2. By 2030, protect and conserve through well connected and effective system of protected areas and other effective area-based conservation measures at least 30% of the planet with the focus on areas particularly important for biodiversity	2.0.1 Protected area coverage of important biodiversity areas	By ecosystem type	Linked to 14.5.1, 15.1.2, 15.4.1 (national definition of important areas)

8. Members of the Indicator working group are invited to comment on the proposed indicator list and the following discussion questions:

- a. For extent indicators that measure change, how to determine the opening stock (based on last year or a reference year)?
- b. Do you have any suggestion on extent indicators for natural ecosystem and protected area that are Feasible, relevant and representative. Table 3 proposes additional indicators on protected area and natural ecosystem based on the proposal from the GBF monitoring framework.

Table 3: Proposed indicators on ecosystem extent related to protected area and natural ecosystem

Extent indicators	Spatial unit	Disaggregation	Unit of measurement
Percentage of protected area coverage in the ecosystem accounting area	Ecosystem accounting area	Ecosystem type	Hectares; % of opening
Percentage of ecosystem accounting area covered by natural ecosystem, including: <ul style="list-style-type: none"> • forest, savannahs and grasslands, wetlands, mangroves, saltmarshes, coral reef, seagrass, macroalgae and intertidal habitats 	Ecosystem accounting area	Ecosystem type	Hectares; % of opening

Indicators from ecosystem condition accounts

9. The ecosystem condition account records data on the state and functioning of ecosystem area within an ecosystem accounting area using a combination of relevant variables and indicators. The selected variables and indicators reflect changes over time in the key characteristics of each ecosystem asset. Ecosystem condition accounts are compiled in physical terms. Ecosystem condition indexes and sub-indexes are composite indicators that are aggregated from (ecosystem condition indicators. The use of ecosystem condition typology and compatible reference levels (e.g., through a common reference condition) underpins the aggregation process. Many condition indicators are developed and implemented by the scientific communities that can be integrated into the condition accounts of the SEEA EA for further aggregation. The following indicators from ecosystem condition account in were proposed in Ch.14 and discussed at the SEEA EA Forum in Nov 2020.

Table 4: Potential indicators on ecosystem condition in Ch.14

Ecosystem condition indicators	Further description	Spatial unit	Disaggregation	Unit of measurement
Overall ecosystem condition index		Ecosystem accounting area	Ecosystem type, ecosystem condition classes	Index

Physical state indicator	Overall physical state characteristics of an ecosystem asset (including characteristics on soil structure, water availability)	Ecosystem type	Ecosystem condition sub-classes	Index
Chemical state indicator	Overall chemical state characteristics of an ecosystem asset (including characteristics on soil nutrient levels, water quality, air pollutant concentrations)	Ecosystem type	Ecosystem condition sub-classes	Index
Compositional state indicator	Overall compositional state characteristics of an ecosystem asset (including characteristics on species diversity)	Ecosystem type	Ecosystem condition sub-classes	Index
Structural state indicator	Overall compositional state characteristics of an ecosystem asset (including characteristics on vegetation, biomass, food chains)	Ecosystem type	Ecosystem condition sub-classes	Index
Functional state indicator	Overall functional state characteristics on an ecosystem asset (including characteristics on ecosystem process, disturbances regimes)	Ecosystem type	Ecosystem condition sub-classes	Index
Landscape / seascape indicator	Overall characteristics on landscape (including landscape diversity, connectivity fragmentation, embedded semi-natural elements in farmland)	Ecosystem type	Ecosystem condition sub-classes	Index

10. During the forum, it was pointed out that find a consensus of reference condition at global level is important. On one hand, there was support for a limited set of high-level aggregate condition index, and on the other hand the discussion noted the measurement issue on aggregate index and the need to be more prescriptive on condition indicators. Finally, it was noted that pressure indicators are not considered as part of condition indicators, but they are equally important for their own rights. It was suggested to have a more consistent on pressure in the SEEA EA framework.

11. Similar to the discussion on extent account, the GBF monitoring framework as well as SDGs cover several headline indicators that could potential linked to the ecosystem condition accounts. Consider their relevance, the proposal here is to consider these indicators as the key indicators from the condition accounts.

Table 5: Headline indicators related to ecosystem extent in the GBF monitoring framework

<i>Proposed goal or target</i>	<i>Proposed indicators</i>	<i>Possible disaggregations</i>	<i>Links to relevant Sustainable Development Goals</i>
Goal A. The area, connectivity and integrity of natural ecosystems increased by at least [X%] supporting healthy and resilient	A.0.2 Living Planet Index	By species group	

<i>Proposed goal or target</i>	<i>Proposed indicators</i>	<i>Possible disaggregations</i>	<i>Links to relevant Sustainable Development Goals</i>
populations of all species while reducing the number of species that are threatened by [X%] and maintaining genetic diversity i)	A.0.3 Red list index	By species group	15.5.1
	A.0.4 Species habitat index	By species group	
	A.0.5 The proportion of populations maintained within species*	By species group	
Target 2. By 2030, protect and conserve through well connected and effective system of protected areas and other effective area-based conservation measures at least 30% of the planet with the focus on areas particularly important for biodiversity	2.0.1 Species Protection Index	By ecosystem type	
Target 6. By 2030, reduce pollution from all sources, including reducing excess nutrients [by x%], biocides [by x%], plastic waste [by x%] to levels that are not harmful to biodiversity and ecosystem functions and human health	6.0.3 Proportion of water with good ambient water quality (freshwater and marine)	By water body type	14.1.1a and 6.3.2
Target 11. By 2030, increase benefits from biodiversity and green/blue spaces for human health and well-being, including the proportion of people with access to such spaces by at least [100%], especially for urban dwellers	11.0.1 Average share of the built-up area of cities that is green/bluespace for public use for all		11.7.1
Target 14. By 2030, achieve reduction of at least [50%] in negative impacts on biodiversity by ensuring production practices and supply chains are sustainable	14.0.1 Potential population and species loss from terrestrial and marine human modification*	By species group	

SDG indicators
6.3.2 - Proportion of bodies of water with good ambient water quality
15.3.1 - Proportion of land that is degraded over total land area
15.4.2- Mountain Green Cover Index
15.5.1 - Red List Index

12. Members of the Indicator working group are invited to comment on the proposed indicator list and the following discussion questions:

- a. What is your view on the inclusion of the the following GBF and SDG indicators as part of the key indicators from the SEEA EA condition accounts

- i. Living Planet Index (GBF)
 - ii. Red list index (SDG, GBF)
 - iii. Species habitat index (GBF)
 - iv. Proportion of populations maintained within species (GBF)
 - v. Species protection index (GBF)
 - vi. Proportion of water with good ambient water quality (GBF, SDG)
 - vii. Proportion of land that is degraded over total land area (SDG)
 - viii. Mountain Green cover index (SDG)
- b. Your thoughts on the possibility to identify a limited set of indicator for each of the ecosystem condition typology class (i.e. physical state, chemical state, compositional state, structural state, functional state, landscape, seascape)

Indicators from ecosystem services flow accounts

13. The physical ecosystem services flow accounts describe the ecosystem services generated by ecosystem asset in volume terms. The ecosystem services are classified as provisioning, regulating and maintenance, and cultural services. Indicators from the accounts commonly focus on measuring the supply side of ecosystem service flows in physical units such as cubic metres and tonnes, but quantification of ecosystem contributions can also take place through a focus on the use of ecosystem services. The following indicators from physical ecosystem services flow account in were proposed in Ch.14 and discussed at the SEEA EA Forum in Nov 2020.

Table 6: Potential indicators on physical ecosystem services flow in Ch.14

Physical ecosystem services flow indicators	Further description	Spatial unit	Disaggregation	Unit of measurement
Amount of biomass generated	Biomass provisioning services	Ecosystem accounting area	Ecosystem type; Type of biomass	Tonnes
Water abstracted for use by household and industry (proxy measure)	Water supply services	Ecosystem accounting area	Ecosystem type	Cubic metres
Tonnes of carbon retained (captured and stored/trend in the carbon sequestered)	Global climate regulation services	Ecosystem accounting area	Ecosystem type	Tonnes
Tonnes of airborne pollutants captured (e.g., PM10; PM2.5)	Air filtration services	Ecosystem accounting area	Ecosystem type; type of pollutant	Tonnes
Tonnes of waterborne pollutants removed (e.g., chemical oxygen demand) from wastewater	Water purification services	Ecosystem accounting area	Ecosystem type, type of pollutant	Tonnes
Number of properties/ km of coast/shoreline/riparian zone protected; change in degree of risk	Flood mitigation services	Ecosystem accounting area	Ecosystem type	Count/km

Number of tourist/recreation visits	Recreation-related services	Ecosystem accounting area	Ecosystem type	Count
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14. The forum discussed the above proposed indicators in terms of their feasibility, reliability and representativity, noting that most of them are feasible covering a selected number of provisioning, regulating and maintenance services and cultural service. The discussion also pointed to the importance to have disaggregated measures. On biomass provision, it was noted that the focus of this indicator should be on measuring the ecological contribution. Finally, there was suggestion to include threshold-based indicator that could inform sustainability
15. The GBF monitoring framework covers several headline indicators that could potential linked to the ecosystem services accounts. Consider their relevance, the proposal here is to consider these indicators as the key indicators

Table 7: Headline indicators related to physical ecosystem services flow in the GBF monitoring framework

<i>Proposed goal or target</i>	<i>Proposed indicators</i>	<i>Possible disaggregations</i>	<i>Links to relevant Sustainable Development Goals</i>
Goal B. Nature's contributions to people have been valued, maintained or enhanced through conservation and sustainable use, supporting the global development agenda for the benefit of all people	B.0.1 Population benefiting from ecosystem services*	By ecosystem type and type of service	
Target 4. By 2030, ensure that the harvesting, trade and use of wild species of fauna and flora, is legal, at sustainable levels and safe.	4.0.2 Proportion of fish stocks within biologically sustainable levels	By type of fish	14.4.1
Target 7. By 2030, increase contributions to climate change mitigation adaption and disaster risk reduction from nature-based solutions and ecosystems based approached, ensuring resilience and minimising any negative impacts on biodiversity	7.0.1 Total climate regulation services provided by ecosystems*		
Target 8. By 2030, ensure benefits, including nutrition, food security, livelihoods, health and wellbeing, for people, especially for the most vulnerable through sustainable management of wild species of fauna and flora.	8.0.1 Number of people using wild resources for energy, food or culture (including firewood collection, hunting and fishing, gathering, medicinal use, craft making, etc)*	By type of resource	
Target 10. By 2030, ensure that, nature based solutions and ecosystem approach contribute to regulation of air quality, hazards and extreme events and quality and quantity of water for at least [XXX million] people.	10.0.1 Population living in areas with clean air and clean and accessible water*		
	10.0.2 Ecosystems providing reduced coastal erosion, flood protection and other services)*	By sex	1.5.1, 11.5.1, 13.1.1

<i>Proposed goal or target</i>	<i>Proposed indicators</i>	<i>Possible disaggregations</i>	<i>Links to relevant Sustainable Development Goals</i>
Target 15. By 2030, eliminate unsustainable consumption patterns, ensuring people everywhere understand and appreciate the value of biodiversity, make responsible choices commensurate with 2050 biodiversity vision, taking into account individual and national cultural and socioeconomic condition	15.0.1 Biomass material footprint per capita	By type of material	8.4.1,12.2.1

16. Members of the Indicator working group are invited to comment on the proposed indicator list and the following discussion questions:

- Your thoughts on whether is appropriate to consider the following GBF indicators as part of the key indicators from the SEEA EA physical ecosystem services flow accounts
 - Population benefiting from ecosystem services
 - Proportion of fish stocks within biological sustainable level
 - Total climate regulating services provided by ecosystems
 - Number of people using wild resources for energy, food or culture
 - Ecosystems providing reduced coastal erosion, flood protection and other
 - Biomass material footprint per capita
- What is the appropriate indicators for biomass provisioning that is able to reflect the ecological contribution on the amount of biomass generated? Is the distinction between natural and human modified ecosystem system important for this indicator?
- Do you have any suggested indicators on sustainably yield or threshold-based indicators for measuring ecosystem capacity.

Indicators from the monetary ecosystem services flow account and ecosystem asset account

17. The monetary ecosystem services flow accounts describe the ecosystem services generated by the ecosystem asset in monetary term. The monetary ecosystem asset account describes the opening and closing monetary value of ecosystem assets over an accounting based on the net present value of the bundles of ecosystem services, under their current use/institutional regime. When compiled for multiple years, the asset account identifies the share of the cost of degradation and /or enhancement (e.g., restoration) of ecosystem assets that can be identified by exchange value. Based on the feedback from the forum, the proposed indicators for the monetary accounts in Ch.14 was modified to the following:

Table 8: Potential indicators from monetary accounts

Monetary indicators	Further description	Spatial unit	Disaggregation	Unit of measurement
Rate of Gross Ecosystem Product (GEP) change over time	GEP is defined as the economic value added of all ecosystem services generated	Ecosystem accounting area	Ecosystem type, ecosystem services classes	change
Monetary ecosystem asset value		Ecosystem accounting area	Ecosystem type, per capita by administrative areas, planning areas	Local currency, % change
Cost of degradation as a percentage of the monetary ecosystem asset value		Ecosystem accounting area	Ecosystem type, per capita by administrative areas, planning areas	% change

18. During the forum, there was some discussion of the framing of values, as the proposed indicators would be derived from accounts based on exchange values, which could be misleading in certain policy contexts. Welfare values were felt likely to have greater policy relevance, and could be derived from complementary accounts. It would be important to be clear about the uses of indicators based on different valuation approaches. It was also noted that compilation of indicators based on welfare values would be a major task. It was remarked that a focus on assessing changes over time would correlate with tracking changes in welfare
19. There was concern that the metrics proposed suggest that the true absolute value of ecosystems is well-known, and some would not make good indicators, as changes in the indicators were difficult to interpret and it was not always evident whether an increase in value was a move in the right direction. Often the proposed indicator would need to be used as a basis for further analysis rather than as a communication tool in its own right. The importance was emphasized of expressing indicators as relative measures (e.g. values per ha) and/or to focus on assessing changes over time (rather than absolute numbers).
20. Members of the Indicator working group are invited to comment on the proposed indicator list and the following discussion questions:
- Do you have any suggestion on whether the indicator on GEP and should be expressed as absolute measure or relative measures/changes, such as,
 - Change in GEP over time
 - GEP as a percentage of GDP,
 - GEP per hectares
 - Relative importance of different services
 - Indicators of monetary asset value could have greater potential to convey important messages as in principle they incorporate a projection of likely future service flows.

Your suggestion on whether monetary asset value should be expressed as absolute measures or relative measures/changes, such as

- Value as a percentage of net worth
- Values per hectare of ecosystem type
- What is your view on the scope of degradation to be considered for the indicator on the cost of degradation:
 - Narrow scope – degradation based on changes in condition, but exclude conversion
 - Medium scope – all negative elements (reduction in value) in asset account (ie. Negative conversion + degradation + downward reappraisals)
 - Widest scope – Net change in value (except revaluation)

List of hybrid / combined /integrated indicators (that can be derived by combining multiple ecosystem accounts and/or CF accounts):

21. It was noted that the following types of indicator were missing in Chapter 14, which were considered as policy relevant on their own rights. .

- a. Indicators from the sequence of accounts
- b. Expenditure related indicators
- c. Indicators that integrated/combined across various SEEA accounts
- d. Indicators based on application of the accounts, such as ecosystem footprint.

22. To address these gaps, it is suggested to include an addition sub-section on integrated accounts in Chapter 14 and proposed a list of possible indicators that can combined across various SEEA accounts The following table documents an initial suggestion. Members of the Indicator working group are invited to comment on the proposed list.

Table 9: Potential indicators from integrated accounts

Type	Indicators	Related SEEA accounts
Sequence of accounts	Net domestic product adjusted for cost of degradation	Ch.11 of SEEA EA
Expenditure	Expenditure on restoration/conservation (could potential include the value of Payment of Ecosystem Services scheme, emission permits, etc)	EPEA
Expenditure	Return on biodiversity expenditure (change in ecosystem condition index per dollar spent	EPEA, condition
Expenditure	Biodiversity related environmental tax	Account for environmental tax

Combined accounts	The area of ecosystem that has seen an increase in condition	Extent, condition
Combined accounts	GEP per hectare of ecosystem type	Extent, monetary
Combined accounts	Ratio of ecosystem asset value to service value	Services, monetary
Application	Economic activity dependent on nature (e.g. Value of ecosystem services linked to industry value added)	Monetary, SNA
Application	Ecosystem footprint (e.g. ecosystem service embodies in a countries import and export of goods and services) (of which carbon and water footprints would be example)	Services, multi-regional input output analysis)