Assessing the linkages between global indicator initiatives, SEEA Modules and the SDG Targets

Draft Working Document

Assessing the linkages between global indicator initiatives, SEEA Modules and the SDG Targets: Draft Working Document

Authors
Steven King, Katherine Moul, Claire Brown and James Vause

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Contents

1 Introduction

In 2015 the UN Statistical Commission created the Inter-Agency Expert Group on SDG (Sustainable Development Goals) Indicators (IAEG-SDGs) to develop and implement a global indicator framework for the SDGs and their targets. This framework was developed and adopted by the General Assembly on Work of the Statistical Commission in July 2017 (as set out in the Annex of UN General Assembly Resolution A/RES/71/313). [1] To facilitate the implementation of this framework, all indicators are classified into three tiers based on their methodological development and availability of data at a global level, as follows:

- Tier I: indicator is conceptually clear, established methodology and standards are available and data are regularly produced by countries;
- Tier II: indicator is conceptually clear, established methodology and standards are available but data are not regularly produced by countries
- Tier III: no established methodology or standards are available for the indicator or methodology/standards are being developed or tested for the indicator.[2]

To inform the high-level political forum on progress towards the Sustainable Development Goals, annual reports are produced under the auspices of the Secretary-General in cooperation with the United Nations based on this global indicator framework (UN Economic and Social Council, March 2017).[3] The indicators presented in the progress report represent global, regional and sub-regional aggregates calculated from data produced by national statistical systems (PARA. 2 and as directed by Resolution A/RES/71/313). [4, 5] The data is compiled by international agencies / custodians, who may adjust national data for international comparability or estimate missing values using Tier I or Tier II approaches outlined above when countries have no data on the indicators themselves.

As national statistical agencies face significant reporting requirements, it is likely that many countries will also use their own indicators for reporting on progress towards the SDGs. They will use global indicators only when they match specific country priorities or are most convenient. The SEEA (System of Environmental-Economic Accounting) is a multi-purpose statistical framework, and provides an opportunity to streamline the production of SDG target indicators with an environmental dimension with other demands for environmental-economic statistics. For example, mainstreaming the environment into development and economic planning, reporting under the other Rio conventions and understanding the distribution and status of a country's natural capital wealth. This will not only reduce the data processing demands on national statistical agencies, but also on custodian agencies who have to apply agreed global methodologies where national data gaps emerge.

1.1 Aims and objectives

The aim of the work presented in this report is to develop a sustainable development indicator set based on SEEA Experimental Ecosystem Accounting (SEEA-EEA) modules and selected modules in the SEEA Central Framework (SEEA-CF). The starting point for this work is to establish the role the SEEA can play in directly supporting the production of SDG target Indicators. This is described in the left hand side of Figure 1, which illustrates the well-known information pyramid. As shown in right hand side of

[1] https://undocs.org/A/RES/71/313
[2] https://undocs.org/E/CN.3/2017/2
[3] https://unstats.un.org/sdgs/files/report/2017/secretary-general-sdg-report-2017--EN.pdf
[4] https://unstats.un.org/sdgs/files/report/2017/secretary-general-sdg-report-2017--EN.pdf
[5] https://undocs.org/A/RES/71/313

Figure 1, the work is extended to evaluate how the SEEA can be aligned with other existing global indicator initiatives and associated data. This is intended to facilitate and improve our understanding of how the SEEA can:

- Streamline multiple environmental reporting obligations
- Improve consistency between multiple data and indicators for informing on progress towards the SDGs can support reporting on the SDG indicators.
- Facilitate the integration of existing indicator initiatives into wider environmental-economic analysis

[In addition, national Indicators from 5 case study countries will also be evaluated in future work, comprising: Brazil; China; India; Mexico; and, South Africa.]

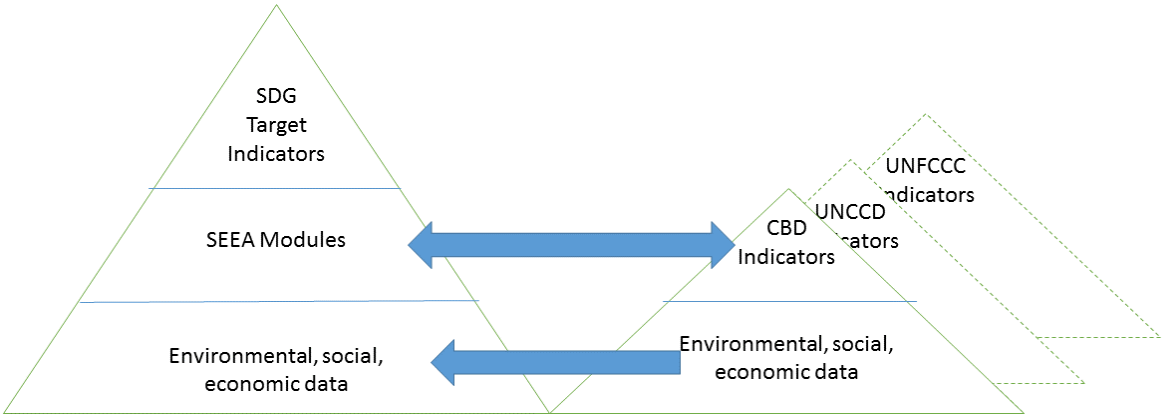

Figure 1: Conceptual approach to the project

There are five objectives for the analysis:

1. Which global and national indicators can be directly integrated into the SEEA to support reporting on progress towards SDG Targets?
2. Which global and national indicators have the potential to be generated using modules within the SEEA framework to support reporting on progress towards SDG Targets?
3. What are the gaps in current indicator initiatives that could be filled using the SEEA and existing global (and national) data?
4. Which global and national indicators supported by the SEEA and relevant to SDG Targets should be considered priorities for testing?
5. What are the most suitable economic instruments to stimulate progress towards SDGs and associated policy targets based on the set of identified priority indicators?

2 Relevant Accounting Modules

This project specifically focuses on the core and thematic accounts of the SEEA-EEA and those in the SEEA-CF that provide significant overlap. These comprise the following:

- Ecosystem Extent and Ecosystem Condition Accounts: These are the core biophysical accounts for measuring the stocks of ecosystem assets under the SEEA-EEA.
- Ecosystem Services – Supply and Use (Physical and Monetary) Accounts. These accounts record the actual flows of services and goods from ecosystems to the economy in both physical and monetary terms. It should be noted (following para 5.10 of the SEEA-EEA TR), the ecosystem services accounts are developed from the SEEA-CF Physical Supply and Use Tables
- The SEEA-CF Physical Flow (Supply and Use) Accounts. These are included in the analysis. However, as these align with ecosystem provisioning services, every effort should be made to integrate these accounts with ecosystem service supply and use accounts to support ecosystem to economy analysis. The SEEA-CF Physical Flow (Residuals) Accounts are not considered in the analysis. Whilst these provide information on ecosystem pressures, directly observed measures of the state of pressure impacts (e.g., Ocean pH) are considered more relevant condition type indicators for anthropogenic pressures. This reflects that the analysis is from the ecosystem perspective.
- Thematic Biodiversity, Water, Carbon and Land Accounts. These are the thematic bio-physical accounts proposed in the SEEA-EEA. It should be noted (following para 9.4 of the SEEA-EEA TR), thematic accounts for land and water are grounded in the SEEA-CF Asset Accounts and those for biodiversity and carbon represent adaptions of these Asset Accounts.
- The SEEA-CF Physical Asset Accounts. Those that align with relevant provisioning services (e.g., timber, water) are considered in the analysis as these will provide particular measures of 'Stock' that may be an explicit parameter in an SDG indicator. However, the potential alignment / overlap with the thematic accounts described above also need to be considered – especially with respect to the provision of water by ecosystems.

The Environmental Activity Accounts of the SEEA-CF are recognised to have the potential to inform on several of the SDG Indicators related to Overseas Development Assistance and Government Expenditure on environmental protection. However, whilst these possibilities are acknowledged, this analysis does not attempt to make the links to these accounts. Work to align classification of biodiversity expenditures (e.g., under BIOFIN) and these accounts is ongoing under the auspices of the UNCEEA, with the aim to support indicator production for SDG 15a and 15b.

With a clearly defined set of accounting modules identified, the following pages set out a stepwise approach for assessing specific global indicator initiatives from a SEEA perspective and explicitly linking them to the above accounts. By adopting a systematic approach, gaps in the current global indicator initiatives can be identified and opportunities for the SEEA to generate indicators for priority SDG Targets can be developed. Indicator alignment is considered from two perspectives:

1. *Supported by* ecosystem accounting (e.g., indicators whose underlying data can be organised using the above accounting modules, termed output indicators); and,
2. *Supporting* ecosystem accounting (e.g., indicators that can contribute to ecosystem condition accounts, termed input indicators).

3 Global Indicator Review

To focus the analysis, an inventory of global indicator initiatives was compiled. The inventory included initiatives for the SDGs, Multilateral Environment Agreements, biodiversity and the environment, Green Economy / Growth and Wealth Accounting. This inventory is presented as Appendix A, which provides a brief review of each indicator initiative and an assessment of their priority for analysis based on their relevance to the SDGs and the accounting modules identified in Section 2. The review identified the following initiatives as high priority for focus via the analysis:

- Inter-Agency Expert Group on SDG Indicators (IAEG-SDG)
- United Nations Convention on Biological Diversity (CBD) Aichi Target Indicators
- United Nations Convention to Combat Desertification (UNCCD) Indicators
- United Nations Framework Convention on Climate Change (UNFCCC) Indicators
- Biodiversity Indicator Partnership (BIP) Indicators
- Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) Indicators
- Sendai Framework for Disaster Risk Reduction (Sendai) indicators
- The Convention on wetlands (Ramsar convention) Indicators

3.1 Methodology for assessing SDG Target Indicators from a SEEA Perspective

The IAEG-SDG Target indicators are the necessary starting point to assess form the SEEA perspective as they inform a set of SDG Targets to prioritise and initially focus on. From this assessment a common approach and format organising the assessment of other global indicators form a SEEA perspective can also be developed. This is necessary to allow aggregation of findings across the various indicator sets reviewed.

3.1.1 Methodology for assessing SDG Target Indicators from a SEEA Perspective

To assess the IAEG-SDG Target Indicator set from a SEEA perceptive we implemented the following stepwise approach (this is presented in Appendix B, SDG Target Indicators Tab, with reference to the columns as indicated below):

1. The official list of SDG indicators was reviewed, expert judgment was used to identify any indicators that could in part (e.g., ratio indicators) or completely, be generated by the SEEA framework, or that could be integrated into the SEEA framework (e.g., SDG Target Indicator 14.3.1 on marine acidity for ecosystem condition accounting) (Column B).[6]
2. A unique Indicator ID field to represent the indicator, comprising 'SDG' and the indicator number (e.g., SDG 15.3.1) was specified (Column A).
3. The Custodian Agency information (Column C) and information on the operational status of the indicator) (Column D) was added to the spreadsheet. The operational status was based on the

[6] We took the SEEA alignment SDGs_24_01_18.xls provided by UNSD as our starting point and adapted this to include columns on alignment with SEEA ('Integrated into SEEA' and 'Generated by SEEA') and integrated the UNCEEA Comments to the IAEG as appropriate (SEEA and SDGs_Green_20 Nov.xls – provided by UNSD)

Tier Classification provided by IAEG-SDG Members as of 15 December 2017[7] and updated to reflect the six requests agreed by the IAEG-SDG for reclassification of Tier III indicators to Tier II during the meeting of the group between 10 – 12 April 2018.[8]

4. Information on the indicator definition (Column E), computation method (Column F), data availability (including limitations) (Column G), and (where possible) frequency of production / data collection (Column H) of the indicator was added from the SDG Indicators metadata repository for Tier I and II and the Work Plans for Tier III Indicators. [9, 10]

5. Details on how the SDG Target Indicator could be aligned with the SEEA framework accounts in terms of their potential to be integrated into the SEEA framework (Column I) and / or generated using the SEEA framework (Column J) was added to the spreadsheet based on expert judgement.

6. With this information in place, the spreadsheet was reviewed and each indicator assigned a 'Full', 'Partial', or 'None' possibility for alignment with the selected SEEA accounting modules listed in Section 2. This was based on a consideration of the following factors:

    a. Full: Where the SEEA has obvious potential to organise all, or most, of the data required to calculate the indicator or when the indicator clearly represents an individual accounting item of interest (e.g., an indicator of condition that could be directly integrated in an ecosystem condition account).

    b. Partial: Where the SEEA could organise some of the information for calculating the indicator but:
        i. there were more efficient / accepted means already in place (e.g., Red List);
        ii. the indicator was derived from a statistical procedure to deal with missing data gaps (e.g., Living Planet Index); or,
        iii. the sub-indicator components the SEEA could inform on was not the significant barrier to calculating the indicator

    c. None: where the identified accounts were not considered relevant to the data underpinning the indicator or the phenomena the indicator represents.

7. The penultimate column provides a short explanation of the above categorisation (Column K).

3.1.2 Methodology for Linking Other Global Indicators to the SEEA

The same approach and excel spreadsheet format employed for the SDG Target Indicators assessment was also applied for the other high priority global indicator initiatives. The data consulted to inform the indicator selection and its metadata, together with any methodological adaption is summarised below:

1. Aichi Target Indicators: The list proposed at CBD COP 13 was reviewed.[11] Specific indicators that were operational and quantitative in nature and not related to plans, management actions, policies or finance were captured in the spreadsheet. For instance indicators relevant for Targets 16 to 20 were included. Where necessary additional information on information was collected from the BIP website.[12] Where an Aichi Target was also an SDG Target Indicator, this

[7] https://unstats.un.org/sdgs/iaeg-sdgs/tier-classification/
[8] https://unstats.un.org/sdgs/files/meetings/iaeg-sdgs-meeting-07/7th%20IAEG-SDG%20Meeting%20tier%20reclassification%20requests_list%20of%20indicators_web.pdf
[9] https://unstats.un.org/sdgs/metadata/
[10] https://unstats.un.org/sdgs/tierIII-indicators/
[11] https://www.cbd.int/doc/decisions/cop-13/cop-13-dec-28-en.pdf
[12] https://www.bipindicators.net/

was recorded (Column M), or if there was a link, but not a direct match, to an SDG Target, this was noted in the spreadsheet (Column N).

2. UNCCD Indicators: The list of progress indicators proposed at COP 13, Ordos, China 2017 was reviewed (note this is a draft decision at present).[13] All indicators relevant to Strategic Objective 1 (to improve the condition of affected ecosystems); Strategic Objective 2 (to improve the living conditions of affected populations), Strategic Objective 4 (to generate global environmental benefits through effective implementation of the UNCCD) and Strategic Objective 5 (To mobilize substantial and additional financial and non-financial resources to support the implementation of the Convention) were included in the spreadsheet. Strategic Objective 3 (to mitigate, adapt to, and manage the effects of drought in order to enhance resilience of vulnerable populations and ecosystems) was not included due their qualitative nature.

3. UNFCCC indicators: All of the UNFCCC set of 40 performance indicators and the 39 core climate-change related indicators proposed by the UN Economic Commission for Europe to support inter alia UNFCC reporting were included.[14, 15] These documents also provided the principle source of metadata for completing the assessment. Where the UNFCCC indicator was also an SDG Target Indicator or Aichi Target, this was recorded (Column M and N, respectively N).

4. BIP Indicators: The list of all BIP indicators was assessed along with additional indicators that have since been developed (list obtained from the BIP secretariat at UNEP-WCMC - identified in Column M).[16] A large majority of these indicators reflect the specific indicators of the Aichi Targets. Indicators were included in the spreadsheet if they were quantitative in nature and not related to plans, management actions, policies or finance. Where a BIP Indicator is also an SDG or Aichi Target Indicator, this was recorded (Column N and O, respective. These indicators were not re-assessed on the BIP spreadsheet.

5. IPBES Indicators: The list of core, highlighted and socio-economic IPBES indicators were all captured in the spreadsheet.[17] Where the IPBES indicator was also equivalent to an SDG Target, Aichi Target Indicator or BIP Indicator this was recorded (Column M, N; and O, respectively). These indicators were not re-assessed on the IPBES spreadsheet.

6. Sendai Indicators: The 38 Sendai Framework indicators are set out in the UN Office for Disaster Risk Reduction (UNISDR) PreventionWeb website.[18] Given the nature of the targets and the specifics of the indicators themselves (e.g., number of countries implementing multi-hazard EWS), the SEEA is considered to have limited utility as a framework for generating Sendai indicators. As such the SEEA is not considered to be relevant to generating any of the specific indicators listed. Nonetheless, there is clearly a role for mainstreaming the environment into disaster risk reduction using the SEEA (this is explored in latter analysis).

7. Ramsar Indicators: In order to track progress towards the Strategic Targets of the convention, a series of indicator questions are posed to countries in Section 3 of the national report template for the Ramsar Convention.[19] The SEEA provides a framework to streamline the production of indicators for these questions with other reporting requirements (e.g., with

[13] https://www2.unccd.int/sites/default/files/sessions/documents/2017-09/copL-18.pdf
[14] https://www.unece.org/statistics/networks-of-experts/task-force-on-a-set-of-key-climate-change-related-statistics-using-seea.html
[15] https://unfccc.int/sites/default/files/resource/docs/2009/sb/eng/04.pdf
[16] https://www.bipindicators.net/system/resources/files/000/002/201/original/2827_A3_BIP_Indicator_matrix_2.0.pdf?1512640311
[17] https://www.ipbes.net/indicators-data-ipbes-assessments
[18] https://www.preventionweb.net/drr-framework/sendai-framework-monitor/indicators
[19] https://www.ramsar.org/document/national-report-form-for-cop13-offline-version

respect to SDG 6). The list of mandatory indicator questions were reviewed, all qualitative indicators (where the answer was coded as =Yes; B=No; C=Partially; D=Planned; X= Unknown; Y= Not Relevant) were disregarded and the remaining captured in the spreadsheet. Where the Ramsar indicator question reflected an SDG Target Indicator this was captured in Column M and an Aichi Target Indicator in Column N.

3.1.3 Results of Global Indicator Review

After applying the initial selection criteria for including individual indicators from different global initiatives (as described above), it was possible to rationalise the number of indicators for review to 314. The distribution of these indicators is summarised in Table 1.

Table 1: Distribution of global indicators reviewed

Global Indicator Intative	Number of indicators
IAEG-SDG Target Indicators	46
UNCBD Aichi Target Indicators	95
UNCCD Indicators	14
UNFCCC Indicators	64
BIP Indicators	60
IPBES Indicators	22
RAMSAR Indicators	13
Total	**314**

The results of the analysis for the SDG Target Indicators only, are presented in Table 2. This is a necessary starting point, as it directs attention to a set of priority SDG Targets to focus the analysis on. Table 2 identifies that out of the 46 SDG Target Indicators captured on the spreadsheet, 18 have the potential for full and 6 for partial alignment as input or output indicators from the SEEA.[20] As would be expected, Table 2 identifies a number of 'Full Possibilities' for aligning SDG 14 (life below water) and SDG 15 (life on land) Target indicators with the SEEA. In addition, a number of 'Full Possibilities' for alignment are observed for indictors for SDG 6 (clean water and sanitation) and SDG 11 (sustainable cities and communities). However, the latter would likely require development of urban scale environmental accounts and this may not, necessarily, align with the remit of national statistical agencies (i.e., they may be more likely to be implemented by specific municipal authorities).

The results of the assessment across all global indicator initiatives are summarised in Figure 2. In broad terms, around a quarter of the indicators are assessed as having 'Full Possibilities' for alignment with the SEEA for the Aichi Targets, UNCCD, BIP, IPBES and Ramsar indicator sets. This figure is below 10% for the UNFCCC indicators. Nonetheless, there is a clear role for the SEEA to support reporting on a number of different conventions and national commitments. In absolute terms, 28 specific Aichi Target Indicators and 12 BIP Indicators were identified as 'Full Possibilities' for alignment with the SEEA. However, a number of these will also be included as SDG Target Indicators and further analysis is

[20] In Table 2 the Red List is only assigned partial alignment with the SEEA. This is because any integration with the Red List would require disaggregating Global Red Lists to National scale (or undertaking a national Red List process) and then using this information to compile an account at a National Level. This seems to offer little in the way of added benefit using the SEEA for this purpose. There are also challenges in dealing with the introduction of new species into the list as it becomes updated during future iterations and the implications this would have for the trends communicated by the accounts. Nonetheless, the SEEA may organise data relevant to the Red List process (e.g., information on suitable habitat extent via extent accounts or species populations via a biodiversity account). However, there are several other criteria, such as species population demographics and extinction probabilities that are sufficiently nuanced to be fundamental measurement challenge for the SEEA.

required to understand where individual indicators may satisfy multiple reporting requirements. This will help identify where synergies and gaps in global indictors exist.

Table 2: Priority SDG Target indicators that have full or partial alignment with the SEEA

	Full Alignment	Partial Alignment
1	6.3.1 - Proportion of wastewater safely treated	2.4.1 - Proportion of agricultural area under productive and sustainable agriculture
2	6.3.2 - Proportion of bodies of water with good ambient water quality	2.5.2 Proportion of local breeds classified as being at risk, not at risk or at unknown level of risk of extinction
3	6.4.1 - Change in water-use efficiency over time	6.1.1 Proportion of population using safely managed drinking water services
4	6.6.1 - Change in the extent of water-related ecosystems over time	6.4.2 - Level of water stress: freshwater withdrawal as a proportion of available freshwater resources
5	11.3.1 Ratio of land consumption rate to population growth rate	8.9.1 - Tourism direct GDP as a proportion of total GDP and in growth rate
6	11.7.1 Average share of built-up area of cities that is open space for public use for all, by sex, age and persons with disabilities	15.5.1 - Red List Index
7	14.1.1 - Index of coastal eutrophication and floating plastic debris density	
8	14.3.1 Average marine acidity (pH) measured at agreed suite of representative sampling stations	
9	14.4.1 - Proportion of fish stocks within biologically sustainable levels	
10	14.5.1 - Coverage of protected areas in relation to marine areas	
11	14.7.1 - Sustainable fisheries as a proportion of GDP in small island developing States, least developed countries and all countries	
12	15.1.1 - Forest area as a proportion of total land area	
13	15.1.2 Proportion of important sites for terrestrial and freshwater biodiversity that are covered by protected areas, by ecosystem type	
14	15.2.1 - Progress towards sustainable forest management	
15	15.3.1 - Proportion of land that is degraded over total land area	
16	15.4.1 - Coverage by protected areas of important sites for mountain biodiversity	
17	15.4.2- Mountain Green Cover Index	
18	15.9.1 - Progress towards national targets established in accordance with Aichi Biodiversity Target 2 of the Strategic Plan for Biodiversity 2011-2020	

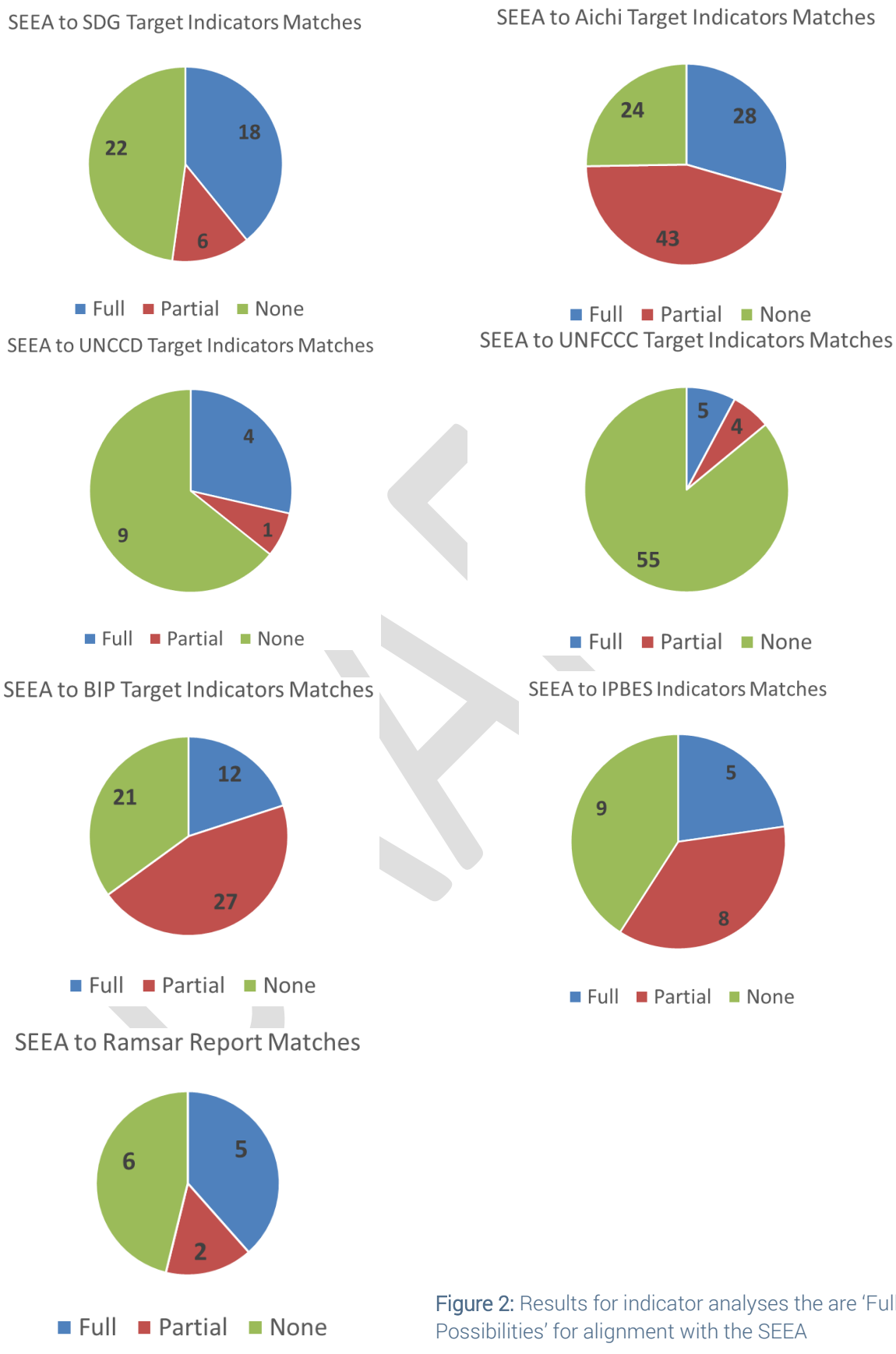

Figure 2: Results for indicator analyses the are 'Full Possibilities' for alignment with the SEEA

3.2 Analysis of global Indicators with full alignment with SEEA

A key objective for the overall analysis is to identify a set of SEEA-compliant indicators for tracking progress to priority SDG targets for testing. This requires identifying a unique set of individual global indicators from across the global indicator initiatives reviewed. This will also allow for a more focussed assessment of the role of the SEEA in generating or integrating such indicators.

3.2.1 Methodology

There is a common structure for organising information from the different global indicator initiatives in Appendix B, this allowed the indicators with 'Full' possibilities for alignment to be collated within the same spreadsheet (see 'Full Possibilities' tab in Appendix B). From this and a set of non-overlapping indicators can be identified for analysis from a SEEA perspective. In order to complete this analysis the following steps were taken:

1. The information on the Indicator ID, Description, Custodian Agency, Operational Status, Definition / Source, Methodology, Data Needs & Availability, Frequency of Data Collection for those indicators with 'Full Possibility' for alignment were captured for each global indicator initiative in in Columns A to H. The information on how the Indicators could be aligned with the SEEA framework was also retained in Columns I to L.
2. Where the indicator reflected an SDG Target Indicator this was captured in Column M and an Aichi Target Indicator in Column N. Where the indicator was noted to be related but not directly equivalent the prefix 'Related to' was made to the indicator ID (e.g., the indicator was a sub indicator of equivalent indicator but with a narrower ecosystem focus).
3. A field for 'Non-overlapping' was created in Column O, this was populated with a 'Yes' if the indicator met the following criteria:
    - It was an SDG Target Indicator
    - It was an Aichi Target but not an SDG Target Indicator (excluding 'Related To' IDs)
    - It was an UNCCD, UNFCCC, BIP, IPBES or Ramsar Indicator but not an SDG Target or Aichi Target Indicator (excluding 'Related To' IDs).
4. Where there was a clear linkage to an SDG Target Indicator this was noted in Column P
5. A field to capture if the indicator was an input indicator (i.e., the possibilities for alignment with SEEA were manly with respect to integration into a SEEA accounting module) or output indicator (i.e., the possibilities for alignment with SEEA were manly with respect to generation by a SEEA accounting module) was created in Column Q.
6. Columns R and S captured the two most relevant account modules for generating or integrating the indicator. Where the SEEA-CF Flow and Asset Accounts were relevant to the SEEA-Water, "SEEA Water" was used to represent the relevant account. Where only one account was required for the indicator, this was double counted. From this information scores for the relative usefulness of different accounting modules can be calculated.

3.2.2 Results

In total, 46 non-overlapping individual input and output indicators were identified from the set of global indicator initiatives reviewed. Focusing on the output indicators with the potential to be generated using the SEEA reduced this number to 39. The distribution of these unique indicators across the different initiatives reviewed is presented in Figure 3. Figure 3 reveals that 15 SDG Target Indicators have the potential to be generated using the SEEA. 8 Aichi Target Indicators are identified with potential to be generated using the SEEA (this excludes Aichi Target indicators that are also SDG Target indicators).

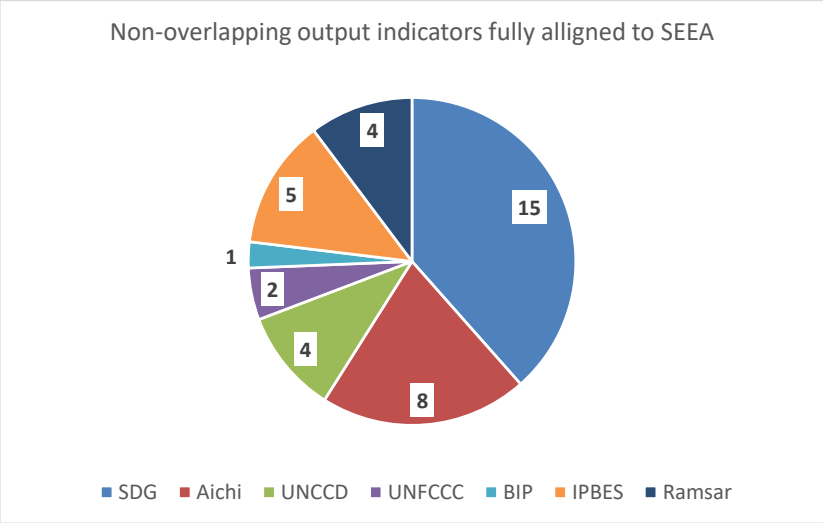

Figure 3: Distribution of output indicators with 'Full Possibilities' for alignment with the SEEA

Figure 4 summarises the scores for the different accounting modules for the 39 output indicators only (i.e., those with the full possibility for generation via SEEA).[21] This suggests that accounts for land cover, land use or ecosystem extent are particularly relevant for informing on different indicator initiatives (scoring 11.5 out of 39). This is followed by ecosystem condition accounts (scoring 7.5 out of 39). It is notable that ecosystem service accounts only score 5 out of 39, these are generally associated with very conventional provisioning services (biomass, crop, fisheries and wood provision). The exception is for SDG 11.7.1 (the only SDG Indicator where ecosystem service accounts were considered relevant), which relates to the provision of open space for public use in cities. This suggests the full potential of the environment and ecosystem services to contribute to sustainable development is only being considered implicitly (via capacity reflected in condition and extent) in existing global indicators.

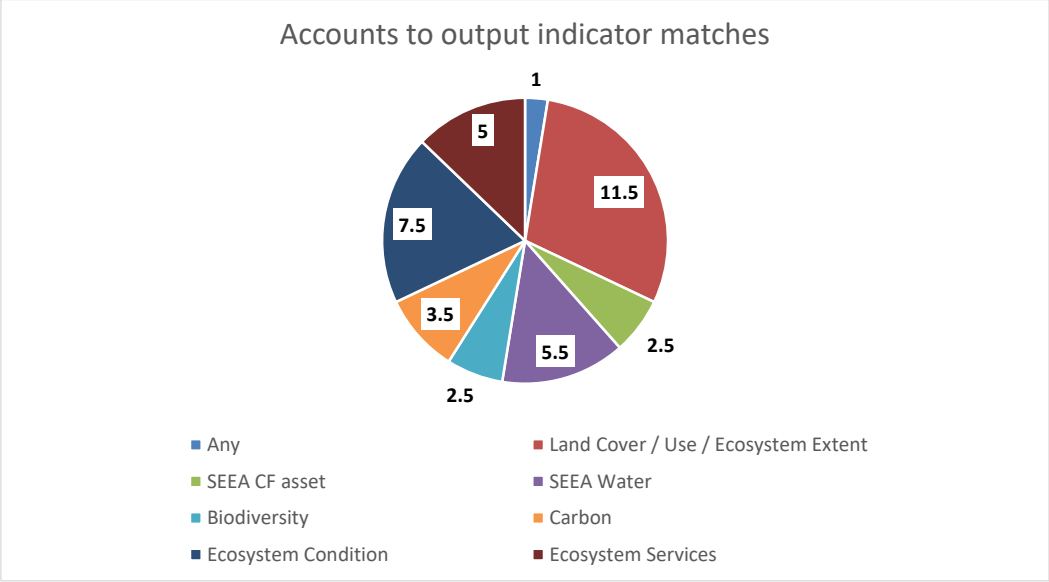

Figure 4: Accounting modules 'scores' for output indicators

[21] Note: as the SDG Target Indicator 15.9.1, for the Number of countries implementing SEEA (excluding energy accounts), represents the 'Any' entry).

3.3 Assessment of Indicator Overlap and Relevant Accounting Modules

Collating information on indicator overlaps in the 'Full Possibilities' tab in Appendix B, allows the identification of which of the SDG Target Indicators are also relevant to other reporting commitments countries face. These are summarised in Table 3, which is organises the 15 'Full Possibilities' SDG Target Indicators so that those relevant to the highest number of individual global indicators are at the top. In addition, input indicators are shaded grey and relevant accounting modules identified in Table 3.

Table 3: SDG Target indicators and their overlap with other global indicator initiatives

SDG Target Indicator ID	Relevant Accounts	Aichi Indicator	UNFCCC Indicator	UNCCD Indicator	RAMSAR Indicator	BIP Indicator	IPBES Indicator	Total
15.3.1 - Proportion of land that is degraded over total land area	Thematic Carbon Account & Ecosystem Extent / Land Cover Account	AT 5.3.2	CC.3, CC.21, CC.20	SO 1-1, SO 4-1, SO 1-3, SO 1-2		BIP X.2		10
15.1.2 Proportion of important sites for terrestrial and freshwater biodiversity that are covered by protected areas, by ecosystem type	Ecosystem Condition Account & Biodiversity Account	AT 11.3.1, AT 5.4.3				BIP C.2, BIP X.16	IPBES C.20	6
6.6.1 - Change in the extent of water-related ecosystems over time	Ecosystem Extent / Land Cover Account & SEEA Water Accounts	AT 5.5.3, AT 5.5.1			R 8.6	BIP B.1	IPBES H.10	6
15.1.1 - Forest area as a proportion of total land area	Ecosystem Extent / Land Cover Account	AT 5.4.2	CC.3			BIP B.2	IPBES C.6	5
15.9.1 - Progress towards national targets established in accordance with Aichi Biodiversity Target 2 of the Strategic Plan for Biodiversity 2011-2020	All	AT 2.1.1, AT 2.3.1, AT 2.2.1						4
6.3.1 - Proportion of wastewater safely treated	SEEA Water Accounts				R 2.6, R 2.11, R 2.8			4
15.2.1 - Progress towards sustainable forest management	Ecosystem Extent / Land Cover Account & Ecosystem Condition Account	AT 5.4.4	CC.38					3
15.4.1 - Coverage by protected areas of important sites for mountain biodiversity	Biodiversity Account & Ecosystem Condition Account	AT 14.3.3				BIP X.17		3
6.4.1 - Change in water-use efficiency over time	SEEA Water Accounts & Ecosystem Condition Account	AT 4.2.2, AT 4.2.3						3
11.3.1 Ratio of land consumption rate to population growth rate	Ecosystem Extent / Land Cover Account	AT 4.5.2						2
14.1.1 - Index of coastal eutrophication and floating plastic debris density	Ecosystem Condition Account	AT 8.3.6						2
14.3.1 Average marine acidity (pH) measured at agreed suite of representative sampling stations	Ecosystem Condition Account	AT 10.3.1						2
14.5.1 - Coverage of protected areas in relation to marine areas	Ecosystem Condition Account and Biodiversity Account	AT 11.2.2						2
15.4.2- Mountain Green Cover Index	Ecosystem Extent / Land Cover Account & Ecosystem Condition Account	AT 14.3.2						2
6.3.2 - Proportion of bodies of water with good ambient water quality	SEEA Water Accounts & Ecosystem Condition Account	AT 8.4.4						2
11.7.1 Average share of built-up area of cities that is open space for public use for all, by sex, age and persons with disabilities	Ecosystem Extent / Land Cover Account & Ecosystem Services Account							1
14.4.1 - Proportion of fish stocks within biologically sustainable levels	SEEA Central Framework Asset Accounts (Fisheries)							1
14.7.1 - Sustainable fisheries as a proportion of GDP in small island developing States, least developed countries and all countries	SEEA Central Framework Asset Accounts (Fisheries)							1

Table 3 identifies three 'Input' indicators in the grey rows / cells, the remaining fifteen observations represent the result presented in Figure 3. By identifying those SD target Indicators that overlap with multiple reporting requirements, the analysis presented in Table 3 provides a rationale to guide the selection of SDG Target Indicators for testing. For example, as Table 3 shows, SDG Target 15.3.1 is also relevant to 5 global initiatives and 10 individual indicators. Consequently, this should be a priority for calculation using the SEEA. Similarly SDG Target Indicator 6.6.1 is relevant to a number of global initiatives. SDG Target Indicator 15.1.1 is also relevant to several initiatives but this may be more readily addressed using existing global platforms, such as global forest watch.[22] The second column identified the relevant SEEA accounting modules for calculating output indicators (these are the white rows / cells) and the relevant accounting modules. Reflecting the results presented in Figure 4, Ecosystem Extent / Land Cover Accounts and Ecosystem Condition Accounts feature strongly in this column.

3.4 Analysis of Full Possibility Non-SDG Target Indicators

It has been observed that the IAEG-SDG process did not maximise the potential to build on existing global biodiversity indicator frameworks used for biodiversity related conventions and processes. Many operational global indicators already used under the CBD have been identified as highly relevant to the SDG Targets and would fall into the Tier I category.

There are two major reviews of the SDG indicator framework envisaged before 2030, in 2020 and 2025. These reviews could imply substantive changes to the framework, including the addition, deletion, refinement or adjustment of indicators. The preparation for the 2020 review begins in 2018, and presents a clear opportunity to promote better harmonisation of the SDG indicator suite with those used for the CBD, IPBES and other processes. Identifying where the SEEA can provide support for producing established global indicators and evolving a better set of indicators for monitoring progress towards SDG Targets is an important contribution to this process.

Accounting for the above, Table 4 presents information on the overlap across the 24 Non-SDG Target Indicators identified in Figure 3 in more detail (these are all output indicators with 'Full Possibilities' for generation using the SEEA). As Figure 3 shows, the Aichi Targets represent a third of these indicators. These indicators are presented in Table 4, together with other indictors with whom they overlap.

Table 4: Overlapping of Aichi Target Indicators with other global indicator sets

Aichi Target	UNFCCC Indicator	BIP Indicator	IPBES Indicator	RAMSAR Indicator
AT 4.2.1 - Human appropriation of net primary productivity		BIP X.8	IPBES H.7	
AT 5.5.2 - Natural habitat extent (land area minus urban and agriculture)	CC.3			
AT 5.5.3 - Wetland extent		BIP B.1	IPBES H.10	R 8.6
AT 6.4.6 - Trends in population of non-target species affected by fisheries				
AT 7.5.1 - Wild Bird Index for farmland birds/Living Planet Index (farmland specialists)		BIP X.5		
AT 12.3.5 - Wild Bird Index		BIP B.8		
AT 14.3.4 - Ocean Health Index		BIP D.2		
AT 15.2.1 - Trends in forest carbon stocks				

[22] https://www.globalforestwatch.org/

In addition to the above, the BIP indicator BIP X.1 for the extent of continuous mangrove forest cover is also represented in the set of 24 indicators. The IPBES indicators represented the second largest share of indicators (5 out of 24). They comprised:

- IPBES C.8 Total wood removals
- IPBES C.11 Inland fishery production
- IPBES C.15 Nitrogen use efficiency
- IPBES H.36 Land under cereal production
- IPBES S.8 World grain production per capita/year

The four UNCCD indicators are all sub-indicators of SDG Target 15.3.1 proportion of degraded land. Of the four Ramsar indicators included R 8.5, trend in wetland condition. The other three are linked to SDG Target 6.3.1, comprising:

- R 2.6 No. households linked to sewage system
- R 2.8 percentage of sewage coverage in the country
- R 2.11 No. wastewater treatment plants

The two UNFCCC indicators were: CC.11 GHG emissions form land use; and, CC.3 losses of land covered by (semi-)natural vegetation. The latter is closely related to Aichi Target Indicator 5.5.2, listed above.

Figure 5 repeats the analysis of evaluating the most important accounts for the generation of output indicators but focusing on the 24 Non-SDG Target indicators only. This figure also highlights the important role that land cover or ecosystem extent accounts can play in helping to derive indicators to support reporting on national commitments (scoring 7 out of 24). This is followed by ecosystem condition and ecosystem services accounts, each scoring 4.5 out of 24.

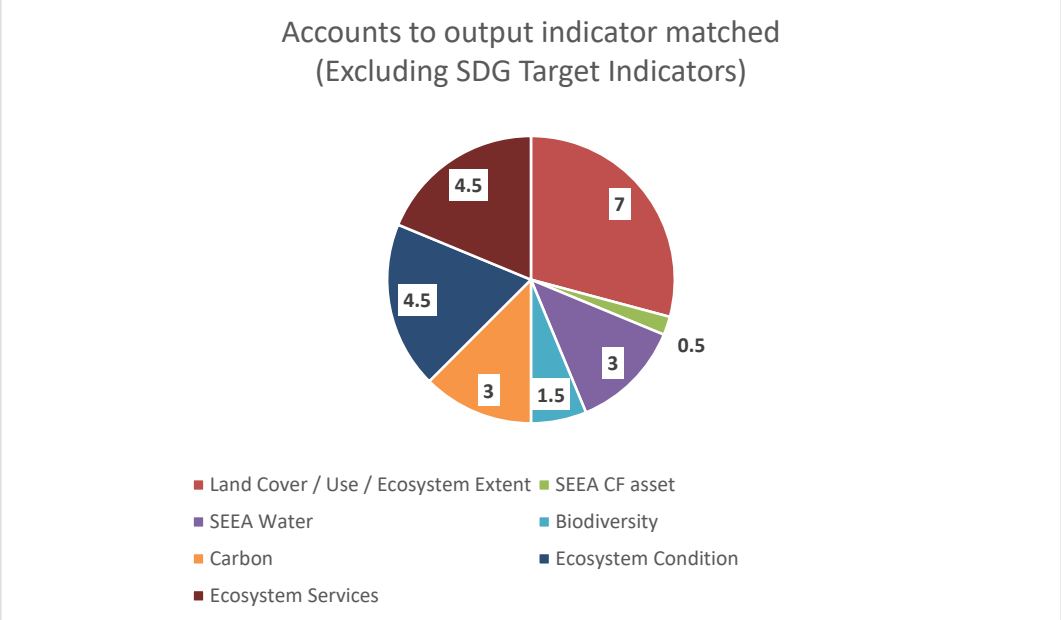

Figure 5: Accounting modules 'scores' for NON-SDG Target output indicators

3.5 Analysis of Global Indicator Gap and Mainstreaming Opportunities from a SEEA perspective

The SEEA provides a multi-purpose framework that can be used to organise information and generate new indicators to address gaps in existing environmental and economic indicator initiatives. In particular, the framework is designed with a view to mainstreaming the environment into economic and development planning for sustainable development. To understand the potential for the SEEA in these regards, it is necessary to understand: where the key methodological gaps are in existing global indicators that the SEEA can address; and, what the best opportunities are for the SEEA to mainstreaming the environment into sustainable development planning.

3.5.1 Methodology for Indicator Gap Analysis

The gap analysis specifically focuses on the SDG Target Indicators and the Aichi Target Indicators. This reflects the initial findings of the analysis, which show that the main overlap in indicators was between the SDG Target Indicators themselves or the Aichi Target indicators.[23] The main gaps in the current SDG Target Indicator initiatives are considered to be those categorised as Tier III. The main gaps in specific indicators for the Aichi Target are identified in the updated list of indicators for the Strategic Plan for Biodiversity 2011-2020.[24] This document clearly identifies a set of generic indicators with no matching specific indicators decided upon at present.

To identify gaps in the global indicator initiatives and evaluate them from a SEEA perspective, the following stepwise approach was implemented (this is presented in Appendix C, 'Indicator Gaps' Tab, with reference to the columns as indicated below):

1. In Column A, a description for the overarching SDG Target was captured
2. The indicator ID (Column B), Indicator (Column C) for all Tier III (Indicated Column D) SDG Target Indicators from the Full Possibilities Tab in Appendix B were captured. The information on how to align with the SEEA (integration and generation), whether the SDG Target Indicator was an input or output indicator and the possibilities for alignment was also copied into Columns E to H.
3. This created a suitable structure, which was populated with all of the generic indicator gaps the Aichi Targets. [25]
4. The potential to integrate or generate these Aichi Target Indicators with the SEEA, whether the Indicator was an input or output indicator and the possibilities for alignment were captured in Columns E to H.

3.5.2 Results of Indicator Gap Analysis for SEEA

The results of the gap analysis are presented in Table 5. This reveals limited potential for the SEEA to generate the remaining set of Tier III SDG Target indicators, with only 3 such gaps identified. Specifically, generating an indicator for SDG 11.7.1is likely to require municipal scale accounting applications. For SDG 14.7.1, there remain challenges relating to how to measure the fraction of sustable fisheries catch that may best be addressed via fishery expert workshops / forums. For SDG 15.9.1, establishing SEEA accounts (excluding energy) is identified as an indicator for Aichi Target 2. As such, the existence of such accounts is an appropriate indicator for this targets. For the Aichi Targets,

[23] The exception to this is SDG Target Indicator 6.3.1 – Proportion of wastewater treatment. This only overlaps with the Ramsar indicators R.2.6, R.8 and R2.11. However, it should be noted that there is no agreed methodology or global data in place for the calculation of the Ramsar indicators (in fact they should be considered as indicator questions to relevant national authorities).
[24] https://www.cbd.int/doc/decisions/cop-13/cop-13-dec-28-en.pdf
[25] https://www.cbd.int/doc/decisions/cop-13/cop-13-dec-28-en.pdf

there are a number of indicator gaps that the SEEA-EEA is considered extremely well-suited to address. In particular AT 10.5, 14.1, 14.4 and 15.1 provide very relevant entry points for the SEEA-EEA for measuring trends in ecosystem assets and services. These are also likely to reflect the key indicators considered under the post 2020 agenda and are very relevant to mainstreaming the environment into a range of policy objectives, for instance Ecosystem based Adaptation in support of the Sendai goals.

Table 5: Analysis of indicator gaps from a SEEA perspective

Indicator ID	Indicator	Operaional Status	Input / Output indicator	Possbilities for Allignment under this Project (Full, Partial, None)
SDG 11.7.1	11.7.1 Average share of built-up area of cities that is open space for public use for all, by sex, age and persons with disabilities	Tier III	Output	Full
SDG 14.7.1	14.7.1 - Sustainable fisheries as a proportion of GDP in small island developing States, least developed countries and all countries	Tier III	Output	Full
SDG 15.9.1	15.9.1 - Progress towards national targets established in accordance with Aichi Biodiversity Target 2 of the Strategic Plan for Biodiversity 2011-2020	Tier III	Output	Full
AT 7.4	Trends in proportion of production of aquaculture under sustainable practices	N/A	Output	Full
AT 10.5	Trends in extent and condition of other vulnerable ecosystems impacted by climate change or ocean acidification	N/A	Output	Full
AT 10.7	Trends in pressures on other vulnerable ecosystems impacted by climate change or ocean acidification	N/A	Output	Full
AT 11.3	Trends in areas of particular importance for biodiversity conserved	N/A	Output	Full
AT 14.1	Trends in safeguarded ecosystems that provide essential services	N/A	Output	Full
AT 14.4	Trends in restoration of ecosystems that provide essential services	N/A	Output	Full
AT 15.1	Trends in ecosystem resilience	N/A	Output	Full

3.5.3 Methodology for identifying SEEA Mainstreaming Indicators

The CBD, FAO (Food and Agriculture Organisation of the United Nations), World Bank, UN Environment and UNDP (United Nations Development Programme) have produced a technical note that maps the linkages between the Aichi Targets and the SDGs.[26, 27] This provides an authoritative foundation to evaluate the ability of the SEEA for generating indicators for integrating the environment into the economic and social dimensions of sustainable development planning. By providing a clear link to relevant Aichi Targets, it also allows for existing methodologies and data to be readily identified and adopted for this purpose.

[26] https://www.cbd.int/development/doc/biodiversity-2030-agenda-technical-note-en.pdf
[27] Extended cross-mapping to the BIP indicators is also possible via the following publication: https://www.bipindicators.net/system/resources/files/000/002/291/original/Cross_mapping_4pp_A3.pdf?1525960022

In order to identify where SEEA based indicators could be generated to mainstream the environment into achieving different SDG Targets, the following stepwise approach was implemented (presented in Appendix C, 'Mainstreaming Opportunities' Tab, with reference to the columns as indicated below):

1. The SDG Description (Column C), SDG Target number (Column D), the SDG Target description (Column E) where captured in the spreadsheet. The Rational for biodiversity being relevant to that SDG Target provided by the CBD, FAO, World Bank, UN Environment and UNDP technical note[28] was added in Column F and the relevant Aichi Targets in Column I.[29]
2. If any relevant indicators had been captured as 'Full Possibilities' for alignment with the SEEA, this was captured in the spreadsheet (Column A) with the associated SDG Target Indicator ID (Column B). Where such an indicator was already available, the respective SDG Target was no longer considered in the analysis (i.e., SDG 6.3, 6.4, 6.6, 11.7)
3. In Column G an assessment was provided on whether the general requirements for generating the indicator could be aligned with the selected SEEA accounting modules (Column G) and provided a None, Partial or Full conclusion on the possibility for alignment provided (Column H).

3.5.4 Results of Mainstreaming Indicator analysis

The results of the spreadsheet analysis are summarised in the Figure 6. This identifies that the SEEA could potentially support the production of 17 indicators for mainstreaming the environment into the sustainable development goals. The most relevant SDGs comprised SDG 1 – No poverty (2); SDG 2 – Zero hunger (3) and SDG 9 – Industry, innovation and infrastructure (2) and comprised:

- SDG Target 1.4 – Relating to access to basic ecosystem services
- SDG Target 1.5 – Relating to building the resilience of ecosystem services supply on which vulnerable persons depend
- SDG Target 2.1 – Relating to ensuring access to food provisioning services
- SDG Target 2.3 – Relating to the flow of multiple ecosystem services to improve agricultural yields
- SDG Target 2.4 – Relating to maintaining the condition and resilience of agricultural ecosystems.
- SDG Target 9.1 – Relating to green infrastructure
- SDG Target 9.4 - Relating to green infrastructure

The potential for the SEEA for integrating environmental data into poverty alleviation (i.e., with respect to SDG 1 and 2) is currently a proposed application for testing via the Poverty-Environment Accounting Frameworks.[30] It would be useful to explore such applications further in the context of yielding indicators for poverty alleviation based on improving access to environmental resources. As shown in Figure 6, for SDG 11 – Sustainable cities and communities, three potential mainstreaming indicators were identified but these would require development of municipal scale accounts. A key observation is the potentially ability of the SEEA to support mainstreaming of the environment into achieving a wide range of SDG Targets. In total 11 SDG Targets are identified where environmental mainstreaming targets could be derived, in addition to SDG 14 and 15.

[28] https://www.cbd.int/development/doc/biodiversity-2030-agenda-technical-note-en.pdf
[29] SDG 14 and 15 are not included in the spreadsheet as these are environment focused goals and covered in the wider analysis
[30] https://unstats.un.org/unsd/envaccounting/londongroup/meeting22/BK_7.pdf

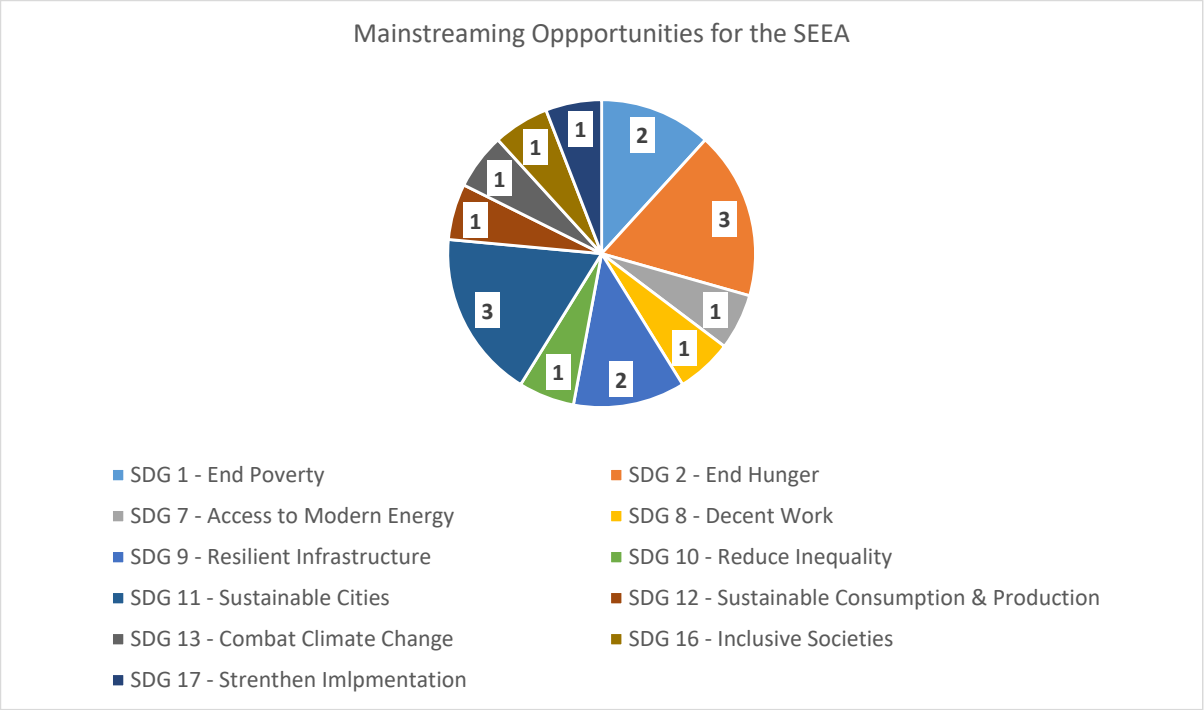

Figure 6: Mainstreaming opportunities for the SEEA

3.6 Summary of Global Indicators Review

The global indicator review is based on a rapid expert assessment process. The broad analysis of the 314 individual global indicators across the set of 8 global initiatives reveals the following insights:

- Combined analysis revealed 46 'Full Possibilities' for alignment of global indicators with the SEEA. Of these, 39 were considered to be output indicators that could be generated using the SEEA.
- Land cover / ecosystem extent and ecosystem condition accounts were identified as a priority for calculation to assist national reporting obligations. The relatively low importance of ecosystem services accounts for calculating indicators is considered to reflect a gap in the ability of existing indicators to mainstream the environment into sustainable development.
- With respect to the SDG Target Indicators specifically, 18 offer 'Full Possibilities' for alignment with the SEEA and related to SDG 6, 11, 14 and 15. Of these, 15 were considered to be output indicators. Those that could also inform and benefit from existing global indicator initiatives comprise:
    - SDG Target Indicator 15.3.1 – Proportion of degraded land (Relevant to the CBD; UNFCCC; UNCCD and Ramsar). The key accounts for calculation of this indicator are the Thematic Carbon Accounts and Ecosystem Extent / Land Cover Accounts.
    - SDG Target Indicator 6.6.1 – Change in the extent of water related ecosystems (Relevant to the CBD; Ramsar; BIP and IPBES). The key accounts for calculation of this indicator are the Ecosystem Extent / Land Cover Accounts and SEEA Water Accounts.
    - SDG Target Indicator 15.1.1 – Proportion of forest area (Relevant to the CBD; UNFCCC; BIP and IPBES). The Ecosystem Extent / Land Cover Accounts are the key accounts for calculating this indicator.

    - SDG Target Indicator 6.3.1 – Proportion of waste water safely treated (Relevant to Ramsar). The SEEA Water Accounts are the key accounts for calculating this indicator.
    - SDG Target Indicator 15.2.1 – Progress towards sustainable forest management (Relevant to CBD and UNFCCC) are the Ecosystem Extent / Land Cover Accounts and Ecosystem Condition Accounts
- Of the 24 Non-SDG target output indicators that were 'Full Possibilities' for generation using the SEEA, 8 of these were Aichi Target (AT) Indicators. Those that could inform other global initiatives outside of the BIP comprised:
    - AT 4.2.1 – Human appropriation of net primary productivity (Relevant to IPBES)
    - AT 5.5.2 – Natural habitat extent (Relevant to UNFCCC)
    - AT 5.5.3 – Wetland extent (relevant to IPBES and Ramsar)
- Analysis of the SDG Target gaps identified DG Target Indicators11.7.1 (Open space for public use in cities) and 14.7.1 (sustainable fisheries) could, potentially, be addressed using the SEEA. However, these may not be suitable priorities under this project. Analysis of the Aichi Target Indicator gaps identified 8 indicator gaps that the SEEA could potentially address. Of these the SEEA-EEA is considered very well suited to generate the following indicators:
    - AT 10.5 - Trends in extent and condition of other vulnerable ecosystems impacted by climate change or ocean acidification
    - AT 14.1 - Trends in safeguarded ecosystems that provide essential services
    - AT 14.4 - Trends in restoration of ecosystems that provide essential services
    - AT 15.1 - Trends in ecosystem resilience
- Analysis of mainstreaming opportunities identified 18 SDG Targets that the SEEA could generate environmental mainstreaming indicators for. The most relevant comprised:
    - SDG Targets 1.4 and 1.5 – Relating to access to basic ecosystem services and building resilience in their supply
    - SDG Targets 2.1, 2.3 and 2.4 – Relating to ensuring access to food provisioning services and the condition of agricultural ecosystems to ensure a flow of multiple services that contribute to food production.
    - SDG Targets 9.1 and 9.4 – Relating to green infrastructure

4 Conclusions

The purpose of this work is to arrive a set of recommendations for selecting a set of SDG relevant indicators that are compliant with the SEEA and can be tested at country level.

4.1 Proposed Global Indicators for Testing

The global indicators assessment reveals a number of SDG relevant indicators could be partly or fully generated by establishing ecosystem extent accounts (or land cover / use accounts as potential proxies for development). These are considered priorities for testing and include SDG Target Indicator 15.3.1 – Proportion of degraded land (calculated via Thematic Carbon Accounts and Ecosystem Extent / Land Cover Accounts); SDG Target Indicator 6.6.1 – Change in the extent of water related ecosystems (calculated via Ecosystem Extent / Land Cover Accounts and SEEA Water Accounts); and, SDG Target Indicator 15.1.1 – Forest area as a proportion of total land area (calculated via Ecosystem Extent / Land Cover Accounts). These indicators will also support wider reporting obligations under the CBD, UNCDD and UNFCCC. SDG Target Indicators 6.6.1 and 15.3.1 are further identified as a Tier II indicators, providing an opportunity for the SEEA to contribute a statistical process for national scale data collection and estimation. Furthermore, it is anticipated that the accounts required to generate SDG Target indicators 15.3.1 and 15.1.1 could also inform on the Aichi Target indicators AT 5.5.2 – Natural habitat extent (also relevant to UNFCCC) and AT 5.5.3 – Wetland extent (relevant to IPBES and Ramsar).

A key challenge to developing extent accounts for deriving these indicators will be defining extent in an ecologically meaningful manner that remains amenable to measurement on a regular basis. In this context, further work is required to understand the trade-offs between disaggregating identified global data for use by national statistical offices versus the use of nationally (or regionally) established ecosystem typologies and how these can be combined to support regular ecosystem accounting. Organising this type of data will also be relevant to other reporting processes beyond the identified indicator initiatives, for example contributing to the Forest Resources Assessments of the FAO (either directly or via the supply of ground-truthed data to extend remote sensed observations).

The review of the Aichi Target indicator gaps and environmental mainstreaming opportunities for the SEEA identifies clear synergies. Specifically, Aichi Target Indicators AT 14.1 (Trends in safeguarded ecosystems that provide essential services); AT 14.4 (Trends in restoration of ecosystems that provide essential services) and AT 15.1 (Trends in ecosystem resilience) are highly relevant to the most promising environmental mainstreaming opportunities for reducing poverty (SDG Targets 1.4 and 1.5), ending hunger (SDG Targets 2.1, 2.3 and 2.4) and building resilient (green) infrastructure (SDG Targets 9.1 and 9.4). These indicators should also be considered as priorities for testing under the SEEA as they are likely to be highly relevant to the post 2020 SDG and CBD agenda. These indicators will also be particularly relevant to a range of wider policy goals, for instance harnessing the full potential of Ecosystem based Adaption to climate change for mitigation of a wider range of disaster risks (i.e., Goals A through E of the Sendai framework for disaster reduction).

Appendix A: Inventory of Global Indicator Initiatives (Excel file)

Appendix B: Assessment of Global Indicators from a SEEA perspective (Excel file)

Appendix C: Indicator Gaps and Mainstreaming Opportunities (Excel file)