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Item 3 of the provisional agenda*
Monitoring framework for the Kunming-Montreal Global Biodiversity Framework

Guidance on using the indicators of the monitoring framework of the Kunming-Montreal Global Biodiversity Framework**

Note by the Secretariat

1. The Executive Secretary circulates herewith, for the information of participants in the twenty-sixth meeting of the Subsidiary Body on Scientific, Technical and Technological Advice, the guidance related to using the indicators of the monitoring framework of the Kunming-Montreal Global Biodiversity Framework.

2. The present document was prepared by the Ad Hoc Technical Expert Group on Indicators for the Kunming-Montreal Global Biodiversity Framework with support from the Secretariat. It supports the consideration of document CBD/SBSTTA/26/2 on the monitoring framework for the Kunming-Montreal Global Biodiversity Framework.

* CBD/SBSTTA/26/1.
** The present document is being issued without formal editing.

Guidance on using the indicators of the monitoring framework

Acknowledgements: In order to operationalize the monitoring framework for the Kunming-Montreal Global Biodiversity Framework, the Conference of the Parties, in decision 15/5, established an Ad Hoc Technical Expert Group (AHTEG) on Indicators for the Kunming-Montreal Global Biodiversity Framework. The guidance in this document was produced by the AHTEG with substantive contributions and dedication from all the members involved. The AHTEG co-chairs are Ms. Maria Cecilia Londoño Murcia (Colombia) and Mr. James Williams (United Kingdom of Great Britain and Northern Ireland). The members of the AHTEG are, presented by regional group and then the by observer organization: Burundi: Mr. Onesphore Masabo, Central African Republic: Mr. Cleoface Landry Mabessimo, Ghana: Mr. Alfred Apau Oteng-yeboah, Namibia: Ms. Britta Hackenberg, Nigeria: Ms. Egbuwalo Sikeade Oluwakemi, South Africa: Ms. Ntakadzeni Tshidada, China: Mr. Jing Xu, Indonesia: Ms. Ruliyana Susanti, Japan: Mr. Ryo Kohsaka, Malaysia: Ms. Lillian Chua Swee-lian, Pakistan: Mr. Rizwan Irshad, Türkiye: Mr. Muhammed Hakan Çakmak, Belarus: Mr. Vasili Shakun, Bosnia and Herzegovina: Ms. Belma Kalamujić Stroil, Czechia: Mr. Jan Dušek, Georgia: Ms. Salome Nozadze, Hungary: Mr. Zsolt Molnár, Montenegro: Ms. Milena Batakovic, Antigua and Barbuda: Ms. Shanna Challenger, Argentina: Ms Monica Gabay (replaced Mr. Alberto Santos Capra, Brazil: Mr. Geraldo Wilson Fernandes, Colombia: Ms. Maria Cecilia Londoño Murcia, Jamaica: Ms. Andrea Donaldson, Mexico: Mr. Arturo Flores Martínez, Australia: Mr. Piers Dunstan, Canada: Mr. Brett Painter, European Union: Ms. Sara Vallecillo, France: Ms. Odile Conchou, Norway: Ms. Lucrezia Gorini, United Kingdom of Great Britain and Northern Ireland: Mr James Williams, Forest Peoples Programme: Mr. Maurizio Farhan Ferrari International Indigenous Forum on Biodiversity (IIFB): Ms. Joji Carino, Food and Agriculture Organization of the United Nations (FAO): Ms. Julie Bélanger, Intergovernmental Oceanographic Commission of UNESCO (IOC): Mr. Stephen Widdicombe, Office of the United Nations High Commissioner for Human Rights (OHCHR): Mr. Marc Titus Cebreros, United Nations Statistics Division (UNSD): Ms. Ilaria Di Matteo (replaced Alessandra Alfieri),World Bank: Ms. Macha Petronella Kemperman, Global Biodiversity Information Facility (GBIF): Mr. Tim Hirsch, GEO BON: Mr. Andrew Gonzalez, International Union for Conservation of Nature (IUCN): Ms. Emily Nicholson, Secretariat of the Pacific Regional Environment Programme (SPREP): Ms. Tiffany Straza, Birdlife International: Mr. Stuart Butchart, Coastal Oceans Research and Development – Indian Ocean (CORDIO): Mr. David Obura, Global Youth Biodiversity Network: Ms. Josefa Isabel Cariño Tauli, and Leibniz Institute: Ms. Amber Hartman Scholz. The SBSTTA Co-Chairs who were in place in 2023 and 2024 also provided inputs to the work as ex-official members, this included: Ms Senka Barudanovic of Bosnia and Herzegovina and Mr Hesiquio Benítez Díaz of Mexico. The work of the Technical Advisory Group on Financial Reported also provided inputs and its co-chairs participated directly in the work of the AHTEG to develop this guidance, the co-chairs were: Ms. Lucretia Landmann of Switzerland and Juan Camilo Pinto Ojeda of Colombia.

The AHTEG was supported by the Secretariat of the Convention on Biological Diversity and UNEP-WCMC. Many staff from these two organizations were involved in supporting the work. Additionally, many experts from around the world contributed to the development of the methodologies for the headline and binary indicators which are described in this document.

Note: This document is currently unedited and in some cases it may include technical terms and acronyms.

Contents

Section 1: Introduction

Introduction to the monitoring framework

Addressing biodiversity loss requires knowledge about biodiversity, related socio-economic issues and assessments of the effectiveness of policy and management decisions. Monitoring, including through the use of indicators, is therefore of fundamental importance in addressing biodiversity loss as recognized in Article 7 of the Convention.

Indicators are information tools which summarize data on varied and complex environmental and socio-economic issues to indicate overall status and trends. They can be used to assess progress towards desired objectives at various scales and to signal key issues to be addressed through policy interventions and other actions. Indicators are, therefore, important for monitoring the status and trends of biological diversity and, in turn, feeding back information on ways to continually improve the effectiveness of biodiversity management programmes. Biodiversity indicators, when used to assess national or global trends, also build a bridge between the fields of policy-making and science.

The Kunming-Montreal Global Biodiversity Framework is accompanied by a detailed monitoring framework comprised of a set of agreed indicators for tracking progress towards the Goals and Targets of the Framework. The monitoring framework, which was adopted in decision 15/5, includes headline and binary indicators which are recommended for national, regional and global monitoring, and more detailed component and complementary indicators. The indicators are to be reported nationally in the national reports, but also will serve as the basis for global analysis and informing the Conference of the Parties when it reviews progress towards the implementation of the Framework.

The monitoring framework will provide information on how the world is faring in terms of achieving the Goals and Targets of the framework. In the same decision, the Conference of the Parties decided to establish an ad hoc technical expert group (AHTEG) to provide guidance on the further development and operationalization of the monitoring framework.

In decision 15/6 the Conference of the Parties adopted an enhanced multidimensional approach to planning, monitoring, reporting and review which links with the monitoring framework for the Global Biodiversity Monitoring framework. According to this decision, headline and binary indicators will be included in the core template for the 7th and 8th national reports. Component and complementary indicators as well as national indicators can also included in the national report (optional).

The headline and binary indicators aim to capture the main elements of each goal and target of the Framework. The component indicators aim to capture key elements of the goals and targets which are not as well captured by the headline indicators. The complementary indicators provide a resource of available indicators which could be used to track specific aspects of the goals and targets. The component and complementary indicators represent indicators which have methodologies which are publicly available with hyperlinks in the document CBD/SBSTTA/26/2. This document captures the metadata for the headline and binary indicators, the metadata for each indicator is a summary of the methodologies, including the computation methods, guidance on disaggregation data compilation processes, data sources, references to guidance and other information. It also includes guidance on implementing Section C of the Framework in monitoring processes and it provides guidance on disaggregations.

Disaggregations by ecosystem functional group and by different people group (indigenous people and local communities, gender, age and disability) are proposed to be used across the implementation of the monitoring framework in order to provide information for guiding decision making.

1.1 Types of indicators

Indicators are "summary measures related to a key issue or phenomenon and derived from a series of observed facts of reported perceptions, attitudes or expectations"[1]. Within the context of the Kunming-Montreal Global Biodiversity Framework (henceforth referred to as "the Framework"), there are four types of indicators: headline, binary, component and complementary indicators. Headline and binary indicators capture the overall scope of the goals and targets of the Framework are used for planning and tracking progress towards them. Reporting on headline and binary indicators is included in the national reporting under the Convention and all Parties are legally obligated to complete national reports. Component and complementary indicators provide more in-depth information on progress but are not required for reporting.

The monitoring framework of the Framework emphasises the use of indicators derived from measurable continuous data, such as pH or forest cover. However, the Framework calls for a whole-of-society approach that follows its theory of change and, as such, concerns itself with more than ecological measurements. Its monitoring framework requires assessment of societal progress on processes that, to date, cannot all be measured empirically but can be reported on using rigorously designed surveys. In some cases, empirical measurements are infeasible because it may be too costly to implement a data collection program due to a lack of resources. In other cases, the target of interest requires complex information to quantify concepts that are not straightforward to measure (e.g. access, equity). Nevertheless, no targets are inherently more important than others and as such, all must be reported on with a headline or binary indicator. Therefore, although some goals and targets have headline indicators that can be reported on using quantitative measurements, others do not and need to be reported on using qualitative data.

For goals or targets where quantitative measurements would not capture the scope of the target, creating indicators using question-based reporting is a way to measure progress. These indicators are referred to as "binary indicators". Reporting on progress will be required by February 2026 so there is a need to determine how headline and binary indicators can be operationalized in the national reports. Questions will be included in the national report of each party and their answers aggregated into a six-point outcome scale measuring each party's progress towards the goal or target. This approach provides a fit-for-purpose way of measuring progress towards the goals and targets of the Framework using a combination of headline and binary indicators.

For a few targets, the use of binary indicators may be a short-term solution whilst quantitative methods are developed, or capacity-building takes place to enable measurements of quantitative data. However, for most goals and targets, the binary indicator covers a key aspect of the scope of the goal or target which is best captured using qualitative information. For example, target 14 which concerns itself with the mainstreaming of the multiple values of biodiversity or target 13 which concerns legal, policy, administrative and capacity-building measures, mainstreaming and policy processes are inherently not quantifiable. Furthermore, the monitoring framework requires tracking progress from multiple perspectives. In many cases, new structures and processes need to be put in place to deliver on the goals and targets. These structures and processes are particularly well suited to be measured using binary question-based indicators. In other cases, measuring outcomes will be more relevant. Here, headline indicators may be more appropriate.

1.2 Reporting on the headline indicators

In the national reporting processes, headline indicators should be reported in a tabular format for a time series from 2020 to data for the most recently available year. If possible, data can be reported for years prior to 2020. For some of the indicators, data is available from a global data source for the headline indicator. In these cases, a Party can choose to either use the globally available data or report national data (reporting national data would be the default option, however, the indicators which are also SDG indicators are a special case and described below).

A Party could also choose not to report data and to enter a comment to explain the reason. A Party can also add graphs, maps or pictures to the national report as a visualization of the data.

Building national data systems in order to report national data is seen as an important factor in ensuring that the indicators guide national decision making and tracking of national targets.

1.3 Background on the SDG indicators

The Sustainable Development Goals were adopted by the General Assembly of the United Nations in 2015. The global indicator framework for Sustainable Development Goals was developed by the Inter-Agency and Expert Group on SDG Indicators (IAEG-SDGs) and agreed upon at the 48th session of the United Nations Statistical Commission held in March 2017. The global indicator framework was later adopted by the General Assembly on 6 July 2017 and is contained in the Resolution adopted by the General Assembly on Work of the Statistical Commission pertaining to the 2030 Agenda for Sustainable Development (A/RES/71/313), Annex (https://unstats.un.org/sdgs/indicators/indicators-list/).

In developing the monitoring framework, the Conference of the Parties decided to align the indicators used for monitoring the Global Biodiversity Framework with the SDG indicators when possible. As the Sustainable Development Goal indicators already have an existing national reporting process through the SDGs. Parties would be asked to use the relevant SDG data in their national reporting processes under the Convention (as opposed to submitting data to both the United Nations through the SDG process and to the Convention). However, in some cases, the metadata presented in this document recommends additional disaggregations of the SDG indicators which could be reported through the national reporting process

This would apply for the following headline indicators: A.3, D.1, 3.1, 5.1, 7.1, 10.1, 10.2 and 12.1.

1.4 Background on the binary indicators

The use of binary type questions is utilized for a number of Sustainable Development Goal indicators (for example, SDG 6.5.1 or SDG 12.1.1) as well as other processes, including for example, the Ramsar Convention on Wetlands of International Importance, the Convention on International Trade in Endangered Species of Wild Fauna and Flora, the Convention on Biological Diversity, the World Happiness Report, the World Health Organisation, multiple national statistics offices, the Global Wellness Institute, Ipsos, Kantar, Gartner, Amnesty International and Oxfam. The use of binary indicators by these organisations strengthens the case for the use of such binary indicators as a core part of the monitoring framework for the Global Biodiversity Framework. Moreover, several other UN bodies rely on binary indicators for their reporting, making it a pre-established approach familiar to focal points that will ease reporting efforts.

The binary indicators will be included as part of the core elements of the national reporting template. Binary indicators can thus be considered a type of headline indicator. While the binary indicators are made of a set of questions, the answers to which are used to assign a score to each Party which can be summed globally, more in depth information than an overall score is useful for national decision-making. Therefore, each binary indicator’s set of questions and possible answers provide further information on the progress of Parties towards a specific part of a goal or target. These questions can be summarized to reach an overall score for each Party or the questions can be used to develop more detailed information to identify specific gaps.

In summary, binary indicators are a special type of headline indicator derived from qualitative questions in the national reports. These binary indicators are required elements of national reports and hold the same weight as other headline indicators in showing progress towards their goal or target. The binary indicators have some key advantages in their ease of deployment and low resource cost, which makes them usable temporarily in cases where quantitative headline indicators are not yet available. Binary indicators also provide a standardized approach to reporting for targets which are primarily action-based, and these will continue to have a place in the Framework’s monitoring framework in the long-term. An overall methodological file and metadata sheet for each binary indicator are provided.

1.5 Methods for aggregating answers

1.5.1 Headline Indicators

The type of quantitative data for each headline indicator differs. The specific methods for aggregating data are described in the metadata for each headline indicator. The SDG indicators have existing data aggregation processes which have been agreed through the SDG process.

1.5.2 Binary Indicators

There are fourteen binary indicators in the Framework that track progress towards a goal or target. Each relies on a set of questions (from two to seven) specific to the goal or target they relate to. Party focal points are accountable for answering the set of questions following the relevant metadata guidance for each indicator. The answers to these questions then need to be aggregated into an overall measure of progress towards the target that can be understood at both the local and global level. This section concerns itself with the methodology that will be used to aggregate answers across questions to measure progress towards each indicator and its goal or target.

There are two types of answers to the questions found in the binary indicator question set: single- and multiple-choice answers. Single-choice answers require Parties to select only one "level of progress" answer to the question (e.g. one of: No/No, but under development/Yes, partially/Yes, fully). Multiple-choice answers require Parties to select all that apply, considering that every selection means a "yes" for the particular item selected (e.g. mitigation/adaptation/risk reduction). Some questions use a mix of both (e.g. No/No, but under development/Climate change/Ocean acidification), in such cases the same logic as for multiple-choice answers is to be used, namely: select all that apply. Therefore, there are two levels of aggregation to consider: aggregation at the question level and aggregation at the indicator level.

At the question level, it is important to be able to assign the multiple-choice answers to the "level of progress" answer format of single-choice questions. As such, three possible interpretations of multiple-choice answers are possible. If no options are selected the answer to the question is considered a "No". If some options are selected but not all (i.e. "yes" to some), the overall answer is considered a "Yes, partially". If all options are selected (i.e. "yes" to all) the overall answer is considered as a "Yes, fully" (Figure 1). This overall answer format corresponds to the possible answers found in single-choice questions and allows direct comparison of answers, enabling indicator level aggregation.

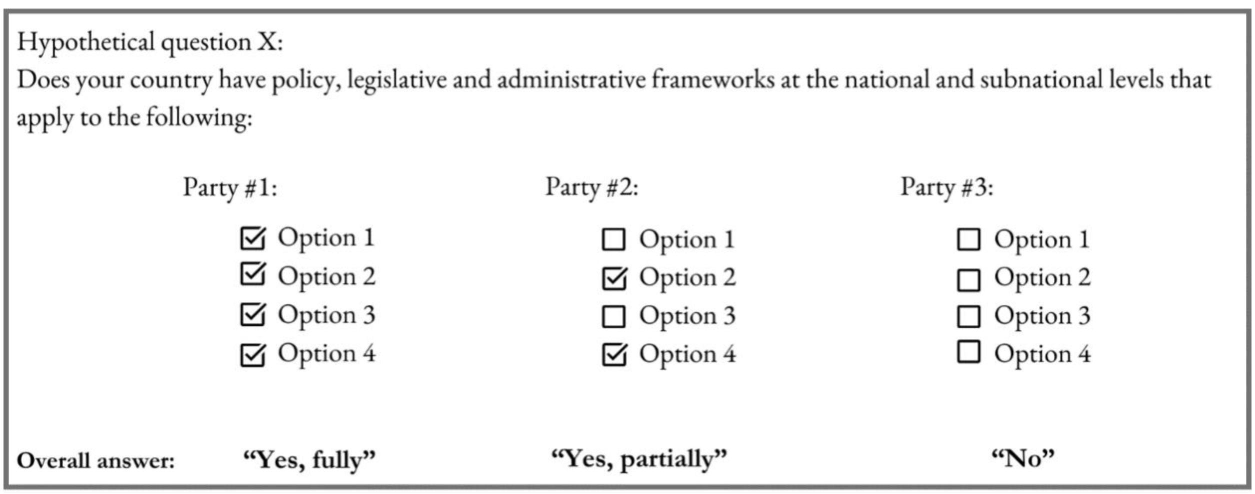

Figure 1. Example question level interpretation for three Parties answering a hypothetical question. Party 1 selected all possible answers and therefore answered "Yes, fully" overall. Party 2 selected only answers 2 and 4, therefore answered "Yes, partially". Party 3 did not select any answers and therefore answered "No" overall.

At the indicator level, the overall answer needs to fairly reflect the efforts and progress made by Parties. As such, the aggregation method needs to be sensitive enough to reflect the different stages of progress towards a goal or target whilst consistently differentiating between Parties. The AHTEG further recognises the need for the aggregation method to allow for Parties to be rewarded for the efforts made towards achieving the goals and targets of the Framework and therefore proposes a six-point outcome scale (from 0 to 5) representing the range of outcomes from unmet to fully met. This outcome scale does not represent a quantitative measure of progress towards the binary indicators but rather an ordinal measure of progress that allows interpretation and global level aggregation. Each Party will be assigned a score (between 0 and 5) based on the combination of answers given for each binary indicator (Figure 2). Answer combinations are based on mutually exclusive answer sets that represent all potential answer combinations for the four possible answers to questions (i.e. "No", "No, but under development", "Yes, partially" and "Yes, fully"). Namely:

5. "Yes, fully" only
4. "Yes, partially" only or "Yes, partially" and "Yes, fully"
3. At least one "Yes, fully" and one or more "No, but under development" or "No"
2. At least one "Yes, partially" and one or more "No, but under development" and/or "No" but no "Yes, fully".
1. "No, but under development" only or "No, but under development" and "No"
0. "No" only

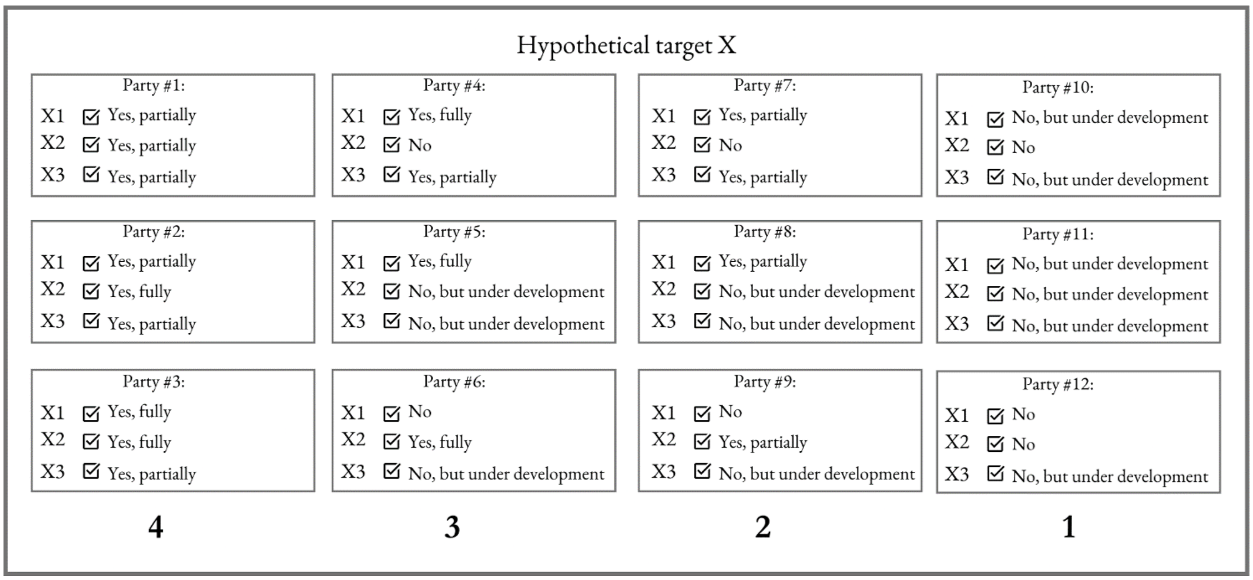

Figure 2. Example indicator level aggregation for 12 Parties answering for a hypothetical target X with three questions (X1, X2 & X3). Only the final selected answer for each question is shown. Parties 1 to 3 achieved a score of 4, parties 4 to 6 a score of 3, parties 7 to 9 a score of 2 and parties 10 to 12 a score of 1. These scores are based on the combination of answers given by each party and illustrate how the different mutually exclusive answer sets can provide an overall score for each indicator. Note that this is not an exhaustive list of potential outcomes. Example answers for a score of 5 and 0 are not shown as they can only be achieved with all "Yes, fully" or all "No" answers, respectively.

A trial of these rules was done with in collaboration with a subgroup of five AHTEG members working with, or as, focal points for their Party and representing different continents (North America, South America, Europe, Asia and Africa). Each participant was asked to answer the questions for Goal B and Targets 1 and 23. These goals and targets were chosen to combine multiple- and single-choice questions and include from two to five questions per set. The indicator level aggregation method was then used to assign an overall score to each Party (Table 1).

Table 1. Outcomes for five Parties taking part in a trial of the aggregation methodology during the AHTEG meeting. Each Party was represented by an AHTEG member who answered the binary questions for Goal B and Targets 1 and 23.

	Outcome score

	Goal B	Target 1	Target 23
Party 1	4	4	4
Party 2	4	2	3
Party 3	4	4	2
Party 4	5	5	4
Party 5	4	2	3

Table 2. Global progress based on outcomes for five Parties taking part in a trial of the aggregation methodology during the AHTEG meeting. Each Party was represented by an AHTEG member who answered the binary questions for Goal B and Targets 1 and 23.

	Global progress					
	0	1	2	3	4	5
Goal B	0	0	0	0	4	1
Target 1	0	0	2	0	2	1
Target 23	0	0	1	2	2	0

The global progress towards a target for each binary indicator is then measured from the number of countries in each outcome category at the indicator level (Table 2). For any binary indicator or for specific question, further detail can be studied by analysing individual answers.

To illustrate this, hypothetical outcomes for the years 2026 and 2029 are presented below with suggested layouts.

Table 2. Hypothetical results for target Y from three questions (Y1, Y2 & Y3) showing the number of answers from Parties for each option in the years 2026 and 2029.

		No	No, but under development	Yes, partially	Yes	No answer
Y1	2026	55	63	50	17	11
	2029	30	35	80	45	6
Y2	2026	67	33	55	33	8
	2029	62	27	60	40	7
Y3	2026	15	65	57	47	12
	2029	10	50	75	56	5

Table 3. Results from Table 1 summarised into 0-5 outcome scale for target Y as a result of the aggregation methodology. This summary table does not illustrate how the unique answer sets were used to measure progress. This process would be done by a simple algorithm following the rules outlined above.

		Global progress					
		0	1	2	3	4	5
Overall	2026	15	33	42	51	38	17

	2029	10	27	49	65	20	25

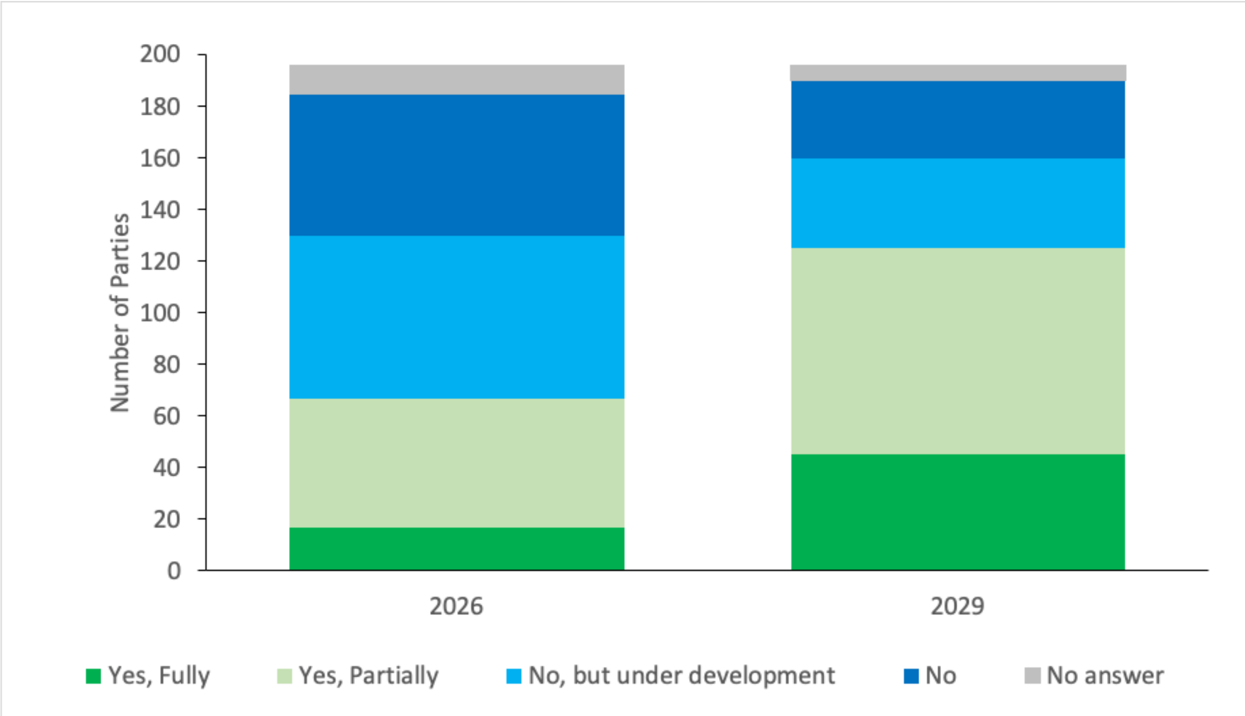

Figure 3. Detailed progress towards for question Y1 derived from Table 2.

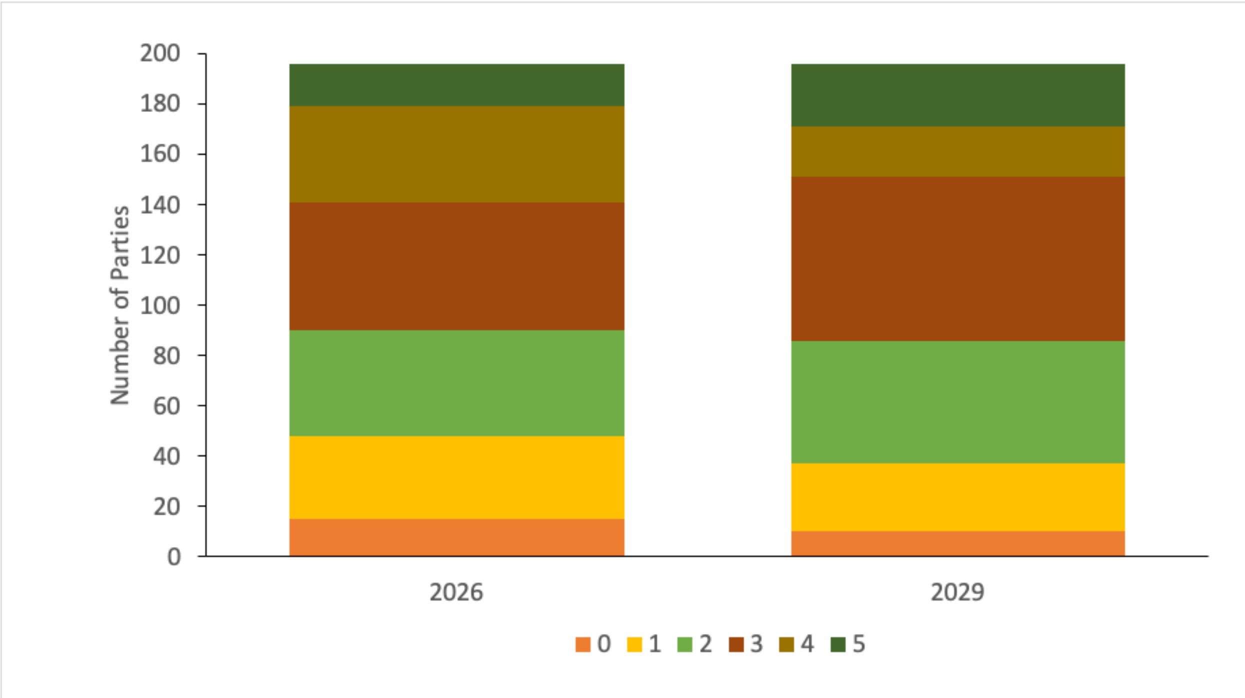

Figure 4. Global progress towards target Y based on the aggregation algorithm (Table 3).

Progress towards the goals and targets of the Framework measured with multiple-choice questions can also be represented with each option displayed independently (Figure 5).

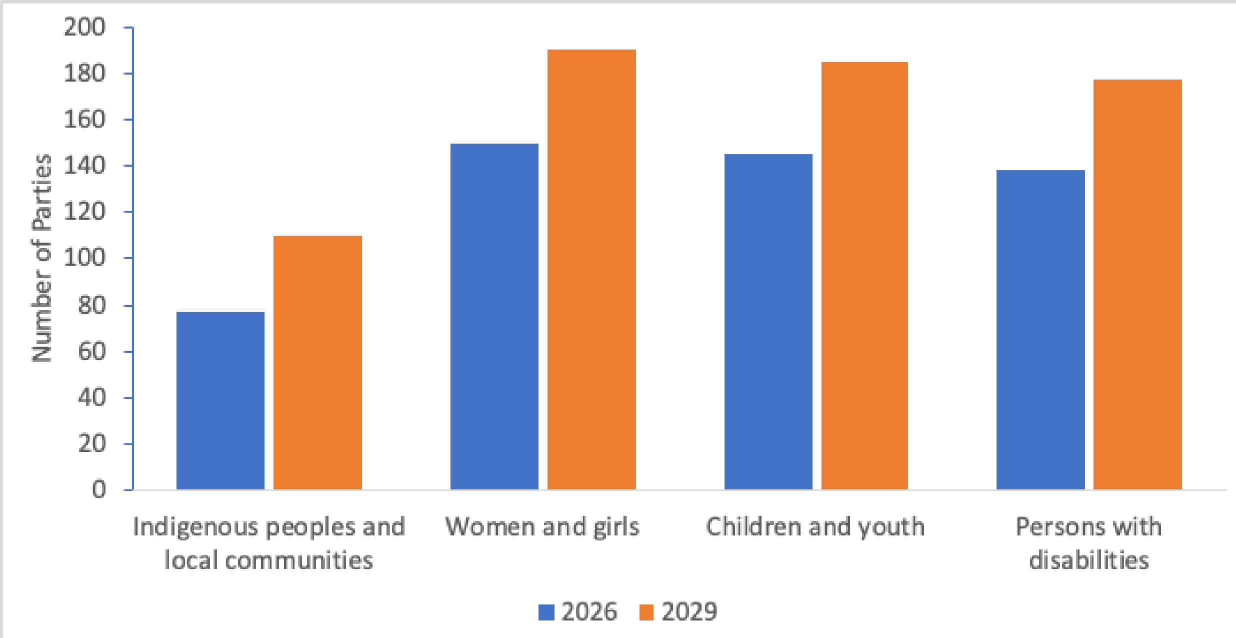

Figure 5. Progress towards a hypothetical target question with a multiple-choice answer (e.g. 22.1.a).

Section 2 Cross-cutting disaggregations and monitoring the implementation of the Global Biodiversity Framework in accordance with its Section C

This guidance describes cross-cutting disaggregations and the ways that Section C of the Framework can be implemented by Parties in their implementation of the monitoring framework and is primarily aimed at Parties for use in national implementation of the monitoring framework. Section 2a focuses on guidance related to people and biodiversity and Section 2b focuses on guidance related to monitoring ecosystems across the framework.

Introduction

Decision 15/4 sets out, in Section C, **Considerations for the implementation of the Kunming-Montreal Global Biodiversity Framework** which are understood to be cross-cutting across the entire Framework.

The indicators of the monitoring framework link to specific goals and targets of the Framework and not to Section C of the Framework. Aspects of Section C can however be considered within some of the binary, headline, binary, component and complementary indicators. Additionally, by using the traditional knowledge indicators, some aspects of Section C can be addressed. In the absence of indicators about processes, it will be difficult to assess the progress of the global community in making monitoring processes more inclusive.

Parties may consider including section(s) in their NBSAP and/or setting national targets that address the considerations of Section C. For example, the current Canadian draft Milestone document includes in the preamble a section called "From vision to action: Achieving the 2030 targets" that includes many of the elements of Section C.

Three major approaches to implement the considerations within Section C through monitoring:

1. Using a strong monitoring framework with appropriate indicators and disaggregation:
    - Disaggregation of the headline indicators and the use of binary, component and complementary indicators within the Monitoring Framework can provide information on the state of elements of Section C.
    - Monitoring process can include indicators that are important and pertinent for IPLCs in relation to biodiversity. In this context, a key mechanism is to include the four traditional knowledge indicators developed under the Article 8j process and as part of the Joint Programme of Work on the Links Between Biological and Cultural Diversity.

2. Strengthening the processes of monitoring:
    - Monitoring process can be adapted to generate disaggregated data and to include participatory processes, including through involving a broad range of sources in the acquisition of the underlying data needed to populate the indicators.

3. Strengthening systems of monitoring:
    - Developing monitoring processes so they provide disaggregated detail will require effort but will ultimately strengthen understanding and provide a positive feedback loop into implementation both of the goals and targets within the Framework, and of the Monitoring Framework.

Guidance on monitoring Section C

Section C of the Framework includes a number of different elements. It includes elements related to people and biodiversity; it includes elements related to interlinkages with specific themes and it includes broader concepts related to implementation. Elements of Section C are referred to in some of the headline and binary indicators. Appendix 2 of SBSTTA/26/2 notes explicit links to elements of Section C where related reporting may be possible by 2026, including through disaggregation of existing datasets for headline and binary indicators (see Table 1 below). This list is not intended to be comprehensive or prescriptive of where and how Section C considerations are addressed. Rather, each element of Section C should be considered throughout the design, implementation and revision of the Framework; and therefore in its monitoring.

For the purpose of this document, guidance on the following elements of Section C is provided as described below:

Guidance	Section C elements
Section 2a of this document includes guidance on inclusively monitoring people and biodiversity when implementing monitoring framework	(a) Contribution and rights of indigenous peoples and local communities, (g) Human rights-based approach, (h) Gender, (n) Intergenerational equity
No specific guidance provided. Some of the elements are captured in the indicators for specific targets as noted in Appendix 2 of SBSSTA/26/2. Guidance related to national planning, national reporting and national implementation applies.	(b) Different value systems, (c) Whole-of-government and whole-of-society approach, (d) National circumstances, priorities and capabilities, (e) Collective effort towards the targets, (f) Right to development, (i) Fulfilment of the three objectives of the Convention and its Protocols and their balanced implementation, (j) Consistency with international agreements or instruments, (k) Principles of the Rio Declaration, (l) Science and innovation, (o) Formal and informal education, (p) Access to financial resources, (q) Cooperation and synergies
Consistency is captured in different ways, but for indicators that are also used in reporting against the Sustainable Development Goals, the reporting should be through the SDG process.	(j) Consistency with international agreements or instruments
Monitoring specific ecosystems is necessary to implement the ecosystem approach and to use many of the indicators in national planning. Section 2b of this document includes guidance on monitoring ecosystems across the framework.	(m) Ecosystem approach
Indicators are being further developed in the context of the biodiversity and health plan (for COP-17).	(r) Biodiversity and health

Section 2a: Guidance on inclusively monitoring people and biodiversity when implementing the monitoring framework.

Taking an inclusive approach to monitoring

Section C of the Global Biodiversity Framework provides "**considerations for the implementation of the Kunming-Montreal Global Biodiversity Framework".**

SBSTTA-25 in recommendation 1 requested the AHTEG to develop guidance on implementing monitoring in accordance with Section C of the Global Biodiversity Framework:

> "*Encourages* the Expert Group to take section C of the Framework into consideration when addressing the gaps in the monitoring framework in preparation for the twenty-sixth meeting of the Subsidiary Body on Scientific, Technical and Technological Advice" (CBD/SBSTTA/REC/25/1, paragraph 9).

Additional requests for an inclusive approach to monitoring have both been agreed by Parties and suggested by expert groups:

- The Gender Plan of Action (Decision 15/11) adopted by the Conference of the Parties includes a specific action to promote gender-responsive monitoring within the context of the Framework:

  > "4. *Urges* Parties and invites where appropriate, relevant organizations to incorporate the Gender Plan of Action in national biodiversity strategies and action plans, and to include gender-specific indicators in the development of national indicators, collecting data disaggregated by sex, age and other demographic factors and gender indicators, where possible;" [...] and
  >
  > "6. *Encourages* Parties to submit information on efforts and steps taken to implement the Gender Plan of Action in their national reporting, including sex-disaggregated data;"

- The 12th meeting of the Ad Hoc Open-ended Intersessional Working Group on Article 8(j) and Related Provisions of the Convention on Biological Diversity recommended that the AHTEG:

  > *"consider the need for data disaggregation by sex for all indicators related to the Framework, including the traditional knowledge indicators, and of strengthening, in line with objective 3.2 of the Gender Plan of Action, the evidence-based understanding and analysis of the gender-related impacts of the implementation of the Framework, including insights from the traditional knowledge of women and girls from Indigenous Peoples and Local Communities"*

- The 12th meeting of the Ad Hoc Open-ended Intersessional Working Group on Article 8(j) and Related Provisions of the Convention on Biological Diversity also reviewed a draft Knowledge Management Strategy, which will be further considered by COP-16. The strategy is "aimed at enhancing the accessibility and use of relevant data, information and knowledge, including traditional knowledge given access to with the free, prior and informed consent of Indigenous Peoples and Local Communities, for informed policy development, planning, decision-making and action to support the implementation and monitoring of the Framework at all levels. It is also aimed at strengthening communication, awareness-raising, education, capacity development, knowledge-sharing and organizational learning."

Addressing People and Biodiversity in Section C through the use of indicators and disaggregation

Considering the Framework as a whole, there is no existing set of indicators that, currently, would comprehensively measure all aspects of Section C, or of all elements of the goals and targets. The set of proposed headline and binary indicators are intended as an informative proxy to progress across the Framework. Further strengthening this set of indicators would improve the consideration of elements in Section C in national implementation.

For some indicators, which are also used in reporting against the Sustainable Development Goals, the associated methodology provides guidance for inclusive monitoring and relevant data disaggregation, even though the global survey may not currently require reporting on or present such disaggregation. In such cases, countries may be able to supplement their data within global datasets with their national disaggregated data, where such exist.

In all cases, knowledge and data should be reported in line with the FAIR and CARE principles as well as the Human-Rights-Based Approach to Data. The AHTEG recognized that processes for deciding priorities and implementation of monitoring and assessment activities, and the management activities under assessment, are intended to be inclusive.

Table 1: Summary of key links between selected societal groups identified in Section C and the monitoring framework of the Kunming-Montreal Global Biodiversity Framework.

Indigenous Peoples and Local Communities (IPLCs)	There are several indicators for which the information could be disaggregated, including information relating to IPLCs (see Appendix 2 of SBSTTA/26/2). For reporting indicators such as A.1, A.2, 1.1, 2.2, 3.1, and 10.2, if georeferenced data are provided, disaggregation may be possible given corresponding georeferenced data for IPLCs and their territories and areas, for analysis at global or regional level. However, data governance by IPLCs and their free, prior and informed consent must be respected in the indicator development and monitoring processes. Indigenous Peoples have developed the Indigenous Navigator (https://indigenousnavigator.org/) to monitor the implementation of internationally agreed and adopted standards to respect their rights, including in relation to their holistic and interdependent relationship with nature. A holistic monitoring approach that includes social, cultural, economic and political aspects and rights is important in order to meet current and future monitoring commitments.
Women and girls	There are several indicators for which the information could be disaggregated by gender (see Appendix 2 of SBSTTA/26/2). For many indicators however, gender was not a possible disaggregation by data layer. Target 23 is currently to be monitored using a binary indicator. The Women4Biodiversity (2023) has prepared guidance for gender-disaggregated data collection in the Monitoring Framework beyond headline indicators and required reporting.
Youth and Intergenerational Equity	Section C of the Kunming-Montreal Global Biodiversity Framework includes intergenerational equity and with it, the expectation of meaningful participation of younger generations in decision-making processes. There is currently a gap in the availability of operational and relevant indicators on youth and intergenerational equity, as well as a lack of operational guidance on youth-responsive monitoring in relation to biodiversity. However, there are ongoing initiatives to fill these gaps for future use (e.g. as a component indicator for Target 22), including youth-led initiatives by the Global Youth Biodiversity Network. There are several indicators for which the information could be disaggregated by age (see Appendix 2 of SBSTTA/26/2). For many indicators however, disaggregation by age is not possible. Intergenerational equity and full and effective participation of children and youth i has implications for the monitoring framework when considering usefulness for assessing sustainability and long-term trends and for modelling and scenarios (with respect to assessing implications for future generations), inclusiveness of

	methodologies, disaggregation, identifying differentiated and intersectional impacts, respecting the rights of children, and potentially assessing contributions of children and youth.
Human rights-based approach	In concert with the discussion in WG8J-12, the AHTEG identified the utility of the traditional knowledge indicators as component indicators under Target 22 and selected other targets (see Appendix 1 of SBSTTA/26/2). The AHTEG also considered that the traditional knowledge indicator on land-use change and land tenure by Indigenous Peoples and Local Communities could meet the criteria required for a headline indicator. Parties identified the number of killings and other attacks on environmental human rights defenders, which is derived from SDG indicator 16.10.1, as a useful component indicator for Target 22. These component indicators, combined with the binary indicator which measures Target 22, allows for a more holistic measurement of progress in terms of structure, process and outcomes. Further work will be needed to establish component or complementary indicators that can assess "access to justice" and "access to information".

Using indicators pertinent to People and Biodiversity in Section C

The considerations in Section C are partly, but not wholly, addressed by the existing monitoring framework and its headline and binary indicators. Indicators with particular relevance and with relevant disaggregation are identified in Appendix 2 of SBSTTA/26/2.

Specifically for Indigenous Peoples and Local Communities, the four traditional knowledge indicators (TK indicators) developed under the parallel Article 8(j) process and as part of the Joint Programme of Work on the Links Between Biological and Cultural Diversity could be used to complement the headline and binary indicators. These indicators assess traditional knowledge systems, as a complement to the scientific monitoring used in other Framework indicators. The TK indicators are component or complementary indicators for certain targets and can provide a basis for disaggregation of existing indicators but also have a broader, cross-cutting relevance across the Framework (for example disaggregating by indigenous and traditional territories is recommended across the monitoring framework).

These four TK indicators have been developed by the Working Group on Article 8(j) and Related Provisions (WG8J-12) of the Convention on Biological Diversity:

- Percentage of the population in traditional occupations
    - Designated as Headline Indicator 9.2.
    - The share of the population in traditional occupations, which is calculated using the number of self-identified Indigenous and tribal people engaging in such occupations, is also relevant to the monitoring of Targets 5, 10, 18, 21, 22 and 23.
- Status and trends in land-use change and land tenure in the traditional territories of Indigenous Peoples and Local Communities
    - Land use and tenure data is specifically relevant to the disaggregation of Headline Indicators A1, A2, B1, 2.2, 3.1, 10.1 and 10.2. It provides data and information for monitoring of Targets 1, 2, 3, 5, 8, 9, 10, 21, 22 and 23, and it provides context for binary indicators in Target 22 and 23. Trends in land tenure provide data that contributes to the realization of Section C.
- Indicator on participation of Indigenous Peoples and Local Communities
    - WG8J-12 proposed a revision of the indicator title: *Participation in decision-making of Indigenous Peoples and Local Communities in the implementation of the Kunming-Montreal Global Biodiversity Framework at all levels.*

- Trends in IPLC participation provide data that contributes to the implementation of Section C. Participation is cross-cutting and relevant to most, if not all, goals and targets, and particularly relevant to Target 21 and Target 22. There may be links to binary and headline indicators.
- Status and trends of linguistic diversity and numbers of speakers of Indigenous languages
  - Trends in linguistic diversity and the number of speakers provide data that contributes to the implementation of Section C, given demonstrated correlation between linguistic diversity and biodiversity.

These TK indicators can be considered as a package, functioning together to address the cross-cutting relevance of traditional knowledge for the Framework. As one example, the indicators on traditional occupations and linguistic diversity can be regarded as proxies for the relationship that IPLCs have with local land/biodiversity and its conservation, sustainable management and use, which also inform biodiversity conservation and sustainable use. The percentage of traditional occupations shows how many people use spatial knowledge, and the vitality of local languages indicates a long-term connection between land, knowledge and wisdom coded in these languages. From a conservation knowledge base perspective, TK holders can be regarded as 'walking encyclopedia' of knowledge relevant in these landscapes. To this end, the connection between traditional occupations and indigenous and traditional languages are intimately connected to achieving the implementation of GBF and the overall objectives of the Convention.

Strengthening the approach to and processes of monitoring

There are currently no indicators directly linked to the implementation of Section C. However, as noted in the section above on the use of TK indicators, and in the light of the ongoing developments around Community Based Monitoring and Information Systems (CBMIS) and parallel developments in the application of monitoring through citizen science, there are opportunities to address the current lack of indicators about processes and to make monitoring more inclusive. Processes to advance Parties' capacity to monitor the considerations described within Section C of the Framework could therefore be developed.

Approaches to monitoring the implementation of the Global Biodiversity Framework can be strengthened by using strategic data disaggregation, inclusive processes in designing and conducting monitoring, and a broad range of information sources to inform assessments.

Generating and using disaggregated data:

SBSTTA/26/2 Appendix 2 identifies headline and binary indicators with data available to address elements of Section C.
Where available, relevant disaggregated data are described in the metadata sheet for the respective indicator. Some general principles apply, such as the recommendation to collect and report sex-disaggregated data, age-disaggregated data, and disaggregation on IPLCs for any indicator pertaining to humans.

The actual availability of datasets is more limited than the theoretical disaggregation possible or relevant for a specific target and indicator. Opportunities exist to improve the levels and types of disaggregation produced in many of the underlying data sets, for example by provision of resources for development of such datasets.

Using inclusive and participatory processes:

The processes of prioritization (for example, of species or sites for monitoring) and of designing and conducting monitoring systems can be made more inclusive through broad consultation, inclusion of diverse representatives among the monitoring teams, and specific attention to the considerations identified in Section C of the Framework.

The processes of information collection, analysis and communication should be inclusive, in line with the Framework and other CBD Decisions and processes. For example, the *contributions and rights of Indigenous Peoples and Local Communities* can be addressed in how Indigenous Peoples and Local Communities are involved in the implementation of goals and targets as well as in the data collection, reporting, and communication around them.

Addressing data collection for indicators to measure progress against the Goals and Targets of the Kunming-Montreal Global Biodiversity Framework to include *implementation of the human rights-based approach, gender,* and *intergenerational equity* will enhance implementation of those Goals and Targets.

The human rights-based approach to implementing and monitoring the Framework means identifying both rights holders (those entitled to rights) and duty bearers (entities with obligations to protect these rights). The goal is to ensure safe exercise and enjoyment of human rights in all aspects of the Framework by empowering both rights holders and duty bearers, helping them understand their roles, claim rights, and fulfill obligations. Statistical guidance on operationalizing a human rights-based approach to data principles is also relevant to address risks associated with the production of disaggregated indicators on, or with the participation of, groups in vulnerable situations. As in the SDGs context, national human rights institutions, where present, are best placed to support Parties and stakeholders in addressing these issues. UN guidance and regional instruments such as the Escazu Agreement or the Aarhus Convention anchor the rights of access to information, public participation and access to justice in environmental matters, and the protection of environmental human rights defenders from killings and other attacks.

To ensure c*onsistency with international agreements or instruments,* the Framework needs to be implemented in accordance with relevant international obligations, taking into account opportunities for cooperation and synergies, and in working with others, including the Bern process, to improve alignment. The *Principles of the Rio Declaration* were taken into account in how the framework was developed and are to be taken into account in its implementation and monitoring, as well as different value systems, national circumstances, priorities and capabilities and the right to development.

For many indicators, underlying data layers do not currently permit the recommended disaggregation by gender, Indigenous Peoples and Local Communities, children and youth, or disability. However, the AHTEG recognized that processes for implementation of monitoring and assessment activities, and the management activities under assessment, are intended to be inclusive as defined in Section C and in Targets 22 and 23 of the Framework.

Intergenerational equity, and the full and effective participation of children and youth, are identified as cross-cutting considerations in the Framework. To apply this to the monitoring framework, all actors must ensure that monitoring methodologies are inclusive and youth-responsive. This also means taking steps to gather age-disaggregated data and other ways to account for age-differentiated benefits to, impacts on, or contributions by, individuals including children and youth. To account for intergenerational implications of biodiversity actions, it is important to identify and monitor the sustainability and long-term trends of resource use, nature's contributions to people including ecosystem services, ecosystems and other relevant aspects of the Framework.

Using a broad range of information sources:

The broad scope of the Framework necessitates a broad range of information sources to accurately establish baselines, assess progress and identify knowledge gaps, including in reference to the identified social groups.

Decision 15/5 (paragraph 6) "*Invites* Parties and relevant organizations to support community-based monitoring and information systems and citizen science and their contributions to the implementation of the monitoring framework for the Kunming-Montreal Global Biodiversity Framework".

Similarly, the recommendation of the 12th meeting of the Ad Hoc Open-ended Intersessional Working Group on Article 8(j) and Related Provisions of the Convention on Biological Diversity "*Stresses* the importance of community-based monitoring and information systems for filling temporal and spatial data gaps and building capacity to implement the monitoring framework for the Kunming-Montreal Global Biodiversity Framework, while acknowledging the need to engage Indigenous Peoples and Local Communities in the development and management of those information systems[…]".

The contribution of community-based monitoring and information systems (CBMIS) approaches is becoming well documented in relation to monitoring progress and achieving biodiversity targets. Some community-based monitoring tools implementing a human rights-based approach, such as the Indigenous Navigator, are already operational.

As an example of an expanded information base, *Local Biodiversity Outlook 2* (LBO-2) brings together information from published academic and non-academic sources. In its second edition, LBO-2 highlights more than 50 stories by authors representing Indigenous Peoples and Local Communities about their perspectives and experiences around the current social-ecological crisis, contributions to the UN Decade on Biodiversity, and, more broadly, local solutions across biodiversity, climate change, and sustainable development challenges. The cases from LBO-1 and LBO-2, as well as multimedia available on the LBO Online illustrate the contributions of Indigenous Peoples and Local Communities to the Kunming-Montreal Global Biodiversity Framework.

Strengthening monitoring systems

Effective systems of monitoring require adequate and sustainable capacity, including human resources and infrastructures (with attention to interoperability), as well as sufficient guidance and widespread adoption of shared standards. The foundations of a successful monitoring system will include (but is not limited to) capacity building, interoperable and sustainable infrastructures, resource mobilization for monitoring, technical and scientific cooperation, and technology transfer.

Research and knowledge gaps: to 2030 and beyond

A full mapping of the relevant rights of all people, including those specifically identified in the KM-GBF such as Indigenous Peoples and Local Communities, women and girls, youth and children, environmental human rights defenders, and persons with disabilities, is needed to support the implementation of the Framework. A human rights-based approach to monitor these rights has well-established guidance, methodology and indicators, which are available to complement the operationalisation of the monitoring framework (e.g. EMG 2022, OHCHR 2012). This approach is applied to the monitoring of traditional knowledge indicators developed under the Article 8(j) process.

Although data availability may limit the use of disaggregated data in National Reports due in 2026 and 2029, the gaps, priorities and opportunities for data disaggregation and participatory approaches should be identified and advanced to improve future monitoring and resulting management action under the Convention.

To meet existing commitments under the Convention, particular attention is needed to address future monitoring of and disaggregation by:

- Gender, age, and disability
- Indigenous Peoples and Local Communities
- The use and management of traditional knowledge

- Community-based monitoring and information systems and citizen science
- The social, economic and cultural implications of environmental change

Accompanying attention will be needed to ensure such monitoring is adequately resourced.

In completing their national reports, Parties are encouraged to take advantage of the reporting template to indicate their progress, challenges and opportunities in reporting on their progress in implementation of Section C.

References and supporting documents

(a) Contribution and rights of indigenous peoples and local communities	CARE Principles for Indigenous Data Governance ELATIA partnership for self-determined sustainable development The Indigenous Navigator Akwe`:kon Guidelines Mo'otz Kuxtal Voluntary Guidelines CBD Plan of Action on customary sustainable use Regarding Target 10: The FRA guidelines include data disaggregation by indigenous peoples and local communities for forest ownership and management rights. Countries are encouraged to report on the elements, noting that these attributes contribute to the long-term effectiveness of forest management.
Participatory approaches for monitoring based on national needs, e.g. building from:	CBD (2012) Ensuring Inclusive Societal Engagement in the Development, Implementation and Updating of NBSAPs, Module 5 (B Series) UNU-IAS (2023) Using Landscape Approaches in National Biodiversity Strategy and Action Planning Resources related to CBMIS (list is not exhaustive): Enhancing Indigenous Peoples' Development through Community-Based Monitoring and Information Systems (CBMIS). Community-based monitoring and information systems (CBMIS) in the context of the Convention on Biological Diversity (CBD). Basic course on community-based monitoring and information systems Locally Based, Regionally Manifested, and Globally Relevant: Indigenous and Local Knowledge, Values, and Practices for Nature. The Concept, Practice, Application, and Results of Locally Based Monitoring of the Environment Community Monitoring of Natural Resource Systems and the Environment. Sharper eyes see shyer lizards: Collaboration with indigenous peoples can alter the outcomes of conservation research.
(g) Human rights-based approach	Existing metadata and data collection on SDG indicator 16.10.1 (component indicator of Target 22) but it needs to be adapted specifically to data collection on attacks on environmental human rights defenders. Existing UN guidance for Resident Coordinators and UN Country Teams on protection of environmental human rights defenders OHCHR will soon release a new Fact Sheet on Land and Human Rights which incorporates KMGBF monitoring framework, including Section C and specific indicators Environmental Management Group (2022) Guidance on integrating human rights in NBSAPs OHCHR (2012) Human Rights Indicator - A Guide to Measurement OHCHR (2015) Land and Human Rights: Standards and Applications OHCHR (2018) Guidance Note on Human Rights Based Approach to Data

(h) Gender	CBD (2021) Developing and measuring a gender-responsive post-2020 Biodiversity Framework: Information on gender considerations within the draft post-2020 Biodiversity Framework. CBD/WG2020/3/INF/10, CBD/SBSTTA/24/INF/30, CBD/SBI/3/INF/42. CBD Women (2023) Discussion Paper: How to monitor the gender-responsiveness of the KM-GBF? ESCAP, UNEP, IUCN and UN Women (2019) *Mainstreaming gender in environment statistics for the SDGs and beyond: Identifying priorities in Asia and the Pacific*. NOTE: Proposes a Gender-Environment Indicator Set in Asia and the Pacific GEF (2018) Guidelines to Address Gender Inequality. ILO (2013) Guidance Note 3.1: Integrating gender equality in monitoring and evaluation. Updated 2020 (v3). UNIDO (2015) Guide on gender mainstreaming: environmental management projects UNDP (2016) How to conduct a gender analysis CEDAW General Recommendation 39
(n) Intergenerational equity	Meaningful Youth Engagement in Policy and Decision-making Processes (Our Common Agenda, April 2023) Youth, Peace and Security: A Programming Handbook (UN, 2021) - contains some guidance on youth-responsive monitoring

Section 2b: Using a consistent ecosystem classification to support the monitoring framework of the Kunming-Montreal Global Biodiversity Framework based on the IUCN Global Ecosystem Typology

1. Executive summary

The Kunming-Montreal Global Biodiversity Framework (GBF) under the UN Convention on Biological Diversity includes goals, targets and headline indictors that relate to ecosystems. Section C states that the Framework is to be implemented based on the ecosystem approach. While application of the ecosystem approach *per se* is context specific, its implementation and monitoring can be aided by using a consistent classification when disaggregated reporting by ecosystem is considered appropriate and feasible.

A consistent approach to monitoring ecosystems is the basis reporting on headline indicators that relate to ecosystems, including for Goal A, Goal B and multiple targets. The recommended framework is the IUCN Global Ecosystem Typology (GET), a hierarchical ecosystem classification system used across sectors. It is recommended to use level 3 of GET hierarchy for reporting for each indicator which takes into account the need to respect the application of the typology under diverse circumstances of data availability and capacity.

This document contains:
Section 2: a brief introduction to the context of using the GET in monitoring the GBF
Section 3: an introduction the Global Ecosystem Typology (GET).
Section 4: the reasons for national reporting at the middle level of the typology (level 3, ecosystem functional group, EFG), rather than higher (level 2, biome, or level 1, realm), to support the objectives and information demands of the GBF.
Sections 5 and 6: preliminary analyses examine the number of ecosystem functional groups per country, as a proxy for reporting burden; the average number of natural ecosystem functional groups per country is 20, with larger countries typically having more groups.
Section 7: includes examples of reporting tables needed for two headline indicators (A1 and A2), to demonstrate how national data might be compiled for reporting.
Section 8: outlines future work that will be needed to support countries to use the Global Ecosystem Typology and report on ecosystem-related headline indicators.

Using level 3 of the GET facilitates differentiation of ecosystem groups by the biodiversity they support, the benefits they provide, the pressures and threats they face and thus actions needed. It can also improve understanding of links between actions (e.g. indicator 2.2, area under restoration) and outcomes (e.g. indicator A2, extent of natural ecosystems, and A1, Red List of Ecosystems).

It is noted that the detail needed for national reporting is different from the detail required for public communication (a secondary role for headline indicators). If data are reported with greater detail, the results can be simplified for ease of communication to non-specialists (e.g. all forest ecosystem types aggregated, or all coastal ecosystem types), but the reverse is not possible if national reporting uses simplified categories that risk being uninformative for science-based reporting.

The biggest challenge is that data availability and capacity on ecosystems are poorly understood – there is currently no database that compiles the number of countries with appropriate national ecosystem data (ecosystem classifications and maps) for GBF reporting.

Initial analyses from available datasets suggest that at least 70 countries may have suitable ecosystem data to support reporting for at least some ecosystem groups, where cross-walks between national ecosystem classifications and the GET – referred to as '*mapping national ecosystem data to the Global Ecosystem Typology level 3*' in CBD/SBSTTA/26/2 – is feasible or has already occurred. Other countries will need support to develop new national classifications and maps, or to use other sources (such as global data), which may be assisted by global initiatives underway, such as the Global Earth Observation (GEO) Global Ecosystems Atlas. Future work needed includes guidelines and tools for cross-walking, for developing new ecosystem classifications and maps, databases that could support application, and initiatives and people who can build capacity and support countries. The science of ecosystem classification, mapping and assessment has leapt forward over the last decade, making such advances now feasible over the coming five years and enabling science-based reporting for ecosystems across the GBF.

2. Background

A unified approach to ecosystems forms the basis for the reporting of a range of headline indicators that relate to ecosystems across the monitoring framework[3], including:
Goal A on enhancing ecosystem integrity, connectivity, and resilience, and increasing ecosystem area (Headline indicators A1 Red List of Ecosystems and A2 Ecosystem extent);
Goal B on sustaining nature's contributions to people (B.1 Services provided by ecosystems);
Target 1 on integrated spatial planning to reduce ecosystem loss;
Target 2 on restoration (2.2 Area under restoration);
Target 3 on protected areas (PAs) and other effective area-based conservation measures (OECMS) (3.1 Coverage of PAs and OECMs);
Target 6 on invasive species (6.1 Rate of invasive alien species establishment).

The recommended ecosystem classification system is the IUCN Global Ecosystem Typology (GET). This recommendation would require parties to report on headline indicators disaggregated to ecosystem groupings in the GET that summarise national data (see examples below for headline indicators A1 and A2). Countries with established ecosystem classifications (i.e. a list and description of ecosystem types present in the country) and maps (i.e. spatial data that represents the distribution of those ecosystem types) will need to cross-walk or align their ecosystem classification with the typology– this is referred to as 'mapping national ecosystem data to the Global Ecosystem Typology level 3' in CBD/SBSTTA/26/2. Other countries may need to develop both the list of ecosystem types known to occur in their country and maps to represent them, or alternatively use independently developed data (including global-level map products) to represent them.

The GET level 3 is proposed as a typology which can minimize the reporting burden while ensuring the benefits of the level of information needed to enable a causal connection to be made between different targets and indicators – for example, how restoration actions under Target 2 increase extent of natural ecosystems and reduce their risk status (Goal A). IUCN has developed guidance for application of the typology under diverse circumstances of data availability and capacity. This document examines some of the benefits and implications of this recommendation, focussing primarily on the level of reporting (i.e. in the GET hierarchy).

3. Introduction to the Global Ecosystem Typology (GET)

The GET is a comprehensive and hierarchical system for ecosystem classification, endorsed as a global standard by IUCN (International Union for Conservation of Nature) at the 2020 World Conservation Congress (Resolution 7.061), and by the United Nations Statistical Commission at its 55th session in March 2024 as an international statistical classification. The GET was first published in 2020, with updates published in 2022 (see global-ecosystems.org/). The GET covers all realms (marine, terrestrial, subterranean, and freshwater), including those shaped primarily by natural and anthropogenic drivers.

The typology is a conceptual framework, not a map product. However, as part of the development of the GET, indicative global maps of each of the Ecosystem Functional Groups (EFGs) were compiled from existing data, yielding broad distribution maps of 110 EFGs (shown on the GET website, www.global-ecosystems.org). These spatial data will be iteratively updated as mapping methods continue to develop, and new and improved data on the distribution of the world's ecosystem types becomes available. A new global initiative, the GEO Global Ecosystems Atlas, seeks to compile existing high-quality maps of ecosystem types and to align them with EFGs, which would provide an important source of spatial data in the coming years.

The typology is hierarchical (Figure 1) and addresses functional drivers at the upper levels (realm, biome and ecosystem functional group), and compositional features at lower levels (global or local ecosystem types)[4]. Typically national classifications (and associated maps) are at the lower levels (5-6), such as those used for Red List of Ecosystems assessments (headline indicator A1) and ecosystem accounting (headline indicators A2 and B1); for example, level 5 or 6 for national scale assessments[5] (e.g. Colombia[6], Finland[7,8], South Africa[9,10] and Myanmar[11]), or level 4 for global or regional assessments (e.g. coral reefs of the Western Indian Ocean[12]). This document primarily explores the implications of national reporting at levels 1 (realm), 2 (biome) or 3 (ecosystem functional group, EFG).

Importantly, the typology enables harmonisation of national ecosystem classifications and maps, for comparisons of ecosystem diversity and extent between jurisdictions and different parts of the world. It allows integration of existing national classifications and the maps that represent them, through cross-walks of national ecosystem types (level 5-6) to the ecosystem functional group level of the typology hierarchy. It can also support development of national lists of ecosystem types (e.g. Maldives[13]) and underpin the development of new finer-scale ecosystem maps at country level (e.g. in Myanmar[11]).

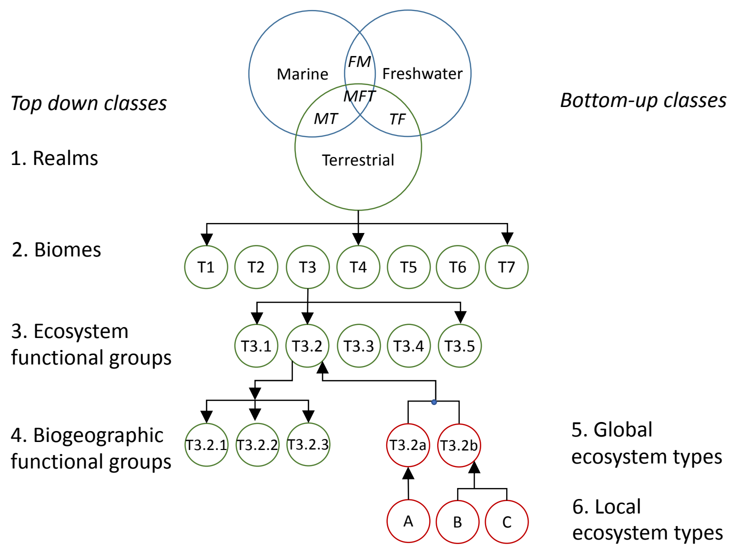

***Figure 1**. The IUCN Global Ecosystem Typology[4] is hierarchical, with higher levels (1-3) capturing ecosystem functional traits, and lower levels (4-6) addressing composition. Levels 4 and 5 represent alternative pathways to comparable descriptions of the world's ecosystems that capture both function and composition. Level 4 (green) is a top-down approach, whereby ecosystem function groups are split to represent biogeographic compositional patterns, for example using ecoregions[14] as a proxy. Alternatively local composition may be captured through bottom-up aggregation of local ecosystem types (red), for example a national classification, using hypothetical terrestrial ecosystem types in ecosystem functional group T3.2 Seasonally dry temperate heath and shrublands. Adapted from[15].*

4. Justification for reporting at level 3 of the GET hierarchy

The developers of the GET and the Red List of Ecosystems expert group recommend that countries report to the CBD at level 3 (ecosystem functional group) of the typology for several reasons:

- Reporting at level 3 provides appropriate resolution to support the objectives and information demands of the GBF, compared with reporting at biome level. For example, e.g. biome M1 marine shelf includes M1.1 seagrass meadows, M1.3 photic coral reefs and M1.2 kelp forests, which differ in the biodiversity they support, the benefits they provide, the pressures and threats they face, and thus their conservation and management needs.

- It provides transparent information about restoration progress that would be lost if countries report at level 2 (biome): for example, reporting at the biome level (marine shelf) could see advances in seagrass restoration mask failures in other ecosystem types such coral reefs. Poorly known ecosystem types such as marine animal forests (e.g. sponge beds) would be transparently reported as data gaps, highlighting the need for investment in survey and mapping.
- Similar issues emerge for forest ecosystems, where the tropical-subtropical forests biome (T1) includes T1.1 Tropical/Subtropical lowland rainforests and T1.2 Tropical/Subtropical Dry forests and thickets. In Brazil, these are subject to different regulations that govern their protection and restoration; relatively high rates of protection and restoration of Amazonian lowland forests could mask high deforestation and low restoration rates of dry forests in the Cerrado, if reporting occurred at the biome level.
- Reporting at level 3 provides consistency in definition of the ecosystem concept across the framework, allowing comparison between countries, and from national to global scales[16], as well as consistency between indicators across goals and targets – both A1 and A2 recommend reporting at level 3 (see section 7 below), as does the international standard for ecosystem accounting (SEEA EA), which underpins A2 and B1.
- Reporting at level 3 also enables the causal links across the GBF to be tracked and progress to be monitored effectively. The goals (outcomes) of the GBF rely on actions (under the targets); this relationship can be measured by the headline indicators if they are reported consistently at the appropriate resolution. For example, the impacts of seagrass restoration under Target 2 can be measured on improvements in seagrass extent (Goal A indicator A2) and risk status (A1 Red List of ecosystems). This is illustrated for other targets in Figure 2.
- Reporting at level 3 allows for simplified aggregation to level 2 when presented data, because EFGs are nested within biomes and realms, but not vice versa. They can also be aggregated to simplified groupings for public communication, a secondary role for headline indicators. This is important for bridging the needs of national reporting, global reporting and public communication. If national data are reported with greater detail (i.e. level 3), the results can be simplified for global reporting (e.g. at biome) or communication to non-specialists (e.g. all forest ecosystem types combined, or all coastal ecosystem types). However, the reverse is not possible if national reporting uses simplified categories that risk being uninformative for science-based reporting.

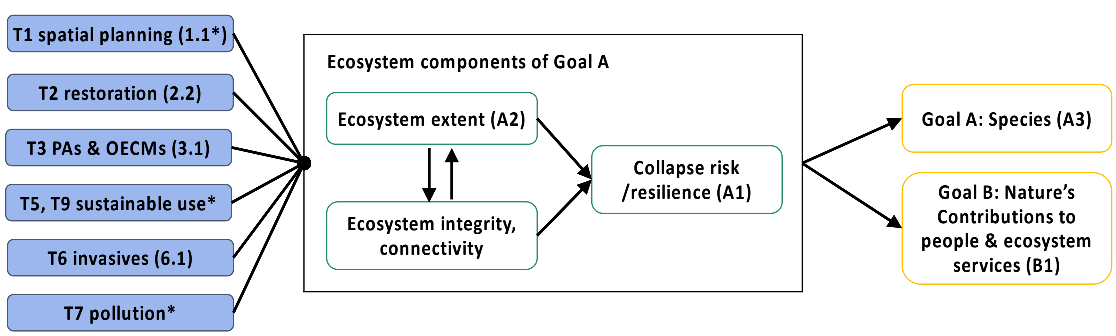

Figure 2. *Theory of change for the goals and targets of the Global Biodiversity Framework: implementation of actions under the GBF targets (blue, with headline indicator numbers in brackets) directly affect the ecosystem components of Goal A, and goals for species and nature's contributions to people and ecosystem services. Through consistent classification of ecosystems at the appropriate level in the typology (i.e. at least EFG/level 3) in national reporting, the causal links between goals and targets can be tracked, and the success of the framework evaluated. The goals and targets included in the figure (Goals A and B, and targets 1, 2, 3, 5, 6, 7 and 9) were identified by the AHTEG as needing consistent approach to ecosystem classification. *headline indicators are under development for these targets.*

5. Understanding existing data and country capacities

To implement and monitor the GBF, all parties to the GBF will need ecosystem classifications and maps that are relevant at the national scale, regardless of whether the GET is used. This is because aspects of Goal A and many targets explicitly include ecosystems, and ecosystem maps and classifications form the basis for headline indicators A1 and A2. Ecosystem classifications and maps also play key roles in implementing the GBF, for example in biodiversity-inclusive spatial planning, restoration and identifying new protected areas/OECMs[16].

The number of countries with adequate ecosystem classifications and maps to support the targets and goals of the GBF is currently unknown. However, a recent review of data available for Headline Indicator A1 (Red List of Ecosystems assessments, which depend on ecosystem maps that are consistent with GET concepts) found that at least 63 countries have Red List assessments available for all terrestrial ecosystems, and a further 30 have subsets (e.g. all forests); data are also available for freshwater and marine ecosystems (see Figure 2). However, most were developed by external groups (e.g. by non-governmental organisations) or at regional scales, rather than led by or in collaboration with governments. It is estimated that approx. half of the maps of ecosystem types that underpin these Red List assessments been cross-walked to some degree with GET; experience suggests this is a relatively straightforward process, although requiring expert input and some resources. Numerous other countries (that haven’t yet completed national Red List of Ecosystem assessments) have ecosystem classifications and maps that would be suitable for cross-walking with the GET and supporting GBF reporting (e.g., Malaysia, Morocco, India, Japan, New Guinea, Australia).

The largest challenge for countries is to develop new national ecosystem classifications and maps (see examples in Myanmar[11] and Maldives[13]) or compile them from existing disparate data (e.g. Ghana[17] and Uganda[18]). Although global data are available for many ecosystem types and groups at spatial resolution and accuracy required for GBF demands[4], no spatially comprehensive global map of ecosystem types exists. Such a map would not replace national ecosystem maps, which are typically more accurate due to local knowledge and data and are created at an appropriate thematic resolution (e.g. with more ecosystem classes, e.g. level 6 of the GET) that can support action including ecosystem management and policy; rather it would harmonise national maps using the EFGs in the GET.

Current initiatives to develop global maps for key ecosystem types include the GEO Global Ecosystems Atlas. The Atlas aims to compile existing high-quality maps of ecosystem types (global, regional and national) and to align them with EFGs, providing an important source of global, regional and national spatial data in the coming years. The Atlas will also highlight gaps in spatial information about the distribution of ecosystem types and EFGs, and seek to improve on the current indicative maps that underpin most EFGs in the GET. These global maps may provide spatial data for countries that lack their own ecosystem classifications and maps, supporting reporting for A1 and A2, as well as targets such as Target 2 on restoration. Over the medium term, the Atlas will develop resources to support countries in developing and improving national ecosystem maps.

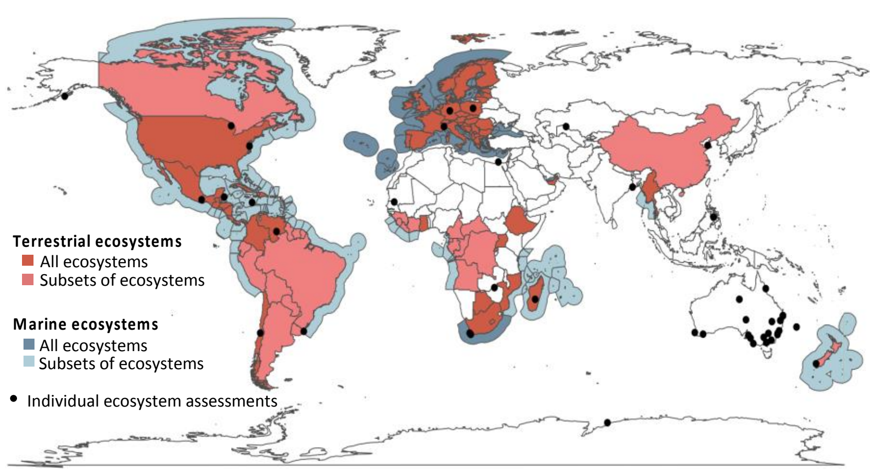

Figure 2. *Map of available Red List of Ecosystems assessments by country, which are underpinned by ecosystem classifications and maps (adapted from[16]). Assessments of all terrestrial ecosystems are available for 63 countries (shown in red), approximately one third of the CBD's 196 Parties, mostly as part of national or regional assessments (Supplementary Data 1). Subsets of terrestrial ecosystems (e.g., temperate and tropical forest ecosystems across the Americas[19]) have been assessed in 30 countries, shown in pink. Assessments of all marine ecosystems are available in 32 countries (including marine-transitional ecosystems such as mangrove forests[4]), shown in dark blue, while subsets (e.g., all coral reefs in the Western Indian Ocean[12]) have been assessed in 49 countries (pale blue). Assessments of all freshwater ecosystems (including freshwater transitional ecosystem such as wetlands[4]) are available in 42 countries, with subsets in 47 (not shown but listed in Supplementary Data 1). Black dots show individual ecosystems that have been assessed. Further national assessments are underway (e.g., in Australia, Namibia, and Malaysia).*

6. Implications of the GET level for global reporting and national reporting on ecosystems

The ATHEG recommended testing and analyses to understand the implications of reporting at level 2 (biome) or 3 (ecosystem functional group) of the typology. Here preliminary findings are presented, including:

The number of EFGs per country from GET indicative maps (Figures 3 and 4);

The number of EFGs for a subset of countries based-on cross-walks of national classifications and maps to the GET EFGs (Table 1) – that is, via bottom-up alignment;

Example reporting tables for Headline Indicators A1 and A2.

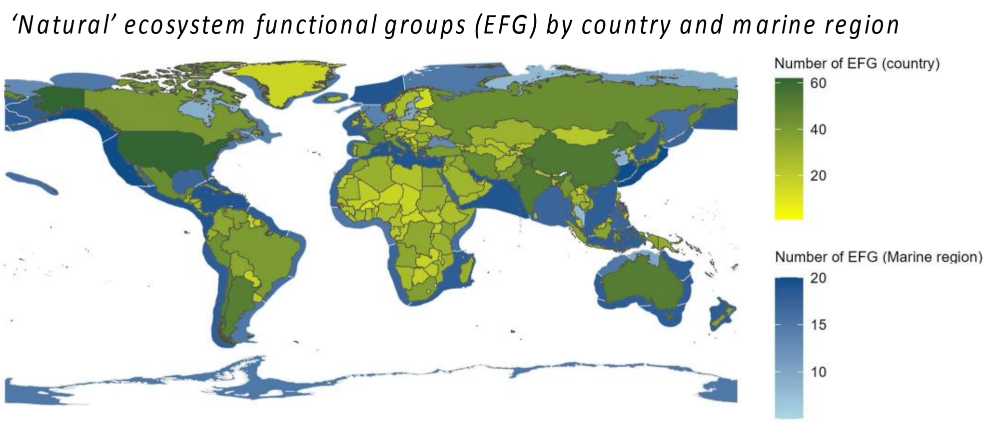

Figure 3. *Total number of 'natural' EFGs per country (including those from all realms in green) and marine regions (marine realm only in blue): large countries (e.g. Australia, China) are more likely to contain more EFGs, along with those on the edge of continents (e.g. South Africa, Argentina) or with high levels of environmental diversity (e.g. India). The mean and median number of natural EFGs (excluding marine) per country is 20, and 28 including anthropogenic (excluding marine). The number of EFGs per country/marine region were extracted from data from 'analyse' function on the GET website: https://global-ecosystems.org/*

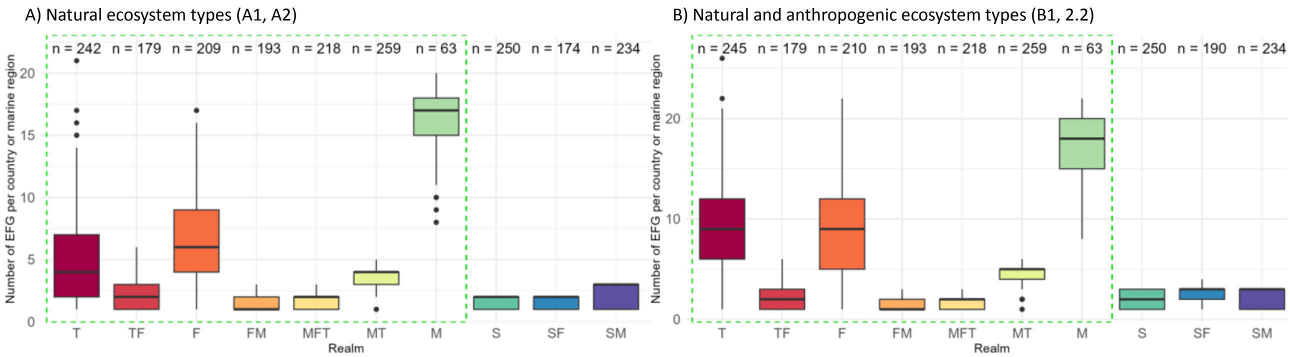

Figure 4. *Number of Ecosystem Functional Groups (EFG) per country (including overseas territories; n=259), divided by realm (including transitional realms), for: A) natural ecosystem types, to be used for headline indicators A1 and A2, and B) all ecosystem types (including anthropogenic ecosystems), which may be used in headline indicators B1 and 2.2 (for target 20. Only those realms in the dotted boxes are likely to be included in reporting, given the lack of data on subterranean ecosystem types. T=terrestrial, TF=terrestrial-freshwater transitional, F=Freshwater, FM=freshwater-marine transitional, MFT=marine-freshwater-terrestrial transitional, M=marine, S=subterranean, SF=freshwater subterranean and SM=marine subterranean (see https://global-ecosystems.org/ for details). The number of EFGs per country/marine region were extracted from data from 'analyse' function on the GET website: https://global-ecosystems.org/*

Table 1. *Number EFGs per realm for Colombia[6], Finland[7,8], Maldives, Myanmar[11], and South Africa[9,10] , using a bottom-up cross-walk of national ecosystem types to EFGs, undertaken as part of development of new ecosystem classifications or their Red List of Ecosystems (RLE) assessments (providing data for A1 and A2). Not Evaluation (NE) are realms that were not included in the national Red List assessment. The number of national ecosystem types per EFG varies (see Tables 2 and 3 for examples). T=terrestrial, TF=terrestrial-freshwater transitional, F=Freshwater, FM=freshwater-marine transitional, MFT=marine-freshwater-terrestrial transitional, M=marine, S=subterranean, SF=freshwater subterranean and SM=marine subterranean (see https://global-ecosystems.org/ for details).*

Realm	T	FT	F	FM	MFT	MT	M	S, SM, SF	Total
Colombia	8	3	NE	NE	1	NE	NE	NE	12
Finland	10	4	9	2	1	5	9	1	41
Maldives	3	1	1	1	2	5	16	4	33
Myanmar	10	2	1	NE	2	3	NE	1	19
South Africa	10	1	TBC	2	1	4	12	NE	30

7. Implications for reporting on A1 and A2
Headline indicator A1 Red List of Ecosystems

National reporting for headline indicator A1 Red List of Ecosystems would be number of ecosystem types (at level 5-6 of the GET) in each risk category, within each EFG in tabular form (example in Table 2).

Table 2. *Example table for reporting on A1 Red list of Ecosystems: the number of ecosystems per risk category per ecosystem functional group (EFG), showing results for Colombia's national Red list of Ecosystems assessment[6]. CO=Collapsed, CR=Critically Endangered, EN=Endangered, VU=Vulnerable, NT=Near threatened, LC=Least Concern, DD=Data deficient, and NE=Not Evaluated.*

Ecosystem Functional Group	CO	CR	EN	VU	NT	LC	DD	Total

T1.1 Tropical-subtropical lowland rainforests		3	7	1		10		21
T1.2 Tropical-subtropical dry forests and thickets		7						7
T1.3 Tropical-subtropical montane rainforests		1	1	4		6		12
T1.4 Tropical heath forests				2		1		3
T3.1 Seasonally dry tropical shrublands						2		2
T4.2 Pyric tussock savannas			5	2		4		11
T5.2 Thorny deserts and semi-deserts		2				1		3
T6.5 Tropical alpine grasslands and shrublands			1	2		1		4
TF1.1 Tropical flooded forests and peat forests		1	2	3		4		10
TF1.4 Seasonal floodplain marshes		4						4
TF1.5 Episodic arid floodplains		1						1
MFT1.2 Intertidal forests and shrublands			1			1		2

A2 extent of natural ecosystems

Headline indicator A2 *extent of natural ecosystems* will track change in the area of natural ecosystem types through time. These data will likely come from national ecosystem accounts, but could come from other sources, such as Red List of Ecosystems assessments (e.g. Colombia[6], Table 3), or global data where available.

Table 3. *An example of the type of data required for reporting A2 on extent of natural ecosystems, shown for Colombia based on data from its Red List of Ecosystems assessment[6].*

Ecosystem Functional Group	Extent of ecosystem functional groups (ha)		
	1750	**1970**	**2014**
T1.1 Tropical-subtropical lowland rainforests	43,094,094	41,023,388	35,494,363
T1.2 Tropical-subtropical dry forests and thickets	9,788,794	2,262,966	366,825
T1.3 Tropical-subtropical montane rainforests	23,425,463	16,851,456	11,116,381
T1.4 Tropical heath forests	4,359,525	4,342,731	4,277,338
T3.1 Seasonally dry tropical shrublands	854,331	853,356	798,694
T4.2 Pyric tussock savannas	13,073,000	12,855,838	11,040,275
T5.2 Thorny deserts and semi-deserts	756,775	739,519	748,419
T6.5 Tropical alpine grasslands and shrublands	2,265,194	1,801,538	1,719,375
TF1.1 Tropical flooded forests and peat forests	12,209,250	11,243,550	8,005,581
TF1.4 Seasonal floodplain marshes	1,223,569	572,500	91,938
TF1.5 Episodic arid floodplains	508,019	163,825	30,469
MFT1.2 Intertidal forests and shrublands	553,200	492,513	387,594

8. Future work to support use of GET by countries

Urgent (currently underway): develop guidelines and tools (e.g. decision trees) for cross-walking existing ecosystem classifications to the GET, drawing on lessons from countries who have undertaken such crosswalks (e.g. Finland and South Africa[20]).

Urgent (currently underway): develop guidance of the relationships between the GET and common existing classification frameworks (e.g. Ramsar wetland classification, FAO and UN Decade

classifications) to support translation between datasets, noting that one-to-one cross-walks may not be possible, especially where these classifications have different purposes. Because *ad hoc* cross-walks are already underway, this will be needed to ensure consistency of application across sectors.
Develop guidelines for the development of new national ecosystem classifications and maps aligned with GET concepts (e.g., identifying EFGs and ecosystem types within a country, reviewing existing maps, and mapping ecosystem types).
Ongoing improvements of spatial data for EFGs at global levels. The GEO Global Ecosystems Atlas initiative holds potential for a global synthesis of spatial data on EFGs that could be used by countries without national ecosystem maps or capacity, subject to ongoing scientific development (including data standards) and adequate resourcing for development of the Atlas.
Develop an online registry collecting existing national ecosystem classification systems and maps, cross-walked to EFGs – this is anticipated as part of the GEO Global Ecosystems Atlas initiative.
Provide support for countries to undertake cross-walks with existing classifications and maps of ecosystem types, through a capacity building role; potential hosts include regional/ sub-regional technical and scientific cooperation support centres that are in the process of being established by the CBD Secretariat, to support implementation of the GBF.

References

1 CBD. Kunming-Montreal Global Biodiversity Framework (CBD/COP/15/L.25). (Convention on Biological Diversity, 2022).
2 CBD. Decision Adopted by the Conference of the Parties to the Convention on Biological Diversity 15/5. Monitoring framework for the Kunming-Montreal Global Biodiversity Framework (CBD/COP/DEC/15/5). (2022).
3 CBD. Report of the Ad Hoc Technical Expert Group on Indicators for the Kunming-Montreal Global Biodiversity Framework on its third meeting. CBD/IND/AHTEG/2023/3/2. a. https://www.cbd.int/doc/c/f22d/ab58/236acdd54779ab58b97aecf1/ind-ahteg-2023-03-02-en.pdf (Convention on Biological Diversity, 2023).
4 Keith, D. A. *et al.* A function-based typology for Earth's ecosystems. *Nature* **610**, 513-518, doi:10.1038/s41586-022-05318-4 (2022).
5 UN. System of Environmental-Economic Accounting—Ecosystem Accounting (SEEA EA). (2021).
6 Etter, A. *et al. Colombian Ecosystems, Threats and Risks. An application of the Red List of Ecosystems to the continental terrestrial ecosystems*. (Pontificia Universidad Javeriana and Conservación Internacional-Colombia, 2020).
7 Kontula, T. & Raunio, A. *Threatened Habitat Types in Finland 2018 - Red List of Habitats Results and Basis for Assessment*. (Finnish Environment Institute and Ministry of the Environment, 2019).
8 Salomaa, A. & Arponen, A. The role of the Red Lists of Ecosystems in leveraging sustainability changes in Finland – perceptions of the assessors. *Ecosystems and People* **19**, 2222185, doi:10.1080/26395916.2023.2222185 (2023).
9 Botts, E. A. *et al.* More than just a (red) list: Over a decade of using South Africa's threatened ecosystems in policy and practice. *Biol Cons* **246**, 108559, doi:https://doi.org/10.1016/j.biocon.2020.108559 (2020).
10 Skowno, A. L. & Monyeki, M. S. South Africa's Red List of Terrestrial Ecosystems (RLEs). *Land* **10**, 1048 (2021).
11 Murray, N. J. *et al.* Myanmar's terrestrial ecosystems: Status, threats and conservation opportunities. *Biol Cons* **252**, 108834, doi:https://doi.org/10.1016/j.biocon.2020.108834 (2020).
12 Obura, D. *et al.* Vulnerability to collapse of coral reef ecosystems in the Western Indian Ocean. *Nature Sustainability* **5**, 104-113, doi:10.1038/s41893-021-00817-0 (2022).
13 Toor, M. *et al.* Applying the IUCN Global Ecosystem Typology to the Maldives, https://www.environment.gov.mv/v2/en/download/14710. (Ministry of Environment, Maldines, 2022).
14 Dinerstein, E. *et al.* An Ecoregion-Based Approach to Protecting Half the Terrestrial Realm. *Bioscience* **67**, 534-545, doi:10.1093/biosci/bix014 (2017).

15 Xiao, H. *et al.* Synergies and complementarities between ecosystem risk assessment and ecosystem accounting (v1). *EcoEvoRxiv [PREPRINT]* **https://doi.org/10.32942/osf.io/y86ar** (2022).
16 Nicholson, E. *et al*. Roles of the Red List of Ecosystems in the Kunming-Montreal Global Biodiversity Framework. *Nature Ecology & Evolution*, doi:https://doi.org/10.1038/s41559-023-02320-5 (2024).
17 CONNECT Project. Ghana Spatial Biodiversity Assessment v2. (National Biosafety Authority and the Council for Scientific and Industrial Research, Accra, Ghana, 2021).
18 National Environment Management Authority. Uganda Spatial Biodiversity Assessment v1. (CONNECT Project, Kampala, Uganda, 2020).
19 Ferrer-Paris, J. R. *et al.* An ecosystem risk assessment of temperate and tropical forests of the Americas with an outlook on future conservation strategies. *Cons Lett* **12**, e12623, doi:10.1111/conl.12623 (2019).
20 Sink, K. J. *et al.* Iterative mapping of marine ecosystems for spatial status assessment, prioritization, and decision support. *Frontiers in Ecology and Evolution* **11**, doi:10.3389/fevo.2023.1108118 (2023).

Section 3: Headline and binary indicator metadata

Noted: The binary indicator text in the heading says “to be inserted” to reflect that the text is still under negotiation. It will be inserted once agreed

GBF indicator metadata: A.1 Red List of Ecosystems

1. Indicator name
A.1 Red List of Ecosystems
2. Date of metadata update
March 2024
3. Goals and Targets addressed
3a. Goal
Headline Indicator for **Goal A**: The integrity, connectivity and resilience of all ecosystems are maintained, enhanced, or restored, substantially increasing the area of natural ecosystems by 2050; Human induced extinction of known threatened species is halted, and, by 2050, the extinction rate and risk of all species are reduced tenfold and the abundance of native wild species is increased to healthy and resilient levels; The genetic diversity within populations of wild and domesticated species, is maintained, safeguarding their adaptive potential.
3b. Target
Headline Indicator for **Target 1:** Ensure that all areas are under participatory, integrated and biodiversity inclusive spatial planning and/or effective management processes addressing land- and sea-use change, to bring the loss of areas of high biodiversity importance, including ecosystems of high ecological integrity, close to zero by 2030, while respecting the rights of indigenous peoples and local communities.
This is also relevant for Target 2, 3 and 7.
4. Rationale
This indicator addresses the elements of Goal A highlighted in bold: *The* ***integrity, connectivity and resilience of all ecosystems are maintained, enhanced, or restored****, substantially* ***increasing the area of natural ecosystems*** *by 2050*.
Sustaining ecosystems is essential to halting biodiversity decline and species extinctions, and to maintaining ecosystem services that underpin human well-being and the economy (Nicholson et al. 2021). The World Economic Forum ranks biodiversity loss and ecosystem collapse in the top five global risks in terms of likelihood and impact this decade (WEF 2020).
The Red List of Ecosystems was adopted by IUCN in 2014 as the global standard for assessing risk of ecosystem collapse for terrestrial, freshwater and marine ecosystems. The Red List of Ecosystems provides a systematic framework for compiling information on ecosystems, and assessing their relative risks of collapse based on change in ecosystem area and integrity. Similar to the IUCN Red List of Threatened species, assessment criteria are used to assign ecosystems to Red List risk categories (e.g., *Critically Endangered*, *Endangered*, *Vulnerable*), with *Collapsed* replacing the *Extinct* category used for species (see section 5b for further details). Red List of Ecosystems assessments identify which ecosystems are most at risk, and the drivers of ecosystem loss and degradation. The Red List of Ecosystems therefore addresses multiple aspects of Goal A, by assessing how change in integrity, connectivity and area affect ecosystem risk status, which is related to ecosystem resilience. It typically focusses on natural and some semi-natural ecosystem types (e.g. derived grasslands).
Headline indicator A.1 Red List of Ecosystems uses the outcomes of Red List of Ecosystems assessments, ideally at national scales (e.g. Colombia, Figure 1), but data from sub-national (e.g. states or provinces within a country, e.g. in China, Tan et al. 2017) or above-national assessments (e.g. regional assessment such as the Western India Ocean coral reef assessment, Obura et al. 2021, or the forests of the Americas, Ferrer-Paris et al. 2019, Figure 2)) could also be used. Countries should report on the number of ecosystem types per risk category in each ecosystem functional group (from the Global Ecosystem Typology, Keith et al. 2022). The indicator will be calculated from these data for countries and globally.
The headline indicator is the ***Red List Index of ecosystems*** **(RLIe)**, which summarises risk status across sets of ecosystem types, based on the proportion of ecosystems in each Red List risk category (Rowland et al. 2020). A decrease in the RLIe (towards 0) means more ecosystems are threatened or at heightened risk of collapse. An increase in the RLIe (towards 1) means that ecosystems are becoming less threatened. The RLIe uses the same method as the widely used indicator of species extinction risk, the Red List Index

of species survival (RLI, Headline indicator A.3), which is based on the *IUCN Red List of Threatened Species* (Figure 2), and provides a complementary assessment of the state and trajectory of biodiversity.

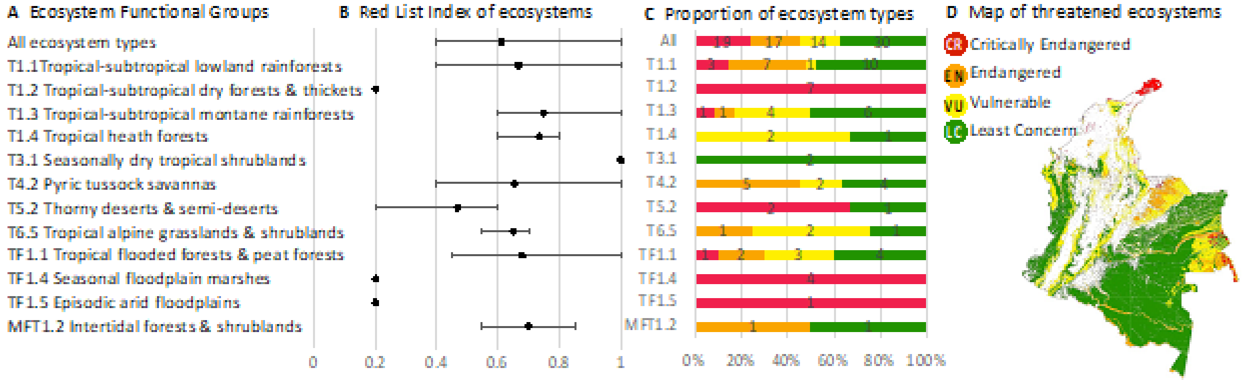

Figure 1. *The risk outcomes of the Red List of Ecosystems assessments for Colombia (Etter et al. 2020a and 2020b), for 80 ecosystem types across 12 ecosystem functional groups: A) ecosystem functional groups to which the ecosystem types belong (using the IUCN Global Ecosystem Typology, Keith et al. 2022); B) the Red List Index of ecosystems (RLIe) for all ecosystem types (first row) and for each ecosystem functional group (intervals show 25th and 75th percentiles to represent the middle 50% of the data); C) key summary statistics from the data reported – the number and proportion of ecosystems in each risk category, overall and per ecosystem functional group; and D) a map of threatened ecosystems.*

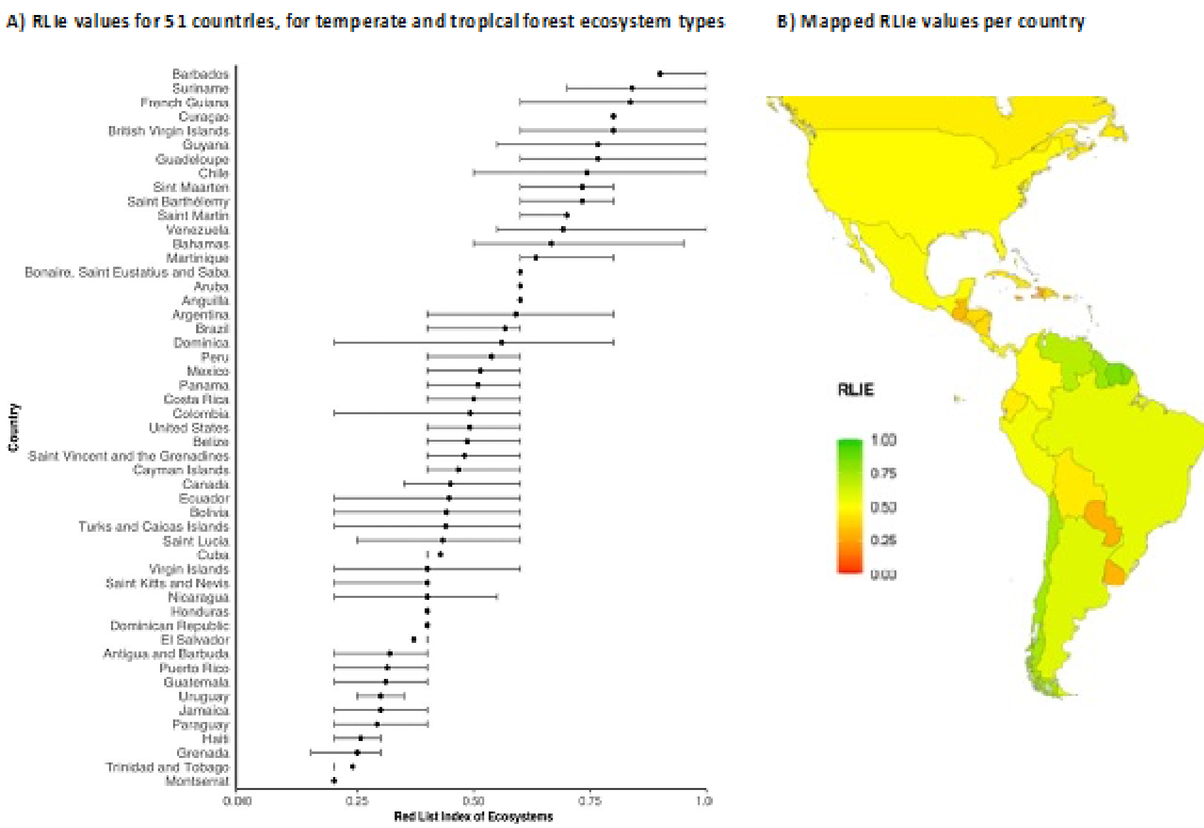

Figure 2. *The Red List Index of Ecosystems (RLIe) can be reported per country for comparative purposes. Panel A national RLIe index values of all temperate and tropical forest ecosystem types for 51 countries and territories within North, Central and South America and the Caribbean, using data from a regional (continental) assessment across the Americas (Ferrer-Paris et al. 2019); intervals show 25th and 75th percentiles to represent the middle 50% of the data for each country (adapted from Rowland et al. 2020); Panel B maps the national index values.*

The RLIe can be used to report on the overall risk status of all ecosystems within the country, as well as summarized by ecosystem functional group (using the Global Ecosystem Typology, Figure 1b). RLIe values can be compared between countries (e.g. Figure 2). For those countries with repeat assessments, it can be shown as a time-series (e.g. for South Africa, Figure 3).

For countries undertaking their first assessment, the indicator will be the current RLIe value, along disaggregations by ecosystem functional group (e.g. figure 1b). It is recommended that the indicator is reported alongside summary statistics (e.g. number of ecosystem types in each risk category, Figure 1c) and where possible maps (Figure 1d). For those countries with repeat assessments, the indicator will be the RLIe time-series (e.g. Figure 3) with disaggregations by ecosystem functional group, complemented by summary statistics.

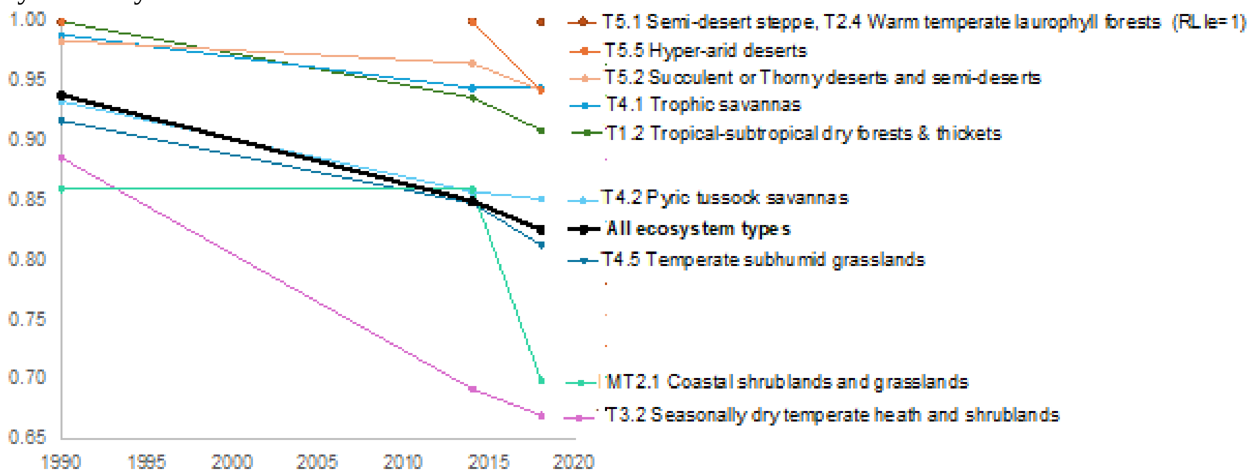

***Figure 3**. A preliminary Red List Index of ecosystems (RLIe) time-series for South Africa for 1990, 2014 and 2018, for all terrestrial ecosystem types (black) and for each ecosystem functional group; data provided by SANBI, based on National Biodiversity assessments (Botts et al. 2020; Skowno and Monyeki 2021).*

The RLIe and summary statistics from Red List of Ecosystems assessments can be represented in graphs or maps (e.g., Figures 1 and 2) to aid communication and inform spatial planning, including biodiversity-inclusive planning (Target 1), restoration planning (Target 2) and protected area planning (Target 3).

5. Definitions, concepts and classifications

5a. Definition:

Indicator definition:

The Red List of Ecosystems framework assesses the relative risk of ecosystem collapse of an ecosystem type. The indicator '*Red List Index of Ecosystems (RLIe)*' measures the average risk of ecosystem collapse of a group of ecosystems, and tracks change in this over time based on genuine change in the risk category of each ecosystem (i.e. excluding changes in categories owing to improved knowledge or better data). The Index is expressed as changes in an index ranging from 0 to 1, with decreases (towards 0) resulting from more threatened ecosystems or heighted risk, and increases (towards 1) showing improvements in risk status. A value of 0 means that all ecosystems have collapsed. A value of 1 means that all ecosystems are listed as Least Concern.

The RLIe can be calculated for any set of ecosystem types for which there are *Red List of Ecosystems* assessments. It can thus be calculated at the subnational, national, regional or global level, or for broad ecosystem groups (e.g. ecosystem functional groups).

Other key concepts and definitions:

Ecosystems: a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit (Convention on Biological Diversity, 1992). Specifically, ecosystems are made up of living components (biotic complexes and assemblages of species), the abiotic environment, the processes and interactions within and between the biotic and abiotic components, and the physical space in which these operate (Keith et al., 2013).

Ecosystem types are differentiated from one another by a degree of uniqueness in composition, structure, and ecological processes and function. Ecosystem types present a useful model or abstraction of the complexities of the natural world. Similar definitions are used for other, often synonymous, terms such as ecological communities, habitats, biotopes, and vegetation types (Keith et al. 2013, Nicholson et al. 2021). Ecosystem types can be described, classified, and identified using the IUCN Global Ecosystem Typology (Keith et al. 2022).

Ecosystem collapse is the endpoint of ecosystem decline, when an ecosystem loses its defining features (i.e., species, assemblages, structure, and functions) and is replaced by a different, often depauperate, ecosystem type. Collapse can be irreversible, but some ecosystems may recover, over long timeframes or with restoration. The risk of ecosystem collapse is the likelihood that an ecosystem will collapse over a specified timeframe (Keith et al. 2013).

Risk categories: The risk of ecosystem collapse is based on the risk categories each ecosystem is assigned through assessment under the *Red List of Ecosystems* framework. The risk categories include, in order of increasing risk of collapse: Least Concern, Near Threatened, Vulnerable, Endangered, Critically Endangered, and Collapsed. If there are insufficient data to assign a risk category, a criterion or ecosystem type it is considered *Data Deficient*, or *Not Evaluated* if not assessed.

Ecosystem functional groups: The number of ecosystem types will be reported by Ecosystem Functional Group from the Global Ecosystem Typology. Ecosystem functional groups comprise "a group of related ecosystems within a biome that share common ecological drivers, which in turn promote similar biotic traits that characterise the group. Derived from the top-down by subdivision of biomes" (Keith et al. 2022, https://global-ecosystems.org/). Examples include: M1.1 seagrass meadows, M1.2 kelp forests and M1.3 photic coral reefs in the marine realm, T1.1 tropical/subtropics lowland rainforests and T4.2 pyric tussock savannas in the terrestrial realm, F1.6 episodic arid rivers and F2.8 artesian springs and oasis in the freshwater realm, and MFT1.3 coastal saltmarshes and reedbeds in the transitional realm between freshwater, marine and terrestrial realms.

Guidelines for the application of the *Red List of Ecosystems* can be found on the IUCN website (Keith et al. 2013; Bland et al. 2017).

5b. Method of computation

Reported data:

The reported data will come from Red List of Ecosystems assessments. The data reported will be the number of ecosystems in each risk category, per ecosystem functional group, as a table (see example in Table 1). Only the categories of risk (Least Concern, Near Threatened, Vulnerable, Endangered, Critically Endangered, and Collapsed) will be used for calculation of RLIe, but additional columns for categories Not Evaluated or Data Deficient can be added to the table to indicate existing data gaps in national assessments (see section 5j on data gaps and 5k on missing data). Further guidance in this topic will be finalised in 2024. This advice will also address how to report on ecosystem functional groups in which no or only some ecosystem types have been assessed, differentiating 'Not Evaluated' ecosystem types within an otherwise assessed group (i.e. identified but not assessed, which may be included in the reporting table), and whole ecosystem functional groups or biomes that have not been evaluated (where the number of ecosystem types may be unknown, as the classification process may not have begun within the country). The advice will also deal with treatment of EFGs, biomes or even realms that are not applicable in the country (e.g. no marine ecosystems types in a land-locked country).

Table 1. *An example of the type of data to be reported on A1 Red list of ecosystems: the number of ecosystems per risk category per ecosystem functional group, showing results for Colombia's national Red List of Ecosystems assessment (Etter et al. 2020a), where CO=Collapsed, CR= Critically Endangered, EN=Endangered, VU=Vulnerable, NT=Near threatened, LC=Least Concern, DD=Data deficient, and NE=Not Evaluated. Reporting templates will be provided in 2024. See a further example in Table 2 in section 5k.*

Ecosystem functional group	CO	CR	EN	VU	NT	LC	DD	NE
T1.1 Tropical-subtropical lowland rainforests		3	7	1		10		
T1.2 Tropical-subtropical dry forests and thickets		7						
T1.3 Tropical-subtropical montane rainforests		1	1	4		6		
T1.4 Tropical heath forests				2		1		
T3.1 Seasonally dry tropical shrublands						2		
T4.2 Pyric tussock savannas			5	2		4		
T5.2 Thorny deserts and semi-deserts		2				1		
T6.5 Tropical alpine grasslands and shrublands			1	2		1		
TF1.1 Tropical flooded forests and peat forests		1	2	3		4		
TF1.4 Seasonal floodplain marshes		4						
TF1.5 Episodic arid floodplains		1						
MFT1.2 Intertidal forests and shrublands			1			1		

Red List Index of Ecosystems (RLIe):
The RLIe measures trends in ecosystem collapse risk based on the proportion of ecosystem types in each risk category (for details see Rowland et al. 2020). The RLIe is the weighted mean of ordinal ranks assigned to each risk category:

$$RLIE_t = 1 - \frac{\sum_{i=1}^{n} W_{c_{(i,t)}}}{W_{CO} \cdot n}$$

where $Wc_{(i,t)}$ is the risk category rank for ecosystem *i* in year *t* (*Collapsed*=5, *Critically Endangered*=4, *Endangered*=3, *Vulnerable*=2, *Near Threatened*=1, *Least Concern*=0; following the approach taken for the Red List Index of species survival; Butchart et al. 2004; 2007), W_{CO} is the maximum category rank (CO = Collapsed=5), and *n* is the total number of ecosystem excluding *Data Deficient* or *Not Evaluated* ecosystem. The RLIe ranges from 0 (all ecosystems Collapsed) to 1 (all Least Concern). *Data Deficient* ecosystem types may be included by included by allocating them to risk categories in proportion with data sufficient ecosystem types (see section 5k on missing data). The RLIe should be calculated for each ecosystem type.

Genuine change
The Indicator should only report on genuine changes in risk category. The IUCN Red List of Ecosystems group will publish guidance on this topic in 2024/ in the forthcoming update to the Guidelines for the application of IUCN Red List of Ecosystems Categories and Criteria. This draws on guidelines from the Red List of Threatened Species and associate indicators (see headline indicator A.3), and experience from countries that have undertaken repeat Red List of Ecosystems assessments (e.g. Finland, Norway and South Africa).

Indicator testing:
A key question for indicators is how sensitive they are to biodiversity change. Several studies have tested aspects of the Red List of Ecosystems framework in its capacity to detect meaningful change in ecosystems. For example, Murray et al. (2017) tested metrics for restricted range size (Criterion B – restricted geographic distribution) for their capacity as predictors of ecosystem collapse in landscapes subject to stochastic threats. They found that the methods currently used in Red List of Ecosystems assessments for measuring range size are the best spatial metrics for estimating risks from stochastic threats. Analyses from Norway found that the RLIe could provide time-series to reliably compare

alternative policy scenarios (Kyrkjeeide et al. 2021). The RLIe has been tested for sensitivity and responsiveness using an ecosystem simulation model of a coral reef (Rowland et al. 2020b), showing that the RLIe can differentiate between low and high threat levels, responds to both increases in threats (e.g., climate change) and decreases (e.g., effective conservation policy), and detects change in area and integrity.

5c. Data collection method

The reported data will ideally stem from national Red List of Ecosystems assessments. However data can also come from regional, global and sub-national assessments, subject to national validation (see section 5e). Ideally, data should come ideally from comprehensive assessments of all ecosystems in all ecosystem functional groups within a country. If this is not possible, data can be used from assessments of all ecosystems within an ecosystem functional group (nationally or globally, e.g. Figure 2), or in a sub-national area such as a province.

The Red List of Ecosystems is the global standard for assessing risk of ecosystem collapse and biodiversity loss to all marine, freshwater, and terrestrial ecosystems. Red List of Ecosystems assessments collate standardised knowledge, maps and data about ecosystems, and apply quantitative criteria to estimate relative risks of ecosystem collapse to identify threatened ecosystems. The five criteria are: (A) change in ecosystem area; (B) restricted ecosystem distribution; (C) change in the abiotic environment (e.g., hydrological processes); (D) change in biotic processes and components (e.g., species interactions); and (E) the probability of collapse estimated using dynamic ecosystem models (where such models are available). Change in area and integrity (Criteria A, C and D) is assessed over a 50-year timeframe (past and/or future), and/or since the onset of industrialised change (1750 at the earliest). Change in integrity (Criteria C and D) is measured using ecosystem-specific metrics, to capture different ways in which ecosystems respond to drivers of biodiversity loss. For example, integrity can be tracked in forests using the proportion of old-growth (Burns et al. 2015), in coral reefs using coral cover and fish abundance (Obura et al. 2022), and in rivers using hydrological flow (Ghoraba et al. 2019).

Through assessment against one or more criteria, ecosystems are assigned to ordinal risk categories: *Collapsed*, *Critically Endangered*, *Endangered*, *Vulnerable*, *Near Threatened*, *Least Concern*; if there are insufficient data to assign a risk category, a criterion or ecosystem is considered *Data Deficient*, or *Not Evaluated* if not assessed. Ecosystems listed as *Critically Endangered*, *Endangered*, *Vulnerable* are considered threatened, and ecosystems in those categories can collectively be referred to as “threatened”. Detailed guidelines are available to support the assessment of each criterion (Bland et al. 2017; Keith et al. 2013). Ideally, as many criteria as possible should be assessed, but the scope can be tailored to the resources and data available. Guidelines to support rapid assessments using one or a few criteria have been developed (e.g. Holness & Botts 2022) and used in national assessments across Africa (e.g. NEMA 2020).

Data used in Red List of Ecosystems assessments can come from a diverse range of sources (see reviews in Rowland et al 2018, Murray et al 2018). Ecosystem classifications and maps used in these assessments typically come from national ecosystem inventories (e.g. forest types), local experts (e.g. within universities or environment institutes), government agencies, or when these are not available, from global classifications and maps of ecosystem types (e.g., the Global Ecosystem Typology, https://global-ecosystems.org/). Data on change in ecosystem area (for Criterion A) typically comes from similar data, although an increasing number of global datasets are also available – many of these are listed as data sources for Headline Indicator A.2 (extent of natural ecosystems) and as complementary indicators in the Global Biodiversity Framework monitoring framework (e.g., tree cover loss, wetland extent trends index, and trends in mangrove extent). Assessing Criteria C and D requires ecosystem-specific variables, which may come from a range of data sources, including scientific literature, reports, experts, historical accounts, and existing indicators (including some listed as complementary indicators in the monitoring framework, e.g., live coral cover). These data may be field-based empirical data, remotely sensed (e.g., satellite imagery, see Murray et al 2018), modelled (extrapolating from field and/or remotely sensed data) or a combination. The Red List of Ecosystems guidelines (Bland et al 2017) provide advice on the types of data needed, and how it should be analysed. Further guidance and reviews are currently being developed to provide further support for assessors.

5d. Accessibility of methodology

Application of the Red List of Ecosystems framework for undertaking **Red List of Ecosystems assessments** is supported by a range of resources, all accessible via the Red List of Ecosystems website (iucnrle.org):

- Formal guidelines published by IUCN (Bland et al. 2017): https://portals.iucn.org/library/sites/library/files/documents/2016-010-v1.1.pdf.
- Multiple peer-reviewed scientific papers have been published to describe the assessment methods in detail (e.g. Keith et al 2013, and others – see reference list below)
- Free online training material via FutureLearn (in partnership with Deakin University and IUCN) and IUCN Academy.
- Tools to support assessment (available at https://iucnrle.org/rle-material-and-tools)
- A growing database of assessments https://iucnrle.org/rle-database

The **Red List Index of Ecosystems** can be calculated for any set of ecosystem types for which *Red List of Ecosystems* assessments have been undertaken. The method for calculating the RLIe was published in an open-access peer-reviewed paper (Rowland et al. 2020).

Scripts to calculate the indicator using the program *RStudio* are publicly available via the Red List of Ecosystems GitHub site (https://github.com/red-list-ecosystem/rle_indices). The script provides the code to calculate the indicator and includes examples of the indicator outputs using sample data from the continental assessment of 136 temperate and tropical forests across 51 countries/territories in the Caribbean and Americas (Ferrer-Paris et al. 2019). The sample data are provided to demonstrate the structure of the data required to calculate the indicator. The RLIe can also be calculated in a spreadsheet, using the formula and weightings in 5b; a reporting template with such a calculation will be developed as part of the reporting advice.

5e. Data sources

The ideal data for reporting on A.1 are national Red List of Ecosystems assessments, typically done by governments or in partnership with government (e.g. with partners in universities or NGOs). Thus the data should ideally come from national databases.

Where national data do not exist, there are several other sources of assessment data that can be used for national reporting, including from regional and sub-national assessments. A review published in 2024 estimates that Red List of Ecosystems assessments are available for 63 countries for all terrestrial ecosystem types, 41 countries for all freshwater ecosystems (including freshwater-transitional ecosystem types such as wetlands), and 32 countries for all marine ecosystems (including marine transitional ecosystem types such as mangroves). A further 30 countries have assessments for subsets or groups of terrestrial ecosystems, for example, temperate and tropical forest ecosystem types in the Americas (Figure 2), while 49 have subsets of marine and marine-transitional ecosystem types, e.g. all coral reefs (Obura et al 2021) or mangroves (Etter et al 2020a), and 47 have subsets of freshwater ecosystems (see figure 4 and Nicholson et al. 2024).

Data used from sources other than national Red List of Ecosystems assessments will require validation to be used in national reporting, e.g. from national biodiversity experts. Guidelines and tools will be developed in 2024/2025 to support countries in this validation process.

Red List of Ecosystems assessments are typically published in technical reports, and/or peer-reviewed publications. An increasing number of assessments are available in a publicly-available, centralised database of assessments, including some national assessments (e.g. Colombia – the database is available via the Red List of Ecosystems website: iucnrle.org). This database will become a key source of data at national, regional and global scales in the medium term. In the short-term, Red List of Ecosystems assessments may be accessed from relevant national agencies, NGOs, or other data holders/providers.

5f. Availability and release calendar

To date, over 4000 ecosystems have been assessed using the Red List of Ecosystems framework (Figure 4) in over 110 countries (Nicholson et al. 2024). For countries where assessments are not available, global terrestrial assessments are anticipated to be available for key ecosystems by 2026-2027, in particular key terrestrial and freshwater ecosystem types, with anticipated updates every 5 years. Some countries have already undertaken repeat assessments (e.g., South Africa, Norway, and Finland) providing time-series. At a national level, the release will vary by country.

The RLIe can already be calculated for all countries that have completed Red List of Ecosystems assessments (Figure 4), and a time-series for those countries with repeat assessments (e.g. Norway, Figure 4). Countries can use available code or seek assistance to calculate RLIe values from their National Red List of Ecosystems assessments.

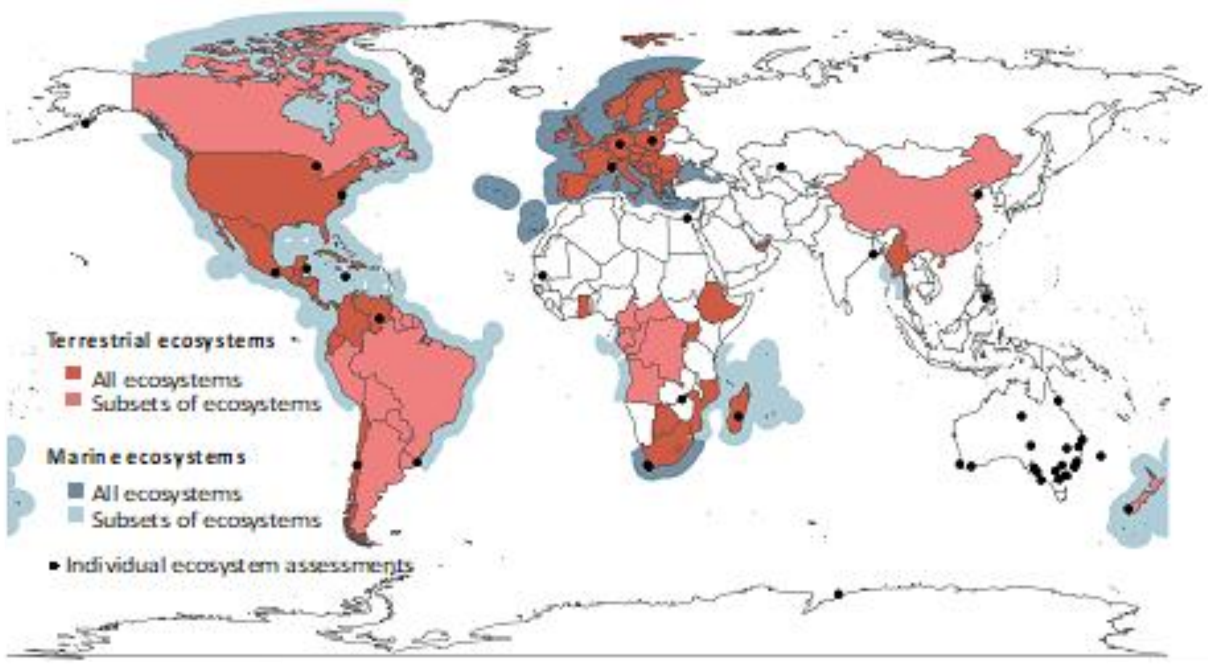

Figure 4*. Current availability of Red List of Ecosystems assessments by country. Countries where all terrestrial ecosystems have been assessed (comprehensive assessments) are shown in red (63 countries), and those with subsets of terrestrial ecosystem assessed are shown in pink (25). Regions where all marine ecosystems (including marine-transitional ecosystems) have been assessed are shown in dark blue (32), those with subsets of marine ecosystems assessed in pale blue (46). Black dots show individual ecosystems that have been assessed, separate from any comprehensive assessments or group assessments (e.g. all forests). Coverage of freshwater ecosystems (including freshwater-transitional ecosystems such as wetlands) is not shown, but typically mirrors terrestrial assessments (41 countries, with subsets in 43).*

5g. Time series

The Red List of Ecosystems uses data on ecosystem trends to assess risk of collapse (Criteria A, C and D), and is therefore inherently trend-based, even when presented as a snapshot or single time point (e.g. in Figures 1 and 2). Subject to national validation, up to 90 countries could submit national reports, based on regional and national assessments (see coverage in Figure 4). As noted, some countries have already undertaken repeat assessments (e.g., South Africa, Norway, and Finland) providing time-series of change in risk. The IUCN has committed to support the ongoing development and application of the Red List of Ecosystems, with a goal of assessing key ecosystem groups globally in 2026-2027.

5h. Data providers

The preferred primary source will be national Red List of Ecosystems assessments (see section 5e), typically undertaken by government environmental agencies, often in partnership with universities, NGOs and other partners. These assessments will typically be available via government databases and/or reports, and/or in the scientific literature. They may also be available in the Red List of Ecosystems Database. Where national assessments are not available, data can come from sub-national, regional or global assessments, as outlined in section 5e, subject to national validation. Some of these are available in the Red List of Ecosystems database (https://assessments.iucnrle.org), or may be available via reports, scientific publications or partner organisations (e.g. NGOs). See section 5e.

5i. Data compilers

Data to calculate the indicator are currently compiled independently by the assessment teams for available national or global assessments. It is anticipated that in the medium term, tools hosted by IUCN and the IUCN Commission on Ecosystem Management, including the Red List of Ecosystems database, may provide national and global-level indicators, but these are not yet available.

5j. Gaps in data coverage

To date, over 4000 ecosystems have been assessed in over 100 countries (Nicholson et al. 2024; iucnrle.org/rle-in-progress). The current goal is to assess key ecosystem groups by 2026-2027. Figure 4 shows the spatial coverage at the start of 2024, based on data in Nicholson et al. (2024). Subject to national validation, up to 90 countries may be able to report based on these data.

Assessment effort are biased towards terrestrial ecosystem types, with more countries having assessments of all terrestrial ecosystems than freshwater or marine, while South America has much greater spatial coverage than Northern Africa, South Asia or Eastern Europe. Spatial gaps will be closed through a combination of targeted global-level projects across broad thematic ecosystem groups (e.g. forests, mangroves, coral reefs), and national assessments. National reporting of Not Evaluated and Data Deficient categories could provide further evidence on existing data gaps and help guide future efforts.

5k. Treatment of missing values

There are multiple forms of missing data that need to be addressed for headline indicator A.1 Red List of Ecosystems, including lack of assessments, and uncertain assessments. Explicitly reporting on ecosystems that are Not Evaluated, Data Deficient or Not Applicable (i.e. marine ecosystems in a landlocked country, or polar ecosystem functional groups in a tropical country), at ecosystem type, ecosystem functional group or biome level, will help identify data and knowledge gaps for targeted work. In some cases it will be appropriate to report these in the national reporting tables (see Table 2 for Myanmar); reporting guidance will be developed in 2024/2025.

Guidelines will be developed to support countries in reporting in the face of missing data on Red List status of their ecosystems. These will range from countries with near-complete national assessments (e.g. most ecosystem functional groups are comprehensively assessed, i.e. all ecosystem types assessed), to those with comprehensive assessments for only some ecosystem functional groups, to those with no or very little data (the white areas of Figure 4).

Countries may also have available Red List of Ecosystems assessments (e.g. regional assessments), that require validation for use in national reporting. Guidelines for validation and data-quality assessment will also be developed, with the aim of developing consistent validation protocols for headline indicators A.2 Extent of natural ecosystems and B1 Services provided by ecosystems, which may also rely on non-government data sources.

Table 2. *Example table for reporting on A1 Red list of ecosystems: the number of ecosystems per risk category per ecosystem functional group, showing results for Myanmar, including Data Deficient ecosystem types that were assessed but where there were insufficient data or information to assign them to a risk category (Murray et al. 2020).*

Ecosystem functional group	Collapsed	Critically Endangered	Endangered	Vulnerable	Near Threatened	Least Concern	Data Deficient
F2.4 Freeze-thaw freshwater lakes						1	
MFT1.2 Intertidal forests and shrublands		2	1			1	
MFT1.3 Coastal saltmarshes							1
MT1.2 Muddy shorelines						1	
MT1.3 Sandy shorelines						1	

S1.1 Aerobic caves						1	
T1.1 Tropical-subtropical lowland rainforests		1	2	3			4
T1.2 Tropical-subtropical dry forests and scrubs		1	2	5		2	4
T1.3 Tropical-subtropical montane rainforests		1					
T2.1 Boreal and temperate montane forests and woodlands							1
T2.4 Warm temperate rainforests			1	1	1		3
T4.2 Pyric tussock savannas	1		1	3	1	4	1
T4.5 Temperate subhumid grasslands							1
T6.1 Ice sheets, glaciers and perennial snowfields					1		
T6.2 Polar/alpine cliffs, screes, outcrops and lava flows						1	
T6.4 Temperate alpine meadows and shrublands			1			1	
TF1.1 Tropical flooded forests and peat forests		2				1	
TF1.4 Seasonal floodplain marshes		1	1				
TM2.1 Coastal shrublands and grasslands							2

National ecosystem assessments can also be incomplete where there are insufficient resources to evaluate all criteria or ecosystem types – such ecosystems are reported as Not Evaluated. Category Not Evaluated is always excluded from calculation of RLIe. Missing data may stem from incomplete assessments, or coarse scale assessments that exclude finer scale variation in ecosystems.

Individual ecosystem assessments can also be uncertain, where insufficient data exist to assign an ecosystem type to a risk category. This can result in some poorly known ecosystem types being listed Data Deficient. Uncertainty in Red List of Ecosystems assessment can be dealt with through a range of methods, including bounds in estimates of risk category – please see the Red List of Ecosystems Guidelines for more information (Bland et al 2017).

Data deficient ecosystem types can be included in the Red List Index of ecosystem (RLIe) through similar means to headline indicator A.3 Red List Index for species, i.e. by randomly allocating Data Deficient (DD) ecosystem types to risk categories with a probability proportional to the number of non-DD ecosystem types in each risk category, repeating this 1,000 times through a bootstrapping procedure, and reporting the mean.

6. Scale

6a. Scale of use

Scale of application (please check all relevant boxes):

Global: ☒ Regional: ☒ National ☒

Scale of data disaggregation/aggregation:

- Global/ regional scale indicator can be disaggregated to national level: ☒
- National data is collated to form global indicator: ☒

The indicator can be used at national, regional, and global levels, depending on data availability. Global/regional values can be disaggregated to national scales (e.g. Ferrer-Paris et al. 2019, Obura et al. 2022). In principle, national data can be aggregated to form regional/global assessments, though this is yet to be applied and will require more testing.

6b. National/regional indicator production

N/A

6c. Sources of differences between global and national figures

The procedure for applying the Red List of Ecosystems framework is the same across national to global scales. The outcomes may vary between national and global levels where:

1. National assessments have more detailed ecosystem units than global assessments; for example, a comparison of ecosystem classifications in South Africa found that more ecosystems were listed as threatened when using more finely defined units (Payet et al. 2013).
2. Ecosystems extend beyond national boundary, particularly for smaller countries. This can also be dealt with to some degree by aligning and aggregating similar ecosystems with the Global Ecosystem Typology, and considering how this issue is addressed in species red listing (e.g. national assessment guidelines that account for rescue effects).
3. There are inconsistencies among nations in data and indicators used in assessments, and in the criteria assessed. This will require tools to be developed, learning from experiences in economics where the methods have been developed to account for ways in which national accounts, GDP and other economic indicators vary per country.

An example of this can be seen in Figures 1 and 2, which show results from the Colombian National assessment, where the RLIe for forest ecosystems is approx. 0.63 (Figure 1) and results for Colombia from the regional forest ecosystem assessment, where the RLIe is approx. 0.52 (Figure 2). With more research and analyses, understanding of the general patterns, underlying causes and implications of these differences will improve.

6d. Regional and global estimates & data collection for global monitoring

6d.1 Description of the methodology

The methods of conducting Red List of Ecosystems assessments are well established, and the same across national, regional and global scales. The methods of calculating the RLIe are also the same across national, regional and global scales. At present, indicators at these different scales are calculated based on assessments at the corresponding scales; country values are not yet aggregated to calculate regional or global assessments. Where ecosystem types extend beyond national boundaries, there is the possibility of aggregating data using the IUCN Global Ecosystem Typology – approaches for doing so are currently being trialled.

6d.2 Additional methodological details
N/A
6d.3 Description of the mechanism for collecting data from countries
N/A

7. Other MEAs, processes and organisations

7a. Other MEA and processes

N/A

7b. Biodiversity Indicator Partnership

Yes: ☒ No: ☐
https://www.bipindicators.net/indicators/red-list-index-of-ecosystems

8. Disaggregation

The primary recommended disaggregation for the Red List of Ecosystems is:

- By Ecosystem Functional Group (based on the IUCN Global Ecosystem Typology level 3); this will be the expected disaggregation for national reporting. Because the Global Ecosystem Typology is hierarchical, results can also be disaggregated to biome, which is a higher level in the hierarchy, and therefore with fewer categories (and thus potentially less informative, but more digestible for non-specialists).

Potential further disaggregations that are informative for this headline indicator include:

- By Lands of indigenous peoples and local communities (IPLCs) or Indigenous Territories, where spatial data are available, for example, intersecting national ecosystem maps with national maps of Indigenous Territories or equivalent
- By protected status, by intersecting spatial data on Protected Areas and/or OECMs (see Headline Indicator 3.1).
- By threatening process to support reporting on targets, for example:
    - Target 8: where climate change is identified as a threat in the Red list of Ecosystems assessment, or using risk status under sub-criterion C2 (projected future change in an ecosystem's abiotic environment, e.g. warming that leads to increased bleaching in coral reefs, Obura et al. 2021; or changes in temperature and precipitation in forest ecosystems, Ferrer-Paris et al. 2019)
    - Target 6: ecosystems that are threatened by invasive species
    - Target 7: ecosystems that are threatened by pollution

9. Related goals, targets and indicators

The Red List of Ecosystems and RLIe complements three other headline indicators:

- Indicator A.2 *extent of natural ecosystems*, based on the System of Environmental Economic Accounting (SEEA) ecosystem extent accounts at national levels and global datasets at global levels, provides information about the relative abundance of different natural and semi-natural ecosystem types; in contrast the Red List of Ecosystems provides information about the risk of collapse of these ecosystems. Note that change in extent is an input variable to Criterion A of the Red List of Ecosystems, and may share many of the same data sources.
- Indicator A.3 *Red List Index*, based on data from the IUCN Red List of Threatened Species, addresses species extinction risk; the Red List of Ecosystems focusses on a different level of biodiversity, deepening understanding of biodiversity loss and priorities for action to reverse it.
- Indicator B.1 *services provided by ecosystems,* based on SEEA ecosystem services accounts at national levels and global datasets at global levels, provides information on how changing ecosystem extent and condition affects ecosystem services, people and the economy; whereas the Red List of Ecosystems assesses impacts of ecosystem change on risks to ecosystem-level biodiversity, and emphasises a risk-reduction strategies for ecosystem management.

Many of the complementary and component indicators for Goal A, such as *Live Coral Cover*, *trends in mangrove forest fragmentation*, and *Forest Landscape Integrity Index*, can provide input data for Red List of Ecosystems assessments (eg Obura et al 2022, Murray et al. 2020).

Red List of Ecosystems assessments can also support production of other indices, including: the Ecosystem Area Index, which aggregates data on change in ecosystem extent (criterion A); and the Ecosystem Health Index, which summarises data on changes in ecosystem integrity (Criteria C and/or D, based on ecosystem-specific indicators (see Rowland et al 2020).

10. Data reporter

10a. Organisation

International Union for Conservation of Nature (IUCN)
Commission on Ecosystem Management (CEM)

10b. Contact person(s)

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11. References

Website

https://iucnrle.org/ https://assessments.iucnrle.org/ ; https://global-ecosystems.org/

References

Bland LM, Keith DA, Miller RM, Murray NJ, Rodríguez JP (2017) Guidelines for the application of IUCN Red List of Ecosystems Categories and Criteria Version 1.1. IUCN International Union for Conservation of Nature, Gland, Switzerland. Available from https://portals.iucn.org/library/sites/library/files/documents/2016-010-v1.1.pdf.

Bland LM et al (2019) Impacts of the IUCN Red List of Ecosystems on conservation policy and practice. Conservation Letters 12 (5): e12666. doi.org/10.1111/conl.12666

Botts E.A., Skowno A., Driver A. et al. (2020) More than just a (red) list: Over a decade of using South Africa's threatened ecosystems in policy and practice. Biological Conservation 246, 108559.

Burns EL, Lindenmayer DB, Stein J, Blanchard W, McBurney L, Blair D, Banks SC (2015) Ecosystem assessment of mountain ash forest in the Central Highlands of Victoria, south-eastern Australia. Austral Ecology **40**:386–399.

Butchart SHM et al. (2004). Measuring global trends in the status of biodiversity: Red List Indices for birds. PLoS Biology 2: e383. http://www.plosbiology.org/article/info:doi/10.1371/journal.pbio.0020383.

Butchart SHM et al. (2007) Improvements to the Red List Index. PLoS ONE **2**:e140.

Etter A., Andrade A., Kelly Saavedra, Amaya P., Cortés J., Arévalo P. (2020a) *Colombian Ecosystems, Threats and Risks. An application of the Red List of Ecosystems to the continental terrestrial ecosystems*. Pontificia Universidad Javeriana and Conservación Internacional-Colombia, Bogotá.

Etter A., Andrade A., Nelson C.R., Cortés J., Saavedra K. (2020b) Assessing restoration priorities for high-risk ecosystems: An application of the IUCN Red List of Ecosystems. *Land Use Policy* **99**, 104874.

Ferrer-Paris JR, Zager I, Keith DA, Oliveira-Miranda MA, Rodríguez JP, Josse C, González-Gil M, Miller RM, Zambrana-Torrelio C, Barrow E. (2019.. An ecosystem risk assessment of temperate and tropical forests of the Americas with an outlook on future conservation strategies. Conservation Letters.

Ghoraba SMM, Halmy MWA, Salem BB& Badr NBE (2019) Assessing risk of collapse of Lake 417Burullus Ramsar site in Egypt using IUCN Red List of Ecosystems. Ecological Indicators 104, 172–183

Holness S & Botts E (2022) Spatial Biodiversity Assessment and Prioritisation Technical Guide Series 2022. CBD, UNEP-WCMC, SANBI, Japan Biodiversity Fund.

Keith DA et al. (2013) Scientific Foundations for an IUCN Red List of Ecosystems. PLoS ONE **8**:e62111.

Keith DA et al. (2022). A function-based typology for Earth's ecosystems. Nature 610 (7932): 513-518.
https://global-ecosystems.org/

Kyrkjeeide MO, Pedersen B, Evju M, Magnussen K, Mair L, Bolam FC, Mcgowan PJK, VestergaardKM, Braa J, Rusch G. 2021. Bending the curve: Operationalizing national Red Lists to customize conservation actions to reduce extinction risk. Biological Conservation 261

Marshall A, Schulte to Bühne H, Bland L, Pettorelli N. 2018. Assessing ecosystem collapse risk in ecosystems dominated by foundation species: The case of fringe mangroves. Ecological Indicators **91**:128–137. Elsevier. Available from https://doi.org/10.1016/j.ecolind.2018.03.076.

Murray NJ et al (2017) The use of range size to assess risks to biodiversity from stochastic threats. Diversity and Distributions, 1–10. DOI: 10.1111/ddi.12533

Murray, N.J., et al. (2018). The role of satellite remote sensing in structured ecosystem risk assessments. *Science of The Total Environment* 619–620: 249-257.

Murray N.J., Keith D.A., Duncan A. et al. (2020) Myanmar's terrestrial ecosystems: Status, threats and conservation opportunities. Biological Conservation, 252, 108834.

National Environment Management Authority (NEMA), 2020. Uganda Spatial Biodiversity Assessment v1, CONNECT Project, Kampala, Uganda

Nicholson E et al. (2021) Scientific foundations for an ecosystem goal, milestones and indicators for the post-2020 Global Biodiversity Framework. Nature Ecology and Evolution:1–26.

Nicholson E., Andrade A., Brooks T.M. *et al.* (2024) Roles of the Red List of Ecosystems in the Kunming-Montreal Global Biodiversity Framework. *Nature Ecology & Evolution*. https://doi.org/10.1038/s41559-023-02320-5

Obura D et al. (2022) Vulnerability to collapse of coral reef ecosystems in the Western Indian Ocean. Nature Sustainability 5 (2): 104-113.

Payet, K. *et al.* (2013) The effect of land cover and ecosystem mapping on ecosystem risk assessment in the Little Karoo, South Africa. *Conservation Biology*. *https://conbio.onlinelibrary.wiley.com/doi/abs/10.1111/cobi.12065*

Rodríguez JP et al. 2015. A practical guide to the application of the IUCN Red List of Ecosystems criteria. Philosophical Transactions of the Royal Society B: Biological Sciences **370**:1–9. Royal Society of London.

Rowland JA, Bland LM, Keith DA, Juffe-Bignoli D, Burgman MA, Etter A, Ferrer-Paris JRJR, Miller RM, Skowno AL, Nicholson E. 2020a. Ecosystem indices to support global biodiversity conservation. Conservation Letters **e12680**:11. Wiley-Blackwell.

Rowland JA, Lee CKF, Bland LM, Nicholson E. 2020b. Testing the performance of ecosystem indices for biodiversity monitoring. Ecological Indicators **116**:106453. Elsevier. Available from https://doi.org/10.1016/j.ecolind.2020.106453.

Rowland JA, Nicholson E, Murray NJ, Keith DA, Lester RE, Bland LM. 2018. Selecting and applying indicators of ecosystem collapse for risk assessments. Conservation Biology **32**:1233–1245. Available from http://doi.wiley.com/10.1111/cobi.13107.

Skowno A.L., Monyeki M.S. (2021) South Africa's Red List of Terrestrial Ecosystems (RLEs). Land 10, 1048.

Tan, J., Li, A., Lei, G., Bian, J., Chen, G., & Ma, K. (2017). Preliminary assessment of ecosystem risk based on IUCN criteria in a hierarchy of spatial domains: A case study in Southwestern China. Biological Conservation, 215, 152–161. https://doi.org/10.1016/j.biocon.2017.09.011

WEF (2020). Nature Risk Rising: Why the Crisis Engulfing Nature Matters for Business and the Economy. (World Economic Forum, in collaboration with PwC)

12. Graphs and diagrams

N/A

GBF indicator metadata: A.2 Extent of natural ecosystems

1. Indicator name

A.2 Extent of natural ecosystems

2. Date of metadata update

March 2024

3. Goals and Targets addressed

3a. Goal

Headline Indicator for **Goal A:** The integrity, connectivity and resilience of all ecosystems are maintained, enhanced, or restored, substantially increasing the area of natural ecosystems by 2050; Human induced extinction of known threatened species is halted, and, by 2050, the extinction rate and risk of all species are reduced tenfold and the abundance of native wild species is increased to healthy and resilient levels; The genetic diversity within populations of wild and domesticated species, is maintained, safeguarding their adaptive potential.

3b. Target

Headline Indicator for **Target 1:** Ensure that all areas are under participatory integrated biodiversity inclusive spatial planning and/or effective management processes addressing land and sea use change, to bring the loss of areas of high biodiversity importance, including ecosystems of high ecological integrity, close to zero by 2030, while respecting the rights of indigenous peoples and local communities.

4. Rationale

Natural ecosystems are the foundation of biodiversity, providing the conditions necessary for a wide array of life forms to coexist and thrive. The conversion of natural ecosystems to intensively modified or anthropogenic ecosystems, driven by human activities such as urban development, agriculture, and infrastructure development, is one of the main drivers of biodiversity loss and is reflected in the reduction of the area of natural ecosystems. Conversely, ecological restoration efforts can result in increases in the area of natural ecosystems.

This indicator aims to show the extent of natural ecosystems as a proportion of overall area, and to track changes in this proportion over time. This responds to the element of Goal A that refers to “substantially increasing the area of natural ecosystems by 2050”. The indicator also responds to the elements of Target 1 that refer to “addressing land and sea use change”, “to bring the loss of areas of high biodiversity importance, including ecosystems of high ecological integrity, close to zero by 2030”. The indicator can be disaggregated into different natural ecosystem types, providing insights into the relative abundance or scarcity of different natural ecosystem types as well as their relative rates of loss or gain over time.

The term ‘natural ecosystem’ broadly refers to ecosystems where the impact of humans on ecosystem composition, structure and function are low compared to natural factors It is used in the indicator in a broad sense, including natural and semi-natural ecosystems, for several reasons:

- Semi-natural ecosystems often retain substantial biodiversity and are thus important from a biodiversity perspective, along with natural ecosystems. This contrasts with anthropogenic (intensively modified) ecosystems, which are of far less importance from a biodiversity perspective. Thus, the key distinction from a biodiversity perspective is between natural or semi-natural ecosystems on the one hand and anthropogenic ecosystems on the other.
- If semi-natural ecosystems were excluded from the indicator, this may have the unintended consequence of reducing attention to their management, conservation and in some cases restoration.
- In practice there are virtually no ecosystems that are completely natural and there is no agreed scientific basis for making firm distinctions between natural, near-natural and semi-natural ecosystems, which exist on a continuum, so a narrow definition of natural ecosystems would make the indicator difficult to operationalise.

The indicator focuses on conversions from natural/semi-natural to anthropogenic ecosystems and vice versa. The overall indicator will not reflect changes from natural to semi-natural ecosystems or vice versa, or changes from one natural ecosystem type to another.

The indicator does not aim to address the ecological condition of natural ecosystems, which is captured in other indicators such as the Red List of Ecosystems (indicator A1). This means that ecosystems do not have to be in good ecological condition to be included in the indicator as natural or semi-natural. Where land uses in natural ecosystems result in some biodiversity loss and a transition to a semi-natural state (such as in managed native forests or grazed shrublands, grasslands or savannas), this decline in condition and accompanying biodiversity loss would be picked up in a Red List of Ecosystem assessment.

The System of Environmental-Economic Accounting (SEEA) Ecosystem Accounting, as the adopted international statistical standard for organizing data about ecosystems, measuring ecosystem services, tracking changes in ecosystem assets, and linking this information to economic and other human activity, provides the conceptual framework and methodology for the compilation of this indicator. SEEA Ecosystem Accounting requires accounting for ecosystem extent in biophysical terms as one of five core ecosystem accounts, with the extent account providing the foundation for the other four core accounts. Because accounting tables have a standard structure and are based on standard definitions and classifications, they allow for comparison across time periods and between countries. This makes an accounting approach a powerful basis for the development of national and global indicators. An additional strength of the accounting approach is that accounts provide granular information that can be used for local application and fine-grained policy decisions as well as aggregate information for national and global reporting.

An ecosystem extent account tracks the extent of different ecosystem types within an area (such as a country) for successive accounting periods, providing an opening extent and closing extent for each ecosystem type in each accounting period. The information on opening and closing stocks in the account tables can be used to derive a range of indicators and presented in a range of forms (e.g., summary tables, maps, graphs).

In its simplest form, the indicator “Extent of natural ecosystems” can be shown as **natural and semi-natural ecosystems as a proportion of total area**, at the national level and globally, based on the closing extent for a particular accounting period. This provides information about the abundance of all natural and semi-natural ecosystems relative to anthropogenic ecosystems. A mock-up (with a hypothetical global average) is provided in Figure 1. An average per region could also be included.

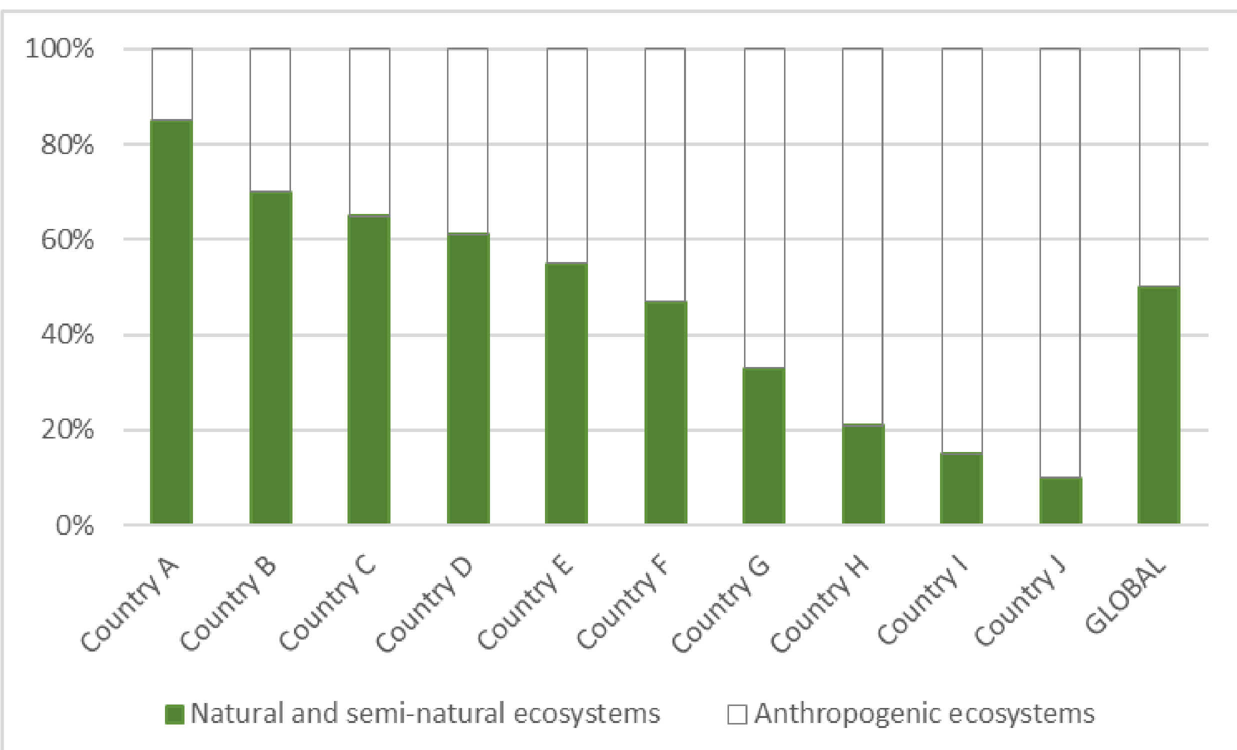


***Figure 1**. Mock-up of indicator Proportion of natural ecosystems as at [end of accounting period]*

The natural and semi-natural ecosystems can be disaggregated into different ecosystem types, for example by realm, biome or ecosystem functional group, to show the relative abundance or scarcity of different ecosystem types within the broad "natural and semi-natural" category.

The focus on natural ecosystems in Indicator A2 means that it aligns with the scope of Indicator A1, the Red List of Ecosystems, as Red List assessments focus primarily on natural ecosystems. Indicator A2 complements Indicator A1, each providing a different perspective. Indicator A1 focuses on which ecosystem types are most threatened and face the greatest risk of collapse, while indicator A2 focuses on the abundance of natural ecosystems relative to anthropogenic ecosystems and the relative abundance or scarcity of different natural ecosystem types.

5. Definitions, concepts and classifications

5a. Definition:

Indicator definition:

The indicator, at the national level, is defined as **the extent of natural and semi-natural ecosystems as a proportion of total area of the country** at a particular point in time, expressed as a percentage. The point in time is the closing date of the accounting period for which the ecosystem accounts were compiled. Trends over time will be evident from changes in the proportion of total area over successive accounting periods.

The total surface area of a country includes land, inland water and, if applicable, territorial waters (i.e., ocean area to the end of the exclusive economic zone). For countries with marine territory, the indicator should be compiled ideally for the total surface area of the country, including territorial waters. However, it could be compiled only for land and inland water areas if data on the distribution of marine ecosystems are not yet available.

It is recognised that the indicator does not capture information about ecosystems in the high seas (i.e., areas beyond national jurisdiction - ABNJ).

Other key concepts and definitions:

The concepts, definitions and classification used are based on the SEEA Ecosystem Accounting[1] and the International Union for the Conservation of Nature's Global Ecosystem Typology (IUCN GET).[2]

Ecosystem extent is the size of an ecosystem asset, where *ecosystem assets* are defined as contiguous spaces of a specific ecosystem type characterized by a distinct set of biotic and abiotic components and their interactions,[3] and the specific *ecosystem type* reflects a distinct set of abiotic and biotic components and their interactions. An ecosystem type may have several occurrences, i.e. be made up of several ecosystem assets. The extent of all the ecosystem assets combined make up the *extent of the ecosystem type*.

The total area for which ecosystem accounts are compiled is called the *ecosystem accounting area*. For the purposes of accounting, ecosystem types must be delineated to be spatially mutually exclusive and comprehensive across the ecosystem accounting area (i.e., no overlaps[4] or gaps between ecosystem types and wall-to-wall coverage of the whole ecosystem accounting area). The total area is the sum of the areas of all ecosystem types in that area including natural, semi-natural and anthropogenic ecosystem types. For the purposes of this indicator, the ecosystem accounting area should be the total area of the country. For countries that have marine territory, the total surface area of the country could be divided into separate ecosystem accounting areas, for example one for the land and inland water area and another for the territorial waters. Further guidance on this will be provided in compilation guidelines to be developed.

Changes in extent of natural ecosystems occur primarily through *ecosystem conversion*. In the SEEA Ecosystem Accounting, ecosystem conversions refer to situations in which, for a given location, there is a change in ecosystem type involving a distinct and persistent change in the ecological structure, composition and function which, in turn, is reflected in the supply of a different set of ecosystem services. This definition aligns well with the approach to loss of ecosystem area (leading eventually to ecosystem collapse) in the Red List of Ecosystems.

Reduction in the extent of natural and semi-natural ecosystems will be tracked primarily through measuring conversion of area within natural or semi-natural ecosystems to anthropogenic ecosystems.

There are also instances in which the extent of natural ecosystems may increase, for example through restoration of anthropogenic ecosystems to natural or semi-natural ecosystems.

Ecosystems are classified according to the IUCN GET, which is the *reference classification for ecosystem types* in the SEEA Ecosystem Accounting and which was also endorsed by the United Nations Statistical Commission at its 55th session in March 2024 as an international statistical classification and recommended it to be included in the international family of classifications.[5] The three upper levels of IUCN GET – realms, biomes and ecosystem functional groups – classify ecosystems based on their functional characteristics (such as structural roles of foundation species, water regime, climatic regime or food web structure). Level 3 – ecosystem functional groups (EFGs) – of the IUCN GET is used as the basis for this indicator.

Natural ecosystems are ecosystems in which the impacts of humans on ecosystem composition, structure and function are low compared to natural factors.[6] As discussed in Section 4, for the purposes of this indicator natural ecosystems are defined broadly to include natural and semi-natural ecosystems.

Intensively modified or anthropogenic ecosystems are predominantly influenced by human activities where a stable natural ecological state is unattainable and future socio-economic interventions are required to maintain a new stable state. In some cases semi-natural ecosystems also require constant management to be maintained.

For the purposes of this indicator, *natural and anthropogenic ecosystems are identified based on the EFGs of the IUCN GET*. Of the 110 EFGs, 98 are considered natural or semi-natural and 12 are considered anthropogenic. The anthropogenic EFGs are listed in Table 1. The distinction between natural and anthropogenic ecosystem types should be made at level of EFGs rather than biomes, because some biomes include both semi-natural and anthropogenic ecosystem types.

Table 1: *List of ecosystem functional groups (EFGs) in the IUCN GET that are considered intensively modified or anthropogenic and thus excluded from "natural ecosystems" for Indicator A2*

Realm	Biome	Ecosystem functional group
Terrestrial	T7 Intensive land-use systems[7]	T7.1 Annual croplands
		T7.2 Sown pastures and fields
		T7.3 Plantations
		T7.4 Urban and industrial ecosystems
Freshwater	F3 Artificial fresh waters	F3.1 Large reservoirs
		F3.2 Constructed lacustrine wetlands
		F3.3 Rice paddies
		F3.4 Freshwater aquafarms
		F3.5 Canals, ditches and drains
Marine	M4 Anthropogenic marine systems	M4.1 Submerged artificial structures
		M4.2 Marine aquafarms
Marine-terrestrial	MT3 Anthropogenic shorelines	MT 3.1 Artificial shorelines

Please refer to the IUCN GET (Keith et.al 2020) for detailed descriptive profiles for each EFG, which can also be found at https://global-ecosystems.org/.

The IUCN GET is also used as the basis for Indicator A1, the Red List of Ecosystems, which focuses on the risk of collapse of natural ecosystems.

5b. Method of computation

The indicator is drawn directly from ecosystem extent accounts compiled based on the SEEA Ecosystem Accounting framework, which organize data on the extent of different ecosystem types. An ecosystem extent account records the extent (area) and changes in extent, for all ecosystem types within an ecosystem accounting area (in this case a country), including natural, semi-natural and anthropogenic ecosystem types.[8] A stylized example of an ecosystem extent account is shown in Table 2, where the opening extent, closing extent, and additions and reductions in extent for each ecosystem type are recorded for a particular accounting period.[9] Entries are in measurement units such as hectares or square kilometres. Ideally accounts are compiled for successive accounting periods, with the closing extent for one accounting period becoming the opening extent for the next accounting period. The critical elements of the account table for reporting on the indicator are the opening extent of the first accounting period and the closing extent of the first and each subsequent accounting period (see Section 6d.3).

More comprehensive versions of the ecosystem extent account table than the one shown in Table 2 are also possible (e.g. see Table 4.1 in SEEA EA), and a change matrix can be compiled alongside the extent account (described in SEEA EA), providing additional information about conversions between different ecosystem types.

***Table 2**: Stylized ecosystem extent account (units of area)*

	Ecosystem functional groups (examples)						
Accounting entries	T2.6 Temperate forests and woodlands	T4.5 Temperate subhumid grasslands	F2.3 Seasonal freshwater lakes	T7.1 Annual croplands	T7.4 Urban and industrial ecosystems	…	**Total**
Opening extent							
Additions to extent							
Reduction to extent							
Closing extent							

Source: Adapted from SEEA Ecosystem Accounting, Table 2.2.

Countries that have their own national classification system and maps for ecosystems should use that classification and spatial data for the compilation of extent accounts. The accounts can be compiled in as much detail as needed at the national level, for example at a level equivalent to Levels 5 or 6 of the GET (these levels are intended to be developed bottom-up, from the national or local level).

In such cases, a bridge or concordance of this national classification system with IUCN GET Level 3 (EFGs) should be developed to facilitate consistency and comparison across countries. Each national ecosystem type should be cross-walked to the EFG that provides the best fit (not necessarily a perfect fit) based on the descriptions of the EFGs (available at https://global-ecosystems.org/).

Guidance and tools to support countries with this cross-walking process, which is required for several GBF indicators, are in the process of being developed. It is important to note that the cross-walk from national ecosystem types to EFGs is a conceptual cross-walk not a spatial cross-walk. Countries should use their own spatial data on the distribution of ecosystem types (cross-walked to EFGs) for compiling the extent account, not, for example, the indicative spatial data on distribution of EFGs that is available on the GET website.

When no existing national classification and/or map of ecosystem types is available, or deemed suitable for reporting, a country could opt to use global data or tools to compile extent accounts.

Once national ecosystem types have been cross-walked to the EFGs in the GET, the extent account table based on national ecosystem types should be converted to an extent account based on GET EFGs. In some cases this will involve aggregating values for several national ecosystem types that fall within one EFG. The indicator, "*extent of natural and semi-natural ecosystems as a proportion of total area"*, is then obtained by summing the extent of the EFGs pertaining to natural and semi-natural ecosystems (in hectares or square kilometres) and dividing by total area of the country (in the same units). The final indicator is expressed in percentage terms.

As noted in Section 4, total area of the country includes land area, inland water area and, where applicable, territorial waters (to the end of the exclusive economic zone). For countries with marine territory that do not yet have data on the distribution of marine ecosystem types, the indicator can be compiled only for total land and inland water area and the associated EFGs. Further, because most marine ecosystems are natural or semi-natural, there is a risk that reporting the indicator for land and marine area combined would mask the extent of anthropogenic ecosystems in the terrestrial realm. This means that the indicator should be reported separately for terrestrial and marine realms (at the national and global level).

Guidance will be needed on dealing with freshwater ecosystems and transitional ecosystems (such as coastal ecosystems) in the indicator. In addition, further guidance will be needed on how to deal with instances where a country has spatial data on some but not all ecosystem types within its area (this may be the case especially in marine areas). Compilation guidelines, to be developed, should address these issues.

For reporting the indicator, countries will not be expected to submit the ecosystem extent account table. Rather, they will submit data on the extent of each EFG and the total country area in absolute terms (e.g. ha/km^2). A globally aggregated indicator can then be obtained by summing the national values in absolute terms and converting them to proportions expressed in percentage terms. (See further discussion in Section 6d.)

5c. Data collection method

Also see Section 5e Data sources. The national maps and classifications of ecosystem types that underpin ecosystem extent accounts, and time series maps that show changes in extent of ecosystems, are developed based on a wide range of data sources which differ for different realms and have different collection methods. Remote sensing and earth observation data often play an important role, along with field data and expert knowledge.

When national data is not available, global data layers may be used where they are considered suitable.

5d. Accessibility of methodology

The United Nations Statistical Commission at its 52nd session in 2021 adopted the SEEA Ecosystem Accounting chapters 1-7 describing the accounting framework and the biophysical accounts, including chapters on ecosystem extent, as an international statistical standard. Existing SEEA EA resources can be drawn on in compiling accounts, including freely available e-learning resources (SEEA e-learning resources | System of Environmental Economic Accounting). In addition, the Technical Committee on the SEEA Ecosystem Accounting is working on technical guidance notes on the compilation of ecosystem extent accounts (among others), which will assist countries in producing these accounts. Capacity development for Parties, especially for developing countries, should be provided to support the compilation of this this indicator.

IUCN GET is a published and peer reviewed classification of global ecosystems which can be accessed at https://global-ecosystems.org/.

5e. Data sources

The main data requirements for this indicator are national maps of ecosystem types using national ecosystem classifications and time series maps that show changes in extent of ecosystems. In the terrestrial realm, conversion of natural ecosystems to intensively modified ecosystems would typically be mapped using time series land cover/land use data. Data sources could include research institutions, various government ministries and national mapping agencies.

In the absence of national data sources, regional and global datasets can be used, subject to criteria, standards and quality assurance, including validation at the national level through appropriate institutional processes involving relevant national experts. For example, ARIES for SEEA allows users to derive a basic ecosystem extent account (for the period between 1992 and 2020) in the terrestrial, freshwater and coastal realms using a multilayer look-up table approach which combines global data sources on land cover and other metrics to approximate EFGs (https://seea.un.org/content/aries-for-seea). The recent initiative of the Group on Earth Observations (GEO) to establish a Global Ecosystems Atlas may also provide useful data for this indicator.

Data quality guidelines for this and other headline indicators should be addressed in compilation guidelines.

5f. Availability and release calendar

The indicator methodology is based on SEEA Ecosystem Accounting, which is well developed and accepted by the international statistical community and other communities working on ecosystem accounting.

Since the adoption of the SEEA Ecosystem Accounting as an international statistical standard, an increasing number of countries have started the implementation of ecosystem extent accounts. According

to the 2023 Global Assessment of Environmental-Economic Accounting and Supporting Statistics, 33 countries compiled ecosystem extent accounts at least once during the period 2019 to 2023.
For countries with no national data on ecosystem extent, global tools and databases could be drawn on. Preliminary ecosystem extent estimates could be prepared via the ARIES for SEEA platform based on global datasets and models. These would require validation at the national level through appropriate institutional processes involving relevant national experts.

5g. Time series

Although it is ideal to compile ecosystem accounts on an annual basis, in practice this is seldom possible and may not be meaningful. For the ecosystem extent account, an update every three to five years may be sufficient and is likely to indicate actual changes in extent.

5h. Data providers

For those countries that have national ecosystem extent accounts, the relevant national authorities, in particular national statistical offices, ministries of environment or related agencies, will provide data for this indicator. In the absence of national ecosystem extent accounts, data may be estimated through ARIES for SEEA or other global data platforms and mechanisms. Such estimates would require national validation through appropriate institutional processes involving relevant national experts.

5i. Data compilers

For those countries that have national ecosystem extent accounts, the relevant national authorities, in particular the national statistical offices, ministries of environment or related agencies, will compile this indicator. In the absence of national ecosystem extent accounts, estimates may be made using ARIES for SEEA or other global data platforms using existing global data sources. Such estimates would require national validation through appropriate institutional processes involving relevant national experts.

5j. Gaps in data coverage

N/A

5k. Treatment of missing values

Missing values for individual countries may be estimated using global data platforms using existing global data. Such estimates would require national validation through appropriate institutional processes involving relevant national experts.

6. Scale

6a. Scale of use

Scale of application (please check all relevant boxes):

Global: ☒ Regional: ☒ National☒

Scale of data disaggregation/aggregation:

- Global/ regional scale indicator can be disaggregated to national level: ☒
- National data is collated to form global indicator: ☒

The indicator is applicable at the global, national and regional scale. National data can be aggregated to form the global indicator provided that the underlying ecosystem classifications can be linked to IUCN GET, noting that further guidance on cross-walking national ecosystem classifications to the IUCN GET is needed.

6b. National/regional indicator production

The SEEA Ecosystem Accounting and IUCN GET are scalable at any level, including national and regional levels.

6c. Sources of differences between global and national figures

Differences between country produced and internationally estimated data may arise due to differences in spatial resolution of datasets, classification and mapping approaches, cross-walking approaches, projection, and definition of ecosystem conversion.
Differences may also arise due to territorial disputes between countries or in the case condominiums. These differences will be dealt with on a case-by-case basis.

6d. Regional and global estimates & data collection for global monitoring

6d.1 Description of the methodology
Regional and global estimates are produced by aggregating country-level data.
6d.2 Additional methodological details
Countries will provide data (using a spreadsheet template or through an online data collection system) that will request them to provide values in absolute terms (e.g., ha) for all EFGs in their country (see Section 6d.3 below). These values can then be aggregated globally and converted to percentages.
6d.3 Description of the mechanism for collecting data from countries
Data will be collected from countries (using a spreadsheet template or an online data collection system). As noted earlier, countries will not be required to submit their ecosystem extent account tables but rather to submit data extracted from the tables. Data on actual area in absolute terms is very useful, so the reporting template will require countries to report not only on proportions in percentage terms but also on the actual areas (e.g., in ha or km^2). Countries will be requested to submit data on the extent of each EFG present in the country (natural, semi-natural and anthropogenic EFGs) at the end of each accounting period[10] as well as the total area of the country. The sum of the area of all EFGs for each accounting period should equal the total area of the country (noting that separate ecosystem accounting areas may be required for land and inland water area and for territorial waters, if applicable, as discussed in Section 5a).[11] Countries should identify the EFGs using the EFG codes and names from the GET Collecting data from countries disaggregated to EFGs allows for global aggregation to biomes or realms as needed.
The reporting template will allow countries to submit data for all the accounting periods for which they have compiled accounts. The first data point will be the opening extent of the first account compiled, followed by the closing extent for the first account and for each subsequent account, The opening extent of the first account provides a baseline for the country. Depending on the data available nationally, this could be the historical extent of the EFG, prior to major human modification of the landscape, or a more recent baseline.
Country baseline dates are distinct from the global baseline date. The proposed baseline year for global reporting under the GBF is likely to be 2020, or alternatively an average of the values between 2010 and 2020. Collecting data for years prior to the global baseline from countries that have such data could enable additional analyses that may be useful.

7. Other MEAs, processes and organisations

7a. Other MEA and processes

N/A

7b. Biodiversity Indicator Partnership

Yes: ☐ No: ☒

8. Disaggregation

This indicator can be disaggregated by realm, biome, EFG and geographical location, all of which provide useful information.
It could be useful to disaggregate the indicator between of natural and semi-natural ecosystems, but this would need further discussion as the distinction between natural and semi-natural ecosystems can be difficult to make in practice (as discussed earlier). Those countries that are able to distinguish systematically between natural and semi-natural ecosystems could use this information on the relative share of natural and semi-natural area for analytical purposes, as it can provide additional relevant information about the interactions between people and ecosystems.
Subnational disaggregation may be important and useful at the country level (for example, disaggregation to provinces and municipalities). However, this would not be required for global data collection.
Disaggregation related to Indigenous Peoples and Local Communities (IPLCs) may be relevant for this indicator. Where spatial data on IPLC lands exists, it may in principle be possible to disaggregate the indicator on this basis. However, this is a complex issue and guidance would need to be sought from the CBD’s Working Group on Article 8(j) which addresses with IPLCs.

9. Related goals, targets and indicators

Target 2: Restore 30% of all Degraded Ecosystems
Target 3: Conserve 30% of Land, Waters and Seas

10. Data reporter

10a. Organisation

United Nations Statistics Division (UNSD)

10b. Contact person(s)

Ilaria Di Matteo (dimatteo@un.org),
Environmental Economic Accounts Section of the UN Statistics Division (seea@un.org)

11. References

UN System of Environmental-Economic Accounting: https://seea.un.org/ecosystemaccounting

United Nations et al. (2021). System of Environmental-Economic Accounting—Ecosystem Accounting (SEEA EA). White cover publication, pre-edited text subject to official editing. Available at: https://seea.un.org/ecosystem-accounting.

United Nations (2021). Guidelines on Biophysical Modelling for Ecosystem Accounting Available at: https://seea.un.org/ecosystem-accounting/biophysical-modelling

ARIES for SEEA: https://seea.un.org/content/aries-for-seea

Keith, D.A., Ferrer-Paris, J.R., Nicholson, E. and Kingsford, R.T. (eds.) (2020). The IUCN Global Ecosystem Typology 2.0: Descriptive profiles for biomes and ecosystem functional groups. Gland, Switzerland: IUCN

Assessment of Environmental-Economic Accounting and Supporting Statistics 2023. Available at https://seea.un.org/content/global-assessment-environmental-economic-accounting

12. Graphs and diagrams

N/A

GBF indicator metadata: A.3 Red List Index

1. Indicator name

A.3 Red List Index

2. Date of metadata update

March 2024

3. Goals and Targets addressed

3a. Goal

Headline Indicator for **Goal A**: The integrity, connectivity and resilience of all ecosystems are maintained, enhanced, or restored, substantially increasing the area of natural ecosystems by 2050; Human induced extinction of known threatened species is halted, and, by 2050, the extinction rate and risk of all species are reduced tenfold and the abundance of native wild species is increased to healthy and resilient levels; The genetic diversity within populations of wild and domesticated species, is maintained, safeguarding their adaptive potential.

3b. Target

Headline indicator for **Target 4:** Ensure urgent management actions to halt human induced extinction of known threatened species and for the recovery and conservation of species, in particular threatened species, to significantly reduce extinction risk, as well as to maintain and restore the genetic diversity within and between populations of native, wild and domesticated species to maintain their adaptive potential, including through in situ and ex situ conservation and sustainable management practices, and effectively manage human-wildlife interactions to minimize human-wildlife conflict for coexistence.

As noted in CBD/ID/OM/2022/1/2 “Report of the Expert Workshop on the Monitoring Framework for the Post-2020 Global Biodiversity Framework”, Annex III, specific disaggregations of the Red List Index are relevant to a number of other targets described in section 9.

4. Rationale

The world’s species are impacted by a number of threatening processes, including habitat destruction and degradation, overexploitation, invasive alien species, human disturbance, pollution and climate change. This indicator can be used to assess overall changes in the extinction risk of groups of species as a result of these threats and the extent to which threats are being mitigated.

The Red List Index value ranges from 1 (all species are categorized as ‘Least Concern’) to 0 (all species are categorized as ‘Extinct’), and so indicates how far the set of species has moved overall towards extinction. Thus, the global Red List Index allows comparisons between sets of species in both their overall level of extinction risk (i.e., how threatened they are on average), and in the rate at which this risk changes over time. A downward trend in the global Red List Index over time means that the expected rate of future species extinctions is worsening (i.e., the rate of biodiversity loss is increasing). An upward trend means that the expected rate of species extinctions is abating (i.e., the rate of biodiversity loss is decreasing), and a horizontal line means that the expected rate of species extinctions is remaining the same, although in each of these cases it does not mean that biodiversity loss has stopped. An upward global Red List Index trend would indicate that the SDG Target 15.5 of reducing the degradation of natural habitats and protecting threatened species is on track. A global Red List Index value of 1 would indicate that biodiversity loss has been halted.

The name “Red List Index” should not be taken to imply that the indicator is produced as a composite indicator of a number of disparate metrics (in the same way that, e.g., the Multidimensional Poverty Index is compiled). The Red List Index provides an indicator of trends in species’ extinction risk, as measured using the IUCN Red List Categories and Criteria (Mace et al. 2008, IUCN 2012a), and is compiled from data on changes over time in the Red List Category for each species, excluding any changes driven by improved knowledge or revised taxonomy.

The Red List Index was used as an indicator towards the 2011–2020 Strategic Plan for Biodiversity (CBD 2014, Tittensor et al. 2014, CBD 2020a), the Convention on Biological Diversity’s 2010 Target (Butchart et al. 2010), Millennium Development Goal 7, Sustainable Development Goal 15.1 and is also used by Parties to the CMS (and its daughter agreements and memoranda of understanding), CITES and UNCCD

(Butchart et al. 2024). It is a Headline Indicator in the Kunming-Montreal Global Biodiversity Framework (CBD 2022).

5. Definitions, concepts and classifications

5a. Definition:

Indicator definition:

The indicator "*Red List Index*" measures change in aggregate extinction risk across groups of species. It is based on genuine changes in the number of species in each category of extinction risk on The IUCN Red List of Threatened Species (www.iucnredlist.org) and is expressed as changes in an index ranging from 0 to 1.

Other key concepts and definitions:

Threatened species are those listed on The IUCN Red List of Threatened Species in the categories Vulnerable, Endangered, or Critically Endangered (i.e., species that are facing a high, very high, or extremely high risk of extinction in the wild in the medium-term future). Changes over time in the proportion of species threatened with extinction are largely driven by improvements in knowledge and changing taxonomy. The indicator excludes such changes to yield a more informative indicator than the simple proportion of threatened species. It therefore measures change in aggregate extinction risk across groups of species over time, resulting from genuine improvements or deteriorations in the status of individual species. It can be calculated for any representative set of species that have been assessed for The IUCN Red List of Threatened Species at least twice (Butchart et al. 2004, 2005, 2007). To calculate the Red List Index for individual countries and regions, each species contributing to the index is weighted by the proportion of its global range within the particular country or region. The resulting index therefore shows the aggregate extinction risk for species within the country or region relative to its potential contribution to global species extinction risk (within the taxonomic groups included) (Butchart et al. 2024). Complementing such national disaggregations of the global index, national RLIs can be generated from repeated assessments of national extinction risk (e.g., national Red Lists). Guidance for assessing national extinction risk of species has been developed by IUCN (IUCN 2012b), and most countries have developed national red lists for at least one taxonomic group. National RLIs may be more sensitive than disaggregated global RLIs to factors influencing biodiversity loss within each country (including national policies), but require repeated assessments of national extinction risk for multiple groups in each country (with associated costs), and cannot be directly compared between countries (Raimondo et al 2022, Butchart et al. 2024).

Unit of measure:

The disaggregated global Red List Index for a particular country or region is an index of the aggregate extinction risk for species within the country or region relative to its potential contribution to global species extinction risk (within the taxonomic groups included), measured on a scale of 0 to 1, where 1 is the maximum contribution that the country or region can make to global species survival, equating to all species being classified as Least Concern on the IUCN Red List, and 0 is the minimum contribution that the country or region can make to global species survival, equating to all species in the country or region having gone extinct.

5b. Method of computation

The Red List Index is calculated at a point in time by first multiplying the number of species in each Red List Category by a weight (ranging from 1 for 'Near Threatened' to 5 for 'Extinct' and 'Extinct in the Wild') and summing these values. This is then divided by a maximum threat score which is the total number of species multiplied by the weight assigned to the 'Extinct' category. This final value is subtracted from 1 to give the Red List Index value.

Mathematically this calculation is expressed as:

RLIt = 1 – [(Ss Wc(t,s) / (WEX * N)]

Where Wc(t,s) is the weight for category (c) at time (t) for species (s) (the weight for 'Critically Endangered' = 4, 'Endangered' = 3, 'Vulnerable' = 2, 'Near Threatened' = 1, 'Least Concern' = 0. 'Critically Endangered' species tagged as 'Possibly Extinct' or 'Possibly Extinct in the Wild' are assigned a weight of 5); WEX = 5, the weight assigned to 'Extinct' or 'Extinct in the Wild' species; and N is the total number of assessed species, excluding those assessed as Data Deficient in the current time period, and those considered to be 'Extinct' in the year the set of species was first assessed.

The formula requires that:

- Exactly the same set of species is included in all time periods, and
- The only Red List Category changes are those resulting from genuine improvement or deterioration in status (i.e., excluding changes resulting from improved knowledge or taxonomic revisions), and
- Data Deficient species are excluded (or treated according to the procedure described above).

In many cases, species lists will change slightly from one assessment to the next (e.g., owing to taxonomic revisions). The conditions can therefore be met by retrospectively adjusting earlier Red List categorizations using current information and taxonomy. This is achieved by assuming that the current Red List Categories for the taxa have applied since the set of species was first assessed for the Red List, unless there is information to the contrary that genuine status changes have occurred. Such information is often contextual (e.g., relating to the known history of habitat loss within the range of the species).

To avoid spurious results from a biased selection of species, Red List Indices are typically calculated only for taxonomic groups in which all species worldwide have been assessed for the Red List, or for samples of species that have been systematically or randomly selected. National RLIs based on national extinction risk should similarly be compiled only for taxonomic groups in which all species in the country (or a systematic or random sample) have been assessed. The methods and scientific basis for the Red List Index were described by Butchart et al. (2004, 2005, 2007, 2010, 2024).

Butchart et al. (2010) also described the methods by which Red List Indices for different taxonomic groups are aggregated to produce a single multi-taxon Red List Index. Specifically, aggregated Red List Indices are calculated as the arithmetic mean of modelled Red List Indices. Red List Indices for each taxonomic group are interpolated linearly for years between data points and extrapolated linearly (with a slope equal to that between the two closest assessed points) to align them with years for which Red List Indices for other taxa are available. The Red List Indices for each taxonomic group for each year are modelled to take into account various sources of uncertainty:

i. Data Deficiency: Red List categories (from Least Concern to Extinct) are assigned to all Data Deficient species, with a probability proportional to the number of species in non-Data Deficient categories for that taxonomic group;
ii. Extrapolation uncertainty: although RLIs were extrapolated linearly based on the slope of the closest two assessed point, there is uncertainty about how accurate this slope may be. To incorporate this uncertainty, rather than extrapolating deterministically, the slope used for extrapolation is selected from a normal distribution with a probability equal to the slope of the closest two assessed points, and standard deviation equal to 60% of this slope (i.e., the CV is 60%);
iii. Temporal variability: the ‘true’ Red List Index likely changes from year to year, but because assessments are repeated only at multi-year intervals, the precise value for any particular year is uncertain.

To make this uncertainty explicit, the Red List Index value for a given taxonomic group in a given year is assigned from a moving window of five years, centred on the focal year (with the window set as 3-4 years for the first two and last two years in the series). Note that assessment uncertainty cannot yet be incorporated into the index. Practically, these uncertainties are incorporated into the aggregated Red List Indices as follows: Data Deficient species are allotted a category as described above, and a Red List Index for each taxonomic group is calculated interpolating and extrapolating as described above. A final Red List Index value is assigned to each taxonomic group for each year from a window of years as described above. Each such ‘run’ produces a Red List Index for the complete time period for each taxonomic group, incorporating the various sources of uncertainty. Ten thousand such runs are generated for each taxonomic group, and the mean is calculated.

5c. Data collection method

A detailed description of the Red List Assessment process is provided at https://www.iucnredlist.org/assessment/process.

5d. Accessibility of methodology

See references in section 11, and https://www.iucnredlist.org

5e. Data sources

The Red List Index is based on data from The IUCN Red List of Threatened Species (www.iucnredlist.org), in particular the numbers of species in each Red List category of extinction risk, and changes in these numbers over time resulting from genuine improvements or deteriorations in the status of species. Data on species' distribution, population size, trends and other parameters that underpin Red List assessments are gathered from published and unpublished sources, species experts, scientists, and conservationists through correspondence, workshops, and electronic fora.

Red List Assessments are checked before submission to IUCN by Assessors and Red List Authority Coordinators, to ensure that all of the required supporting information is provided in the appropriate format, distribution maps follow the required mapping standards (https://www.iucnredlist.org/resources/mappingstandards, and the IUCN Red List Criteria have been applied appropriately and consistently following IUCN Guidelines (IUCN SPSC 2019). For further details, see https://www.iucnredlist.org/assessment/process. All submitted assessments must be reviewed by at least one Reviewer designated by the Red List Authority. For more details on the review process, see the Rules of Procedure (https://nc.iucnredlist.org/redlist/content/attachment_files/Rules_of_Procedure_for_IUCN_Red_List_2017-2020.pdf).

When Red List Indices are updated each year, the updated index (and underlying numbers of species in each Red List Category) are made available for review by countries prior to submission to the SDG Indicators Database. This is achieved through updating the country profiles in the Integrated Biodiversity Assessment Tool (https://ibat-alliance.org/country_profiles and circulating these for consultation and review to CBD National Focal Points, SDG National Statistical Office Focal Points, and IUCN State Members.

In sum: all global Red List assessments are peer reviewed through the relevant Red List Authority for the species or species group in question; and all Red List assessments undergo consistency checks (to ensure consistency with assessments submitted for other taxonomic groups, regions, processes, etc.) by the Red List Unit before publication on the Red List website (http://www.iucnredlist.org/). Finally, the Chair of the IUCN Species Survival Commission (elected each four years by the government and non-governmental Members of IUCN) appoints a Chair for a Standards and Petitions Sub-Committee (https://www.iucn.org/theme/species/about/species-survival-commission/ssc-leadership-and-steering-committee/sub-committees/standards-and-petitions-subcommittee), which is responsible for ensuring the quality and standards of the IUCN Red List and for ruling on petitions against the listings of species on the IUCN Red List.

5f. Availability and release calendar

The Red List Index is updated annually in November-December using the latest data from reassessments on the IUCN Red List.

The IUCN Red List of Threatened Species is updated at least three times per year. Red List Indices for sets of species that have been comprehensively reassessed are usually released alongside the relevant update of the IUCN Red List. Data are stored and managed in the Species Information Service database, and are made freely available for non-commercial use through the IUCN Red List website and can be found under the Advanced Search functionality (www.iucnredlist.org). Re-assessments of extinction risk are required for every species assessed on The IUCN Red List of Threatened Species once every ten years, and ideally undertaken once every five years. A Red List Strategic Plan details a calendar of upcoming re-assessments for each taxonomic group.

5g. Time series

Time series available: 1980 –2023. Updates are released annually

5h. Data providers

National agencies producing relevant data include government, non-governmental organisations (NGOs), and academic institutions working jointly and separately. Data are gathered from published and unpublished sources, species experts, scientists, and conservationists through correspondence, workshops, and electronic fora. Data are submitted by national agencies to IUCN, or are gathered through initiatives of the Red List Partnership. The members of the Red List Partnership are listed at https://www.iucnredlist.org/about/partners, and currently include: ABQ BioPark; Arizona State University Centre for Biodiversity Outcomes; BirdLife International; Botanic Gardens Conservation International; Conservation International; Global Wildlife Conservation; Missouri Botanical Garden; NatureServe; Royal Botanic Gardens, Kew; Sapienza University of Rome; Texas A&M University; and Zoological Society of London.

5i. Data compilers

Compilation and reporting of the Red List Index at the global level is conducted by the International Union for Conservation of Nature (IUCN) and BirdLife International, on behalf of the Red List Partnership.

Responsibility for overseeing Red List assessments, which underpin the Red List Index, is assigned to Red List Authorities according to the IUCN Red List Rules of Procedure (https://nc.iucnredlist.org/redlist/content/attachment_files/Rules_of_Procedure_for_IUCN_Red_List_2017-2020.pdf). The role of Red List Authorities is to ensure that all species within their remit are correctly assessed against the IUCN Red List Categories and Criteria at least once every ten years and, if possible, every five years. Further details of the roles and responsibilities of Red List Authorities are provided at https://www.iucnredlist.org/assessment/authorities, and the full list and contact details for all appointed Red List Authorities are available at https://www.iucn.org/commissions/ssc-groups.

5j. Gaps in data coverage

There are four main sources of uncertainty associated with Red List Index values and trends

a. Inadequate, incomplete or inaccurate knowledge of a species' status. This uncertainty is minimized by assigning estimates of extinction risk to categories that are broad in magnitude and timing.

b. Delays in knowledge about a species becoming available for assessment. Such delays apply to a small (and diminishing) proportion of status changes, and can be overcome in the Red List Index through back-casting (Butchart et al. 2007).

c. Inconsistency between species assessments. These can be minimized by the requirement to provide supporting documentation detailing the best available data, with justifications, sources, and estimates of uncertainty and data quality, which are checked and standardized by IUCN through Red List Authorities, a Red List Technical Working Group and an independent Standards and Petitions Sub-committee. Further, detailed Guidelines on the Application of the Categories and Criteria are maintained (IUCN SPSC 2019), as is an online training course (in English, Spanish and French).

d. Species that are too poorly known for the Red List Criteria to be applied are assigned to the Data Deficient category. For birds, only 0.8% of extant species are evaluated as Data Deficient, compared with 24% of amphibians. If Data Deficient species differ in the rate at which their extinction risk is changing, the Red List Index may give a biased picture of the changing extinction risk of the overall set of species. The degree of uncertainty this introduces is estimated through a bootstrapping procedure that randomly assigns each Data Deficient species a category based on the numbers of non-Data Deficient species in each Red List category for the set of species under consideration, and repeats this for 1,000 iterations, plotting the 2.5 and 97.5 percentiles as lower and upper confidence intervals for the median.

The main limitation of the Red List Index is related to the fact that the Red List Categories are relatively broad measures of status, and thus the Red List Index for any individual taxonomic group can practically only be updated at intervals of at least four years. However, as the overall index is aggregated across multiple taxonomic groups, with groups reassessed asynchronously, it can be updated annually. A further limitation is that the Red List Index does not reflect particularly well the deteriorating status of more common species that remain abundant and widespread but are declining slowly in terms of their range and population. Hence the Red List Index is complemented by indicators of population abundance, such as the Wild Bird Index or Living Planet Index.

5k. Treatment of missing values

At country level

Red List Indices for each taxonomic group are interpolated linearly for years between data points and extrapolated linearly (with a slope equal to that between the two closest assessed points, except for corals) back to the earliest time point and forwards to the present for years for which estimates are not available. The start year of the aggregated index is set as ten years before the first assessment year for the taxonomic group with the latest starting point. Corals are not extrapolated linearly because declines are known to have been much steeper subsequent to 1996 (owing to extreme bleaching events) than before. Therefore, the rate of decline prior to 1996 is set as the average of the rates for the other taxonomic groups.

At regional and global levels
The Red List Index is calculated globally based on assessments of extinction risk of each species included, because many species have distributions that span many countries. Thus, while there is certainly uncertainty around the Red List Index, there are no missing values as such, and so no imputation is necessary.

6. Scale

6a. Scale of use

Scale of application (please check all relevant boxes):

Global: ☒ Regional: ☒ National☒

Scale of data disaggregation/aggregation:

- Global/ regional scale indicator can be disaggregated to national level: ☒
- National data is collated to form global indicator: ☒

The indicator is available for use at the national, regional and global level. It should be noted that local and national data on each species are compiled to undertake global Red List assessments of each species, and it is these that are used to generate the global index, disaggregated to national indices.

6b. National/regional indicator production

Red List Indices for individual countries and regions can be calculated in two ways. Firstly, by disaggregating the global index to the national or regional scale, in which each species contributing to the national or regional index is weighted by the proportion of its global range within the particular country or region. The resulting index therefore shows the aggregate extinction risk for species within the country or region relative to its potential contribution to global species extinction risk (within the taxonomic groups included).

Secondly, complementing such national disaggregation's of the global index, national RLIs can be generated from repeated assessments of national extinction risk (e.g. national Red Lists). Guidance for assessing national extinction risk of species has been developed by IUCN (IUCN 2012), and most countries have developed national red lists for at least one taxonomic group. National RLIs may be more sensitive than disaggregated global RLIs to factors influencing biodiversity loss within each country (including national policies), but require repeated assessments of national extinction risk for multiple groups in each country (with associated costs), and cannot be compared between countries.

The data underlying the global Red List Index are compiled under the authority of the IUCN Red List Committee, through application of the IUCN Red List Categories & Criteria (https://portals.iucn.org/library/node/10315). This includes submissions of endemics from national red list processes, where these have been conducted following the "Guidelines for application of IUCN Red List Criteria at Regional and National Levels" (https://portals.iucn.org/library/node/10336) and following the "Required and Recommended Supporting Information for IUCN Red List Assessments" (http://goo.gl/O52euG). Assessments may be submitted in all three IUCN languages (English, French and Spanish) and Portuguese. All assessments are peer reviewed through the relevant Red List Authority for the species or species group in question, as documented in the Red List Rules of Procedure (https://cmsdocs.s3.amazonaws.com/keydocuments/Rules_of_Procedure_for_IUCN_Red_List_Assessments_2017-2020.pdf); see in particular Annex 3, the "Details of the Steps Involved in the IUCN Red List Process" (https://cmsdocs.s3.amazonaws.com/keydocuments/Details_of_the_Steps_Involved_in_the_IUCN_Red_List_Process.pdf).

The key document providing international recommendations and guidelines to countries and all involved in application of the IUCN Red List Categories & Criteria (https://portals.iucn.org/library/node/10315) is the "Guidelines for Using the IUCN Red List Categories and Criteria" (in English - http://cmsdocs.s3.amazonaws.com/RedListGuidelines.pdf and in French - http://cmsdocs.s3.amazonaws.com/keydocuments/RedListGuidelines_FR.pdf) accompanied by the "Required and Recommended Supporting Information for IUCN Red List Assessments". For countries (and regions), this is supplemented by the "Guidelines for application of IUCN Red List Criteria at Regional and National Levels" (https://portals.iucn.org/library/node/10336). To support the calculation of Red List Indices for any given country (or region), "Code (and documentation) for calculating and plotting national RLIs weighted by the proportion of each species' distribution within a country or region" is posted online (Dias et al. 2020; https://github.com/BirdLifeInternational/rli-codes).

6c. Sources of differences between global and national figures

The national Red List Index for a country may differ from the relevant national disaggregation of the global Red List index because: (a) it considers national rather than global extinction risk, (b) because it takes no account of the national responsibility for the conservation of each species, treating as equal both those species that occur nowhere outside the country (i.e. national endemics) and those with large ranges that occur in many other countries, and (c) the taxonomic groups considered may differ. Any such differences will be smaller for countries within which a high proportion of species are endemic (i.e., only found in that country), as in many island nations and mountainous countries, especially in the tropics. The differences will be larger for countries within which a high proportion of species have widespread distributions across many nations.

6d. Regional and global estimates & data collection for global monitoring

6d.1 Description of the methodology

The Red List Index can be downscaled to generate national and regional Red List Indices, weighted by the fraction of each species' distribution occurring within the country or region, building on the method published by Rodrigues et al. (2014). These show an index of how well species are conserved in a country or region to its potential contribution to global species conservation (for the taxonomic groups of species included).

The index is calculated as:

RLI(t,u) = 1 – [(Ss(W(t,s) * (rsu/Rs)) / (WEX * Ss (rsu/Rs))

where t is the year of comprehensive reassessment, u is the spatial unit (i.e. country), W_((t,s)) is the weight of the global Red List category for species s at time t (Least Concern =0, Near Threatened =1, Vulnerable =2, Endangered =3, Critically Endangered =4, Critically Endangered (Possibly Extinct) =5, Critically Endangered (Possibly Extinct in the Wild) =5, Extinct in the Wild =5 and Extinct =5), WEX = 5 is the weight for Extinct species, r_su is the fraction of the total range of species s in unit u, and R_s is the total range size of species s.

The index varies from 1 if the country has contributed the minimum it can to the global RLI (i.e., if the numerator is 0 because all species in the country are Least Concern) to 0 if the country has contributed the maximum it can to the global RLI (i.e., if the numerator equals the denominator because all species in the country are Extinct or Possibly Extinct).

The taxonomic groups included are those in which all species have been assessed for the IUCN Red List more than once. Red List categories for years in which comprehensive assessments (i.e. those in which all species in the taxonomic group have been assessed) were carried out are determined following the approach of Butchart et al. 2007, i.e. they match the current categories except for those taxa that have undergone genuine improvement or deterioration in extinction risk of sufficient magnitude to qualify for a higher or lower Red List category.

6d.2 Additional methodological details

The Red List Categories and Criteria are applied for each species on The IUCN Red List of Threatened Species and are determined globally and provided principally by the Specialist Groups and stand-alone Red List Authorities of the IUCN Species Survival Commission, IUCN Secretariat-led initiatives, and Red List partner organizations. The staff of the IUCN Global Species Programme compile, validate, and curate these data, and are responsible for publishing and communicating the results. Each individual species assessment is supported by the application of metadata and documentation standards (IUCN 2013), including classifications of, for example, threats and conservation actions (Salafsky et al. 2008). Red List assessments are undertaken through either open workshops or through open-access web-based discussion fora. Assessments are reviewed by the appropriate Red List Authority (an individual or organization appointed by the IUCN Species Survival Commission to review assessments for specific species or groups of species) to ensure standardisation and consistency in the interpretation of information and application of the criteria. A Red List Technical Working Group and the IUCN Red List Unit work to ensure consistent categorization between species, groups and assessments. Finally, a Standards and Petitions Sub-committee monitors the process and resolves challenges and disputes over Red List assessments.

While global Red List Indices can be disaggregated to show trends for species at smaller spatial scales, the reverse is not true. National or regional Red List Indices cannot be aggregated to produce Red List Indices showing global trends. This is because a taxon's global extinction risk has to be evaluated at the global scale and cannot be directly determined from multiple national scale assessments across its range (although the data from such assessments can be aggregated for inclusion in the global assessment).

6d.3 Description of the mechanism for collecting data from countries

N/A

7. Other MEAs, processes and organisations

7a. Other MEA and processes

Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES): global assessment, regional assessments, thematic assessments on sustainable use, IAS etc

Sustainable Development Goal (SDG) indicator 15.5.1. The Red List Index has been classified by the IAEG-SDGs as Tier 1. Current data are available for all countries in the world, and these are updated annually. Index values for each country are available in the UN SDG Indicators Database https://unstats.un.org/sdgs/indicators/database/.

Strategic Plan for Migratory Species (SPMS) indicator: 5.1, 6.2 & 8.1

Used by:

- Convention on the Conservation of Migratory Species of Wild Animals (CMS)
- African-Eurasian Migratory Waterbird Agreement (AEWA),
- Agreement on the Conservation of Albatrosses and Petrels (ACAP)
- Raptors MOU
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)
- United Nations Convention to Combat Desertification (UNCCD)

Disaggregations of the Red List Index are also of particular relevance as indicators towards the following SDG targets (Brooks et al. 2015): SDG 2.4 Red List Index (species used for food and medicine); SDG 2.5 Red List Index (wild relatives and local breeds); SDG 12.2 Red List Index (impacts of utilisation) (Butchart 2008); SDG 12.4 Red List Index (impacts of pollution); SDG 13.1 Red List Index (impacts of climate change); SDG 14.1 Red List Index (impacts of pollution on marine species); SDG 14.2 Red List Index (marine species); SDG 14.3 Red List Index (reef-building coral species) (Carpenter et al. 2008); SDG 14.4 Red List Index (impacts of utilisation on marine species); SDG 15.1 Red List Index (terrestrial & freshwater species); SDG 15.2 Red List Index (forest-specialist species); SDG 15.4 Red List Index (mountain species); SDG 15.7 Red List Index (impacts of utilisation) (Butchart 2008); and SDG 15.8 Red List Index (impacts of invasive alien species) (Butchart 2008, McGeoch et al. 2010).

Red List Index graphs and underlying index data are available for each country, SDG regions, IPBES region, CMS region and various thematic disaggregations at https://www.iucnredlist.org/search. Red List Index graphs are also available for each country in the BIP Indicators Dashboard (https://bipdashboard.natureserve.org/bip/SelectCountry.html), the Integrated Biodiversity Assessment Tool Country Profiles (https://ibat-alliance.org/country_profiles), and (for birds) on the BirdLife International Data Zone (http://datazone.birdlife.org/species/dashboard).

7b. Biodiversity Indicator Partnership

Yes: ☒ No: ☐
https://www.bipindicators.net/indicators/red-list-index

8. Disaggregation

The indicator can also be disaggregated by: **realms** (terrestrial, freshwater and marine), **ecosystems** (forest, wetland etc), various political and geographic divisions (e.g., Han et al. 2014); by taxonomic subsets (e.g., Hoffmann et al. 2011); by suites of species relevant to particular international treaties or legislation (e.g., Croxall et al. 2012); by suites of species exposed to particular threatening processes (e.g., Butchart 2008); and by suites of species that deliver particular ecosystem services (e.g., Regan et al. 2015), or have particular biological or life-history traits (e.g. **migratory species**, as an indicator relating to ecological connectivity). It can also be disaggregated to show trends in the impacts of particular **drivers** (e.g. utilisation, invasive alien species, pollution etc) – these disaggregations show trends in extinction risk for all species, but reflecting only changes in extinction risk driven primarily by particular drivers or their mitigation. In each case, information can be obtained from The IUCN Red List of Threatened Species to determine which species are relevant to particular subsets (e.g. which occur in particular ecosystems, habitats, and geographic areas of interest). Drivers follows the IUCN Threats Classification Scheme. These disaggregations are available on the IUCN Red List website at https://www.iucnredlist.org/search. Those shown in bold above are recommended as priority disaggregations.

9. Related goals, targets and indicators

Target 4. Ensure urgent management actions to halt human induced extinction of known threatened species and for the recovery and conservation of species, in particular threatened species, to significantly reduce extinction risk, as well as to maintain and restore the genetic diversity within and between populations of native, wild and domesticated species to maintain their adaptive potential, including through in situ and ex situ conservation and sustainable management practices, and effectively manage human-wildlife interactions to minimize human-wildlife conflict for coexistence.

- Red List Index
- Red List Index (migratory species) – to reflect the impact of management actions for the recovery of migratory species in relation to enhancing ecological connectivity

Target 5. Ensure that the use, harvesting and trade of wild species is sustainable, safe and legal, preventing overexploitation, minimizing impacts on non-target species and ecosystems, and reducing the risk of pathogen spillover, applying the ecosystem approach, while respecting and protecting customary sustainable use by indigenous peoples and local communities

- Red List Index (impacts of utilisation) [more relevant than the Red List Index for used species, which is listed as a Component indicator];
- Red List Index (internationally traded species) [listed as a Complementary indicator]
- Red List Index (impacts of fisheries)

Target 6. Eliminate, minimize, reduce and or mitigate the impacts of invasive alien species on biodiversity and ecosystem services by identifying and managing pathways of the introduction of alien species, preventing the introduction and establishment of priority invasive alien species, reducing the rates of introduction and establishment of other known or potential invasive alien species by at least 50 per cent by 2030, and eradicating or controlling invasive alien species, especially in priority sites, such as islands.

- Red List Index (impacts of invasive alien species)) [listed as a Complementary indicator]

Target 7. Reduce pollution risks and the negative impact of pollution from all sources by 2030, to levels that are not harmful to biodiversity and ecosystem functions and services, considering cumulative effects, including: (a) by reducing excess nutrients lost to the environment by at least half, including through more efficient nutrient cycling and use; (b) by reducing the overall risk from pesticides and highly hazardous chemicals by at least half, including through integrated pest management, based on science, taking into account food security and livelihoods; and (c) by preventing, reducing, and working towards eliminating plastic pollution.

- Red List Index (impacts of pollution), this is listed as a Component indicator

Target 9. Ensure that the management and use of wild species are sustainable, thereby providing social, economic and environmental benefits for people, especially those in vulnerable situations and those most dependent on biodiversity, including through sustainable biodiversity-based activities, products and services that enhance biodiversity, and protecting and encouraging customary sustainable use by indigenous peoples and local communities.

- Red List Index (species used for food and medicine), this is listed as a Component indicator
- Red List Index (impacts of fisheries)
- Red List Index (impact of utilization)

Target 10. Ensure that areas under agriculture, aquaculture, fisheries and forestry are managed sustainably, in particular through the sustainable use of biodiversity, including through a substantial increase of the application of biodiversity friendly practices, such as sustainable intensification, agroecological and other innovative approaches, contributing to the resilience and long-term efficiency and productivity of these production systems, and to food security, conserving and restoring biodiversity and maintaining nature's contributions to people, including ecosystem functions and services.

- Red List Index (pollinating species), this is listed as a Complementary indicator
- Red List Index (wild relatives of domesticated species), this is listed as a Complementary indicator];
- Red List Index (impacts of agriculture);
- Red List Index (impacts of fisheries),
- Red List Index (forest specialist species)

Target 21. Ensure that the best available data, information and knowledge are accessible to decision makers, practitioners and the public to guide effective and equitable governance, integrated and participatory management of biodiversity, and to strengthen communication, awareness-raising, education, monitoring, research and knowledge management and, also in this context, traditional knowledge, innovations, practices and technologies of indigenous peoples and local communities should only be accessed with their free, prior and informed consent, 14 in accordance with national legislation.

- Proportion of known species assessed through the IUCN Red List [listed as a Complementary indicator].
- Number of assessments on the IUCN Red List of threatened species [listed as a Complementary indicator].

10. Data reporter

10a. Organisation

International Union for Conservation of Nature (IUCN)
BirdLife International (BLI)

10b. Contact person(s)

Dr Thomas Brooks (thomas.brooks@iucn.org)
Dr Stuart Butchart (stuart.butchart@birdlife.org)

11. References

Website:

https://www.iucn.org/assessment/red-list-index ;

References:

These metadata are based on http://mdgs.un.org/unsd/mi/wiki/7-7-Proportion-of-species-threatened-with-extinction.ashx, supplemented by http://www.bipindicators.net/rli/2010 and the references listed below.

Baillie, J. E. M. et al. (2004). 2004 IUCN Red List of Threatened Species: a Global Species Assessment. IUCN, Gland, Switzerland and Cambridge, United Kingdom. Available from https://portals.iucn.org/library/node/9830.

Brooks, T. M. et al. (2015). Harnessing biodiversity and conservation knowledge products to track the Aichi Targets and Sustainable Development Goals. Biodiversity 16: 157–174. Available from http://www.tandfonline.com/doi/pdf/10.1080/14888386.2015.1075903.

Bubb, P.J. et al. (2009). IUCN Red List Index - Guidance for National and Regional Use. IUCN, Gland, Switzerland. Available from https://portals.iucn.org/library/node/9321.

Butchart, S. H. M. (2008). Red List Indices to measure the sustainability of species use and impacts of invasive alien species. Bird Conservation International 18 (suppl.): 245–262. Available from http://journals.cambridge.org/action/displayJournal?jid=BCI.

Butchart, S. H. M. et al. (2004). Measuring global trends in the status of biodiversity: Red List Indices for birds. PLoS Biology 2(12): e383. Available from http://www.plosbiology.org/article/info:doi/10.1371/journal.pbio.0020383.

Butchart, S. H. M. et al. (2005). Using Red List Indices to measure progress towards the 2010 target and beyond. Philosophical Transactions of the Royal Society of London B 360: 255–268. Available from http://rstb.royalsocietypublishing.org/content/360/1454/255.full.

Butchart, S. H. M. et al. (2006). Biodiversity indicators based on trends in conservation status: strengths of the IUCN Red List Index. Conservation Biology 20: 579–581. Available from http://onlinelibrary.wiley.com/doi/10.1111/j.1523-1739.2006.00410.x/abstract.

Butchart, S. H. M. et al. (2007). Improvements to the Red List Index. PLoS ONE 2(1): e140. Available from http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0000140.

Butchart, S. H. M. et al. (2010). Global biodiversity: indicators of recent declines. Science 328: 1164–1168. Available from http://www.sciencemag.org/content/328/5982/1164.short.

Butchart, S. H. M. et al. (2024) Measuring trends in extinction risk: a review of two decades of development and application of the Red List Index. *Phil. Trans. Roy. Soc.* DOI: 10.1098/rstb.2023-0206.

Carpenter, K. E. et al. (2008). One-third of reef-building corals face elevated extinction risk from climate change and local impacts. Science 321: 560–563. Available from http://www.sciencemag.org/content/321/5888/560.short.

CBD (2014). Global Biodiversity Outlook 4. Convention on Biological Diversity, Montréal, Canada. Available from https://www.cbd.int/gbo4/.

CBD (2020a). Global Biodiversity Outlook 5. Convention on Biological Diversity, Montréal, Canada. Available from https://www.cbd.int/gbo5/.

CBD (2022). Decision adopted by the Conference of the Parties to the Convention on Biological Diversity. Document CBD/COP/DEC/15/5. Available at: https://www.cbd.int/doc/decisions/cop-15/cop-15-dec-05-en.pdf

Dias, M.P, Simkins, A.T., & Pearmain, E.J. (2020). Code (and documentation) for calculating and plotting national RLIs weighted by the proportion of each species' distribution within a country or region. Available at: https://github.com/BirdLifeInternational/rli-codes.

Croxall, J. P. et al. (2012). Seabird conservation status, threats and priority actions: a global assessment. Bird Conservation International 22: 1–34.

Gardenfors, U. (ed.) (2010). Rödlistade arter i Sverige 2010 – The 2010 Red List of Swedish Species. ArtDatabanken, SLU, Uppsala.

Han, X. et al. (2014). A Biodiversity indicators dashboard: addressing challenges to monitoring progress towards the Aichi Biodiversity Targets using disaggregated global data. PLoS ONE 9(11): e112046. Available from http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0112046.

Hoffmann, M. et al. (2010). The impact of conservation on the status of the world's vertebrates. Science 330: 1503–1509. Available from http://www.sciencemag.org/content/330/6010/1503.short.

Hoffmann, M. et al. (2011). The changing fates of the world's mammals. Philosophical Transactions of the Royal Society of London B 366: 2598–2610. Available from http://rstb.royalsocietypublishing.org/content/366/1578/2598.abstract.

IUCN SPSC (2019) Guidelines for Using the IUCN Red List Categories and Criteria. Version 14. International Union for Conservation of Nature – Standards and Petitions Subcommittee, Gland, Switzerland. Available from http://www.iucnredlist.org/documents/RedListGuidelines.pdf.

IUCN (2012a). IUCN Red List Categories and Criteria: Version 3.1. Second edition. International Union for Conservation of Nature, Gland, Switzerland. Available from https://portals.iucn.org/library/node/10315.

IUCN (2012b). Guidelines for Application of IUCN Red List Criteria at Regional and National Levels: Version 4.0. International Union for Conservation of Nature, Gland, Switzerland. Available from https://portals.iucn.org/library/node/10336.

IUCN (2013). Documentation Standards and Consistency Checks for IUCN Red List assessments and species accounts. International Union for Conservation of Nature, Gland, Switzerland. Available from http://cmsdocs.s3.amazonaws.com/keydocuments/RL_Standards_Consistency.pdf.

IUCN (2015). IUCN Red List of Threatened Species. Version 2015.1. International Union for Conservation of Nature, Gland, Switzerland. Available from http://www.iucnredlist.org.

Mace, G. M. et al. (2008) Quantification of extinction risk: IUCN's system for classifying threatened species. Conservation Biology 22: 1424–1442. Available from http://onlinelibrary.wiley.com/doi/10.1111/j.1523-1739.2008.01044.x/full.

McGeoch, M. A. et al. (2010) Global indicators of biological invasion: species numbers, biodiversity impact and policy responses. Diversity and Distributions 16: 95–108. Available from http://onlinelibrary.wiley.com/doi/10.1111/j.1472-4642.2009.00633.x/abstract.

Pihl, S. & Flensted, K. N. (2011). A Red List Index for breeding birds in Denmark in the period 1991-2009. Dansk Ornitologisk Forenings Tidsskrift 105: 211-218.

Raimondo, D., et al (2022) Using Red List Indices to monitor extinction risk at national scales. Cons Sci Practice 5: e12854. https://doi.org/10.1111/csp2.12854

Regan, E. et al. (2015). Global trends in the status of bird and mammal pollinators. Conservation Letters. doi: 10.1111/conl.12162. Available from http://onlinelibrary.wiley.com/doi/10.1111/conl.12162/abstract.

Rodrigues, A. S. L. et al. (2014). Spatially explicit trends in the global conservation status of vertebrates. PLoS ONE 9(11): e113934. Available from http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0113934.

Salafsky, N., et al. (2008) A standard lexicon for biodiversity conservation: unified classifications of threats and actions. Conservation Biology 22: 897–911. Available from http://onlinelibrary.wiley.com/doi/10.1111/j.1523-1739.2008.00937.x/full.

Tittensor, D. et al. (2014). A mid-term analysis of progress towards international biodiversity targets. Science 346: 241–244. Available from http://www.sciencemag.org/content/346/6206/241.short.

Visconti, P. et al. (2015) Projecting global biodiversity indicators under future development scenarios. Conservation Letters. doi: 10.1111/conl.12159. Available from http://onlinelibrary.wiley.com/doi/10.1111/conl.12159/abstract.

12. Graphs and diagrams

N/A

GBF indicator metadata: A.4 The proportion of populations within species with an effective population size > 500

1. Indicator name

A.4 The proportion of populations within species with an effective population size > 500
This is sometimes referred to as "the Ne 500 indicator" or "genetic diversity within populations indicator" or "Effective population size 500 indicator"

2. Date of metadata update

March 2024

3. Goals and Targets addressed

3a. Goal

Headline indicator for **Goal A:** The integrity, connectivity and resilience of all ecosystems are maintained, enhanced, or restored, substantially increasing the area of natural ecosystems by 2050; Human induced extinction of known threatened species is halted, and, by 2050, the extinction rate and risk of all species are reduced tenfold and the abundance of native wild species is increased to healthy and resilient levels; The genetic diversity within populations of wild and domesticated species, is maintained, safeguarding their adaptive potential.

3b. Target

Headline indicator for **Target 4**:. Ensure urgent management actions to halt human induced extinction of known threatened species and for the recovery and conservation of species, in particular threatened species, to significantly reduce extinction risk, as well as to maintain and restore the genetic diversity within and between populations of native, wild and domesticated species to maintain their adaptive potential, including through in situ and ex situ conservation and sustainable management practices, and effectively manage human-wildlife interactions to minimize human-wildlife conflict for coexistence.
As noted by Hoban et al 2023a, and Hoban et al 2023c, this indicator is also relevant to a number of targets described below and in section 9.

4. Rationale

Effective population size (Ne) is a well-accepted metric for measuring the rate of loss of genetic diversity within populations. As explained below (see figure 1), an Ne above 500 (usually a census population size of 5000) *will maintain genetic diversity within populations*. Genetic diversity is *necessary for species' populations to remain healthy and adapt to environmental change*, such as climate change, pollution, changing habitats, and pests and disease. Genetic diversity is *also vital for resilience of all ecosystems*, such as recovery from heat waves and ocean pollution or acidification. It is also *vital for the success of ecosystem restoration* and the reintroduction of populations and species. Populations with low genetic diversity suffer inbreeding, low viability, and low resilience. Unfortunately, *genetic diversity has declined* due to habitat loss, fragmentation, overharvest, and other human activities. **Therefore, an Ne indicator is necessary to measure the conservation and sustainable use of genetic diversity**
Genetic diversity is variation at the DNA level, including differences among individuals *within populations of species* and differences *among populations* of each species. However, assessing DNA with genetic sequencing technology can be time consuming, and requires substantial funds, skills and technology, making it challenging for large-scale evaluation, particularly in species-rich nations.
However, genetic status of species and populations can be assessed via Ne without needing DNA data. This is the fundamental basis of this indicator - *to assess genetic status without DNA sequence data*. This is very important since relatively few species have DNA-based studies, especially in biodiversity hotspots. *As explained in the methodology below, proxies of demographic and geographic data can approximate the Ne of populations.*
In 2020, three genetic diversity indicators were proposed, including the Headline Indicator on Ne 500. They have the following important features (see Hoban et al 2023a, and Hoban et al 2023c):

- are **scientifically valid**, based in core conservation and genetic concepts
- are **affordable and feasible** with existing data
- require a moderate to **low time and resource investment**

- leverage diverse data and **multiple ways of knowing including local knowledge** holders
- often **align with other biodiversity assessments**
- allow for **easy translation into policy and management** of species
- are **applicable and relevant in all countries**, taxonomic groups, and ecosystems (and can be disaggregated to these levels).
- use concepts that are **intuitive or accessible to non-geneticists** (e.g. genetic losses due to small populations and loss of populations).
- are '**forward compatible**', meaning they can incorporate new methods that arise

Genetic diversity indicators have multiple practical uses beyond reporting. They will help countries understand and mitigate genetic diversity loss by guiding conservation action, improve allocation of resources, and communicate to the public about genetic threats to flagship species. Also, genetic diversity indicators highlight how local populations provide adaptation and resilience, which facilitates empowerment and leverage for local communities and indigenous peoples. They are useful under other legislation including national level species protections

What exactly is the Effective Population Size (Ne) 500 indicator? This indicator is based on the knowledge that populations that are small in size (effective population size (Ne) < 500) are highly susceptible to rapid loss of genetic diversity and are at high risk of extinction due to genetic threats. (figure 1)

Ne 500 is widely recognized by scientists and conservation practitioners as a "sufficient" size to prevent loss of genetic diversity within populations (in this case, a statistic called 'heterozygosity') – Ne much higher than Ne 500 will reduce the risk of the loss of genetic diversity within populations to near zero. Much lower and genetic loss becomes rapid.

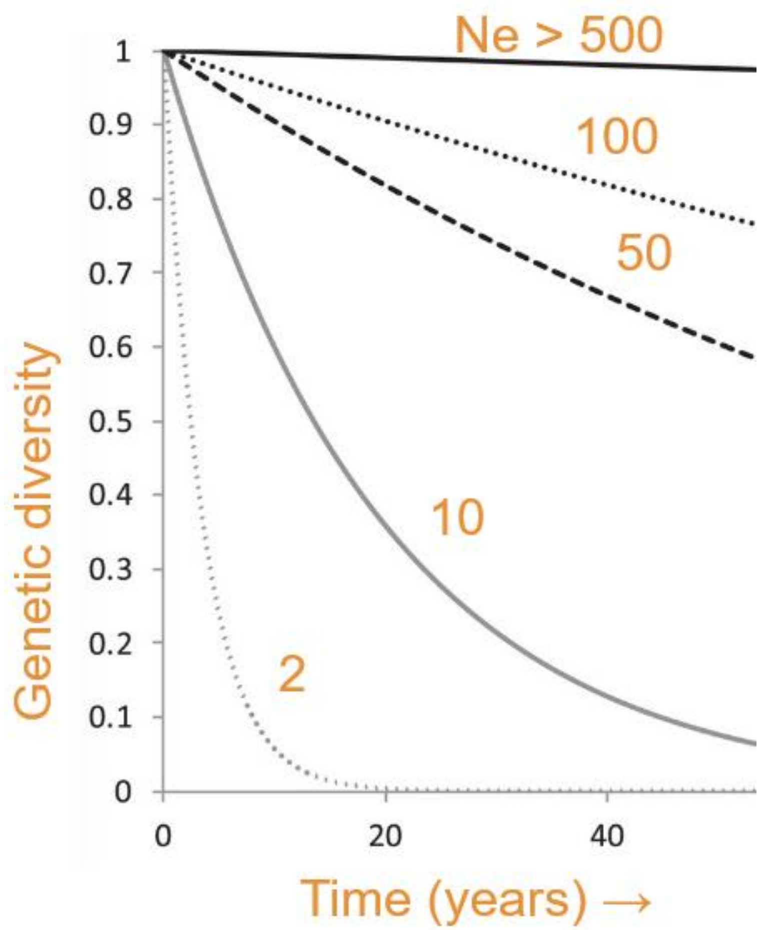


***Figure 1:** Illustration of loss of genetic diversity when Ne<500. Adpated from Wili et al, Dec 2021 PNAS*

Ne can be measured with and without DNA data. Without DNA data, **Ne can be approximated from population census size.** Typically, Ne is about 0.1 of the census size. As Hoban et al (2023b), Hoban et al 2023c and Hoban et al (2020) and as a pilot application (explained below) show, there are many sources of census size data which countries can employ, including existing in-country data, expertise, and biodiversity infrastructure.

The Ne 500 indicator is likely the best evidence of genetic status and risk of genetic erosion when DNA sequencing is not available (the case for most species globally). This indicator provides a measure of the loss or maintenance of genetic diversity within populations and is feasible and scalable for many species per country. Maintaining effective sizes above 500 will protect the genetic diversity within populations for many generations.

Thus, this indicator is directly relevant to **Goal A**, as it informs the health and resilience of species' populations, their genetic diversity, and the threat of species extinction. Knowledge of species population's effective size is relevant to **Target 4** as it facilitates active management of species, ex situ breeding programs and informs the conservation efforts and recovery process of species populations following environmental disruption. The Ne 500 indicator is a Headline indicator for Goal A and Target 4. As noted by Hoban et al (2023a), the Ne 500 indicator is relevant to other targets such as sustainable harvest **Targets 5 and 9** because harvested populations should be maintained at or above Ne 500. To ensure all genetically distinct populations are represented at sufficient sizes to maintain their persistence, it is relevant for **Targets 1 and 3** on biodiversity inclusive spatial planning and representative protected areas, respectively, and **Target 12** for increasing area and connectivity of green and blue spaces in urban environments to promote gene flow and species recovery.

The indicator is complementary to, and can be reported in, a genetic scorecard (O'Brien et al. 2022), a contribute to other indicators or initiatives (e.g., Key Biodiversity Areas, spatial planning, assessing protection level of species). Note: the Ne 500 indicator is relevant for genetic diversity within populations and a separate indicator (i.e. complementary indicator for Goal A the "proportion of populations maintained") is necessary for maintaining genetic diversity among populations. **Experts agree that both indicators are critical for assessing and monitoring the genetic health of species** (Hoban et al 2020, Hoban et al 2023b)**.**

These two indicators are compared below- headline indicator A.4 on the right, indicator on populations maintained on the left.

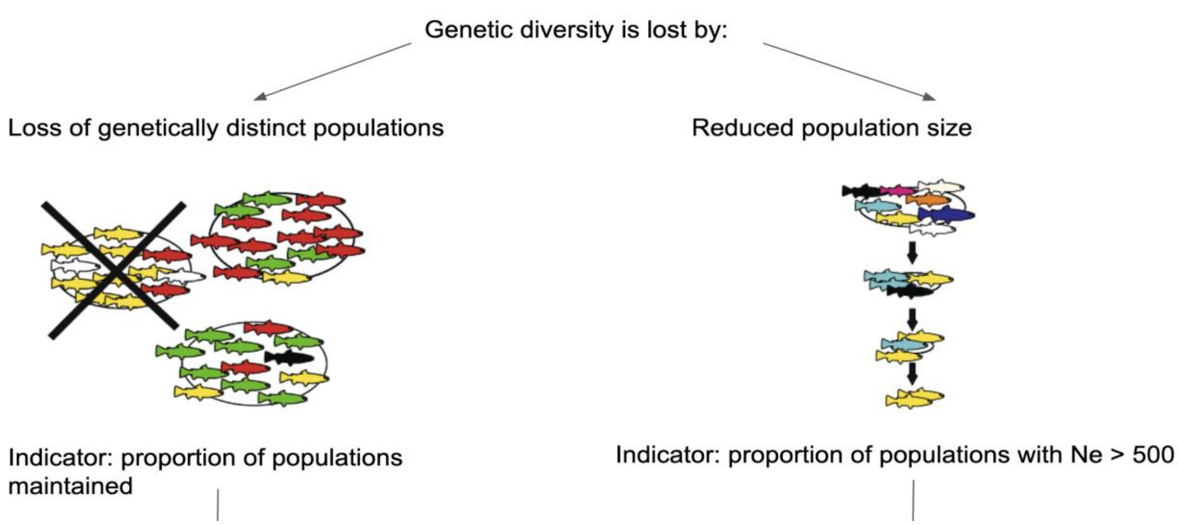


Figure 2:* presenting the concept of genetic diversity lost. The Headline Indicator A.4 is shown on the right- small populations lose genetic diversity. Complementary indicator on loss of populations is shown on the right. Legend: Colours represent different genetic compositions.*

5. Definitions, concepts and classifications

5a. Definition:

Indicator definition:

The indicator, "The proportion of populations within species with a genetically effective population size > 500." *is calculated by taking each population of a species, determining if each population is above the threshold of Ne 500, calculating a proportion of populations above the threshold for each species, and then taking a mean of these proportions across all species examined,* as explained in Hoban et al (2023b) and Hoban et al 2023c. As a proportion it ranges from 0 to 1, with 1 as the desired value. As explained in that publication which contains the basic equations for calculation, the indicator can be weighted by taxonomic groups or other categories to offset any biases in the species selected (e.g. due to having more birds, more rare species etc.).

Other key concepts and definitions:

Effective population size (N_e) is a way to quantify the rate of genetic change, or genetic erosion. Effective population size of a population is related to the number of adult/ breeding individuals in a population that contribute offspring to the next generation, the relative evenness of their offspring production, sex ratio, and other factors. The current state of N_e has important meaning for genetic biodiversity as it represents ongoing genetic erosion. *Any population with N_e below 500 is likely losing genetic diversity fairly quickly, and signals ongoing loss of genetic diversity.*

The effective population size may be a fraction (e.g., 10%) of the species *census population size (N_c)*, which is the number of adult individuals present in a discrete area. *As noted below, a fraction of 1/10th is widely recognized as a slightly conservative and reliable ratio between Ne:Nc.* When knowledge exists for a certain taxonomic group, an alternate fraction may be used.

To maintain genetic diversity typically means that the amount of genetic diversity (alleles, heterozygosity) does not decrease, and there is no loss of within-population genetic diversity or among population genetic diversity; the precise genetic composition may shift for adapting to environmental change. The N_e 500 indicator ensures maintenance of within-population genetic diversity. Some scientists have argued for a more conservative minimum Ne of 1000, though the Ne 500 recommendation remains common and well supported.

To safeguard genetic diversity means to protect genetic diversity e.g. with in situ and ex situ protective measures (e.g. seed banks and botanic gardens, well managed protected areas, translocations, etc.)

5b. Method of computation

Effective population size (N_e) can be calculated for most species through a simple mathematical transformation of the population's census size (N_c). Following the widely accepted rule of thumb of 1:10 effective-to-census size ratio, the default is multiplication of N_c by 0.1 (Hoban et al. 2020). For example, this would equate to a census size of 5000 having an effective size of 500. However, for some taxonomic groups, a more refined ratio could be employed (see Step 2 below).

Choosing species to evaluate. Biased selection of species is an important concern for the indicator. For example, selecting only charismatic species (butterflies, orchids, etc.), species of economic value or rare/ endangered species would result in an indicator that represents the genetic condition of species in that subset rather than all species. To avoid misleading results from a biased selection, the indicator could be calculated for

i. All species within certain taxonomic groups (e.g. birds, gymnosperms, mammals) in a country and thus presented as, for example, "the Ne 500 indicator for gymnosperms"
ii. A randomly selected subset of all known species in a country
iii. A systematically selected set of all known species in a country

A systematic assessment involves pre-defining certain categories, in particular taxonomic groups, e.g. plants, vertebrates, invertebrates, fungi, algae. Then a number of species within each group should be chosen randomly (see Baille et al 2008). The indicator will be less accurate when small numbers of species are used. At minimum, 100 species should be used, though ideally many more will be used (Baille et al 2008 recommend 900 species with sufficient data; however, to allow for species missing data, the initial list of taxa to evaluate should be 1500). IUCN has published guidelines on selecting species and populations for monitoring of genetic diversity (Hvilsom et al. 2022)

Again, the set of species should be as unbiased as possible. As explained below, analysis of the indicator may wish to disaggregate for particular subsets e.g. harvested species, pollinators, keystone species, but the overall indicator value should represent all species.

Step 1*: Define population boundaries and compile data on census size (N_c).*

For each focal species it is first necessary to define 'populations' and to collect data on census population sizes. Many local and national biodiversity monitoring programs (e.g. at species or ecosystem level) have already defined populations based on geographic isolation, occupying distinct habitats or ecoregions, association with a geographic feature like a mountain range or lake, etc. Full guidance on defining populations for a wide variety of organisms are provided in the guidance manual for this indicator (Hoban et al (2023b) and Supporting Information therein). After defining populations, it is necessary to collect data on census population sizes (or to use genetic data). Again, many biodiversity monitoring programs for priority species will have this data available - in some cases in a centralized national database, while in other cases, it may be scattered among different national reports and assessments. "Available data" should be considered broadly and it includes citizen science, local knowledge, indigenous knowledge, and informal data held by small NGOs and similar groups. A recent webinar hosted by the CBD Secretariat and GEO BON showcased the different resources available to countries, emphasizing the flexibility of this indicator.

Step 2: *Calculate each population's N_e.*

This entails first choosing a ratio of effective-to-census size and multiplying the population's census size by this ratio to obtain the population's effective size. As mentioned above, the default ratio, which is slightly conservative, is 1/10th or 0.1 (thus the minimum Nc would be 5000). Alternatively, a taxon-specific ratio can be obtained in one of several ways: (a) from recent reviews of the literature that have compiled average values for groups such as mammals, bony fish, annual plants, trees, etc. (see Hoban et al 2021), (b) from formulas that take into account a species' biological characteristics (especially the male-female sex ratio and the variance in offspring production), or (c) from published literature on the species or even populations that are the focus of study. For instance, the ratio in large-bodied mammals and in some trees is often closer to 0.3 (thus the minimum Nc would be 1500). These are all valid ways of obtaining the ratio. To incorporate uncertainty in calculations, the calculation can be repeated using multiple N_e/N_c ratios. But it is entirely acceptable and useful to use the well-recognized 0.1 ratio

For some organisms, assessment of Nc is fairly straightforward. It is the number of reproductively mature individuals, that is, those which are of sufficient maturity to produce gametes or offspring. A count of mature individuals may mean an actual count of all organisms, an estimate made by counting within given units of area and extrapolating, or an estimate from a model such as a capture-mark-recapture model. The IUCN Red List Guidelines (IUCN Standards and Petitions Committee 2022) contains extensive discussion on consideration of reproductively suppressed individuals, trees, fish, and other cases of interest, and it adhering to this guidance in its entirety, with one exception - clonal organisms, is suggested

Clonal organisms. In assessing Nc for the use of converting to Ne, it is important to use the "genet" (the genetically distinct organism) as opposed to the "ramet" (each distinct part which is capable of surviving on its own). An extreme example is a Populus clone which may have thousands of stems aboveground which are each capable of reproduction, but which are identical in their genotype. This clone formed over thousands of years. The assessor should consider each entire clone as a mature individual when counting Nc, not each stem. This can be done similar to the advice on page 28 of the aforementioned IUCN Red List Guidelines, e.g. "For diffuse, wholly visible organisms in continuous habitats (e.g., reef-forming corals, algal mats) assessors may assume an average area occupied by a genet and estimate the number of genets from the area covered by the taxon. The area covered by the taxon should be estimated at a scale (grid size; e.g. 1 m2) that is as close as practicable to the area assumed to be occupied by a genet." The typical area covered by a genet can be determined by consulting scientific literature on a similar organism (as above, many estimates are available for corals and Populus), contacting an expert in that species or genus, which may include contacting an IUCN Specialist Group for that taxon or the IUCN Conservation Genetic Specialist Group

Step 3: *Calculate the proportion of populations above the 500 N_e threshold.*
For each species, count the number of populations with N_e above 500 and the number with N_e below 500; these two added together should equal the total number of populations. The indicator can be reported as a proportion (from 0 to 1) of all populations that are above 500, or in the form of a ratio 'number of populations above 500':'total number of populations.' Recently extinct populations would have a size of 0 to avoid an increase in the indicator value when populations are lost. To combine across species in a given country or geographic location, a simple average of the proportion from Step 3 for all the relevant species should be performed. If taxonomic groups are not represented evenly, the indicator value is the mean of each taxonomic group's means, which down-weights overly represented taxonomic groups, e.g. mammals. Additionally, each species can be weighted by the proportion of its geographic range in the country, from 0 to 1, to reflect national responsibility, with full weight for endemic species. Transboundary/transnational populations can be weighted similarly (e.g. by the proportion of that population falling within the Parties borders). The indicator would range between 0 and 1 (with 1 being the desired state - all populations above an effective size of 500).
Equations for indicator calculation are given in Hoban et al (2023b).
What to do if a population goes extinct? Any population that goes extinct after the country's baseline year (each country is directed by the CBD to choose a baseline, which defaults to 2010-2020 but which may be adjusted to country context) is assigned an Nc and Ne of 0 and are therefore below Ne 500. **These populations must be retained in the calculation** in order to avoid the perverse incentive to "raise" the indicator value through population extinction
Step 4*: Temporal change in the indicator can be calculated using multiple time point values of population size*
An important consideration is that calculating temporal change in the indicator requires the use of the same set of species at all time points, similar to the Red List Index (Bubb et al 2009, "IUCN Red List index : guidance for national and regional use. Version 1.1"). As a default guidance, all species used in the first time point should be included in the second
However, the country may wish to change or add to the species lists over time (e.g., owing to taxonomic revisions, additional data sources, etc.). In such cases, countries can do one of the following:

- Any species in which taxonomic revisions or data errors are identified to have impacted the indicator value, should be removed from both time points
- Indicator values for any species affected by new knowledge or taxonomic changes can have their current and former indicator value retrospectively calculated. In other words, the entity being evaluated in the current time point can be re-evaluated for its previous time point using the most up to date guidance and data available

In addition, it is anticipated that biodiversity monitoring capacity within countries will increase over time, and thus countries may wish to increase the number of species included in their indicator calculation, e.g. from 100 to 1000 species. In such cases, the species being newly evaluated can have retrospective indicator calculations made, assuming historic data is available. This highlights a broader opportunity, that such retrospective evaluation could extend indicator calculation into the past
Temporal increases in the proportion of populations with N_e above 500 would indicate improvement in the maintenance of genetic diversity (on average slowing the rate of genetic erosion and eventually 'bending the curve' such that genetic diversity is restored via natural processes of mutation, migration, etc.). Decreases would indicate worsening (accelerating rate of genetic erosion). Static values would indicate a stable state of the indicator (stable rate of genetic erosion - *though not necessarily a halting of genetic erosion* - it is only halted when Ne >500). The indicator is designed to be recalculated as new data are compiled, which in many species is a timescale of 2 to 5 years, thus the indicator would be calculated and reported on typically once every 4 years (fitting the timespan of CBD reporting).
Management based on the indicator: The indicator is designed for use in practical biodiversity management – not just for reporting to the CBD. For example, it can be used for: raising alarm in regions or taxonomic groups with low indicator values, prioritizing which species and populations are most in need of management to halt genetic erosion, designing management strategies (e.g. reintroduction, population supplementation), setting achievable goals, tracking the consequences or effectiveness of

management (e.g. if the indicator value improves), and communicating to the public about genetic diversity conservation.

5c. Data collection method

In most cases, the indicator will be calculated using a transformation of census size (N_c), though analysis of DNA data can also be used to obtain Ne and assess if Ne >500. The draft guidance manual (see Hoban et al (2023b) and Supporting Information therein, and Hoban et al 2023c) details other methods of calculating the indicator when other data are available. The census size of local populations of target species can be obtained from a variety of sources, including national biodiversity monitoring databases and programs, endangered species management and recovery plans, detailed population information contained in some Red List assessments, collaboration with local knowledge holders, citizen science, and expert consultation. Detailed guidance on these calculations and a variety of example calculations is available now and will be revised following input from Parties as more Parties undertake this indicator. Demonstrations of the data collection can also be seen in a recent CBD webinar.
The full data collection form can be found online here:
https://ee.kobotoolbox.org/preview/2KDHEWrb. An online data collection form using Kobotoolbox (www.kobotoolbox.org/) have been created and a guidance document (Supporting Information) for anyone to use. Kobo is a free and flexible data collection tool commonly used in social, environmental and epidemiological research. The data form adapts to the type of fundamental source data available and can accommodate qualitative and quantitative data and different levels of certainty.

5d. Accessibility of methodology

Parties can directly calculate country-level values of this indicator by leveraging national data, expertise and biodiversity assessments, and by following the published guidance manual. The method has been peer reviewed in several publications (see list of References below, or https://www.coalitionforconservationgenetics.org/publications), and a detailed methodology has been made available (see Supporting Information for Hoban et al. 2023b and Hoban et al 2023c)

5e. Data sources

As explained in Hoban et al (2023b) the indicator is flexible and adaptable to the data sources already existing in each country. Examples from different countries illustrate the diverse options available. Recovery plans for dozens to thousands of threatened species are mandated by national legislation (Australia- the Environment Protection and Biodiversity Conservation Act; South Africa- Biodiversity Management Plans; USA- the Endangered Species Act). These documents typically detail species biology and demographic status. In Japan, many threatened vascular plants have been surveyed for census size for over two decades by the Japanese Society for Plant Taxonomy, while for common trees, statistical estimates for population size were estimated from vegetation survey data. In Mexico, taxonomic experts who recently helped validate distribution models for crop wild relatives will be consulted for indicator values. In France, Belgium, UK and Sweden, much biodiversity data from experts, local knowledge holders, and diverse sources are collected in easy to access web-based portals (France- INPN, Belgium - www.observations.be, UK- https://nbnatlas.org/, Sweden- Swedish Species Information Centre, Artdatabanken). In Colombia, the Biodiversity Information System (SIB) repository compiles species surveys from throughout the country (https://biodiversidad.co/), which is mandated by many public and private organizations. These data are reviewed by national experts for validation and used to create freely available species distribution models (http://biomodelos.humboldt.org.co/), and for conservation prioritization.
GEO BON, through its working groups, and national and thematic Biodiversity Observation Networks, and the Coalition for Conservation Genetics, is able to provide capacity support, training and consultation. Considering that currently the workflow is manual rather than fully automated, the indicator would be calculated for a relatively small number of representative species per country. This may range from dozens on the low end to 1000 or more on the high end, but for many countries will be on the scale of 100 species. As noted above, data sources include national biodiversity monitoring databases and programs, citizen science, local knowledge, endangered species management and recovery plans, detailed population information contained in some Red List assessments, and expert consultation. Detailed guidance on these calculations and a variety of example calculations is now available (see References).

5f. Availability and release calendar

Ready for deployment and updated approximately every four years. First draft of the guidance manual is available now and an indicator is being calculated, see Hoban et al (2023b) .

Genetic diversity indicators have been demonstrated as feasible and affordable including in middle income and megadiverse countries. **They have been calculated for >900 species and thousands of populations in nine countries: Australia, Belgium, Colombia, France, Japan, Mexico, South Africa, Sweden, and USA** (Figure 3)**.** Data are available and can be compiled quickly. Results from the nine-country deployment highlight that most populations are very small and in danger of imminent genetic losses. Early use of these indicators shows we are at a threshold of dramatic genetic diversity decline unless swift action is taken, guided by genetic diversity indicators.

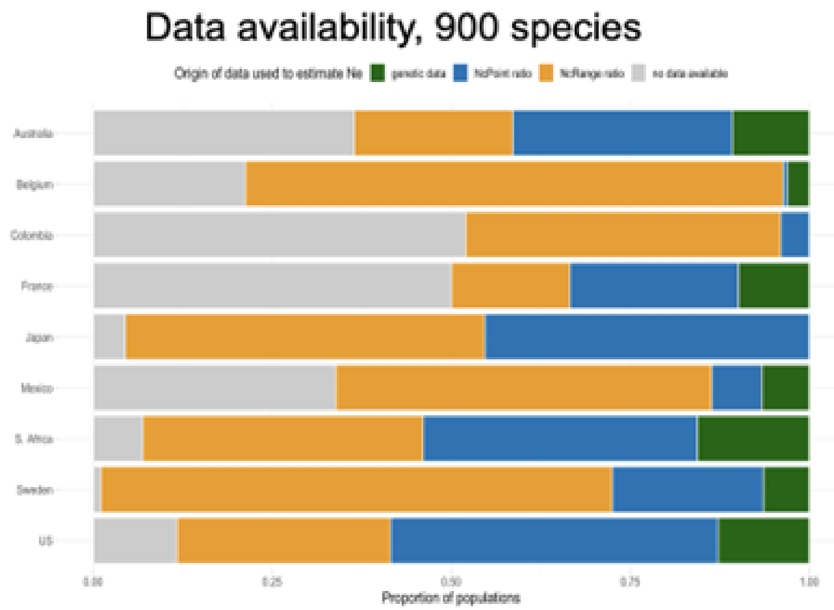


Figure 3. *Initial unpublished preliminary results of the first deployment of indicator A.4*

The amount of data available:

Overall, >64% of species investigated have enough data to calculate the headline indicator (grey shows species without sufficient data). This is shown in the chart at right. This does vary by country. All countries have approximately 50% or more of species with enough data.

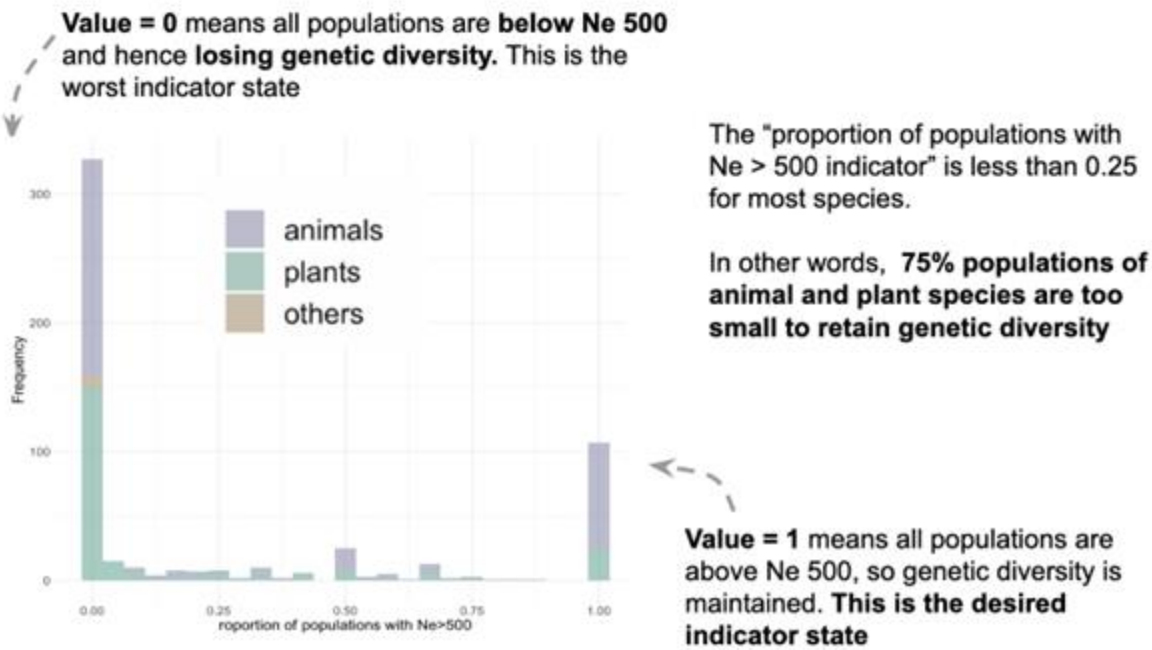
Figure 4 shows the actual indicator values calculated for more than 900 species. It was found that the median across all species for Proportion of populations below Ne500 is 0, i.e. 58% of species assessed have that indicator value. Even more worrying, ~70% of species have an indicator value less than 0.25. T**his means that the majority of species assessed have less than 25% of their populations large enough to sustain genetic diversity- most species are likely in danger of or are already experiencing significant genetic losses.**

There are differences in indicator values among taxonomic groups e.g. indicator values tend to be lower for mammals for example. Data are more available for some groups than others e.g. angiosperms, mammals, birds have more data available than invertebrates, especially clams and mussels. The indicators are not greatly influenced by the method used to define populations meaning that a variety of data are acceptable for defining populations.

Results on the populations maintained indicator are also included which is an important complement to the Headline indicator on Ne 500. The investigation on 900 species showed that the median across all species for Proportion of populations maintained is 1, i.e. 55% of species have that indicator value. This means that most species still maintain all their populations. However, 38% of species have an indicator value less than 0.90, meaning that they have lost at least 10% of their original populations. Number of populations maintained should be reported jointly with the Ne indicator, to ensure that goal A and Target

4 are fully met - maintaining species' adaptive potential and reducing extinction risk. This is a possibility where IPLCs can be included and empowered.

***Figure 4**. actual indicator values calculated for more than 900 species*



5g. Time series

Date range is dependent on data availability at the national scale. Typically, N_c will be obtained from the past decade e.g. post 2010. Going forward it will be reported every 2 to 5 years, typically every 4 years, making it suited to the CBD reporting schedule. As the indicator is increasingly deployed, indicator calculation can be made in temporal windows, including through the use of older biodiversity observation data, reports and consultation with knowledge holders, likely extending indicator assessment at least back to the 1990s. This is noted above under Step 4 of Method of Computation, 5b.

5h. Data providers

The data are sourced from in-country existing biodiversity and environment agencies, thus leveraging in-country resources and ongoing programs. Other data may be obtained from conservation organizations, scientific societies, national and public repositories (e.g., Global Biodiversity Information Facility, GBIF, Red List assessments), citizen scientists, and the contributions of local and indigenous peoples and traditional knowledge holders.

Example data sources from countries that participated in piloting the indicator from 2021-2023 can be found in Hoban et al (2023b)

5i. Data compilers

The following organizations are responsible for maintenance of the methodology and tools for use: GEO BON, The Morton Arboretum, Stockholm University, GBIKE, Coalition for Conservation Genetics. Actual compilation of data is performed by in-country agencies.

5j. Gaps in data coverage

Expected (and demonstrated in the pilot application to 900 species) taxonomic gaps include cryptic (e.g. elusive, located underground, etc.) species, micro-organisms, fungi, invertebrates. However, current projects deploying the indicator have shown it can be calculated for cryptic species and invertebrates. Expected thematic and geographic gaps include species from understudied realms and areas (e.g., deep sea, mountains, and islands). These gaps are unfortunately typical for other biodiversity indicators such as the Red List Index.

The indicator can be calculated at the population level or species level in any species, and thus has no theoretical gaps, and (weighted) averages can be calculated across populations or species taking into account range sizes.
Note that the Ne 500 indicator should be complemented with the "proportion of populations maintained" indicator , and with expert and local knowledge including as compiled in the "genetic scorecard for wild species" indicator, the "comprehensiveness indicator" (all three suggested as complementary indicators for Goal A: CBD/COP/15/L.26), and the proposed indicator "number of species and populations in which DNA based monitoring is used" Hoban et al (2020).

5k. Treatment of missing values

Species with missing data may be aggregated with taxonomically related species, or species with similar characteristics and life history traits. Populations with missing data can be treated as NAs in the dataset.

6. Scale

6a. Scale of use

Scale of application (please check all relevant boxes):

Global: ☒ Regional: ☒ National☒

Scale of data disaggregation/aggregation:

- Global/ regional scale indicator can be disaggregated to national level: ☐
- National data is collated to form global indicator: ☒

Data is applicable at the local, national, regional and global scales.

6b. National/regional indicator production

The guidance documents currently developed explain national methodology. Underlying data will be accessible and usable by countries. The existing data collection tool allows easy organization and storage of data and thus tracking across time.
Countries can collaborate on transnational calculations if desired, and the same is true for regions, including the European Union, for example. Otherwise, regional calculation is a mean or weighted mean of component countries.

6c. Sources of differences between global and national figures

The guidance document explains national methodology. The global figure is a mean, or weighted mean, of all contributing countries.

6d. Regional and global estimates & data collection for global monitoring

6d.1 Description of the methodology

Methods and mathematical formulas for aggregating at these scales, and for weighting countries are described in Hoban et al (2023b).
The pilot application in 900 species showed that data gaps vary by country, but all countries examined have a large number of species with sufficient data available.

6d.2 Additional methodological details

See previous answer

6d.3 Description of the mechanism for collecting data from countries

As noted above, national agencies, or conservation organizations can compile the indicator at national levels using the resources provided in Hoban et al (2023b; see Supporting Information). Consultation and questions about data validation can be made to the custodians of the indicator (GEO BON, Morton Arboretum, Stockholm University, GBIKE, and Coalition for Conservation Genetics).
The guidance (documents and videos) will be improved with a new version released by approximately January 2024, and there are a series of online tools (mapping tools, easy data entry) in development that will help make it even easier to calculate the indicator (GEOBON offers BON-in-a-Box to support calculation of the indicator).

7. Other MEAs, processes and organisations

7a. Other MEA and processes

N/A.

7b. Biodiversity Indicator Partnership

Yes: ☐ No: ☒

8. Disaggregation

Species, taxa, rarity categories, habitat type, guilds.

9. Related goals, targets and indicators

As noted by Hoban et al 2023a, this indicator is also relevant to Targets 1, 2, 3, 5, 9, 10 and 12. Linked to and is complemented by other important genetic diversity indicators (CBD/COP/15/5), including:

- Proportion of populations maintained within species
- Genetic diversity scorecard for wild species (O'Brien et al. 2022)
- Comprehensiveness of conservation of socioeconomically as well as culturally valuable species (Khoury et al 2019),
- Proportion of local breeds classified as being at risk, extinction
- Number of plant and animal genetic resources for food and agriculture secured in either medium- or long-term conservation facilities

The caretakers of this indicator are also developing guidance and suggestions for NBSAPs and are available to help support capacity as countries develop their NBSAPs. This document will be available in spring 2024.

10. Data reporter

10a. Organisation

Group on Earth Observations Biodiversity Observation Network (GEO BON)
The Morton Arboretum
Stockholm University
G-BiKE
Coalition for Conservation Genetics

10b. Contact person(s)

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GEO BON (info@geobon.org)

11. References

Relevant background.

Hoban et al (2023a). Genetic diversity Goals and Targets have improved, but remain insufficient. Conservation Genetics 24, 181–191.. https://doi.org/10.1007/s10592-022-01492-0

Hoban, S., Bruford, M., Funk, W.C., Galbusera, P., Griffith, M.P., Grueber, C.E., Heuertz, M., Hunter, M.E., Hvilsom, C., Kalamujic, S.B., Kershaw, F., et al. (2021). Global commitments to conserving and monitoring genetic diversity are now necessary and feasible. *BioScience*, 71, 964–976.

Laikre, L., Hohenlohe, P.A., Allendorf, F.W., Bertola, L.D., Breed, M.F., Bruford, M.W., Funk, W.C., Gajardo, G., González-Rodríguez, A., Grueber, C.E., Hedrick, P.W., et al. (2021). Authors' Reply to Letter to the Editor: Continued improvement to genetic diversity indicator for CBD. *Conservation Genetics*,22, 533–536. https://doi.org/10.1007/s10592-021-01359-w

Laikre, L., Nilsson, T., Primmer, C.R., Ryman, N. and Allendorf, F.W. (2009). Importance of genetics in the interpretation of favourable conservation status. *Conservation Biology*, *23*, 1378-1381.

Frankham, R. (1995). Effective population size/adult population size ratios in wildlife: a review. *Genetic Research*, 66, 95–107.

Description of the indicator.

Hoban, S., Paz-Vinas, I., Aitken, S., Bertola, L., Breed, M.F., Bruford, M., Funk, C., Grueber, C., Heuertz, M., Hohenlohe, P., Hunter, M., et al. (2021). Effective population size remains a suitable, pragmatic indicator of genetic diversity for all species, including forest trees. *Biological Conservation*, 253, 108906.

Hoban, S., Bruford, M., D'Urban Jackson, J., Lopes-Fernandes, M., Heuertz, M., Hohenlohe, P.A., et al. (2020). Genetic diversity targets and indicators in the CBD post-2020 Global Biodiversity

Framework must be improved. *Biological Conservation*, 248, 108654. https://doi.org/10.1016/j.biocon.2020.108654

Resources and guidance, description of methods for indicator deployment.

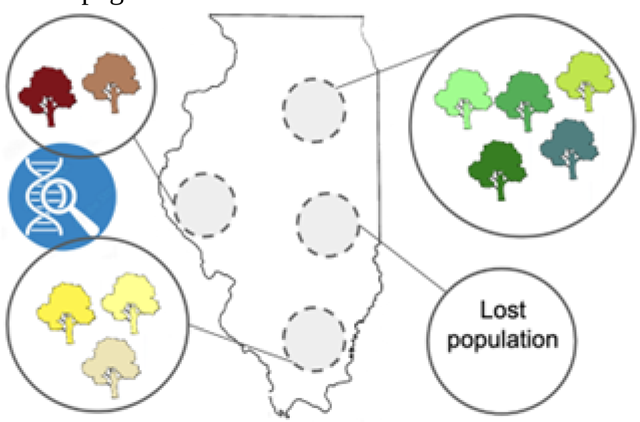
Hoban et al (2023b). Monitoring status and trends in genetic diversity for the Convention on Biological Diversity: an ongoing assessment of genetic indicators in nine countries. Conservation Letters 00, e12953. https://doi.org/10.1111/conl.12953

Supporting Information for: Hoban et al. (2023b) Monitoring status and trends in genetic diversity for the Convention on Biological Diversity: an ongoing assessment of genetic indicators in nine countries. Conservation Letters 00, e12953. https://doi.org/10.1111/conl.12953

Hoban, S., da Silva, J., Hughes, A., Hunter, M., Stroil, B.K., Laikre, L., Yanes, A.M., Millette, K., Paz-Vinas, I., Ruiz, L. et al., (2023c). Too simple, too complex, or just right? Advantages, challenges and resolutions for indicators of genetic diversity. *Bioarxiv preprint*

12. Graphs and diagrams

See next page



Indicator 1. Populations large enough to maintain genetic diversity	Indicator 2. Populations still exist (not lost)	Indicator 3. Populations monitored with DNA data
0.33	0.75	1

Figure 1. Example of the three genetic diversity indicators, for four hypothetical populations in Illinois, USA. One tree = 1,000 plants (five trees = 5,000 plants). Colors illustrate genetic variation within and among populations. In 2020, 2 of 3 extant populations are N_c<5,000 (N_e<500 considering an effective to census size ratio of N_e/N_c = 0.1) and thus too small to maintain genetic diversity (indicator 1). Note that the lost population is considered an extirpation (but is not used for calculating the Ne 500 indicator). Three of four populations are maintained (indicator 2). DNA-based methods have been used to monitor genetic diversity in two populations (indicator 3 - a value of 1 means that one or more populations of the species is monitored with DNA-based methods).

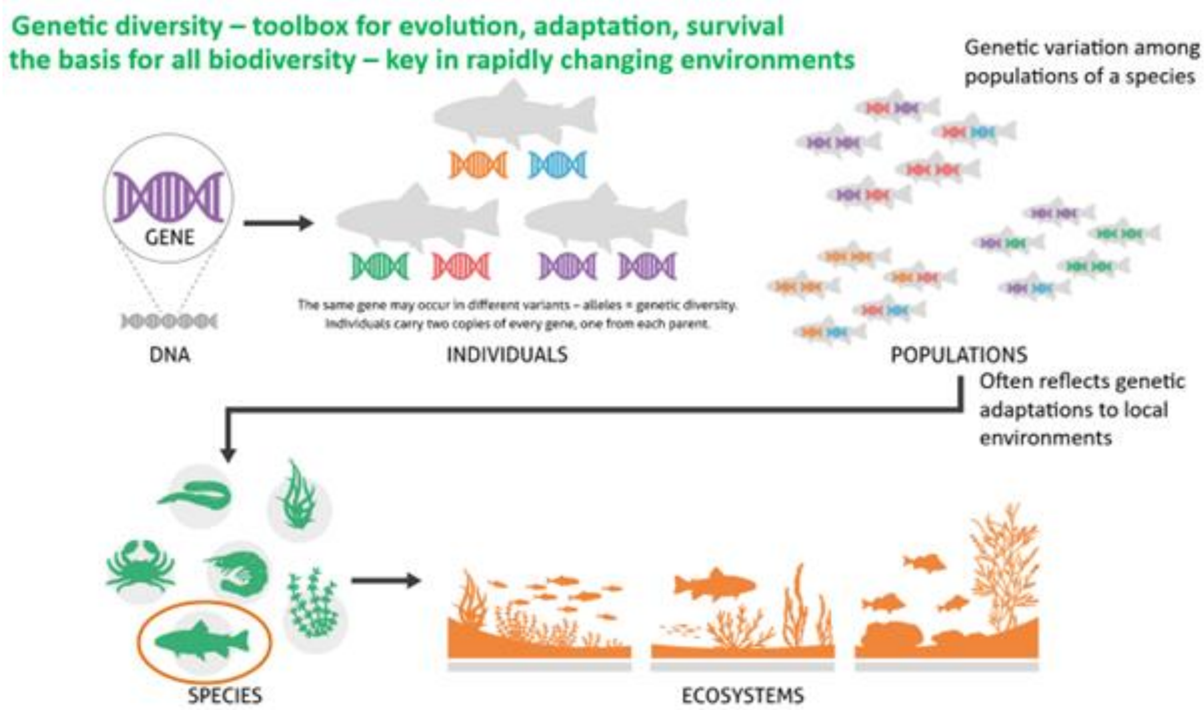


Figure 2: Pictorial representation of how genetic diversity is found within and among populations (see color variations) and is the foundation for species adaptability and for entire ecosystems. Genetic diversity ultimately is seen at the DNA level and can be conserved with large ($N_e \geqslant 500$) populations and by making sure distinct populations are not lost.

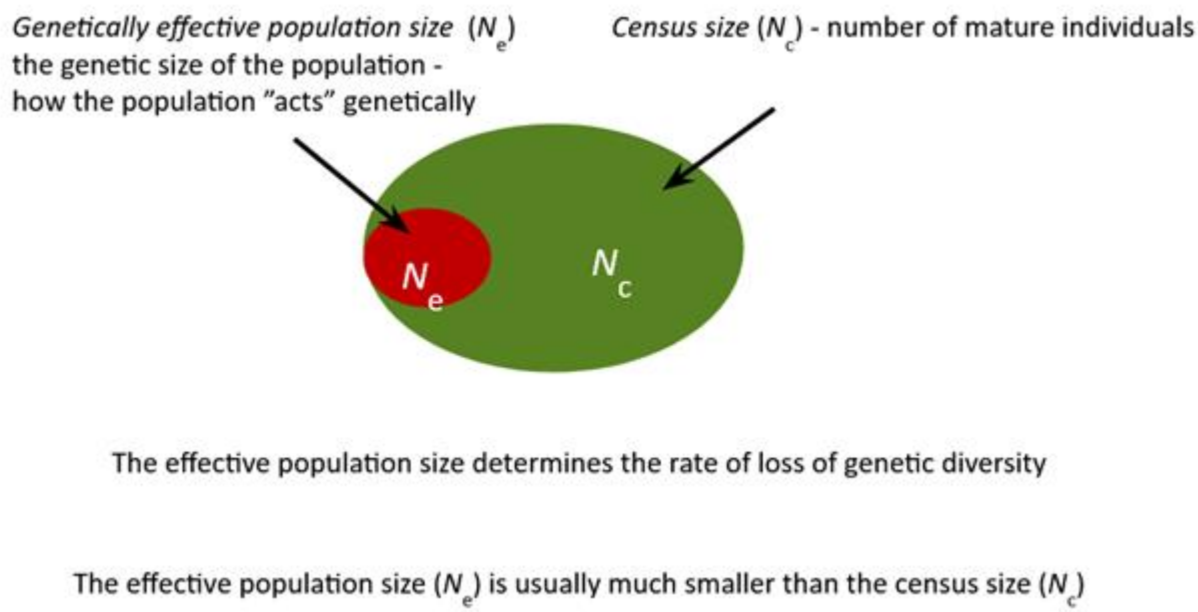


Figure 3: Pictorial representation of N_e relative to the census size of a population. N_e is smaller than N_c, but it is the N_e which determines the rate of loss of genetic diversity within populations, and thus whether they can maintain adaptive capacity.

GBF indicator metadata: B.1 Services provided by ecosystems

1. Indicator name

B.1 Services provided by ecosystems

2. Date of metadata update

March 2024

3. Goals and Targets addressed

3a. Goal

Headline indicator for **Goal B**:: Biodiversity is sustainably used and managed and nature's contributions to people, including ecosystem functions and services, are valued, maintained and enhanced, with those currently in decline being restored, supporting the achievement of sustainable development for the benefit of present and future generations by 2050.

3b. Target

Headline indicator for **Target 11**:: Restore, maintain and enhance nature's contributions to people, including ecosystem functions and services, such as regulation of air, water, and climate, soil health, pollination and reduction of disease risk, as well as protection from natural hazards and disasters, through nature-based solutions and/or ecosystem-based approaches for the benefit of all people and nature.

4. Rationale

Purpose of the indicator

Ecosystem services are critical for the wellbeing of people and make important contributions to the economy. Examples include harvested wild species, pollination of crops, water purification by filtering and regulating water quality, climate regulation by sequestering carbon dioxide, influencing local and global climate patterns, nature-based recreation and many more. Conserving, managing and sustaining ecosystems and biodiversity is fundamental to maintaining and enhancing ecosystem services.

This indicator aims to track trends in the provision of ecosystem services, responding to the wording in Goal B that ecosystem services should be "*maintained and enhanced, with those currently in decline being restored*". The index is intended to show whether the provision of ecosystem services is, on average, increasing, stable or decreasing, as well as the rate of these increases or decreases. Together with ecosystem-related headline indicators for Goal A (A1 Red List of ecosystems and A2 Extent of natural ecosystems), indicator B1 provides insight into changes in the state and trends of ecosystems and the services they provide.

The index of change in ecosystem services has the potential to be disaggregated in several ways, including by different categories of ecosystem service and by ecosystem type. As described further in Section 5, ecosystem services can be divided at a broad level into provisioning, regulating and cultural services, often with differing directions of change. Three sub-indices, one for each broad category of ecosystem services, will illuminate these differences. Combined with information from Indicators A1 and A2, disaggregation of the overall index by ecosystem type could provide valuable information to direct conservation, management and restoration efforts to enhance ecosystem service provision.

Because the primary purpose of monitoring and reporting on headline indicators is to support Parties in their national implementation of the goals and targets of the GBF, the indicator is designed to enable countries to select ecosystem services that they consider important and policy relevant to be included in the indicator, based on guidelines within this metadata document and supporting compilation guidelines (to be developed). The indicator also reflects ecosystem services that are of global relevance and that will be included in the indicator by all countries. Global aggregation of the indicator will provide a view of global progress towards maintaining, enhancing and restoring ecosystem services. The intended audience of the headline indicator is broad, reflecting the whole-of-society approach of the GBF.

An accounting approach to the indicator

The System of Environmental-Economic Accounting (SEEA) Ecosystem Accounting, as the adopted international statistical standard for organizing data about ecosystem assets and services and linking this information to economic and other human activity, provides the conceptual framework and part of the methodology for the compilation of this indicator. SEEA Ecosystem Accounting is aligned with the System of National Accounts (SNA), which underpins the development of economic statistics such as

Gross Domestic Product (GDP), to illuminate the relationship between the environment and the economy, highlighting the contribution of ecosystems to the economy.

Flows of ecosystem services in SEEA Ecosystem Accounting describe the contributions that ecosystems make to benefits used in economic and other human activity, which are a central part of describing nature's contribution to people. Ecosystem services accounts should reflect both the supply of ecosystem services by different ecosystem types and the use of ecosystem services by different types of users, such as businesses, government and households. SEEA Ecosystem Accounting requires accounting for ecosystem services in biophysical terms, with the option of building on the biophysical accounts to develop accounts in monetary terms. Because accounting tables have a standard structure and are based on standard definitions and classifications, they allow for comparison across time periods and between countries. This makes an accounting approach a powerful basis for the development of national and global indicators. An additional strength of the accounting approach is that accounts provide granular information that can be used for local application and fine-grained policy decisions as well as aggregate information for national and global reporting.

Considerations for selection of ecosystem services for inclusion in the indicator

There are several considerations about the types of ecosystem services and their beneficiaries that should inform the selection of ecosystem services for the indicator at the national level. These include:

- Whether people in vulnerable situations (such as low-income households, children and youth, women and girls, indigenous peoples, persons with disabilities, among others) depend on the ecosystem service. Parties are encouraged to include such ecosystem services in their selection of ecosystem services for the indicator acknowledging that worldwide there is unequal access to ecosystem services by different social groups. This consideration is also significant for Target 9 ("providing social, economic and environmental benefits for people, especially those in vulnerable situations and those most dependent on biodiversity"), for which this indicator will contribute information.
- Whether the ecosystem service is significant for indigenous peoples and local communities. Parties are encouraged to include such ecosystem services in their selection of ecosystem services for this indicator, with special attention to services that are necessary for the maintenance of cultural integrity and livelihoods. The selection of ecosystem services should recognize and consider multiple value perspectives on nature, including the diverse value systems and concepts embodied by indigenous peoples and local communities (IPBES, 2022).
- Whether it is possible to assess if provision of the ecosystem service is sustainable or not. Goal B emphasises that ecosystem services should support sustainable development for the benefit of current and future generations. Some (not all) ecosystem services can be used above their regeneration or absorption rate, with a negative impact on the capacity of the ecosystem to generate such services in the future. In such cases, the current use of the ecosystem service is not sustainable and does not support sustainable development. Ideally the indicator would distinguish between sustainable and unsustainable current use of ecosystem services. In practice it is often difficult to identify when the current use of an ecosystem service has crossed a sustainability threshold, but where possible Parties will be encouraged to flag ecosystem services where sustainability thresholds may have been crossed. Nevertheless, it is likely to be challenging to address this aspect fully in the indicator.
- Whether the ecosystem service is provided by natural, semi-natural or anthropogenic ecosystem type(s). Ecosystem services from natural and semi-natural ecosystems are well-suited to this indicator. Provisioning ecosystem services from intensively modified or anthropogenic ecosystem types such as croplands and plantations should be approached with caution in selecting ecosystem services for this indicator, for several reasons. First, conversion of natural ecosystems to intensively modified or anthropogenic ecosystems is one of the main threats to biodiversity, so increases in the provision of these ecosystem services is frequently associated with biodiversity loss. Second, it is often difficult to tease out the

contribution of the ecosystem from the contributions of produced capital and labour to provision of these services, making it difficult to quantify the ecosystem service as distinct from the total harvested biomass. Finally, these ecosystem services are often captured in accounting frameworks outside of ecosystem accounts (such as the System of National Accounts and its associated mainstream economic indicators), so are not “hidden” but rather already accounted for in standard economic measures.

In selecting ecosystem services to include in the indicator, Parties are encouraged to consider the alignment and compatibility of the ecosystem service with the overall intent of the GBF.

It is also important to consider the GBF monitoring framework as a whole, with different indicators giving information about different aspects. In particular, indicators A1 (Red List of Ecosystems), A2 (Extent of natural ecosystems) and B1 should be considered together as a suite of indicators related to ecosystems. Indicator A1 captures information about risks to ecosystems, including as a result of decline in their condition, while indicator A2 captures information about the abundance of natural and semi-natural ecosystems relative to anthropogenic ecosystems.

5. Definitions, concepts and classifications

5a. Definition:

The proposed indicator is defined as the average rate of change in the provision of a set of ecosystem services in a particular time period compared to a baseline year, for a country or globally.

The concepts, definitions and classifications used in this indicator are based on the SEEA Ecosystem Accounting statistical standard that was adopted by the United Nations Statistical Commission in March 2021.[12] **Ecosystem services** are defined as the contributions of ecosystems to the benefits that are used in economic and other human activity, while benefits are defined as the goods and services that are ultimately used and enjoyed by people and society. For accounting purposes, the focus is usually on **final ecosystem services** only, which are those ecosystem services in which the user of the service is an economic unit – i.e., business, government or household[13].

In ecosystem accounting, ecosystem services are conceptualised as flows between ecosystem assets and economic units. This results in an **alignment between supply and use** (i.e. supply needs to match use of a particular service), which is a foundational accounting concept. This means that an ecosystem service is recorded in the tables only when it is used. Explained differently, ecosystem services must actually be used to be included in the account, while ecosystem services that could potentially be used are excluded. For the purpose of this indicator the terms “supply of ecosystem services” and “ecosystem service supply” are avoided as they do not capture the use aspect of ecosystem services. Rather, the terms **ecosystem service provision** or **provision of ecosystem services** are used, with the intention of capturing the combination of supply and use that characterises ecosystem services in an accounting context. The account table follows a standard structure, shown in Table 7.1 of SEEA Ecosystem Accounting.

The total area for which the accounts are compiled is called the **ecosystem accounting area**. For the purposes of this indicator, the ecosystem accounting area should be the total area of the country.[14] For countries that have marine territory, the total surface area of the country could be divided into separate ecosystem accounting areas, for example one for the land and inland water area and another for the territorial waters (sea area to the end of the exclusive economic zone). Further guidance on this will be provided in compilation guidelines to be developed.

Ecosystem services are commonly grouped as provisioning, regulating and maintenance, and cultural services. SEEA Ecosystem Accounting includes a **reference list of ecosystem services**, grouped according to these broad categories, which has been adopted as part of the SEEA Ecosystem Accounting international statistical standard.[15] There was detailed and extensive consultation on the development of this reference list and cross walks exist with all other major ecosystem services classifications. Within provisioning services, the SEEA Ecosystem Accounting reference list identifies ten sub-types of ecosystem services; within regulating services there are sixteen sub-types; and within cultural services there are five sub-types.

SEEA Ecosystem Accounting uses the **IUCN’s Global Ecosystem Typology** as the reference classification for ecosystem types, which was also endorsed by the United Nations Statistical Commission at its 55th session in March 2024 as an international statistical classification and recommended it to be included in the international family of classifications.[16] Parties are able to use their national ecosystem classifications as the basis for their ecosystem accounts and ideally to cross-walk national ecosystem types to the Ecosystem Functional Groups (Level 3) of the Global Ecosystem Typology.

The biophysical ecosystem services accounts describe the flows of ecosystem services provided by ecosystem assets, grouped according to ecosystem type, in volume terms per accounting period. Metrics from the accounts are commonly in physical units such as cubic meters or tonnes. Indicators that can be derived from the account tables include percentage change over an accounting period or with respect to a baseline period.

The biophysical quantity for each ecosystem service may also be expressed in monetary terms where monetary valuation of the service is undertaken. Monetary valuation in an accounting context is approached differently to monetary valuation in environmental economics, and includes only exchange values rather than both exchange values and welfare values. The monetary ecosystem services accounts describe the ecosystem services provided by the ecosystem asset in monetary terms per accounting period, which can be aggregated to a single monetary value per accounting period. Indicators that can be derived from the account tables include percentage change in value over an accounting period or with respect to a baseline period.

5b. Method of computation

The indicator is computed in three stages: 1) selection of ecosystem services for inclusion in the indicator, 2) compilation of ecosystem services accounts, and 3) calculation of an aggregate index based on information from the accounts.

Stage 1 *Selection of ecosystem system services to be included*

The first stage in computing the indicator is to select ecosystem services that will be included in the indicator. As described above, the SEEA Ecosystem Accounting reference list of ecosystem services is used as the basis for the indicator and should thus be used in the selection of ecosystem services to be included in the indicator.

The selection of ecosystem services for this indicator takes a **blended approach**, reflecting both national and global priorities, based on the rationale explained in Section 4. The following starting point is used as the basis for the selection of ecosystem services by Parties for inclusion in the indicator at the national level:

- **Required ecosystem services** of global relevance to be included by all Parties (e.g., global climate regulation services (GCRS)).
- **Recommended ecosystem services** to be included by Parties from the SEEA Ecosystem Accounting reference list of ecosystem services, such that there is a combination of provisioning services, regulating services and cultural services. Alongside the recommended ecosystem services, there may also be a list of ecosystem services that Parties are discouraged from selecting.
- Parties may include **additional ecosystem services** that they consider important or policy relevant if they wish to.

From the recommended ecosystem services, Parties should select services based on a combination of importance or policy relevance of the service and data availability. In the selection of ecosystem services Parties should also consider the alignment and compatibility of the ecosystem service with the overall intent of the GBF, including the factors raised in the rationale in Section 4 related to dependence of people in vulnerable situations on the ecosystem service, its significance for indigenous peoples and local communities, whether it is possible to access if provision of the service is sustainable or not, whether the service is provided by anthropogenic ecosystem type(s) that impact negatively on biodiversity, the ease with which the contribution of the ecosystem to the service can be isolated and quantified, and the extent to which the service is already accounted for in standard economic measures. Relevance to Targets 9 and 11, for which ecosystem services accounts are also the basis for the headline indicator, should also be considered.

Compilation guidelines, to be developed, will provide additional guidance on selection of ecosystem services for inclusion in the indicator, including which services of global relevance are required to be included, the minimum (and potential maximum) number of services to be included per broad ecosystem service category, and more detail on factors to consider in the selection process.

Stage 2 *Compilation of ecosystem services accounts*

The second stage of developing the indicator is to compile accounts for each of the ecosystem services selected. The accounts should be compiled ideally at the national level, based on the SEEA Ecosystem Accounting. Methods for this are described in SEEA Ecosystem Accounting, with some supporting material already available (for example, SEEA e-learning resources | System of Environmental Economic Accounting) and more in development. For an example of an ecosystem services accounting table, see Table 7.1 in SEEA Ecosystem Accounting.

There may be some iteration between selection of ecosystem services and compilation of the accounts, as data needs and data availability for specific ecosystem services are determined.

Stage 3 *Indicator calculation*

The third stage of developing the indicator involves taking information from the ecosystem services accounts to develop an aggregate index of change in ecosystem service provision. Since, in physical terms, each ecosystem service is measured in a different unit, a simple summation across ecosystem services is not possible. Hence, an indicator that would allow aggregation across ecosystem services needs to be developed. Several options were identified, including aggregation of trends (rates of change) in quantitative terms using an averaging method, semi-qualitative approaches, and aggregation in monetary terms.

Based on initial exploration and testing experts converged that an aggregation method using a geometric mean of trends of ecosystem services seems to be the most viable option. The chain method for calculating the geometric mean has the advantage that it allows for different time series lengths with different starting years for different ecosystem services, which means that additional ecosystem services can be added to the index as datasets and accounts for additional ecosystem services become available. However, more testing and theoretical underpinning to justify such a choice is needed and will take place over the course of 2024 and 2025, ahead of the first reporting cycle scheduled for early 2026. Compilation of national ecosystem services accounts can proceed during this period.

In addition to a single aggregate index, three sub-indices, one for each broad category of ecosystem services (i.e., provisioning, regulating and cultural) should be calculated and reported. Because trends in provisioning, regulating and cultural ecosystem services often move in different directions, which can be masked by the overall index, it will be important to present the overall index and the three sub-indices together, not just the overall index. In addition to the aggregate index in biophysical terms, aggregate measures of ecosystem services in monetary terms could be reported by Parties as a component or complementary indicator. If monetary ecosystem services accounts have been developed, aggregate measures in monetary terms can be derived by summing total supply or use for each ecosystem service for the same period, with care taken to use constant prices across accounting periods to ensure that the values are expressed in real rather than nominal terms. The monetary value of ecosystem services can be expressed as a percentage of gross value added (GVA) from the national (economic) accounts.

5c. Data collection method

The compilation of ecosystem services accounts should ideally be based on national time-series datasets for ecosystem services, which could combine data from a range of sources to provide the best available estimates of ecosystem service supply and use. For many ecosystem services, some form of modelling is required to produce these estimates. If suitable national datasets are not available and cannot be developed with current resources, an alternative is to use available global datasets and models to develop initial estimates for the accounts, subject to criteria, standards and quality assurance. Validation by relevant national experts through appropriate institutional processes would be required to assess whether the results from global datasets and models are credible. Several global tools are available, such as ARIES for SEEA, InVEST, ESTIMAP. In some cases, these global tools allow for the incorporation of national datasets and/or models. Further guidance for some ecosystem services is available in Guidelines on Biophysical Modelling for Ecosystem Accounting (United Nations 2021). In addition, a wealth of literature is available on measuring ecosystem services.

Data quality guidelines for this and other headline indicators should be addressed in compilation guidelines.

5d. Accessibility of methodology

The methodology for ecosystem services accounts in biophysical terms is well developed and accepted by the international statistical community as part of the SEEA Ecosystem Accounting framework. The

United Nations Statistical Commission at its 52nd session in 2021 adopted the SEEA Ecosystem Accounting chapters 1-7 describing the accounting framework and the biophysical accounts, including chapters on ecosystem services, as an international statistical standard, whereas chapters 8-11, which deal with accounts in monetary terms, were adopted as internationally recognized statistical principles and recommendations for the valuation of ecosystem services.

As noted in Section 5b.2, some material is available to support the development of ecosystem accounts including ecosystem services accounts (for example, SEEA e-learning resources | System of Environmental Economic Accounting), with more in development. In addition, capacity development for Parties, especially for developing countries, should be provided to support the compilation of this this indicator.

As noted in Section 5b.3, further testing is underway to finalise the methodology for developing an aggregate index of trends in ecosystem services that draws on data from ecosystem services accounts.

5e. Data sources

See Section 5c Data collection method. A very wide range of data sources go into the compilation of ecosystem services accounts, and these differ depending on which ecosystem service is being measured. Data could be sourced from research institutions, various government ministries, national mapping agencies, national statistical offices, various government departments and other organs of state at the national or sub-national level (such as municipalities). Remote sensing and earth observation data play an important role for some ecosystem services.

5f. Availability and release calendar

According to the Global Assessment of Environmental-Economic Accounting and Supporting Statistics (2023) undertaken by the UNSD, 22 countries compiled biophysical ecosystem services accounts at least once and 15 countries compiled monetary ecosystem services accounts at least once during the period 2019 to 2023. Ideally ecosystem services accounts would be compiled annually, but in practice few countries would have the capacity to do this, so accounting periods of three to five years are more likely Global tools and databases to support ecosystem services accounting are currently under development (see Section 5c).

5g. Time series

Data for the indicator in the form of ecosystem services accounts are not yet available for most countries. Time series for different ecosystem services accounts will differ. As ecosystem services accounts are developed at the national level, time series for different ecosystem services will depend on data availability, with back casting possible in some cases.

The proposed baseline year for global reporting under the GBF is likely to be 2020, or alternatively an average of the values between 2010 and 2020.Country baseline dates may be distinct from the global baseline data, depending on data available at the national level.

5h. Data providers

As discussed in Section 5e, a wide range of data sources go into the compilation of ecosystem services accounts. Data providers could include research institutions, various government ministries, national mapping agencies, national statistical offices, various government departments and other organs of state at the national or sub-national level (such as municipalities). Remote sensing and earth observation data play an important role for some ecosystem services.

5i. Data compilers

For countries that have national ecosystem services accounts, the relevant national authorities, in particular the national statistical offices, ministries of environment or related agencies, will compile this indicator. Missing values for individual countries may be estimated using ARIES for SEEA or another international data platform by the custodian agency using existing global data sources, subject to criteria, standards and quality assurance including national validation.

5j. Gaps in data coverage

There are substantial data gaps at this stage for reliable estimates of a suite of ecosystem services in all countries.

5k. Treatment of missing values

Missing values for this indicator could result from several factors, including but not limited to temporal gaps (e.g. once-off datasets, very short time-series or interrupted time series), spatial gaps (e.g. data available only for some sub-regions or local areas within a country), or complete lack of data for some ecosystem services at the national or global level.

As noted in earlier sections, for some ecosystem services, missing values for individual countries may be estimated using ARIES for SEEA or other global modelling platforms based on existing global data, subject to criteria, standards and quality assurance including national validation through appropriate institutional processes involving relevant national experts.

6. Scale

6a. Scale of use

Scale of application (please check all relevant boxes):

Global: ☒ Regional: ☒ National☒

Scale of data disaggregation/aggregation:

- Global/ regional scale indicator can be disaggregated to national level: ☐
- National data is collated to form global indicator: ☒

The indicator is applicable at the global, regional and national scale. National data can be aggregated to global indicators provided that the underlying classifications are harmonized across countries.

6b. National/regional indicator production

N/A

6c. Sources of differences between global and national figures

Differences between country-produced and internationally estimated data may arise due to differences in spatial resolution and projections of datasets, classification and modelling approaches, and definitions of particular ecosystem services.

6d. Regional and global estimates & data collection for global monitoring

6d.1 Description of the methodology

Regional and global estimates are produced by aggregating country-level data.

6d.2 Additional methodological details

Countries will provide data (using a spreadsheet template or through an online data collection system] that will request them to provide values in absolute terms for each ecosystem service included in the indicator as well as the overall index and sub-indices. This will provide flexibility in terms of methods for global aggregation. Also see Section 6d.3 below.

6d.3 Description of the mechanism for collecting data from countries

Data will be collected from countries (using a spreadsheet template or an online data collection system). Countries will not be required to submit their ecosystem services account tables but rather to submit data extracted from the tables. Data in absolute terms is very useful, so the reporting template will require countries to report not only their overall index and three sub-indices but also absolute values for provision of each ecosystem service. Wherever possible, these absolute values should be disaggregated by ecosystem functional group, using the EFG codes and names from the GET. This will align this indicator with indicators A1 and A2 and will allow for global aggregation to ecosystem functional groups, biomes or realms as needed.

The reporting template will allow countries to submit data for all the accounting periods for which they have compiled accounts. As noted in Section 5g, the proposed baseline year for global reporting under the GBF is likely to be 2020, or alternatively an average of the values between 2010 and 2020. Country baseline dates may be distinct from the global baseline data, depending on data available at the national level. Collecting data for years prior to the global baseline from countries that have such data could enable additional analyses that may be useful.

7. Other MEAs, processes and organisations

7a. Other MEA and processes

N/A

7b. Biodiversity Indicator Partnership

Yes: ☐ No: ☒

8. Disaggregation

This indicator can be disaggregated by ecosystem service category (provisioning, regulating, cultural), ecosystem types (for example by realm, biome or ecosystem functional group), and country. It may be possible to disaggregate by type of user (business, households and government – the economic units typically included in ecosystem services accounts).

Subnational disaggregation may be important and useful at the country level (for example, disaggregation to provinces and municipalities). However, this would not be required for global data collection Disaggregation related to Indigenous Peoples and Local Communities (IPLCs) may be relevant for this indicator, if suitably granular data are available. However, this is a complex issue and guidance would need to be sought from the CBD's Working Group on Article 8(j) which addresses with IPLCs.

9. Related goals, targets and indicators

The indicator Services provided by ecosystems complements two other indicators

Target 8:

- Component indicator *total climate regulation services provided by ecosystems by ecosystem type*

Target 9:

- Headline indicator *Benefits from the sustainable use of wild species*

10. Data reporter

10a. Organisation

United Nations Statistics Division (UNSD)

10b. Contact person(s)

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11. References

ARIES for SEEA: https://seea.un.org/content/aries-for-seea

Assessment of Environmental-Economic Accounting and Supporting Statistics 2022. Available at https://seea.un.org/content/global-assessment-environmental-economic-accounting

IPBES (2022). Summary for Policymakers of the Methodological Assessment Report on the Diverse Values and Valuation of Nature of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. Pascual, U., Balvanera, P., Christie, M., Baptiste, B., González-Jiménez, D., Anderson, C.B., Athayde, S., Barton, D.N., Chaplin-Kramer, R., Jacobs, S., Kelemen, E., Kumar, R., Lazos, E., Martin, A., Mwampamba, T.H., Nakangu, B., O'Farrell, P., Raymond, C.M., Subramanian, S.M., Termansen, M., Van Noordwijk, M., and Vatn, A. (eds.). IPBES secretariat, Bonn, Germany. https://doi.org/10.5281/zenodo.6522392

UN System of Environmental-Economic Accounting: https://seea.un.org/ecosystem-accounting

United Nations et al. (2021). System of Environmental-Economic Accounting—Ecosystem Accounting (SEEA EA). White cover publication, pre-edited text subject to official editing. Available at: https://seea.un.org/ecosystem-accounting.

United Nations (2021). Guidelines on Biophysical Modelling for Ecosystem Accounting. Available at: https://seea.un.org/ecosystem-accounting/biophysical-modelling

12. Graphs and diagrams

N/A

GBF indicator metadata: B.b Goal B binary indicator

Full Indicator Name
tbc

Goals And Targets Addressed
Goal
Binary indicator for Goal B. Biodiversity is sustainably used and managed and nature's contributions to people, including ecosystem functions and services, are valued, maintained and enhanced, with those currently in decline being restored, supporting the achievement of sustainable development for the benefit of present and future generations by 2050.

Target
N/A

Rationale
Goal B focuses on the sustainable use and management of biodiversity and the restoration, maintenance and enhancement of nature's contributions, including ecosystem functions and services. This vision is central to the Framework and essential to the achievement of the Sustainable Development Goals. People and nations around the world rely on healthy ecosystems and biodiversity for their livelihoods, economies, health and wellbeing. The degradation of ecosystems and loss of nature's contributions to people (NCP) has been linked to declines in quality of life and predictions of large-scale economic damage for all Parties to the convention. Ensuring that we restore NCP where they have been lost and maintain and enhance those that societies currently benefit from is essential for present and future generations to thrive.

Achieving this goal requires a concerted effort from Parties to implement and enforce policies on the sustainable use of biodiversity and the maintenance and enhancement of NCP. These require that biodiversity-dependent activities follow rules that ensure a healthy continuation of populations and ecosystems. Moreover, it requires that NCP be properly accounted for and valued in political and economic decision-making. As such, this indicator tracks the existence of policies and action plans to ensure the sustainable use of biodiversity and maintenance, enhancement and restoration of NCP by all Parties.

Definitions Concepts And Classifications
Definition
Maintenance [of biodiversity and NCP]: Measures put in place to keep the existing quantity and quality of biodiversity and nature's contribution to people.
Enhancement [of biodiversity and NCP]: Measures put in place to improve the quality and quantity of biodiversity and nature's contribution to people.
Nature's contribution to people: Nature's contributions to people (a concept similar to and inclusive of ecosystem services) refers to all the contributions from biodiversity to people's well-being or quality of life. They include (a) material contributions, such as the production of food, feed, fibre, medicines and energy, (b) regulating services, such as the regulation of air and water quality, climate regulation, pollination, regulation of pests and diseases and provision of habitat, and (c) other non-material contributions, such as learning, inspiration, health, physical, psychological, spiritual well-being and experiences and supporting identities and culture, as well as maintaining options for future generations.
Sustainable use: Sustainable use is defined by the Convention on Biological Diversity since 1992 as "the use of components of biological diversity in a way and at a rate that does not lead to the long-term decline of biological diversity, thereby maintaining its potential to meet the needs and aspirations of present and future generations."
Ecosystem functions: The flow of energy and materials through the biotic and abiotic components of an ecosystem. It includes many processes such as biomass production, trophic transfer through plants and animals, nutrient cycling, water dynamics and heat transfer.

Ecosystem service: A service that is provided by an ecosystem as an intrinsic property of its functionality (e.g. pollination, nutrient cycling, nitrogen fixation, fruit and seed dispersal) contributing to the benefits (and occasionally disbenefits) that people obtain from ecosystems. These include provisioning services such as food and water; regulating services such as flood and disease control; and cultural services such as recreation and sense of place. This includes the whole pathway from ecological processes through to final ecosystem services, goods and anthropocentric values to people. In the original definition of the Millennium Ecosystem Assessment the concept of ecosystem goods and services is synonymous with ecosystem services.
Action plan: A recognized program or strategy with a course of action to deliver on the Framework's goals.
Policy: A set or framework of general objectives and management principles that the undertaking uses for decision-making. A policy implements the undertaking's strategy or management decisions related to a matter. Each policy is under the responsibility of defined person(s), specifies its perimeter of application, and includes one or more objectives (linked when applicable to measurable targets). A policy is validated and reviewed following the undertakings' applicable governance rules. A policy is implemented through actions or action plans.

Method of Computation
This indicator is a binary indicator and must be compiled from the answers to three[1] questions:

B.1 Does your country have policies and/or action plans aiming to ensure the maintenance, enhancement and restoration of nature's contributions to people, including of ecosystem functions and services?

B.2 Does your country have policies and/or action plans aiming to ensure the sustainable use of biodiversity?

B.3 Does your country monitor the sustainable use of biodiversity and the maintenance, restoration and enhancement of nature's contributions to people, including ecosystem functions and services?

There are four possible answers to each of these questions:
(a) No
(b) No, but under development
(c) Yes, partially
(d) Yes, fully

A "No" answer implies that there are no policies or action plans currently in place at the national level to ensure the maintenance, enhancement and restoration of NCP (B.1) nor the sustainable use of biodiversity (B.2) and that no monitoring of neither sustainable use of biodiversity nor maintenance, enhancement and restoration of NCP is taking place (B.3). Therefore, no policies nor action plans exist in the country for the specific requirements of each question in turn.

A "No, but under development" answer implies a concerted effort at the national level to put in place policies or action plans for NCP maintenance, restoration or enhancement (B.1) or for the sustainable use of biodiversity (B.2). These plans or policies may be in the draft stage, been published for review or pending acceptance/ratification. In either case, there must be a clear official proposal for a national level policy or action plan to select this answer, ongoing efforts to draft texts is insufficient. Monitoring of either sustainable use of biodiversity or maintenance, enhancement and restoration of NCP is in development (B.3), monitoring programs and reporting systems may be in the design phase or be completed and accepted but not resourced, and therefore have not begun.

A "Yes, partially" answer implies that some of the elements in the question have been met but not all. That is, policies and/or action plans are in place to:

[1] Assuming the recommendations on including B.3 have been followed

- ensure the maintenance, enhancement or restoration of NCP but not all three (B.1)
- these fail to include ecosystem functions or services or both (B.1)
- these do not account for the sustainable use of all aspects of biodiversity, e.g. not including genetic diversity (B.2)

Monitoring of the sustainable use of biodiversity or the maintenance, enhancement and restoration of NCP is taking place but not both (B.3). If any one of the cases outlined above applies, only partial achievement has been reached.

A "Yes, fully" answer implies that all the conditions outlined in "Yes, partially" have been met. Namely that both policies and/or actions are in place at the national level for maintenance, enhancement and restoration of NCP, including ecosystem functions and services (B.1) and to ensure the sustainable use of biodiversity (B.2). Additionally, monitoring is in place and ongoing for both the sustainable use of biodiversity and the maintenance, enhancement and restoration of NCP (B.3).

Note: further information on progress towards the target can be provided in the free text section of the reporting tool.

GBF indicator metadata: C.1 Monetary benefits received in accordance with applicable internationally agreed ABS instruments

1. Indicator name
C.1 Monetary benefits received in accordance with applicable internationally agreed ABS instruments
2. Date of metadata update
March 2024
3. Goals and Targets addressed
3a. Goal
Goal C. **The monetary** and non-monetary **benefits** from the utilization of genetic resources and digital sequence information on genetic resources, and of traditional knowledge associated with genetic resources, as applicable, are shared fairly and equitably, including, as appropriate with indigenous peoples and local communities, and substantially increased by 2050, while ensuring traditional knowledge associated with genetic resources is appropriately protected, thereby contributing to the conservation and sustainable use of biodiversity, in accordance with internationally agreed access and benefit-sharing instruments.
3b. Target
Target 13: Take effective legal, policy, administrative and capacity-building measures at all levels, as appropriate, **to ensure the fair and equitable sharing of benefits** that arise from the utilization of genetic resources and from digital sequence information on genetic resources, as well as traditional knowledge associated with genetic resources, **and facilitating appropriate access to genetic resources**, and by 2030, **facilitating a significant increase of the benefits share**d, in accordance with applicable international access and benefit-sharing instruments.
4. Rationale
This indicator would aim to measure the trend in the amount of monetary benefits received by countries from the implementation of applicable international access and benefit-sharing instruments during the reporting period. This indicator could compile, *inter alia*, monetary benefits received by countries bilaterally from the implementation of ABS under the Convention and its Nagoya Protocol as well as multilateral ABS instruments, namely the International Treaty on Plant Genetic Resources for Food and Agriculture, and the new multilateral instruments for digital sequence information (DSI) under the Convention and for marine genetic resources and DSI under the United Nations Convention on the Law of the Sea on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction (BBNJ). This does not prejudge that other ABS-related instruments, for example, those under the World Health Organization, could be also incorporated in the future to support the conservation and sustainable use of biodiversity goals of the KMGBF.
National reporting on monetary benefits received bilaterally would not be relevant for all CBD Parties, as some countries do not regulate access to genetic resources and/or do not require or receive benefits from ABS agreements. Possible ways to disaggregate the indicator, without adding undue complexity for reporting, would need to be defined (e.g. monetary benefits from genetic resources, associated traditional knowledge, amount per type of beneficiaries, e.g. women or IPLCs). For the multilateral instruments, disaggregation by categories of distribution and beneficiary types could be considered.
5. Definitions, concepts and classifications
5a. Definition:

Key concepts:
There are two types of benefit-sharing:
Bilateral benefit sharing: Under the CBD and the Nagoya Protocol and its current bilateral benefit-sharing system for GRs and ATK, the recipient is likely to be a country or recognized providers within a country.
Multilateral benefit sharing: Under international ABS instruments that rely on multilateral approaches to benefit-sharing, a single fund would receive all the monetary benefits, such as the one established under the ITPGRFA, and presumably the multilateral mechanism for DSI which calls for a “global fund”, and the fund foreseen by the Agreement under the United Nations Convention on the Law of the Sea on the

conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction (BBNJ).

5b. Method of computation

Monetary benefits can all be measured in terms of the amount of money received and they can be aggregated and reported as a single monetary number for each year. Table 1 provides a list of types of monetary benefits which should be included.

Table 1. List of monetary benefits to be collected

Monetary Benefit	Notes on collecting data
*(a)Access fees/fee per sample collected or otherwise acquired	Easy to implement, payment during access application
(b) Up-front payments	Easy to implement, payment during access application
(c) Milestone payments	Happens during utilization, CNA or other authority need check in/receive several reports over time, milestones need to be clearly defined and agreed on
*(d) Payment of royalties	After successful utilization/commercialization, regular annual reports on revenue needed
(e) License fees in case of commercialization	After successful utilization/commercialization
(f) Special fees to be paid to trust funds supporting conservation and sustainable use of biodiversity	Can happened in several time points along the value chain
(g) Salaries and preferential terms where mutually agreed	Can happened in several time points along the value chain
*(h) Research funding	Can happened in several time points along the value chain
(i) Joint ventures	Can happened in several time points along the value chain
(j) Joint ownership of relevant intellectual property rights	Royalties are generated after the licensing of intellectual property (if successful)

The headline indicator for monetary benefit-sharing would enable countries to report on monetary benefits across all international instruments into a single overarching indicator. This information would be collected at national level for the benefits shared bilaterally, and by the relevant treaty secretariats for those benefits shared multilaterally. The information collected by the treaty secretariats, if so decided by their membership, will be made available to SCBD and may be used by countries for their use in a section of the national reports. Parties to the CBD that have regulated access to their genetic resources and require monetary benefit-sharing will include in their national reports the amount, in US dollars, of the monetary benefits received at the national level during the reporting period.

Parties, in providing this information, will consider different types of monetary benefit, such as those included in annex to the Nagoya Protocol.

However, the collection of information on monetary benefits at national level is not without challenges. Few countries have readily available information on monetary benefits, as many countries do not yet have a fully operational ABS framework or have only concluded agreements for non-commercial use which do not involve monetary benefits.

5c. Data collection method

This information will be collected through the national reporting under the Convention where Parties report which monetary (and/or in the case of indicator C.2 which non-monetary benefits they have received), including the amount of monetary benefits received during the reporting period (in US dollars). It will be based on the categories in table 1 noting that the monetary benefits that are considered to be the most important for reporting purposes are highlighted with a (*).

5d. Accessibility of methodology

This methodology is available online and more information can be found in CBD/SBSTTA/26/INF/12.

5e. Data sources

To be able to report on indicators measured at the national level, it is necessary that countries implement tools that facilitate collection, compilation and report of information. Some recommendations are included in this section for gathering information related to monetary and non-monetary benefits shared.

Establish a national fund as central tool for monetary benefits collection

At the national level, the approach of establishing a mechanism (a specific fund or an account) that centralizes the reception of monetary benefits could help with data reporting. A centralized system eases the accountability of the transactions and the calculation of the monetary benefits received and seems to be a good managing tool to receive payments based on ABS agreements of notifications. Such a fund creates the potential to have a quick overview on the monetary flows and creates the opportunity to assess allocations used for conservation and protection of biodiversity. In general, money from the fund can be distributed to the provider of a GR or may be used for conservation projects (18). This type of fund allows easy identification of the payments made by users and avoids the risks associated with payments made to the general budget of a country, where it will be more difficult to track the initial payment and almost impossible to ensure that the funds are used for biodiversity policy objectives. However, ministries of finance often pursue the principle of universality of the government budget whereby all resources are directed to a common pool or fund, to be allocated and used for expenditures according to the current priorities of the government, where earmarking is forbidden or highly discouraged. Thus, inevitably, like with much of ABS, each country will have unique circumstances.

Anticipate confidentiality issues during non-disclosure agreements negotiations

For some countries confidentiality issues are an important obstacle to report on monetary benefits as information on monetary benefits may be difficult to report due to non-disclosure agreements (NDA) that restrict parties to disclose confidential information included in the MAT and other ABS-related documents. Confidential information usually includes trade secrets like new methods, formulas or designs. In the case of commercial utilization of GR or aTK, information on monetary benefits is also sensitive and usually declared as confidential. On the other hand, based on some interviews with ABS experts from the private sector, confidentiality issues would be prevented if those are discussed and agreed at an early stage of MAT negotiations and if aggregated data is reported. To this end, standardized language can be included in non-disclosure agreements that explicitly allows the recipient of the confidential information to report on benefits received, at the aggregate level, in their national reports under the CBD and the NP.

Develop a national repository where all information in the reporting process on benefits is stored and information is managed

In case various beneficiaries directly receive monetary benefits from the user, in an independent and decentralized manner, collecting aggregate data will be challenging. The alternative in case of multiple recipients of monetary benefits is to implement a mechanism (e.g. an online tool) to compile at the national level the information related to the effective amount and date of those payments and include in the MAT clauses related to the user's obligation to report to just one centralized national authority on monetary benefits shared directly with multiple beneficiaries.

Data management systems for ABS agreements granting and benefits reporting are a good tool to monitor benefit-sharing at national level and could potentially generate reminders about check in and reporting duties of users of GRs or aTK. Some countries have already introduced national virtual systems to apply for access to GRs and report on benefit-sharing. Once the application is successfully processed the corresponding permit is granted and uploaded to the platform. The commitments on both monetary and non-monetary benefit sharing and corresponding deadlines can also be programmed in the system, which could send out reminders to users on reporting obligations for the concluded benefit-sharing activities.

The users could upload benefit-sharing reports (e.g. research results or capacity building reports) and appropriate information to support the report.

5f. Availability and release calendar

This data will be collected through national reports as per the timing of those reports. Parties could share data through their national CHMs or through their ABS CHs and other national data portals on an annual basis.

5g. Time series

Not currently available.

5h. Data providers

Parties should report the data directly.

5i. Data compilers

At the global level, the Secretariat of the Convention on Biological Diversity will compile the data.

5j. Gaps in data coverage

As mentioned above national data compilation may be challenging due to the existing systems for recording data, confidentiality issues and national capacity.

5k. Treatment of missing values

Missing data should not be inputed.

6. Scale

6a. Scale of use

Scale of application (please check all relevant boxes):

Global: ☒ Regional: ☒ National☒

Scale of data disaggregation/aggregation:

- Global/ regional scale indicator can be disaggregated to national level: ☒
- National data is collated to form global indicator: ☒

The indicator is available for use at the national, regional and global level. It should be noted that national data would be aggregated in USD.

6b. National/regional indicator production

This data would be compiled and reported at the national level.

6c. Sources of differences between global and national figures

NA

6d. Regional and global estimates & data collection for global monitoring

Regional and global data would be the aggregate of national data in United States dollars. Missing data would not be estimated in developing the regional or global figures.

7. Other MEAs, processes and organisations

7a. Other MEA and processes

This data may also be reported in the national reports under the Nagoya Protocol on Access and Benefit-sharing and data sources to be identified for the International Treaty on Plant Genetic Resources for Food and Agriculture and other multilateral mechanisms on ABS (DSI, BBNJ).

7b. Biodiversity Indicator Partnership

No

8. Disaggregation

Countries should be able to disaggregate the information by monetary benefits received by different beneficiaries recognized in their national legislation and report on benefits received by IPLCs.

9. Related goals, targets and indicators

This indicator has linkages across the framework, including with Target 15, 19 and 22.

10. Data reporter

10a. Organisation

SCBD

10b. Contact person(s)

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11. References

United Nations Environment Programme. Convention on biological diversity [Internet]. 1992. Available from: https://wedocs.unep.org/20.500.11822/8340

Conference of the Parties to the Convention on Biological Diversity. Access and benefit-sharing as related to genetic resources. In: UN Doc [Internet]. COP 6 Decision VI/24; 2002. Available from: https://www.cbd.int/decision/cop/?id=7198

Conference of the Parties to the Convention on Biological Diversity. Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity: Text and Annex [Internet]. 2011. Available from: https://wedocs.unep.org/20.500.11822/27555

Food and Agriculture Organization of the United Nations. International Treaty on Plant Genetic Resources for Food and Agriculture [Internet]. 2001. Available from: https://www.fao.org/plant-treaty/overview/texts-treaty/en/

Food and Agriculture Organization of the United Nations. The Standard Material Transfer Agreement. In: FAO Doc [Internet]. RESOLUTION 2/2006; 2006. Available from: https://www.fao.org/3/be006e/be006e.pdf

Conference of the Parties to the Convention on Biological Diversity. Kunming-Montreal Global Biodiversity Framework. In: UN Doc [Internet]. CBD/COP/DEC/15/4; 2022. Available from: https://www.cbd.int/doc/decisions/cop-15/cop-15-dec-04-en.pdf

Conference of the Parties to the Convention on Biological Diversity. Digital sequence information on genetic resources. In: UN Doc [Internet]. CBD/COP/DEC/15/9; 2022. Available from: https://www.cbd.int/doc/decisions/cop-15/cop-15-dec-09-en.pdf

Conference of the Parties to the Convention on Biological Diversity. Monitoring framework for the Kunming-Montreal Global Biodiversity Framework. In: UN Doc [Internet]. CBD/COP/DEC/15/5; 2022. Available from: https://www.cbd.int/doc/decisions/cop-15/cop-15-dec-05-en.pdf

Subsidiary Body on Scientific, Technical and, Subsidiary Body on Scientific, Technical and Technological Advice, Conference of the Parties to the Convention on Biological Diversity. 25/1. Monitoring framework for the Kunming-Montreal Global Biodiversity Framework. In: UN Doc [Internet]. 1/14 CBD/SBSTTA/REC/25/1; 2023. Available from: https://www.cbd.int/doc/recommendations/sbstta-25/sbstta-25-rec-01-en.pdf

United Nations. Sustainable development: Convention on Biological Diversity - Resolution adopted by the General Assembly on 19 December 2023. In: UN Doc [Internet]. A/RES/78/155; 2023. Available from: https://www.undocs.org/Home/Mobile?FinalSymbol=A%2FRES%2F78%2F155&Language=E&DeviceType=Desktop&LangRequested=False

World Health Organization. Bureau's text of the WHO convention, agreement or other international instrument on pandemic prevention, preparedness and response (WHO CA+) [Internet]. A/INB/5/6; 2023. Available from: https://apps.who.int/gb/inb/pdf_files/inb5/A_INB5_6-en.pdf

Secretariat of the Convention on Biological Diversity. NOTIFICATION - Survey on indicators on access and benefit-sharing for the Kunming-Montreal Global Biodiversity Framework. In: UN Doc [Internet]. SCBD/NPU/DC/TS/BG/RKi/91289; 2023. Available from: https://www.cbd.int/doc/notifications/2023/ntf-2023-103-abs-en.pdf

Greiber T. An Explanatory Guide to the Nagoya Protocol on Access and Benefit-sharing. IUCN; 2012. 395 p.

Conference of the Parties to the Convention on Biological Diversity. NP-1/3. Monitoring and reporting (Article 29). In: UN Doc [Internet]. UNEP/CBD/NP/COP-MOP/DEC/1/3; 2014. Available from: https://www.cbd.int/doc/decisions/np-mop-01/np-mop-01-dec-03-en.pdf

Conference of the Parties to the Convention on Biological Diversity. NP-3/4. Monitoring and reporting (Article 29). In: UN Doc [Internet]. CBD/NP/MOP/DEC/3/4; 2018. Available from: https://www.cbd.int/doc/decisions/np-mop-03/np-mop-03-dec-04-en.pdf
Conference of the Parties to the Convention on Biological Diversity. DECISION ADOPTED BY THE PARTIES TO THE NAGOYA PROTOCOL ON ACCESS AND BENEFIT-SHARING, NP-4/3. Monitoring and reporting (Article 29). In: UN Doc [Internet]. CBD/NP/MOP/DEC/4/3; 2022. Available from: https://www.cbd.int/doc/decisions/np-mop-04/np-mop-04-dec-03-en.pdf
Conference of the Parties to the Convention on Biological Diversity. DECISION ADOPTED BY THE CONFERENCE OF THE PARTIES TO THE CONVENTION ON BIOLOGICAL DIVERSITY, IX/14. Technology transfer and cooperation. In: UN Doc [Internet]. UNEP/CBD/COP/DEC/IX/14; 2008. Available from: https://www.cbd.int/doc/decisions/cop-09/cop-09-dec-14-en.pdf
Ebert AW, Engels JMM, Schafleitner R, Hintum T van, Mwila G. Critical Review of the Increasing Complexity of Access and Benefit-Sharing Policies of Genetic Resources for Genebank Curators and Plant Breeders–A Public and Private Sector Perspective. Plants. 2023 Aug;12(16):2992.
Conference of the Parties to the Convention on Biological Diversity. DECISION ADOPTED BY THE CONFERENCE OF THE PARTIES TO THE CONVENTION ON BIOLOGICAL DIVERSITY, 15/6. Mechanisms for planning, monitoring, reporting and review. In: UN Doc [Internet]. CBD/COP/DEC/15/6; 2022. Available from: https://www.cbd.int/doc/decisions/cop-15/cop-15-dec-06-en.pdf
Scholz AH, Lange M, Habekost P, Oldham P, Cancio I, Cochrane G, et al. Myth-busting the provider-user relationship for digital sequence information. GigaScience. 2021 Dec;10(12).
Sebo P, de Lucia S, Vernaz N. Accuracy of PubMed-based author lists of publications and use of author identifiers to address author name ambiguity: a cross-sectional study. Scientometrics. 2021 Mar;126(5):4121–35.
Rosonovski S, Levchenko M, Bhatnagar R, Chandrasekaran U, Faulk L, Hassan I, et al. Europe PMC in 2023. Nucleic Acids Research. 2023 Nov;52(D1):D1668–76.
Marden E, Abbott RJ, Austerlitz F, Ortiz- Barrientos D, Baucom RS, Bongaerts P, et al. Sharing and reporting benefits from biodiversity research. Molecular Ecology. 2020 Nov;30(5):1103–7.
Food and agriculture organization of the United Nations. Introduction to the international treaty on plant genetic resources for food and agriculture [Internet]. 2011. Available from: http://www.itpgrfa.net/International/sites/default/files/edm1_full_en.pdf
International Treaty on Plant Genetic Resources for Food and Agriculture. Eighth meeting of the Standing Committee on the Funding Strategy and Resource Mobilization (SFC-8) - Meeting proceedings [Internet]. Food and agriculture organization of the United Nations. Governing Body of the International Treaty on Plant Genetic Resources for Food and Agriculture; 2023. Available from: https://www.fao.org/3/cc8199en/cc8199en.pdf
International Treaty on Plant Genetic Resources for Food and Agriculture. Implementation of the funding strategy [Internet]. Food and Agriculture Organization. Governing Body of the International Treaty on Plant Genetic Resources for Food and Agriculture; 2023. Available from: https://www.fao.org/3/no028en/no028en.pdf
Food and Agriculture Organization of the United Nations. ITPGRFA TENTH SESSION OF THE GOVERNING BODY - The Benefit-sharing Fund: 2022-2023 Report. In: FAO Doc [Internet]. IT/GB-10/23/10/Inf.1; 2023. Available from: https://www.fao.org/3/cc8470en/cc8470en.pdf
Galluzzi G, López Noriega I, Halewood M. Non-monetary benefit sharing mechanisms within the projects funded by the Benefit Sharing Fund. International Treaty on Plant Genetic Resources for Food and Agriculture [Internet]. 2014; Available from: https://www.fao.org/publications/card/en/c/84d6161c-0dba-41ab-99eb-3fbb5ba5999f
Scholz AH, Freitag J, Lyal CHC, Sara R, Cepeda ML, Cancio I, et al. Multilateral benefit-sharing from digital sequence information will support both science and biodiversity conservation. Nat Commun. 2022 Feb 23;13(1):1086.
United Nations. Agreement under the United Nations Convention on the Law of the Sea on the Conservation and Sustainable Use of Marine Biological Diversity of Areas beyond National Jurisdiction [Internet]. 2023. Available from: https://wedocs.unep.org/20.500.11822/8340

12. Graphs and diagrams

N/A

GBF indicator metadata: C.2 Non-monetary benefits arising from applicable internationally agreed ABS instruments

1. Indicator name

C.2 Non-monetary benefits arising from applicable internationally agreed ABS instruments.

2. Date of metadata update

March 2024

3. Goals and Targets addressed

3a. Goal

Headline Indicator for **Goal C.** The monetary and **non-monetary benefits** from the utilization of genetic resources and digital sequence information on genetic resources, and of traditional knowledge associated with genetic resources, as applicable, are shared fairly and equitably, including, as appropriate with indigenous peoples and local communities, and substantially increased by 2050, while ensuring traditional knowledge associated with genetic resources is appropriately protected, thereby contributing to the conservation and sustainable use of biodiversity, in accordance with internationally agreed access and benefit-sharing instruments.

3b. Target

Headline indicator for **Target 13**: Take effective legal, policy, administrative and capacity-building measures at all levels, as appropriate, to ensure the fair and equitable sharing of benefits that arise from the utilization of genetic resources and from digital sequence information on genetic resources, as well as traditional knowledge associated with genetic resources, and facilitating appropriate access to genetic resources, and by 2030, facilitating a significant increase of the benefits shared, in accordance with applicable international access and benefit-sharing instruments.

4. Rationale

The importance of non-monetary benefits from ABS processes and their contribution to the conservation and sustainable use of biodiversity and to sustainable development is increasingly acknowledged and documented. This indicator serves as a proxy for many different types of non-monetary benefits. It aims to measure trends in a key subset of non-monetary benefits arising from applicable international access and benefit-sharing instruments, namely the CBD, the Nagoya Protocol and the ITPGRFA.

The methodology also takes into account the possibility of accommodating new multilateral ABS instruments, which will contribute to conservation and sustainable use of biodiversity such as the United Nations Convention on the Law of the Sea on the Conservation and Sustainable Use of Marine Biological Diversity of Areas Beyond National Jurisdiction, or benefit-sharing from digital sequence information (DSI) on genetic resources (GR).

5. Definitions, concepts and classifications

5a. Definition and concepts:

To avoid double counting, only countries that regulate access to GR or to ATK, as appropriate, would need to report on non-monetary benefits.

Reporting would be on the following types of non-monetary benefits:

a. Number of research and development results arising from ABS instruments (globally aggregated and subsequently pre-populated into national reports)

b. Number of joint scientific publications arising from ABS instruments with authors from the provider country, where appropriate (globally aggregated and subsequently pre-populated into national reports)

c. Number of scientific publications relevant to conservation, sustainable use, food security, and public health arising from ABS instruments (globally aggregated and subsequently pre-populated into national reports)

d. Number of technology transfer events arising from ABS instruments (nationally collected)

e. Number of projects contributing to sustainable development arising from ABS instruments (nationally collected)

f. Indicator related to capacity-building and development as part of the non-monetary benefits arising from ABS instruments (TBD)

Information on three types of non-monetary benefits can be initially collected at the global level following an established methodology (see section 5(e) below) and made available to countries for their use in the national report. The use of a global methodology and compilation ensures that the national data provided is comparable, can easily be aggregated and analyses of trends over time are consistent. Countries can edit and add additional information to their national data as appropriate.
The ability of countries to collect the information on non-monetary benefits may vary from country to country. For some countries it may take some time before it is possible to provide this mandatory information.

Additional types of non-monetary benefits received: Parties may include in their national reports any other type of non-monetary benefits received in accordance with national priorities and circumstances. The reported information cannot be aggregated globally but can help countries to measure trends overtime according to their national priorities.

5b. Method of computation

There are many types of non-monetary benefits that can be included in ABS agreements (a list of 17 benefits is provided, for example, in the Annex of the Nagoya Protocol) but there are significant challenges to measuring all of them. First, there is currently no way to aggregate information on non-monetary benefits in a comprehensive manner across all possible types as these can be quantified with very different parameters (i.e., to aggregate across, for example, contribution to local economy, institutional capacity-building, and or sharing of research and development results). Second, there is little national data currently available on non-monetary benefits and significant challenges in monitoring or reporting on some non-monetary benefits remain. Third, different types of non-monetary benefits may be prioritized at the national level depending on the circumstances and these may be measured or accounted differently.
To simplify the challenge of monitoring non-monetary benefits, the 17 benefits suggested in the Nagoya Protocol Annex were consolidated into five categories that reflect six total proposed indicators as follows. Finding an appropriate indicator to measure non-monetary benefits related to capacity-building, development and training poses its own challenges.

Table 1. Non-monetary benefits

Category	Non-monetary Benefits	Reporting notes
Sharing of information, research results	(a) Sharing of research and development results	Number of research and development results shared from ABS agreements Number of scientific publications relevant to conservation, sustainable use, food security, and public health
	(k) Access to scientific information relevant to conservation and sustainable use of biological diversity, including biological inventories and taxonomic studies	
	(m) Research directed towards priority needs, such as health and food security, taking into account domestic uses of genetic resources in the Party providing genetic resources;	
	(e) Admittance to ex situ facilities of genetic resources and to databases	
Scientific collaboration and/or joint publications	(b) Collaboration, cooperation and contribution in scientific research and development programs, particularly biotechnological research activities, where possible in the Party providing genetic resources	Number of joint scientific publications from ABS agreements

	(n) Institutional and professional relationships that can arise from an access and benefit-sharing agreement and subsequent collaborative activities	with authors from the provider country
Capacity-building, capacity development and/or trainings	(d) Collaboration, cooperation and contribution in education and training	TBD (see Target 20)
	(j) Training related to genetic resources with the full participation of countries providing genetic resources, and where possible, in such countries	
	(h) Institutional capacity-building	
	(i) Human and material resources to strengthen the capacities for the administration and enforcement of access regulations	
Access to and transfer of technology[2]	(f) Transfer to the provider of the genetic resources of knowledge and technology under fair and most favorable terms, including on concessional and preferential terms where agreed, in particular, knowledge and technology that make use of genetic resources, including biotechnology, or that are relevant to the conservation and sustainable utilization of biological diversity	Number of technology transfer events. (Technology transfer events may include joint patents, licenses and other intellectual property rights (IPR); new products, processes or services that have been exchanged; new startups.)
	(h) Strengthening capacities for technology transfer	
	(c) Participation in product development	
	(q) Joint ownership of relevant intellectual property rights.	
Sustainable development benefits	(l) Contributions to the local economy	Number of projects contributing to sustainable development
	(o) Food and livelihood security benefits	
	(p) Social recognition	

In light of all of the above, the headline indicator is computed in three stages 1) selection of types of non-monetary benefits for inclusion in the indicator, 2) compilation of information, and 3) resulting aggregations and dissagregations.

5c. Data collection method

[2] According to the Strategy for the practical implementation of the programme of work on technology transfer and scientific and technological cooperation (17) “The concept of technology as generally understood under the Convention includes both “hard” and “soft” technology. The notion of hard technology refers to the actual machinery and other physical hardware that is transferred, while the category of soft technology refers to technological information or know-how. Such “soft” technology is often transferred within long-term scientific and technological cooperation including through joint research and innovation which move ideas from invention to new products, processes and services”

This information will be collected through the national reporting under the Convention where Parties report which non-monetary benefits they have received. The reporting should at a minimum include:

a. Number of research and development results arising from ABS instruments (globally aggregated and subsequently pre-populated into national reports)
b. Number of joint scientific publications arising from ABS instruments with authors from the provider country, where appropriate (globally aggregated and subsequently pre-populated into national reports)
c. Number of scientific publications relevant to conservation, sustainable use, food security, and public health arising from ABS instruments (globally aggregated and subsequently pre-populated into national reports)
d. Number of technology transfer events arising from ABS instruments (nationally collected)
e. Number of projects contributing to sustainable development arising from ABS instruments (nationally collected)
f. Indicator related to capacity-building and development as part of the non-monetary benefits arising from ABS instruments (TBD)

5d. Accessibility of methodology

This methodology is available online and more information can be found in CBD/SBSTTA/26/INF/12.

5e. Data sources

To be able to report on indicators measured at the national level, it is necessary that countries implement tools that facilitate collection, compilation and report of information.

Compilation of information for the globally collected types of non-monetary benefits will use, subject to the availability of funds, the initial methodology and prototype databases developed by the Leibniz Institute DSMZ within the Examining Trends in Non-Monetary Benefit-Sharing project (funded by the German Federal Agency of Nature Conservation.

This project has developed methods and a pilot database to quantify the three proposed required non-monetary benefits based on the robustness of the scientific publication ecosystem. A database of publications in which an ABS permit is directly listed (cited) in the text of the publication can provide quantification of the three proposed indicators. In order for these methods to capture more data, Parties must fulfill their obligation under the NP to generate IRCCs and scientific practices for citing IRCCs or ABS permits codes in scientific publications need to be better standardized. Making this information available to countries would help reinforce the national systems for monitoring the utilization of genetic resources, as well as help to make the contribution of ABS towards conservation, sustainable use and the advancement of science and research more visible.

The information collected globally will be disaggregated to the national level and made available for countries to report on in their national reports. This approach would be an efficient use of resources and avoid the need for every country to build up a national database to keep track of some types of non-monetary benefits (research results, international collaborations, and research focused on priority areas resulting from ABS agreements).

Compilation of information for other types of non-monetary benefits would be done at national level. Most countries mentioned receiving non-monetary benefits. However, the data on non-monetary benefits is not generally compiled or readily available and for many countries reporting this information may be challenging, particularly when the national systems recognize different providers for GRs and ATK and different beneficiaries.

Some recommendations could help Parties reporting on non-monetary benefits:

- For countries that have multiple authorities involved in negotiating PIC and MAT, they might consider including in their MAT clauses that obligate a user to report to a single centralized national authority for benefits even if they are shared with multiple beneficiaries.
- A national data management system (e.g. a virtual platform or system appropriate for the national circumstances) where all information in the reporting process on benefits is stored and information is managed Data management systems for ABS agreements granting and benefits reporting are a good tool to monitor benefit-sharing at national level and could potentially generate reminders about check in and reporting duties of users of GRs or aTK. Some countries have already introduced national virtual systems to apply for access to GRs and report on benefit-sharing. Once the application is successfully processed the corresponding permit is granted and uploaded to the platform. The commitments on both monetary and non-monetary benefit sharing and corresponding deadlines are also programmed in the system, which will send out reminders to users on reporting obligations for the concluded benefit-sharing activities. The users can upload benefit-sharing reports (e.g. research results or capacity building reports) and appropriate information to support the report.

The recommendations could also help strengthen national ABS systems. A better understanding of benefits received would help countries to measure the effectiveness of their ABS system and mobilize political will and resources for implementing Target 13 and achieve Goal C of the KMGBF.

As an alternative or complementary approach, Parties could also decide to establish a global standardized reporting system for non-monetary benefits by users of genetic resources and associated traditional knowledge. This reporting tool would enable users to report on the benefits shared in their work under an ABS agreement. The information collected and disaggregated by country could be shared with countries for their consideration in their reporting under the different types of non-monetary benefits included in their reporting.

The methodology proposed for globally collected non-monetary benefits can either be expanded to include non-monetary benefit arising from other international ABS Instruments (ITPGRFA and others) or the secretariats of the relevant treaties can compile the data and share it with countries, as appropriate.

5f. Availability and release calendar

This data will be collected through national reports as per the timing of those reports. Parties could share data through their national CHMs, ABS CHs and other national data portals on an annual basis.

5g. Time series

Not currently available.

5h. Data providers

Parties should report the data directly with some global data available on the number of research publications.

5i. Data compilers

At the global level, the Secretariat of the Convention on Biological Diversity will compile the data. Compilation of information for the globally collected types of non-monetary benefits under the CBD and the Nagoya Protocol will use the methodology developed by the Leibniz Institute DSMZ within the Examining Trends in Non-Monetary Benefit-Sharing project (funded by the German Federal Agency of Nature Conservation). The Secretariat will work with Leibniz Institute DSMZ on this.

The information collected globally will be disaggregated to the national level and made available for countries to report on in their national reports (and NBSAPs). This approach would be an efficient use of resources and avoid the need for every country to build up a national database to keep track of some types of non-monetary benefits (research results, international collaborations, and research focused on priority areas resulting from ABS agreements).

5j. Gaps in data coverage

As mentioned above national data compilation may be challenging due to the existing systems for recording data, confidentiality issues and national capacity.

5k. Treatment of missing values

Missing data should not be inputed.

6. Scale

6a. Scale of use

Scale of application (please check all relevant boxes):

Global: ☒ Regional: ☒ National☒

Scale of data disaggregation/aggregation:

- Global/ regional scale indicator can be disaggregated to national level: ☒
- National data is collated to form global indicator: ☒

The indicator is available for use at the national, regional and global level. However, regional and global aggregation may have some gaps.

6b. National/regional indicator production

This data would be compiled and reported at the national level.

6c. Sources of differences between global and national figures

The information on the number of publications which will be estimated using the Leibniz Institute DSMZ methodology, which may differ from national estimates of the number of publications. This could be due to including different publication databases in the search or different publication availabilities. Parties should use national data if available.

6d. Regional and global estimates & data collection for global monitoring

Data could be aggregated from national reports depending on the data received. For the research publications, global level estimates are available.

7. Other MEAs, processes and organisations

7a. Other MEA and processes

This data may also be reported in the national reports under the Nagoya Protocol on Access and Benefit-sharing and data sources to be identified for the International Treaty on Plant Genetic Resources for Food and Agriculture and other multilateral mechanisms on ABS (DSI, BBNJ).

7b. Biodiversity Indicator Partnership

No

8. Disaggregation

Countries should be able to disaggregate the information on benefits by gender and IPLC if possible.

9. Related goals, targets and indicators

This indicator has linkages across the framework, including with Target 22.

10. Data reporter

10a. Organisation

SCBD

10b. Contact person(s)

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Leibniz Institute DSMZ German Collection of Microorganisms and Cell Cultures Dr. Amber Hartman Scholz, (amber.h.scholz@dsmz.de)

Daniele Manzella, ITPGRFA Secretariat, Daniele.Manzella@fao.org

11.

References

United Nations Environment Programme. Convention on biological diversity [Internet]. 1992. Available from: https://wedocs.unep.org/20.500.11822/8340

Conference of the Parties to the Convention on Biological Diversity. Access and benefit-sharing as related to genetic resources. In: UN Doc [Internet]. COP 6 Decision VI/24; 2002. Available from: https://www.cbd.int/decision/cop/?id=7198

Conference of the Parties to the Convention on Biological Diversity. Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the

Convention on Biological Diversity: Text and Annex [Internet]. 2011. Available from: https://wedocs.unep.org/20.500.11822/27555
Food and Agriculture Organization of the United Nations. International Treaty on Plant Genetic Resources for Food and Agriculture [Internet]. 2001. Available from: https://www.fao.org/plant-treaty/overview/texts-treaty/en/
Food and Agriculture Organization of the United Nations. The Standard Material Transfer Agreement. In: FAO Doc [Internet]. RESOLUTION 2/2006; 2006. Available from: https://www.fao.org/3/be006e/be006e.pdf
Conference of the Parties to the Convention on Biological Diversity. Kunming-Montreal Global Biodiversity Framework. In: UN Doc [Internet]. CBD/COP/DEC/15/4; 2022. Available from: https://www.cbd.int/doc/decisions/cop-15/cop-15-dec-04-en.pdf
Conference of the Parties to the Convention on Biological Diversity. Digital sequence information on genetic resources. In: UN Doc [Internet]. CBD/COP/DEC/15/9; 2022. Available from: https://www.cbd.int/doc/decisions/cop-15/cop-15-dec-09-en.pdf
Conference of the Parties to the Convention on Biological Diversity. Monitoring framework for the Kunming-Montreal Global Biodiversity Framework. In: UN Doc [Internet]. CBD/COP/DEC/15/5; 2022. Available from: https://www.cbd.int/doc/decisions/cop-15/cop-15-dec-05-en.pdf
Subsidiary Body on Scientific, Technical and, Subsidiary Body on Scientific, Technical and Technological Advice, Conference of the Parties to the Convention on Biological Diversity. 25/1. Monitoring framework for the Kunming-Montreal Global Biodiversity Framework. In: UN Doc [Internet]. 1/14 CBD/SBSTTA/REC/25/1; 2023. Available from: https://www.cbd.int/doc/recommendations/sbstta-25/sbstta-25-rec-01-en.pdf
United Nations. Sustainable development: Convention on Biological Diversity - Resolution adopted by the General Assembly on 19 December 2023. In: UN Doc [Internet]. A/RES/78/155; 2023. Available from: https://www.undocs.org/Home/Mobile?FinalSymbol=A%2FRES%2F78%2F155&Language=E&DeviceType=Desktop&LangRequested=False
World Health Organization. Bureau’s text of the WHO convention, agreement or other international instrument on pandemic prevention, preparedness and response (WHO CA+) [Internet]. A/INB/5/6; 2023. Available from: https://apps.who.int/gb/inb/pdf_files/inb5/A_INB5_6-en.pdf
Secretariat of the Convention on Biological Diversity. NOTIFICATION - Survey on indicators on access and benefit-sharing for the Kunming-Montreal Global Biodiversity Framework. In: UN Doc [Internet]. SCBD/NPU/DC/TS/BG/RKi/91289; 2023. Available from: https://www.cbd.int/doc/notifications/2023/ntf-2023-103-abs-en.pdf
Greiber T. An Explanatory Guide to the Nagoya Protocol on Access and Benefit-sharing. IUCN; 2012. 395 p.
Conference of the Parties to the Convention on Biological Diversity. NP-1/3. Monitoring and reporting (Article 29). In: UN Doc [Internet]. UNEP/CBD/NP/COP-MOP/DEC/1/3; 2014. Available from: https://www.cbd.int/doc/decisions/np-mop-01/np-mop-01-dec-03-en.pdf
Conference of the Parties to the Convention on Biological Diversity. NP-3/4. Monitoring and reporting (Article 29). In: UN Doc [Internet]. CBD/NP/MOP/DEC/3/4; 2018. Available from: https://www.cbd.int/doc/decisions/np-mop-03/np-mop-03-dec-04-en.pdf
Conference of the Parties to the Convention on Biological Diversity. DECISION ADOPTED BY THE PARTIES TO THE NAGOYA PROTOCOL ON ACCESS AND BENEFIT-SHARING, NP-4/3. Monitoring and reporting (Article 29). In: UN Doc [Internet]. CBD/NP/MOP/DEC/4/3; 2022. Available from: https://www.cbd.int/doc/decisions/np-mop-04/np-mop-04-dec-03-en.pdf
Conference of the Parties to the Convention on Biological Diversity. DECISION ADOPTED BY THE CONFERENCE OF THE PARTIES TO THE CONVENTION ON BIOLOGICAL DIVERSITY, IX/14. Technology transfer and cooperation. In: UN Doc [Internet]. UNEP/CBD/COP/DEC/IX/14; 2008. Available from: https://www.cbd.int/doc/decisions/cop-09/cop-09-dec-14-en.pdf
Ebert AW, Engels JMM, Schafleitner R, Hintum T van, Mwila G. Critical Review of the Increasing Complexity of Access and Benefit-Sharing Policies of Genetic Resources for Genebank Curators and Plant Breeders–A Public and Private Sector Perspective. Plants. 2023 Aug;12(16):2992.

Conference of the Parties to the Convention on Biological Diversity. DECISION ADOPTED BY THE CONFERENCE OF THE PARTIES TO THE CONVENTION ON BIOLOGICAL DIVERSITY, 15/6. Mechanisms for planning, monitoring, reporting and review. In: UN Doc [Internet]. CBD/COP/DEC/15/6; 2022. Available from: https://www.cbd.int/doc/decisions/cop-15/cop-15-dec-06-en.pdf
Scholz AH, Lange M, Habekost P, Oldham P, Cancio I, Cochrane G, et al. Myth-busting the provider-user relationship for digital sequence information. GigaScience. 2021 Dec;10(12).
Sebo P, de Lucia S, Vernaz N. Accuracy of PubMed-based author lists of publications and use of author identifiers to address author name ambiguity: a cross-sectional study. Scientometrics. 2021 Mar;126(5):4121–35.
Rosonovski S, Levchenko M, Bhatnagar R, Chandrasekaran U, Faulk L, Hassan I, et al. Europe PMC in 2023. Nucleic Acids Research. 2023 Nov;52(D1):D1668–76.
Marden E, Abbott RJ, Austerlitz F, Ortiz- Barrientos D, Baucom RS, Bongaerts P, et al. Sharing and reporting benefits from biodiversity research. Molecular Ecology. 2020 Nov;30(5):1103–7.
Food and agriculture organization of the United Nations. Introduction to the international treaty on plant genetic resources for food and agriculture [Internet]. 2011. Available from: http://www.itpgrfa.net/International/sites/default/files/edm1_full_en.pdf
International Treaty on Plant Genetic Resources for Food and Agriculture. Eighth meeting of the Standing Committee on the Funding Strategy and Resource Mobilization (SFC-8) - Meeting proceedings [Internet]. Food and agriculture organization of the United Nations. Governing Body of the International Treaty on Plant Genetic Resources for Food and Agriculture; 2023. Available from: https://www.fao.org/3/cc8199en/cc8199en.pdf
International Treaty on Plant Genetic Resources for Food and Agriculture. Implementation of the funding strategy [Internet]. Food and Agriculture Organization. Governing Body of the International Treaty on Plant Genetic Resources for Food and Agriculture; 2023. Available from: https://www.fao.org/3/no028en/no028en.pdf
Food and Agriculture Organization of the United Nations. ITPGRFA TENTH SESSION OF THE GOVERNING BODY - The Benefit-sharing Fund: 2022-2023 Report. In: FAO Doc [Internet]. IT/GB-10/23/10/Inf.1; 2023. Available from: https://www.fao.org/3/cc8470en/cc8470en.pdf
Galluzzi G, López Noriega I, Halewood M. Non-monetary benefit sharing mechanisms within the projects funded by the Benefit Sharing Fund. International Treaty on Plant Genetic Resources for Food and Agriculture [Internet]. 2014; Available from: https://www.fao.org/publications/card/en/c/84d6161c-0dba-41ab-99eb-3fbb5ba5999f
Scholz AH, Freitag J, Lyal CHC, Sara R, Cepeda ML, Cancio I, et al. Multilateral benefit-sharing from digital sequence information will support both science and biodiversity conservation. Nat Commun. 2022 Feb 23;13(1):1086.
United Nations. Agreement under the United Nations Convention on the Law of the Sea on the Conservation and Sustainable Use of Marine Biological Diversity of Areas beyond National Jurisdiction [Internet]. 2023. Available from: https://wedocs.unep.org/20.500.11822/8340

12. Graphs and diagrams

N/A

GBF indicator metadata: D.1 International public funding, including official development assistance (ODA), for conservation and sustainable use of biodiversity, and ecosystems

1. Indicator name

D.1 International public funding, including official development assistance (ODA), for conservation and sustainable use of biodiversity, and ecosystems

2. Date of metadata update

March 2024

3. Goals and Targets addressed

3a. Goal

Headline Indicator for **Goal D** Adequate means of implementation, including financial resources, capacity-building, technical and scientific cooperation, and access to and transfer of technology to fully implement the Kunming-Montreal Global Biodiversity Framework are secured and equitably accessible to all Parties, especially developing country Parties, in particular the least developed countries and small island developing States, as well as countries with economies in transition, progressively closing the biodiversity finance gap of $700 billion per year, and aligning financial flows with the Kunming-Montreal Global Biodiversity Framework and the 2050 Vision for biodiversity.

3b. Target

Headline indicator for **Target 19** Substantially and progressively increase the level of financial resources from all sources, in an effective, timely and easily accessible manner, including domestic, international, public and private resources, in accordance with Article 20 of the Convention, to implement national biodiversity strategies and action plans, mobilizing at least $200 billion per year by 2030, including by:

(a) Increasing total biodiversity related international financial resources from developed countries, including official development assistance, and from countries that voluntarily assume obligations of developed country Parties, to developing countries, in particular the least developed countries and small island developing States, as well as countries with economies in transition, to at least $20 billion per year by 2025, and to at least $30 billion per year by 2030;

(b) Significantly increasing domestic resource mobilization, facilitated by the preparation and implementation of national biodiversity finance plans or similar instruments according to national needs, priorities and circumstances;

(c) Leveraging private finance, promoting blended finance, implementing strategies for raising new and additional resources, and encouraging the private sector to invest in biodiversity, including through impact funds and other instruments;

(d) Stimulating innovative schemes such as payment for ecosystem services, green bonds, biodiversity offsets and credits, and benefit sharing mechanisms, with environmental and social safeguards;

(e) Optimizing co-benefits and synergies of finance targeting the biodiversity and climate crises;

(f) Enhancing the role of collective actions, including by indigenous peoples and local communities, Mother Earth centric actions and non-market-based approaches including community based natural resource management and civil society cooperation and solidarity aimed at the conservation of biodiversity;

(g) Enhancing the effectiveness, efficiency and transparency of resource provision and use.

4. Rationale

This indicator quantifies total international public finance flows with biodiversity objectives extended to developing countries by bilateral providers of development co-operation, South-South and triangular Co-operation, as well as multilateral providers of development co-operation. It includes official development assistance (ODA) and other official flows (OOF), or alternatively total official support for sustainable development (TOSSD), for biodiversity. The indicator improves visibility and fosters transparency of support to developing countries by all Parties.

5. Definitions, concepts and classifications

5a. Definition:

The indicator measures all international public finance disbursements to developing countries in constant prices, in particular least developed countries and small island developing states, for conservation and the sustainable use of biodiversity and ecosystems, in line with the Convention on Biological Diversity (CBD). Commitments and flows in current prices can also be measured.
The total amount of international public finance flows is composed of:

- Official Development Assistance (ODA) and other official flows (OOF) for developmental purposes that have been marked as targeting the objectives of the CBD (using the so-called biodiversity marker scores "principal" or "significant") in the Creditor Reporting System (CRS) of the OECD Development Assistance Committee (DAC).[17]
- For countries that report on Total Official Support for Sustainable Development (TOSSD), such as South-South and triangular Cooperation providers, this includes flows targeting Sustainable Development Goals (SDGs) 14 and 15 and/or targeting biodiversity-related sectors.
- Outflows of multilateral institutions, such as multilateral and regional development banks, vertical funds or international institutions. These are defined as institutions included in the list of ODA-eligible international organisations (Annex 2 of CRS reporting guidelines). Multilateral institutions' biodiversity-related outflows can be identified through the biodiversity Rio marker, SDGs 14/15 and purpose sectors, as well as through keyword searches – depending on the granularity of the institutions' reporting to the OECD.

Both ODA and OOF, as well as TOSSD, are composed of flows disbursed to developing countries by official agencies, including state and local governments, or by their executive agencies – although commitment flows can also be identified. For ODA and OOF, developing countries include countries on the DAC List of ODA Recipients. The TOSSD list of recipients is broader, based on the DAC List as in 2015.[18]
Multilateral expenditures (outflows) for biodiversity include a mix of activities financed with core contributions and earmarked contributions to multilateral organisations. These resources are provided by official agencies as defined above but also include other resources that multilateral organisations receive as grants from the private sector or leverage from international capital markets.[19] To avoid double counting, therefore, unearmarked (estimated imputed shares) and earmarked contributions from provider countries can be included as part of the provider country reporting, unless a separate indicator is created to track multilateral institution outflows. In this case, caution needs to be taken to ensure to present bilateral from multilateral flows separately. If a separate indicator is introduced for multilateral organisations, these can include the outflows (expenditures on activities in developing countries) reported to the CRS and/or TOSSD. Outflows from the regular budgets are available in the CRS and TOSSD. Outflows from earmarked contributions are available in the TOSSD framework

5b. Method of computation

1. **Options for countries:**
   - A country can compute their international financial flows by using the DAC CRS based on the Rio marker for biodiversity. The indicator is calculated as the sum of all ODA and OOF activities marked for biodiversity with either the principal or significant score. This can include multi-bi allocations. Given that Rio markers are not applicable to core contributions to multilateral organisations, imputed multilateral flows would need to be calculated based on current and estimated multilateral institutions' outflows for biodiversity.
     - Taken together, the bilateral, the multi-bi and the imputed multilateral flows would give the total international finance for biodiversity per providing country.
     - Imputed multilateral flows could be calculated by the OECD based on current reporting of multilateral institutions to the CRS and/or TOSSD, as some institutions report using the Rio markers. For other institutions, estimates could also be calculated.
   - Alternatively, and/or in complement to the above, a country can sum up all activities identified in their TOSSD reporting as additional to ODA and OOF and that have been marked with the SDG14, SDG15 and/or the sector code "biodiversity" or "biosphere protection".
   - Alternatively, a country can report on biodiversity-related international financial flows using other methods (e.g. using own data sources, using more disaggregation than OECD DAC

Rio marker data, using ODA/OOF commitments), as long as the flow targets the objectives of the CBD (in line with the OECD DAC Rio marker definition).

For information, the OECD DAC Rio marker helps track biodiversity-related activities when targeting the objectives of the CBD, with a 'principal objective' or a 'significant objective'. Activities marked as “principal” would not have been funded but for that objective; activities marked “significant” have other primary objectives, but have been formulated or adjusted to help meet biodiversity concerns. The Rio markers were designed to track the degree to which members are integrating and mainstreaming environmental considerations into their development co-operation activities, and thus apply to the entirety of an activity reported – not to the allocation of finance associated with the biodiversity-specific component of that activity. Hence, when reporting on this target, countries could report only a portion of their development finance targeting biodiversity as a “significant” objective, using a coefficient to adjust the volume of finance counted. There is no agreed definition or common approach for this practice, but the most common coefficient applied to countries’ “significant” flows is 40%, along with the full account of “principal” flows. When reporting, countries would need to specify the coefficients used for the amounts disbursed to developing countries.

Two biodiversity-specific activity codes (biodiversity and biosphere protection) have the ‘principal’ score of the Rio marker assigned by default (hence would be accounted in full). Additional information might be available through activities reported to SDGs 14 and 15. When looking at complementary data based on the SDGs 14 and 15, TOSSD represents a better source of information because the reporting is part of the eligibility criteria (at the target level) and therefore better reported and verified by reporters and the Secretariat. Contrary to what happens in TOSSD, the reporting on the SDG focus of ODA flows is voluntary in the CRS and the coverage is lower.

2. **Options for multilateral institutions (should a specific indicator be created for multilateral institutions to report separately and voluntarily on their biodiversity-related outflows):**

- A multilateral institution may report biodiversity-related outflows, either using Rio marker data reported to the OECD, applying the same methodology as explained above for bilateral providers of development co-operation.
- A multilateral institution may report biodiversity-related outflows applying other methods, as long as the outflows captured target the objectives of the CBD (in line with the OECD DAC Rio marker definition).

As noted earlier, the figures of multilateral flows would need to be presented separately from those of bilateral flows, to avoid double counting (except for multi-bi flows, which can be accounted for by bilateral providers). This would require developing a separate complementary indicator for multilateral institutions.

5c. Data collection method

Depending on the reporting option selected by the country/institution, data may be collected through information already reported to the OECD DAC Secretariat and the Secretariat of the International Forum on TOSSD:

- The OECD DAC Secretariat collects individual aid activities on ODA and OOF in the Creditor Reporting System (CRS) via annual reporting tables compiled by national statistical reporters (in aid agencies, ministries of foreign affairs, etc).
- The Secretariat of the International Forum on TOSSD also collects activity-level information on support for sustainable development, including South-South and triangular Cooperation flows, through annual reporting tables filled by national statistical reporters, for inclusion in the TOSSD database.

Alternatively, a country/institution may report independently from these data collection methods, ensuring international comparability.

5d. Accessibility of methodology

Countries and institutions reporting via the OECD databases can refer to:

- Methodology on the Rio marker for biodiversity, available here: https-J/one.oecd org/document/DCD/DAC/STAT(2023)9/.. (Annex 20).
- Information on the OECD DAC CRS itself is available here: https-J/one oecd org/document/DCD/DAC/STAT(2020)44
- The TOSSD methodology (reporting instructions) is available here: https://www.tossd.org/docs/reporting-instructions.pdf

For other countries/institutions, reported data needs to ensure international comparability and the use of these methodological guidelines, notably on what constitutes international public finance for biodiversity (i.e. flows targeting the CBD objectives, as per the Rio marker definition).

5e. Data sources

The OECD/DAC collects data on official resource flows through the Creditor Reporting System (CRS) (CRS data are considered complete from 1995 for commitments at an activity level and 2002 for disbursements). The Rio marker for biodiversity was introduced in 2002 and tracking against the SDGs was introduced in 2018. The data are provided by 32 DAC donors, 17 other bilateral providers of development cooperation and 64 multilateral organisations.

The CRS also includes non-ODA information, e.g. Other Official Flows from bilateral donors, private flows from philanthropic institutions providing development finance for biodiversity, and private finance flows mobilised through public interventions (e.g. using guarantees or other forms of finance, including blended finance). Some of this information may be useful for CBD Parties when reporting to indicator 19 D.3 on private finance for biodiversity.

TOSSD is a data source complementary to the CRS (see method of computation section) for providers that do not report on ODA/OOF, particularly South-South and triangular co-operation providers, that do not use the biodiversity Rio marker, or that report additional biodiversity-related activities (e.g. to developing countries not eligible to receive ODA/OOF). As such, TOSSD measures all official resources flowing into developing countries for their sustainable development, distinguishing between cross-border flows (pillar I) and global and regional expenditures, including for international public goods (pillar II). An activity is deemed to support sustainable development if it directly contributes to at least one SDG target and if no substantial detrimental effect is anticipated on one or more of the other targets. TOSSD data are available at the activity level from 2019. TOSSD includes data from 128 bilateral and multilateral providers.

5f. Availability and release calendar

Availability: In the CRS, the Rio marker on biodiversity was introduced in 2002, with improvements in reporting over time. Additional information is available through the SDGs, purpose codes and keyword searches. TOSSD data is available since 2019. Both TOSSD and CRS are reported yearly. In TOSSD, the Rio markers do not exist and identification can be made using the SDGs, sector codes and keywords.

Provisional data classification: Tier I

Release Calendar: On an annual basis.

5g. Time series

The CRS data are available since 1995 for commitments on an annual basis. The Rio marker on biodiversity is available since 2002. TOSSD data are available on an annual basis since 2019.

5h. Data providers

Countries and institutions (provided a separate indicator is approved) are providers of biodiversity-related international public flows. This data can be reported directly to the CBD or through data already collected by the OECD and the International Forum on TOSSD.

A statistical reporter is responsible for the collection of CRS and/or TOSSD data in each providing country/agency/institution. This reporter is usually located in the national aid agency, Ministry of Foreign Affairs or Finance etc.

The OECD Secretariat, in consultation with countries, validates the CRS data before they are published online; while the Secretariat of the International Forum on TOSSD does the same for TOSSD data.

5i. Data compilers

Data will be compiled by the CBD Secretariat building upon individual country/institution reports and on data already reported to the OECD Development Co-operation Directorate and the Secretariat of the International Forum on TOSSD.

5j. Gaps in data coverage

In the CRS, providers beyond the OECD DAC membership do not systematically report using the biodiversity Rio marker. For these providers, information may therefore be available with Rio marker data, or not. In which case, it may be better to use TOSSD data. If the country does not report on TOSSD, project-level descriptions, where a keyword search can be performed by the OECD, can provide biodiversity-related information.

For DAC members, the main data gap relates to OOF. In addition some modalities, such as debt relief operations or general budget support, are also not tracked through the Rio marker system (except debt-for-nature swaps). Work is on-going to increase the coverage of the indicator in relation to biodiversity-related finance beyond ODA from OECD DAC members.

Available data includes information on other dimensions that cut across with biodiversity objectives, including gender, the intersection with other Rio markers (climate change adaptation and mitigation, desertification), or capacity development type of activities (e.g. technical assistance, scholarships, etc) and the development, transfer, dissemination and diffusion of technology. For other issue areas (e.g. capturing specific sub-themes such as the participation of indigenous peoples and local communities (IPLCs) and youth), keyword searches can be performed by the OECD or activities may be reported by countries, until a systematic method is identified to track such flows.

In TOSSD, the coverage in terms of providers is wider, although the Rio marker methodology does not exist. Biodiversity related activities can be reported through the SDG focus field or biodiversity-related sector codes. For TOSSD, reporting on the SDG focus field was challenging in the first year of data collection in 2019, but the use of the code has steadily improved in coverage and quality since then, and the number of South-South and triangular co-operation providers is growing over time.

Multilateral institutions report to the OECD on a voluntary basis but do not all use the biodiversity Rio marker or comprehensively indicate their biodiversity-related outflows. This data can be estimated through their reporting on the SDGs or purpose codes, or the use of keyword searches. A more robust breakdown of multilateral flows would be possible through the direct identification and reporting of biodiversity-related flows to the OECD, provided these flows aim at targeting the objectives of the CBD. Multilateral institutions report in the CRS activities financed with their core budget (while earmarked activities are attributed to bilateral donors) and in the TOSSD framework biodiversity-related activities financed with both the core budget and earmarked contributions (both ODA and beyond ODA-related).

5k. Treatment of missing values

Countries (and should an indicator be developed, multilateral institutions) are responsible for the compilation and reporting of their biodiversity-related public international finance to the CBD. They need to ensure avoiding missing values, as well as enabling international comparability of their reported flows, using this metadata sheet as guidance. Countries (and institutions) may decide to report data through the OECD DAC CRS and TOSSD databases.

6. Scale

6a. Scale of use

Scale of application (please check all relevant boxes):

Global: ☒ Regional: ☒ National☒

Scale of data disaggregation/aggregation: Activity/project level

- Global/ regional scale indicator can be disaggregated to national level: ☒
- National data is collated to form global indicator: ☒

The indicator is available for use at the national, regional and global level. It should be noted that local and national data on each species are compiled to undertake global Red List assessments of each species, and it is these that are used to generate the global index, disaggregated to national indices.

6b. National/regional indicator production

The DAC statistical Reporting Directives govern the reporting of DAC statistics and are reviewed and agreed by the DAC Working Party of Development Finance Statistics (WP-STAT), see: https://one.oecd.org/document/DCD/DAC/STAT(2020)44... (Annex 20). The International Forum on TOSSD governs the reporting of TOSSD statistics.

6c. Sources of differences between global and national figures

DAC and TOSSD statistics are standardised on a calendar year basis for all providers and may differ from fiscal year data available in budget documents for some countries. Some countries and institutions provide more comprehensive information than others.

6d. Regional and global estimates & data collection for global monitoring

6d.1 Description of the methodology

Data are reported at a country / multilateral institution level

6d.2 Additional methodological details

N/A

6d.3 Description of the mechanism for collecting data from countries

Data are reported via an annual questionnaire (at an aggregate level and at an activity level) by national statistical reporters in aid agencies, ministries of foreign affairs, etc.

7. Other MEAs, processes and organisations

7a. Other MEA and processes

Sustainable Development Goal (SDG) goal 15

7b. Biodiversity Indicator Partnership

Yes: ☒ No: ☐

https://www.bipindicators.net/indicators/official-development-assistance-provided-in-support-of-the-convention

8. Disaggregation

This indicator could be disaggregated by:

- Recipient country (or region, including for Small Island Developing States, Least Developed Countries or fragile contexts)
- Income group
- Type of finance
- Type of aid
- Sector and sub sector
- Policy marker or cross-cutting issues (e.g. climate change adaptation or mitigation, gender, IPLCs, youth)
- Capacity building and development, and technical and scientific cooperation
- Development, transfer, dissemination and diffusion of technology
- Channel of delivery

Additional complementary indicators would be needed to have further information available (e.g. on IPLCs or youth). Countries and institutions may be interested in disaggregating further along other variables.

9. Related goals, targets and indicators

N/A

10. Data reporter

10a. Organisation

For countries and institutions wishing to use the OECD databases, the OECD DAC Secretariat or the International TOSSD Forum would have the databases from which to source the information. Otherwise, the country or institution would be the data reporter.

10b. Contact person(s)

CRS (Juan.CASADOASENSIO@oecd.org)
CRS (Giorgio.GUALBERTl@oecd.org)
TOSSD (Marisa.BerbegalIbanez@oecd.org)
OECD CBD Focal Point (Katia.KAROUSAKIS@oecd.org)

11. References

A CRS glossary with key terms and concepts is available here: https://www.oecd.org/dac/dac-glossary.htm

References

OECD (2023), Biodiversity and development finance 2015-2021, Progress towards Target 19 of the Kunming-Montreal Global Biodiversity Framework, https://www.oecd.org/dac/biodiversity-development-finance-target19-2015-2021.pdf
OECD (2023), A decade of development finance for biodiversity, 2011-2020,https://www.oecd-ilibrary.org/development/a-decade...
OECD (2018), Review of the definition and eligibility criteria for the Rio Marker for Biodiversity, https·//one oecd org/document/DCD/DAC/SJAI(2018)25

12. Graphs and diagrams

N/A

GBF indicator metadata: D.2 Domestic public funding on conservation and sustainable use of biodiversity and ecosystems

1. Indicator name

D.2 Domestic public funding on conservation and sustainable use of biodiversity and ecosystems**.**
Note: Monetary value of domestic public expenditure on biodiversity per year in national currency.

2. Date of metadata update

March 2024

3. Goals and Targets addressed

3a. Goal

Headline Indicator for **Goal D** Adequate means of implementation, including financial resources, capacity-building, technical and scientific cooperation, and access to and transfer of technology to fully implement the Kunming-Montreal Global Biodiversity Framework are secured and equitably accessible to all Parties, especially developing country Parties, in particular the least developed countries and small island developing States, as well as countries with economies in transition, progressively closing the biodiversity finance gap of $700 billion per year, and aligning financial flows with the Kunming-Montreal Global Biodiversity Framework and the 2050 Vision for biodiversity.

3b. Target

Headline indicator for **Target 19** Substantially and progressively increase the level of financial resources from all sources, in an effective, timely and easily accessible manner, including domestic, international, public and private resources, in accordance with Article 20 of the Convention, to implement national biodiversity strategies and action plans, mobilizing at least $200 billion per year by 2030, including by:

(a) Increasing total biodiversity related international financial resources from developed countries, including official development assistance, and from countries that voluntarily assume obligations of developed country Parties, to developing countries, in particular the least developed countries and small island developing States, as well as countries with economies in transition, to at least $20 billion per year by 2025, and to at least $30 billion per year by 2030;

(b) Significantly increasing domestic resource mobilization, facilitated by the preparation and implementation of national biodiversity finance plans or similar instruments according to national needs, priorities and circumstances;

(c) Leveraging private finance, promoting blended finance, implementing strategies for raising new and additional resources, and encouraging the private sector to invest in biodiversity, including through impact funds and other instruments;

(d) Stimulating innovative schemes such as payment for ecosystem services, green bonds, biodiversity offsets and credits, and benefit sharing mechanisms, with environmental and social safeguards;

(e) Optimizing co-benefits and synergies of finance targeting the biodiversity and climate crises;

(f) Enhancing the role of collective actions, including by indigenous peoples and local communities, Mother Earth centric actions and non-market-based approaches including community based natural resource management and civil society cooperation and solidarity aimed at the conservation of biodiversity;

(g) Enhancing the effectiveness, efficiency and transparency of resource provision and use.

4. Rationale

Draft Goal D relates to the means of implementation for the post-2020 global biodiversity framework.
The post-2020 global biodiversity framework will need to be implemented primarily through activities at the national and/or subnational levels, with supporting and/or enabling action at the regional and global levels. However, the capacity for implementing the Convention in terms of human, technical and financial resources is limited in most countries, especially in developing countries, in particular the least developed countries and small island developing States, as well as countries with economies in transition. Reaching the 2050 Vision for biodiversity will require that the necessary means of implementation are available to enable Parties and stakeholders to undertake the necessary actions.
Target 19 refers to an increase of resources for biodiversity from all sources, including international, national, public and private. Target 19 (b) refers to domestic funding aiming at monitoring over time the trend in mobilizing resources for the implementation of the GBF. Inadequate funding levels are a major impediment to effective biodiversity conservation in many countries and may be associated with failures

to meet global targets. Conservation investment has been demonstrated to reduce biodiversity loss. Spending on biodiversity provides a very high social return on investment. Thus, while increased biodiversity resource mobilization from all sources is not only necessary to reduce, halt and reverse biodiversity loss (i.e.to bend the curve on biodiversity loss) it is also likely to generate net economic benefits for both present and future generations. Current global biodiversity finance is of the order of $100 billion per year, while estimates of funding needs for a comprehensive post 2020 global biodiversity framework are of the order of $800 billion per year, giving a funding gap of the order of $700 billion per year. This indicator will provide information on domestic resource mobilization at the national level based on a bottom-up approach, useful for global and regional assessments.

The rationale for domestic public expenditure on biodiversity conservation is firmly grounded in the fundamental importance of this tool for preserving nature and ensuring the health and functionality of ecosystems. Currently, domestic public expenditure represents the predominant share of global financial resources allocated to the protection of biodiversity. This financial commitment reflects a national dedication to maintaining ecological balance, fostering resilience in ecosystems, and promoting the responsible use of natural resources within the country's borders. Moreover, it constitutes a tangible contribution to achieving international conservation goals and emphasizes a commitment to environmental stewardship for the well-being of both present and future generations.

5. Definitions, concepts and classifications

5a. Definition:

The following definitions can be used to identify biodiversity expenditures:

UNDP’s Biodiversity Finance Initiative (BIOFIN) defines biodiversity national expenditures: A “biodiversity expenditure” is any expenditure whose purpose is to have a positive impact or to reduce or eliminate pressures on biodiversity. These biodiversity public expenditures include “direct” expenditures that have biodiversity as their principal purpose, or ‘*causa finalis’*, as well as “indirect” expenditures that have biodiversity as their secondary or joint purpose.

In terms of the categories, BIOFIN uses nine categories for recording primary and secondary expenditures: (1) Biodiversity awareness and knowledge, (2) Green economy, (3) Pollution management, (4) Sustainable use, (5) Biosafety, (6) Protected areas and OECM, (7) Restoration, (8) Access and benefit sharing, and (9) Biodiversity and development planning and finance.

The Classification of Environmental Purposes (CEP[20]) is an international statistics standard. It was adopted by the UN Statistical Commission in March 2024 and replaces the Classification of Environmental Protection Activities (CEPA; UN, 2000). It will be used for SEEA accounts, i.e., classifying activities, products, expenditure and other transactions related to environmental protection and management of natural resource (e.g. environmental protection and expenditure accounts [EPEA]). The most relevant “Division” (first level of disaggregation) for biodiversity is Division 05 Soil, surface and groundwater, biodiversity and forest. This covers activities, expenditures and products aimed at protection and remediation of soil and water, biodiversity and forests.

Division 05 is disaggregated into the following “groups” (level 2): 501 Protection of soil, surface and groundwater, 502 Protection of biodiversity and landscape, 503 Management of forest resources. The Group 502 Protection of biodiversity and landscapes covers activities, expenditures and products aimed at protecting and replenishment of wild fauna and flora, safeguarding and restoring their habitats, ecosystems of which they are part, natural or semi-natural terrestrial, marine and other aquatic ecosystems. Such activities, measures and products are included regardless of the type of areas involved (terrestrial, freshwater incl. wetlands, and marine areas) and whether they occur in areas which are classified as protected areas. Groups are further disaggregated into classes (level 3)

For further detail on the definitions of the other categories, see the CEP document.

The Classification of the Functions of Government (COFOG) COFOG was developed in 1999 by the OECD and published by the UN Statistical Division as an international statistical standard for classifying the purposes (functions) of government activities. It classifies government expenditure data from the System of National Accounts by the purpose for which the funds are used. The first-level COFOG splits expenditure data into ten “functional” groups or sub-sectors of expenditures, and second-level COFOG further splits each first-level group into up to nine sub-groups. Group 5.4: “Protection of Biodiversity and Landscape” covers activities relating to the protection of fauna and flora species (including the reintroduction of extinct species and the recovery of species menaced by extinction), the protection of habitats (including the management of natural parks and reserves) and the protection of landscapes for their aesthetic values (including the rehabilitation of damaged landscapes to improve their aesthetic value). COFOG data can be used in the development of EPEA.

Note: international funding should not be accounted under D.2, even ODA that flows through national budgets.

5b. Method of computation

Countries will report the monetary value of domestic public expenditure in national currency per year during the CBD national reporting cycle.

Data should come directly from countries. Countries should include in their report what the reported expenditure includes, and which methodology and/or statistical framework has been used.

Developing country Parties should exclude from the reporting on domestic expenditures for biodiversity those flows that were supported by developed country Parties, or other providers of international public finance, such as multilateral institutions, or international private finance, such as private philanthropy (these flows are captured through the D.1 and D.3 indicators, respectively).

The reporting template will provide a dropdown menu for countries to select which data source and/or methodology was used to report for this headline indicator, including but not limited to the following:

BIOFIN: UNDP’s Biodiversity Finance Initiative (BIOFIN) developed a methodology providing guidance to estimate national expenditures for biodiversity; these included public, NGOs and donors. For the purpose of reporting on D2, countries will only report on public funding. The methodology focuses on recording primary and secondary expenditures in nine categories; for the latter, BIOFIN uses attribution rates to account for positive impact on biodiversity. These categories: (1) Biodiversity awareness and knowledge, (2) Green economy, (3) Pollution management, (4) Sustainable use, (4) Biosafety, (5) Protected areas and OECM, (6) Restoration, (7) Access and benefit sharing, and (9) Biodiversity and development planning and finance. It is highly recommended to report on expenditures and not planned budget.

CEP: The Classification of Environmental Purposes (CEP) will be used for SEEA accounts, i.e. classifying activities, products, expenditure and other transactions related to environmental protection and management of natural resource. The most relevant division is: 5 Soil, surface and groundwater, biodiversity and forest which encompasses 501 Protection of soil, surface and groundwater, 502 Protection of biodiversity and landscape, 503 Management of forest resources. A share of expenditure classified in other divisions may also be considered biodiversity relevant. Countries should indicate in their reporting which divisions/groups they have included and what, if any, coefficient they have applied (i.e. what share of expenditure they have counted as biodiversity expenditure).

Please note that CEP is an international statistical classification system which is replacing CEPA. The 27 EU countries are required to develop and report data from environmental protection and expenditure accounts (EPEA). The EPEA have been classified according to the CEPA and from 2025 should be classified according to the new CEP. The CEP is the first statistical classification of activities or products that allows mapping to “policy areas” such as for biodiversity (as well climate change mitigation, circular economy, etc.). It therefore allows for SEEA-based applications for those policy areas (see the Annex of the CEP for further detail). The CEP can also be used, for example, in biodiversity budget tagging.

COFOG: Under COFOG, governments code each purchase, wage payment, transfer, loan disbursement or other outlay under one of ten divisions, according to the primary function or purpose that the transaction serves. Each of these divisions is then broken down into groups, which, in turn, are subdivided into classes. Expenditure for which environmental protection is the primary purpose (irrespective of the sector) are coded under Division 5, Environment Protection. Activities relating to the protection of fauna and flora species (including the reintroduction of extinct species and the recovery of species menaced by extinction), the protection of habitats (including the management of natural parks and reserves) and the protection of landscapes for their aesthetic values (including the rehabilitation of damaged landscapes to improve their aesthetic value) are coded under Group 5.4: Protection of Biodiversity and Landscape. COFOG does not capture sustainable use activities.

5c. Data collection method

Data will be reported directly from countries through the CBD Secretariat through the national reporting cycles.

5d. Accessibility of methodology

UNDP-BIOFIN:

- https://www.biofin.org/sites/default/files/content/publications/workbook_2018/
- https://www.biofin.org/biofin-around-world

CEP:

- https://unstats.un.org/UNSDWebsite/statcom/session_55/documents/BG-4e-CEP-E.pdf
- CEP is a classification system (replacing the CEPA and the CREMA in March 2024) used to classify data according to the SEEA. For 27 EU Members States, data are reported to EUROSTAT.

COFOG (COFOG is both a classification system and a database)

- https://data.imf.org/?sk=5804c5e1-0502-4672-bdcd-671bcdc565a9

5e. Data sources

Primarily derived from government records (national budgets and accounts) on public expenditures, and when available regional/multilateral databases e.g., Eurostat.

5f. Availability and release calendar

Reporting will follow CBD's national reporting cycle.

5g. Time series

The baseline for countries to report 2020 onwards, and should follow the CBD national reporting timeline.

5h. Data providers

Countries through national reports to the CBD, Statistical offices or Ministries of Finance preferably or Ministers of Environment.

5i. Data compilers

CBD Secretariat through country national reporting.
EUROSTAT, OECD and IMF for COFOG
EUROSTAT and OECD for EPEA
UNDP-BIOFIN (Compiles data but does not have a database)

5j. Gaps in data coverage

Each of the methodologies or systems of classification available have gaps and challenges, mainly:
None of these are applied by all CBD Parties, they differ in relation to what each methodology or framework considers as biodiversity expenditures.

COFOG: Based on primary purposes, covering "biodiversity and landscape protection". It does not capture sustainable use activities. It is an international statistical classification system. While COFOG has global coverage, not all countries disaggregate data on expenditure on environment protection. Data on biodiversity and landscape protection are available for 59 countries (2020).

EPEA: Not all countries have developed an EPEA according to the SEEA framework. The 27 EU countries are required to develop an EPEA and these statistics are compiled by Eurostat. EPEA from OECD countries are compiled by the OECD. The EPEA have been classified according to the CEPA and from 2025 should be classified according to the new CEP. The CEP is the first statistical classification of activities or products that allows mapping to "policy areas" including for biodiversity, climate change mitigation and circular economy, etc. It therefore allows for SEEA-based applications for those policy areas (see the Annex of the CEP for further detail). CEP is based on primary purposes, covering biodiversity protection and resource management.

BIOFIN: Based on primary and secondary purposes, covering a wide range of activities related to the conservation and sustainable use of biodiversity. It has been used by 41 countries.

5k. Treatment of missing values

N/A

6. Scale

6a. Scale of use

Scale of application (please check all relevant boxes):

Global: ☐ Regional: ☐ National☒

Scale of data disaggregation/aggregation:

- Global/ regional scale indicator can be disaggregated to national level: ☐
- National data is collated to form global indicator: ☐

6b. National/regional indicator production

N/A

6c. Sources of differences between global and national figures

N/A

6d. Regional and global estimates & data collection for global monitoring

NA

7. Other MEAs, processes and organisations

7a. Other MEA and processes

N/A

7b. Biodiversity Indicator Partnership

Yes: ☐ No: ☒

8. Disaggregation

N/A

9. Related goals, targets and indicators

Target 18.1 Positive incentives in place to promote biodiversity conservation and sustainable use.
Target 19.
Goal D.1 International public funding, including official development assistance (ODA) for conservation and sustainable use of biodiversity and ecosystems

10. Data reporter

10a. Organisation

N/A

10b. Contact person(s)

N/A

11. References

N/A

12. Graphs and diagrams

N/A

GBF indicator metadata: D.3 Private funding (domestic and international) on conservation and sustainable use of biodiversity and ecosystems

1. Indicator name

D.3 Private funding (domestic and international) on conservation and sustainable use of biodiversity and ecosystems

Disaggregation of the headline indicator:

- International Private Philanthropy for development*
- Private finance mobilised by official development finance for biodiversity*
- Biodiversity offsets*
- Payments for Ecosystem Services*
- Domestic Private Donations
- Sustainable Commodities
- Private benefit sharing schemes
- Other instruments

All monetary values are to be reported in national currency.

Countries should ensure the methodologies used for potential “other instruments” do not double count with previous categories (for instance, biodiversity-relevant bonds and impact investing with sustainable commodities).

Elements marked with * have a methodology available.

2. Date of metadata update

March 2024

3. Goals and Targets addressed

3a. Goal

Headline Indicator for **Goal D** Adequate means of implementation, including financial resources, capacity-building, technical and scientific cooperation, and access to and transfer of technology to fully implement the Kunming-Montreal Global Biodiversity Framework are secured and equitably accessible to all Parties, especially developing country Parties, in particular the least developed countries and small island developing States, as well as countries with economies in transition, progressively closing the biodiversity finance gap of $700 billion per year, and aligning financial flows with the Kunming-Montreal Global Biodiversity Framework and the 2050 Vision for biodiversity.

3b. Target

Headline indicator for **Target 19** Substantially and progressively increase the level of financial resources from all sources, in an effective, timely and easily accessible manner, including domestic, international, public and private resources, in accordance with Article 20 of the Convention, to implement national biodiversity strategies and action plans, mobilizing at least $200 billion per year by 2030, including by:

(a) Increasing total biodiversity related international financial resources from developed countries, including official development assistance, and from countries that voluntarily assume obligations of developed country Parties, to developing countries, in particular the least developed countries and small island developing States, as well as countries with economies in transition, to at least $20 billion per year by 2025, and to at least $30 billion per year by 2030;

(b) Significantly increasing domestic resource mobilization, facilitated by the preparation and implementation of national biodiversity finance plans or similar instruments according to national needs, priorities and circumstances;

(c) Leveraging private finance, promoting blended finance, implementing strategies for raising new and additional resources, and encouraging the private sector to invest in biodiversity, including through impact funds and other instruments;

(d) Stimulating innovative schemes such as payment for ecosystem services, green bonds, biodiversity offsets and credits, and benefit sharing mechanisms, with environmental and social safeguards;

(e) Optimizing co-benefits and synergies of finance targeting the biodiversity and climate crises;

(f) Enhancing the role of collective actions, including by indigenous peoples and local communities, Mother Earth centric actions and non-market-based approaches including community based natural resource management and civil society cooperation and solidarity aimed at the conservation of biodiversity;

(g) Enhancing the effectiveness, efficiency and transparency of resource provision and use.

4. Rationale

Draft Goal D relates to the means of implementation for the post-2020 global biodiversity framework. The post-2020 global biodiversity framework will need to be implemented primarily through activities at the national and/or subnational levels, with supporting action at the regional and global levels. However, the capacity for implementing the Convention in terms of human, technical and financial resources is limited in most countries, especially in developing countries, in particular the least developed countries and small island developing States, as well as countries with economies in transition. Reaching the 2050 Vision for biodiversity will require that the necessary means of implementation are available to enable Parties and stakeholders to undertake the necessary actions.

Inadequate funding levels are a major impediment to effective biodiversity conservation in many countries and may be associated with failures to meet global targets. Conservation investment has been demonstrated to reduce biodiversity loss. Spending on biodiversity provides a very high social return on investment. Thus, while increased biodiversity resource mobilisation from all sources is not only necessary to reduce, halt and reverse biodiversity loss (Le.to bend the curve on biodiversity loss) it is also likely to generate net economic benefits for both present and future generations. Current global biodiversity finance is of the order of USD 100 billion per year, while estimates of funding needs for a comprehensive post 2020 global biodiversity framework are of the order of USD 800 billion per year, giving a funding gap of the order of USD700 billion per year. This indicator will monitor the extent to which the gap between available financial resources and those necessary to achieve the 2050 Vision, is closed.

This indicator aims to quantify total international and domestic private finance flows with biodiversity objectives. It includes international and domestic private philanthropy with biodiversity objectives, and to the extent that data is available, private funding for non-philanthropic investments in biodiversity.

Private philanthropy is one source of finance for biodiversity conservation and sustainable use. Often these investments in biodiversity do not offer a financial return and therefore are not attractive to the private sector seeking to maximise their profits. While the private sector plays a pivotal role in investing in the sustainable use of biodiversity as part of a broader strategy to mitigate risk and build corporate resilience and reputation, private philanthropy can invest in the protection and preservation of biodiversity and ecosystems for the greater benefits to society without necessarily having a financial return. Measuring private philanthropy finance therefore captures one element of private financial flows towards the protection of biodiversity.

While private philanthropy plays an important role in mobilising finance for biodiversity, non-philanthropic funds are critical to achieve biodiversity-related outcomes in the private sector. Through economic expenditures such as the purchase of biodiversity offsets as part of a mitigation hierarchy strategy, the purchase of nature-based carbon offsets in a greenhouse gas mitigation strategy, the payment for ecosystem services as a risk reduction and cost saving strategy, and investments in natural resource-based supply chains that adhere to sustainability standards, private entities can direct their expenditures to contributions related to biodiversity. In addition to these economic expenditures, financial markets play an equally important role in directing their capital investments towards those in which positive impacts on nature are intended, alongside financial returns.

While a robust dataset to measure and report on all streams of private finance for biodiversity is not readily available, this methodology draws on a variety of available resources for countries to quantitatively report on private finance for biodiversity, depending on their national circumstances.

5. Definitions, concepts and classifications

5a. Definition:

The indicator measures, where information is available, international and domestic private finance for biodiversity conservation and sustainable use. The total amount of private finance captured by this indicator is composed of

International private philanthropy from foundations for development includes foundations reporting their data on grants and program/mission-related investments to the Creditor Reporting System (CRS) of the OECD Development Assistance Committee (DAC). Philanthropic finance targeting the objectives of the CBD is tracked using the Rio marker for biodiversity (scores “principal” or “significant”) or in specific cases other available statistical tools

Private finance mobilised by official development finance includes data reported to the Creditor Reporting System (CRS) of the OECD Development Assistance Committee (DAC) by bilateral and multilateral development finance providers using leveraging mechanisms to attract private investors such as guarantees, syndicated loans, shares in collective investment vehicles, direct investment in companies / SPVs, credit lines, simple co-financing arrangements, project finance schemes and, in some cases, technical assistance. Since data on mobilised private finance data is collected at the activity level, biodiversity-related data can be fetched through the use of purpose codes and keyword searches. For multilateral organisations, only aggregates can be disclosed to the public for confidentiality reasons

Domestic private donations include funding to implement conservation programs with no financial return. This class of funding includes only those revenues generated from individual donations, corporate grants, and investment income (which could be channeled through non-governmental organizations), and excludes revenue received from international private philanthropy from institutionalized philanthropic organizations and from public sources to reduce the risk of double counting.

Biodiversity offsets are “measurable conservation outcomes resulting from actions designed to compensate for significant residual adverse biodiversity impacts arising from project development after appropriate prevention and mitigation measures have been taken.”(BBOP 2018). They are usually under a no net loss or a net gain objective. There are three main types of biodiversity offsets: 1. One-off biodiversity offsets; 2. payments in-lieu and 3. biobanking

Payments for ecosystem services (PES) is a voluntary transaction between ecosystem service users and service providers that are conditional on agreed rules of natural resource management for generating offsite services (Wunder, 2015). Ecosystem service providers and users may be individuals, companies or aggregations of actors. In some cases, a government may act on behalf of users

Sustainable supply chains refer to nature-based commodities such as harvested wood products, agricultural goods, palm oil, and seafood that have obtained certification through an established sustainability standard such as the Forest Stewardship Council, USDA/EU Organic, or Roundtable on Sustainable Palm Oil. These certified products adhere to standards by employing methods to sustainably utilize natural resources that do not deplete biodiversity. Alternatively, countries may elect to implement their own definition of ‘sustainable supply chains’, for instance through alignment with biodiversity-relevant taxonomies, that do not align with established sustainability standards, so long as the definition and methodology for calculation are consistent and transparent

Private benefit sharing schemes refers to programs that channel private funding from the users of genetic resources to the people and communities providing the genetic resources

Other instruments include debt and equity instruments, insurance schemes, and other biodiversity-relevant financial instruments the country wishes to report on. As financial markets evolve rapidly, this list is not intended to be exhaustive, and countries are encouraged to report on innovative finance mechanisms being deployed in their country targeted towards biodiversity-related activities

5b. Method of computation

Countries will report the monetary value of domestic public expenditure in national currency per year during the CBD national reporting cycle.

Options for the Secretariat for global indicators

- *International Private Philanthropy*: The Secretariat can compute biodiversity-related international private philanthropic flows for biodiversity at the global level, drawing on the OECD Creditor Reporting System (CRS). Data is available in gross disbursements and commitments and in current and constant prices, USD. Biodiversity-related activities can be tracked based on sector/purpose codes, SDG focus and the Rio marker on biological diversity, or keyword search in the description fields

- *Private finance mobilized by official development finance* The Secretariat can compute biodiversity-related private finance mobilized by official development finance at the global level, drawing on the OECD Creditor Reporting System. Mobilised private finance can be tracked based on sector/purpose codes and a keyword search in the description fields in the Creditor Reporting System (CRS) of the OECD Development Assistance Committee (DAC)
- *Private finance from biodiversity offsets and PES:* The Secretariat can compute private finance from biodiversity offsets and payments for ecosystems services drawing on the OECD PINE database

Options for countries for national reporting

- *International Private Philanthropy:* A country can compute their international biodiversity-related philanthropic flows by using the DAC Creditor Reporting System based on the amount of flows to their country as a recipient of philanthropic finance. The indicator could be calculated as the sum of all philanthropic activities marked for biodiversity with either the principal or significant score, or countries could apply an attribution score to funding where biodiversity was a significant objective rather than the principal objective
- *Domestic private contributions:* Countries may be able to collect private funding from domestic donations and contributions using other sources, for example from tax filings, other charities/initiatives that publish open and standardized grants data, from each organization's publicly available information such as annual/financial reports, and from surveys collecting information directly. These domestic private donations may flow through conservation non-governmental organizations, or they may be household investments in property and land that benefit biodiversity . Caution should be exercised to deduct from the conservation NGO's spending any financial resources received from public entities, international private philanthropic foundations already reporting to the OECD CRS, and financial resources received from domestic public entities that have been reported under D1, if those funds are accounted for separately using either the Secretariat-calculated global option or the national reporting option for flows to recipient country.
- *Sustainable Commodities:* Countries may select a methodology for reporting on the biodiversity-related expenditures for sustainably produced nature-based commodities that are domestically produced. Countries must only attribute the proportion of the market value of sustainably-produced commodities that has been invested in biodiversity conservation actions. One example of a methodology employed in global estimates of private funding for biodiversity is the assumption, based on findings from the forestry sector, that 1-1.5 percent of the certified commodity market is invested in biodiversity-related actions. Countries may elect to report on a select number of commodities with available data to provide an estimation of the contribution to biodiversity deriving from this commodity following this same methodology.
- *Payments for Ecosystem Services and Biodiversity Offsets:* Countries may report on biodiversity offsets and payments for ecosystem services as reported to the OECD Policy Instruments for Environment (PINE) database, if such figures have been reported, or else report directly to the CBD. If the country has not reported to the OECD's PINE database, a country may derive estimates for private funding for PES schemes and biodiversity offsets by employing other data collection methods, such as through direct outreach and publicly available information.
- *Private benefit sharing schemes:* requires guidance for computation
- *Other instruments:* Countries may report on other instruments based on a consistent, transparent and robust methodology. Countries should ensure said methodology does not lead to double counting with previous categories (for instance, biodiversity-relevant bonds and impact investing with sustainable commodities)

Alternative options for countries for national reporting

Countries may alternatively report on private domestic funding from their Environmental Protection Expenditure Accounts, established following the System of Environmental Economic Accounting framework, for private expenditures, if such accounts have been implemented

Countries may alternatively report on private funding collected through existing biodiversity expenditure reviews as part of participation in the UNDP's Biodiversity Finance Initiative, or alternative initiatives to collect private funding for biodiversity.

5c. Data collection method

Depending on the reporting option selected by the country, data may be collected through information already reported to the OECD DAC Secretariat, with data collection methods described below. All other data collection will occur at the national level based on the approaches described in the previous section

- *Private Philanthropy for development.* The OECD DAC Secretariat collects individual aid activities on private philanthropy for development in the Creditor Reporting System (CRS) via annual collection directly from private foundations
- *Private finance mobilized by official development finance interventions.* As part of the Creditor Reporting System (CRS), the OECD DAC Secretariat has been collecting data on private finance mobilized by bilateral and multilateral providers since 2012. While data are collected at the activity level from all providers, they are not disclosed to the public at the same level of disaggregation due to confidentiality constraints (e.g. multilateral development banks)
- For the case of private funding for biodiversity offsets and PES collected in the OECD PINE database, see the metadata sheet on 18.1. The OECD PINE database also collects data on the finance mobilized by positive incentives

5d. Accessibility of methodology

Countries reporting via the OECD database can refer to

- Methodology on the Rio marker for biodiversity, available here: https://one.oecd.org/document/DCD/DAC/STAT(2023)9/ADD2/final/en/pdf (Annex 20).
- Information on the OECD DAC CRS itself is available here: https://one.oecd.org/document/DCD/DAC/STAT(2023)9/FINAL/en/pdf
- Information on private philanthropy for development is available here: https://www.oecd.org/development/financing-sustainable-development/development-finance-standards/beyond-oda-foundations and https://one.oecd.org/document/DCD/DAC/STAT(2023)9/FINAL/en/pdf
- Information on private finance mobilized by official development finance is available here: oe.cd/mobilisation.
- PINE OECD PINE website, on the about page, regarding methodology.

5e. Data sources

- OECD Creditor Reporting System
- OECD Policy Instruments for Environment database
- Conservation NGO Annual Reports
- Government records
- Publicly available information

5f. Availability and release calendar

N/A

5g. Time series

The CRS data are available since 1996 on an annual basis. The Rio marker on biodiversity is available since 2002

For the OECD PINE database, see the metadata sheet for 18.1

5h. Data providers

Countries and philanthropic foundations provide biodiversity-related international private flows. This data can be reported directly to the CBD or through data already collected and validated by the OECD prior to publishing online.

For the OECD PINE database, see the metadata sheet for 18.1

5i. Data compilers

OECD CRS database

OECD PINE database
CBD Secretariat through country national reporting
EUROSTAT (for the EPEA database, which uses the CEP classification) and National Statistical Offices
UNDP-BIOFIN
Countries through surveys and other available information

5j. Gaps in data coverage

Gaps in the OECD-CRS Database

In the CRS, providers beyond the DAC membership do not systematically report using the biodiversity Rio marker. Multilateral institutions report to the OECD on a voluntary basis but do not all use the biodiversity Rio marker or comprehensively indicate their biodiversity-related outflows. This data can be estimated through their reporting on the SDGs or purpose codes, or the use of keyword searches. A more robust breakdown of multilateral flows would be possible through the direct identification and reporting of biodiversity-related flows to the OECD, provided these flows comply with the definition of the Rio marker on biodiversity (i.e. flows targeting the objectives of the CBD). Multilateral institutions report in the CRS activities financed with their core budget.

Related to private finance mobilized by official development finance, the data may not adequately capture financial flows to projects/interventions where biodiversity may not have been the primary objective, such as investments in agriculture, but have a significant biodiversity benefit. Due to confidentiality concerns, data on private finance mobilized by some official providers (multilateral development banks in particular is only made publicly available at the aggregate level. This work will explore further the available data on private finance mobilized and also address the capacity building needs to improve the biodiversity flagging of the underlying activities

Gaps in the OECD PINE Database

The OECD PINE database includes data from 134 countries. Limited data are available on biodiversity offsets and PES as these instruments have only recently been integrated into PINE. All countries are welcome and encouraged to contribute data, and to disaggregate monetary flows from private and public sectors. The data collection method may result in some reporting bias, as OECD members and active accession countries are likely to report data more regularly. All figures should be interpreted in this context.

Other gaps in data coverage

Datasets on private funding for biodiversity are limited. While the OECD-CRS database captures a significant amount of international biodiversity-related private philanthropy for development, it does not comprehensively capture all other private grants and donations for biodiversity-related activities, such as direct donations by high-net-worth-individuals and smaller private philanthropic foundations. Some private philanthropies also do not wish to report their data to OECD-CRS. In addition, the numerous channels, actors, and instruments for biodiversity conservation funding are not captured in a global dataset that countries can draw on for national reporting. Innovative finance mechanisms for biodiversity are continuously evolving and are not adequately captured in the proposed methodology here given the gaps in identifying, tracking, and reporting on these private financial flows. As new mechanisms and strategies evolve over time, countries are encouraged to track the private financial flows as a result of these efforts

5k. Treatment of missing values

N/A

6. Scale

6a. Scale of use

Scale of application (please check all relevant boxes):

Global: ☒ Regional: ☒ National☒

Scale of data disaggregation/aggregation:

- Global/ regional scale indicator can be disaggregated to national level: ☐
- National data is collated to form global indicator: ☐

6b. National/regional indicator production

N/A

6c. Sources of differences between global and national figures

N/A

6d. Regional and global estimates & data collection for global monitoring

6d.1 Description of the methodology

N/A

6d.2 Additional methodological details

N/A

6d.3 Description of the mechanism for collecting data from countries

N/A

7. Other MEAs, processes and organisations

7a. Other MEA and processes

N/A

7b. Biodiversity Indicator Partnership

Yes: ☐ No: ☒

8. Disaggregation

Private biodiversity-related international philanthropic contributions from the OECD CRS database can be disaggregated by recipient, sector/purpose code, DSG focus, and Rio Marker

9. Related goals, targets and indicators

Target 18.1 Positive incentives in place to promote biodiversity conservation and sustainable use.
Target 19 on Domestic Expenditure
Target 15 on Business Disclosures

10. Data reporter

10a. Organisation

The Organization for Economic Cooperation and Development for the OECD CRS and PINE databases
Eurostat and other statistical agencies for environmental economic accounts including environmental protection expenditure accounts

10b. Contact person(s)

N/A

11. References

N/A

12. Graphs and diagrams

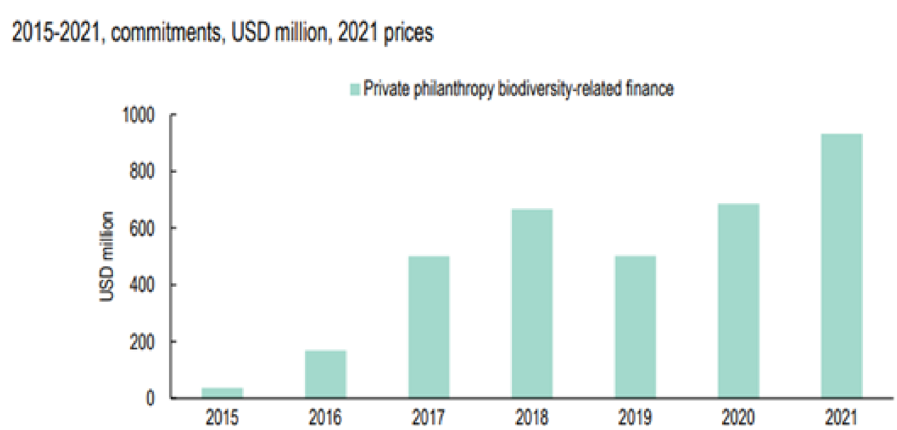

Figure 1: *Private philanthropy for development. Source: OECD (2023). Estimates based on OECD DAC statistics from the OECD, Creditor Reporting System*

Note on GBF indicator: 1.1. Percent of land and seas covered by biodiversity-inclusive spatial plans

In COP DEC 15/ 5, the indicators for Target 1 and H 1.1 were approved with two footnotes:

- b: a binary indicator was proposed for inclusion for this goal or target and will be further considered by the Ad Hoc Technical Expert Group
- * an agreed up-to-date methodology does not exist for this indicator. The Ad Hoc Technical Expert Group will work with partners to guide the development of these indicators

As per the recommendation, a **binary indicator** was developed for Target 1 with a metadata description including proposed definitions on Biodiversity-inclusive approach, Participatory approach to spatial planning, Effective management processes [addressing land and sea use change] and integrated spatial planning. Categorical responses can only be based on national data since it is about national processes.

For the **headline indicator 1.1**. it was recognized that

(1) it overlaps with indicators for other goals and targets of the KMGBF as well as SDG indicators,
(2) it covers multiple cross-cutting issues and provides opportunities to identify synergetic issues and leverages for other targets;
(3) it is highly relevant for the TK indicators (particularly TK indicator on participation).

The further development of a methodology was impacted by the following factors: (1) While most countries have spatial plans, qualitative aspects are usually not measured; the indicator suggests a fusion of spatial/quantitative and qualitative data with aspects of processes, outcomes and impacts to be measured, which is usually in the form of an index or equivalent, which is currently not in existence; (2) There was no partner to provide an institutional home and guide the development of the methodology for this indicator; (3) IPBES has in its program to develop an approved methodological assessment on integrated biodiversity-inclusive spatial planning and connectivity for consideration in 2027 (Decision IPBES-10/1).

It is recommended for this headline indicator to:

(1) Work with binary indicators until the methodology of the headline indicator is operational.
(2) In accordance with the IPBES progress, identify and delegate a lead organization to develop the methodology for the indicator, based on good practices and examples, and be in charge of data collection and evaluation.
(3) Support countries in developing adapted planning and assessment tools taking into account the qualitative aspects.

The below provides a summary of the current status of development of this indicator.

4. Proposed rationale

Target 1 relates to land-use and sea-use change, a major direct driver of biodiversity loss. To achieve the 2050 Vision and the proposed Goals, the loss of existing intact and wilderness areas through land/sea use change must be avoided, reduced and reversed. More effective and comprehensive spatial planning, which accounts for biodiversity and the objectives of the Convention, will be crucial in accomplishing this. Therefore, an indicator tracking the percentage of land and seas covered by spatial plans that integrate biodiversity would be directly relevant to this target and help to monitor progress towards its attainment.

Biodiversity inclusive spatial planning is also relevant for most of the other proposed targets in the draft post-2020 global biodiversity framework. Given competing demands for land and sea areas and potential trade-offs, biodiversity-inclusive integrated spatial planning across all landscapes and seascapes (i.e., marine spatial planning) will be needed to allow socioeconomic development to continue while also conserving biodiversity and maintaining ecosystem services in line with the levels of ambition suggested above, and to ensure connectivity between natural habitats.

Currently spatial planning is practiced variously and unevenly among countries and currently there is no global synthesis available to assess the proportion of the earth that is considered to be "under spatial planning". This is partly because there is no standard definition of what constitutes a spatial plan and a range of approaches and tools for planning are used at different scales.

Currently there is no indicator which is under development or operational to fully track the progress on the land and sea area under biodiversity inclusive spatial planning. However, there are SDG indicators related to marine spatial planning and intercoastal zone management (14.2.1), sustainable agricultural area (2.4.1) which also corresponds to headline indicator 10.1and sustainable forest management (15.2.1), which also corresponds to headline indicator 10.2, which incorporate elements of spatial planning. A selection of further initiatives and examples gathering information on elements of biodiversity inclusive spatial planning is provided under point 5e for guidance. . No comprehensive and systematic overview and methodology exists as of today and as such this represents a gap which needs to be addressed. There is some limited information related to conservation strategies, ecoregional plans and integrated coastal zone management. However, how up to date this information is and the extent to which these plans are operational is uncertain. Similarly the extent to which such plans can be considered representative of spatial planning more generally is also uncertain.

The traditional knowledge indicators (discussed at the 12th Meeting of the Working Group on Article 8(j) and Related Provisions in November 2023) are cross-cutting indicators that underpin the achievement of several Goals and Targets of the KMGBF. SBSTTA-25 (October 2023) "*Requests* the Expert Group to fully take into account the work of the Ad Hoc Open-ended Intersessional Working Group on Article 8(j) and Related Provisions of the Convention on Biological Diversity on traditional knowledge indicators in order to further enhance the monitoring framework; (SBSTTA-25/1, paragraph 12). It is important to point out that Indigenous Peoples and Local Communities lands, recognized and secure, could represent biodiversity-inclusive planning in practice (at certain scales).

Traditional knowledge indicators with notable relevance to this indicator on spatial planning are the following: "Land use change and land tenure in the traditional territories of Indigenous Peoples and local communities".

Addressing the intersession between the headline indicator on spatial planning and this TK indicator can also support Parties to operationalise parts of Section C of the KMGBF, particularly the section on "*Contribution and rights of indigenous peoples and local communities".*

5. Definitions, concepts and classifications

5a. Definition:

Indicator definition

This indicator is linked to the corresponding headline binary/categorical indicator 1.1 "*Number of countries using participatory, biodiversity-inclusive spatial planning or effective management processes to address land and sea use change*" and is based on the same concepts and definitions (table 1).

Table 1: *Definition and concepts for indicator*

Conceptual basis	Definition
Biodiversity-inclusive: Biodiversity-inclusive is recognized in COP 8 Decision VIII/28 but not sufficient for headline binary/categorical indicator and this indicator. The definition of biodiversity-inclusive is expected to reflect the purpose of target 1 to mainstream biodiversity in spatial plans and in the planning process. "Inclusive" is not the same as prioritizing biodiversity for protection in plans. To be consistent with the definition and possible answers in the corresponding headline binary/categorical indicator, the definition aims at reflecting the different dimensions of biodiversity	**Biodiversity inclusive approach**: "*taking into account all relevant information to safeguard biodiversity in spatial planning processes.*"

inclusive (e.g. protected areas, key biodiversity areas, ecological integrity).	
Effective management process [addressing land- and sea-use change] The proposed definition is drawn upon the PAME definition (Hockings et. al 2006), making sure to capture and include traditional management areas (many of these concepts may overlap with OECMs but not registered as OECMs).	**Effective management process**: "*Activities through which evidence-based conservation outcomes are achieved*."
Spatial planning Spatial planning is generally understood as a method or public process for identifying, analysing and allocating the spatial and temporal distribution of activities in a given environment in order to achieve various objectives, including social, economic and ecological (such as biodiversity), that have been specified through a political process. Spatial planning includes land-use planning, marine spatial planning, etc. Glossary for the first draft of the post-2020 global biodiversity framework (cbd.int) (from Land Use and Spatial Planning : Enabling Sustainable Management of Land Resources | SpringerLink and State of the ocean report 2022)	**Integrated spatial planning**: "*a whole-of-government process to create land and sea use plans to achieve social, economic and ecological objectives for sustainable development*." (modified by Integrated Spatial Planning Workbook | United Nations Development Programme (undp.org))
Participatory The definition is a synthesis of key concepts merging previously suggested definitions (such as "rights-based governance" in Springer et al. 2021 and the FAO/CFS Voluntary Guidelines on the Responsible Governance of Tenure (VGGT), which is a document with high levels of legitimacy and that was the result of a long and consultative process with Parties).	**Participatory approaches to spatial planning** "*involve stakeholders and rightsholders in all processes of decision-making and the long-term effective management, taking into account traditional knowledge, ensuring that the voices of rightsholders and particularly marginalized groups are appropriately taken into account, to support healthy ecosystems, social equity and human rights*".

Other key concepts and definitions

Areas of high biodiversity importance: Locations that contain: populations of threatened or geographically restricted species; highly significant extents of threatened or geographically restricted ecosystems; ecosystems of high ecological integrity; high significance for the maintenance of biological processes (e.g. migration, reproduction, refugia etc); high irreplaceability; or high significance for ecological connectivity. Locations that include culturally important biodiversity [or species and ecosystems (for IPLC).

5b. Method of computation

N/A. This proposed indicator will be supplemented by the information gathered through headline binary/categorical indicator 1.1 for the time being and until a comprehensive and systematic methodology can be provided.

5c. Data collection method

No data collection is planned for this indicator yet. However, information gathered through headline binary/categorical indicator 1.1 and experience drawn from that will inform the methodology for collecting quantitative data at a later stage.

5d. Accessibility of methodology

N/A

5e. Data sources/methods and documentation on processes

No comprehensive and uniform data sources have been identified, and there is need to consider/describe sources and processes at the national level.

Elements of spatial planning are covered by the Sustainable Development Goals indicators:

- Proportion of agricultural area under productive and sustainable agriculture (2.4.1),
    - headline indicator 10.1
- Marine spatial planning and intercoastal zone management (14.2.1)
- Sustainable forest management (15.2.1),
- headline indicator 10.2

In addition to partial overlap with

- Coverage of protected areas in relation to marine areas (14.5.1),
- Proportion of important sites for terrestrial and freshwater biodiversity that are covered by protected areas, by ecosystem type (15.1.2), C
- Coverage by protected areas of important sites for mountain biodiversity (15.4.1)
- headline indicator 3.1 Coverage of protected areas and OECMs.

Further examples of relevant data sources/methods are:

- https://unesdoc.unesco.org/ark:/48223/pf0000381921 & https://www.mspglobal2030.org/wp-content/uploads/2022/05/StOR_MSP_SupplementaryMaterial_2022-1.pdf
- https://macbio-pacific.info/
- https://www.mapsofhope.org
- https://unbiodiversitylab.org/en/,
- https://www.cbd.int/protected/2021globalreport.shtml
- : https://drive.google.com/drive/folders/1yCMmZXBMH48dRvXlOtbDOsA5T6-nC1fX?usp=drive_link

For community-based monitoring and information systems see:

- https://pipap.sprep.org/
- and relevant publications by the SPACES coalition:
    - https://production-wordpress.spacescoalition.org/content//uploads/2022/12/202205_SPACES-Primer-Paper_05.pdf
    - https://spacescoalition.org/en/resources

From the CBD discussion forum:

WCS: a few examples of spatial assessment and planning processes that are biodiversity inclusive and participatory, noting that these thresholds are not clearly defined as of yet and there is a great diversity in approaches.

- South Africa: https://www.sanbi.org/biodiversity/building-knowledge/biodiversity-monitoring-assessment/national-biodiversity-assessment/
- Seychelles: https://seymsp.com/the-initiative/
- China (national): https://environmental-partnership.org/wp-content/uploads/2021/12/Policy-Brief-Ecological-Conservation-Redlines-2.pdf
- China (regional): https://journal.hep.com.cn/laf/EN/10.15302/J-LAF-1-030010
- United States/Northeast: https://neoceanplanning.org
- United States/Mid-Atlantic: https://www.midatlanticocean.org/ocean-planning/about-ocean-planning/
- Palau: https://www.spc.int/updates/blog/blog/2023/05/biodiversity-rich-palau-launches-ambitious-marine-spatial-planning
- Niue: https://niueoceanwide.com
- Malaysia. 4th National Physical Plan: The Planning Agenda for Prosperous, Resilient and Liveable Malaysia https://rmke12.ekonomi.gov.my/ksp/storage/event/962_22_dr_alias_rameli_4th_national_physical_plan_for_a_prosperous_resilient_and_liveable_malaysia.pdf

From WWF international:

- *Indonesia: Indonesia's national resource report on spatial planning in coastal areas, with a focus on preventing/reducing the impacts of emergency issues, including natural disasters, climate change and sea-level-rise, considers issues and approaches in spatial planning, lessons from around the world, and specifically the application in Indonesia.
- https://wedocs.unep.org/handle/20.500.11822/44333
- *UK: Guiding principles for Marine Spatial Planning produced by Wildlife and Countryside Link (Link), a nature coalition in England bringing together 80 organisations. https://www.wcl.org.uk/docs/assets/uploads/Guiding_principles_for_Marine_Spatial_Planning.pdf

Examples on "participatory" marine spatial planning from Spain:

- "Real Decreto 150/2023, de 28 de febrero, por el que se aprueban los planes de ordenación del espacio marítimo de las cinco demarcaciones marinas españolas" (https://www.boe.es/diario_boe/txt.php?id=BOE-A-2023-5704) (participatory process included engagement of representatives of the fishing and wind energy sectors.
- In the context of marine protected areas, it has been developed a governance strategy and a guidance for participatory processes within the Life project INTEMARES (access to the Guidance document: https://intemares.es/sites/default/files/a10_guia_procesos_en.pdf).
- Following this methodology, several participatory process have been established for the development of the management plans of marine protected areas. As an example, more information about the participatory process developed for the marine protected area "El Cachucho" can be found at https://intemares.es/procesos-participativos/cachucho and the resulting management plan at https://intemares.es/sites/default/files/real_decreto_686-2021_de_3_de_agosto.pdf

Suggested references from the CBD discussion forum:

*WWF South West Indian Ocean Seascape (SWIO Seascape) Regional Programme

- South West Indian Ocean Annual Report 2022 | WWF SWIO (wwf-swio.org)

*Heart of Borneo - WWF Spatial Planning Experiences in Borneo

- Please use "spatial" and "government" in a keyword search to find relevant information in the report.
- This report examines the systematic conservation planning methods used by WWF and assesses its roles, results (outputs, outcomes) and contributions to the conservation effort in Kalimantan, Sabah and Sarawak. It also captures the challenges and lessons learned and presents it from a consolidated Borneo perspective for sharing with relevant stakeholders within and beyond Borneo.
- hob_spatial_planning_report_fa_web.pdf (panda.org)

*Viet Nam - Informing a national target for protected areas in Viet Nam under the post-2020 global biodiversity framework

- Please use "spatial" and "government" in a keyword search to find relevant information in the report.
- This report provides a global assessment of Viet Nam's PA network important biodiversity and NCP features, using both national (where available and accessible) and global data, and it discusses how a further spatial prioritization framework can support the implementation of the biodiversity and climate conventions.

*Tanzania and Mozambique - Ruvuma transboundary landscape

- Please see the Solutions chapter which states:
- "We need to take a holistic, transboundary landscape approach if we're to secure key terrestrial habitats and their associated wildlife populations and increase benefits for local people and the national economies of Tanzania and Mozambique. Such an approach means multiple stakeholders and partners can collaborate in a well-coordinated and strategic manner to tackle many challenges across several sectors".
- A key intervention for this programme will be:
- "Developing spatially explicit land-use plans jointly, in a consultative manner, with multiple stakeholders and including the valuation and mapping of natural capital".

*Amazon - 2022 Living Amazon Report

- Please use the keyword "planning" to find occurrences of "territorial planning", "basin-wide planning" or "governmental planning" in the report.
- This report outlines the current status of the Amazon biome and basin, summarizes key pressures and drivers of change, and outlines a conservation strategy for this decade that would enable the vision of a Living Amazon to become a reality going forward.
- Living Amazon Report 2022 | Publications | WWF (worldwildlife.org)

5f. Availability and release calendar

Not yet available for this proposed indicator, but available for headline binary/categorical indicator 1.1

5g. Time series

N/A

5h. Data providers

See 5e for a selection of data sources/methods/process for elements of headline indicator 1.1.

5i. Data compilers

See 5e for a selection of data sources/methods/processes for elements of headline indicator 1.1.

5j. Gaps in data coverage

Possible issues related to sensitivity over sharing spatial data should be considered.

5k. Treatment of missing values

N/A

6. Scale

6a. Scale of use

Scale of application (please check all relevant boxes):

Global: ☐ Regional: ☐ National ☒

Scale of data disaggregation/aggregation:

- Global/ regional scale indicator can be disaggregated to national level: ☐
- National data is collated to form global indicator: ☒

6b. National/regional indicator production

N/A

6c. Sources of differences between global and national figures

Explanation on the differences between country produced and internationally estimated data on the indicator, highlighting and summarising the main sources of differences.

6d. Regional and global estimates & data collection for global monitoring

6d.1 Description of the methodology

N/A

6d.2 Additional methodological details

N/A

6d.3 Description of the mechanism for collecting data from countries

N/A

7. Other MEAs, processes and organisations

7a. Other MEA and processes

Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) approved methodological assessment on integrated biodiversity-inclusive spatial planning and connectivity (for consideration by the Plenary at its fourteenth session in 2027) will feed into process to define and operationalise this indicator.

As the custodian agency for SDG 14.2.1, UNEP collects spatial data on marine plans within the national jurisdiction through sea regional plans.

See under point 5e for a selection of examples and initiatives?

7b. Biodiversity Indicator Partnership

Yes: ☐ No: ☒

8. Disaggregation

Recommended disaggregations, once the proposed indicator becomes operational, relate closely to the headline binary/categorical indicator 1.1 and could be combined (area and %):

- % land/sea covered by plans that biodiversity-inclusive to different degrees
- % land/sea covered by plans that are participatory to different degrees
- % land/sea covered by biodiv-inclusive plans for each ecosystem functional group (GET)
- % within a plan/effective management process that is under active implementation
- Optional: % sector (agric, forestry etc, where these exist as separate spatial plans)
- Optional: % for subnational units (provinces etc)

Suggestion for gender disaggregation:

- % of biodiversity-inclusive spatial plans that have included the meaningful participation of women in their design and implementation[1]

Some potentially inspirational questions in the ActionAid VGGT Toolkit, though these would need to be further modified for spatial planning. ILC collects data according to Indicator 1.2 – Target groups, including women, youth and holders of customary rights have access to and are supported to engage in multi-stakeholder platforms – though it is not specific to spatial planning.

9. Related goals, targets and indicators

As made available by CBD guidelines for target 1, progress towards this target will directly support the attainment of Goals A and B and targets 2, 3, 5, 10 and 12 of the Framework. Conversely, progress towards targets 14, 19, 20, 21, 22 and 23 will help to reach Target 1.

Elements of Target 1 are also addressed in the targets of the Sustainable Development Goals, including targets 2.4, 14.2, 14.5, 15.1, 15.2, 15.4, 15.5 and 15.9.

This proposed indicator encompasses PAs and OECMs which are also reported under indicator 3.1. See also under points 3a, 3b and 5e for further linkages.

10. Data reporter

10a. Organisation

GEOBON for the headline binary/categorical indicator

Secretariat of the Convention on Biological Diversity

10b. Contact person(s)

N/A

11. References

N/A

12. Graphs and diagrams

N/A

GBF indicator metadata: 1.b Target 1 binary indicator

Full Indicator Name

tbc

Goals And Targets Addressed

Goal
Goal A The integrity, connectivity and resilience of all ecosystems are maintained, enhanced, or restored, substantially increasing the area of natural ecosystems by 2050; Human induced extinction of known threatened species is halted, and, by 2050, the extinction rate and risk of all species are reduced tenfold and the abundance of native wild species is increased to healthy and resilient levels; The genetic diversity within populations of wild and domesticated species, is maintained, safeguarding their adaptive potential.
Goal B Biodiversity is sustainably used and managed and nature's contributions to people, including ecosystem functions and services, are valued, maintained and enhanced, with those currently in decline being restored, supporting the achievement of sustainable development for the benefit of present and future generations by 2050.

Target
Binary indicator for Target 1. Ensure that all areas are under participatory, integrated and biodiversity-inclusive spatial planning and/or effective management processes addressing land- and sea-use change, to bring the loss of areas of high biodiversity importance, including ecosystems of high ecological integrity, close to zero by 2030, while respecting the rights of indigenous peoples and local communities.

Rationale
Land-use and sea-use change are major direct drivers of biodiversity loss. Land-use change has had the largest relative negative impact on terrestrial and freshwater ecosystems since 1970, with agricultural expansion being the most widespread form of land-use change. Marine and coastal ecosystems have been significantly affected by human activities as well, with research demonstrating increasing cumulative impacts of human activities in more than 60 per cent of the ocean.

Increasing demands and conflicting uses of land, inland water and ocean space and resources underscore the need for cross-sectoral approaches that allow for the consideration of multiple interests, values and types of use. Integrated spatial planning and/or effective management processes allow countries to analyze and then effectively allocate the spatial and temporal distribution of activities in each environment to achieve various social, ecological and economic objectives. Integrated and participatory spatial planning helps bring together all stakeholders for a particular space and thereby ensure the prioritization and proper allocation of various activities and thereby balance the need to safeguard nature, while advancing sustainable socioeconomic development and ensuring food security and human well-being.

To ensure a sustainable development that respects the rights and needs of all people, it is essential that spatial planning of Parties be carried out in an integrated and biodiversity-inclusive manner. As such, this indicator tracks the progress of Parties towards the inclusion of biodiversity in spatial planning for all ecosystem types and the use of participatory processes in the design of spatial plans.

Definitions Concepts And Classifications

Definition

Biodiversity inclusive approach: Taking into account all relevant information to safeguard biodiversity in spatial planning processes.

Integrated spatial planning: A whole-of-government process to create land and sea use plans to achieve social, economic and ecological objectives for sustainable development.
Effective management processes: Activities through which evidence-based conservation outcomes are achieved.
Participatory approach: Involve stakeholders and rightsholders in all processes of decision-making and the long-term effective management, taking into account traditional knowledge, ensuring that the voices of rightsholders and particularly marginalized groups are appropriately taken into account, to support healthy ecosystems, social equity and human rights.
*Land-use change***:** Land-use change includes the conversion of land cover (e.g. deforestation or mining), changes in the management of the ecosystem or agro-ecosystem (e.g. through the intensification of agricultural management or forest harvesting) or changes in the spatial configuration of the landscape (e.g. fragmentation of habitats).
Sea-use change: Similarly, sea-use change refers to measures and activities altering the use of marine areas, for example, coastal development, offshore aquaculture, mariculture, oil and gas exploration, and bottom trawling.
Terrestrial: All lands at or above sea level. These may correspond to the International Union for the Conservation of Nature Global Ecosystem Typology: Tropical-subtropical lowland rainforests (T1), tropical-subtropical dry forests and scrubs (T2), shrublands & shrubby woodlands (T3), savannas and grasslands (T4), deserts and semi-deserts (T5), polar-alpine (T6), Intensive land-use systems (T7).
Inland water: All freshwater and/or landlocked waterbodies, including rivers, lakes, inland seas and groundwater. These may correspond to the International Union for the Conservation of Nature Global Ecosystem Typology: Rivers and streams (F1), lakes (F2), palustrine wetlands biome (TF1), artificial freshwaters (F3).
Coastal and marine: All connected saline ocean waters characterised by waves, tides and currents. These may correspond to the International Union for the Conservation of Nature Global Ecosystem Typology: Marine shelfs (M1), pelagic ocean waters (M2), deep sea floors (M3), semi-confined transitional waters biome (FM1), shoreline systems biome (MT1), supralittoral coastal systems biome (MT2), brackish tidal systems biome (MFT1), anthropogenic marine systems (M4), anthropogenic shorelines (MT3).

Method of Computation

This indicator is a binary indicator and must be compiled from the answers to two questions and three sub questions:

1.1 Are all areas of your country under biodiversity-inclusive spatial planning or effective management processes that:

(a) Address land-use (terrestrial) change?
(b) Address land-use (inland water) change?
(c) Address sea-use (coastal and marine) change (will be considered not applicable for landlocked states)?

1.2 If there are plans in question 1.1, were they created using a participatory process? (Select all that apply, note that if your country is a land-locked state, marine spatial planning will be considered as not relevant)

There are four possible answers to each of the options in question 1.1:

(a) No
(b) No, but under development
(c) Yes, partially
(d) Yes, fully

A "No" answer implies that spatial planning is either absent or being done without the explicit inclusion of biodiversity. Spatial planning may be implemented to cover any extent of the country's terrestrial (1.1a), inland water (1.1b) and coastal and marine (1.1c) areas, if it does not specifically include biodiversity, select "No".

A "No, but under development" answer implies a concerted effort at the national level to implement biodiversity-inclusive spatial planning to address land- and sea-use change in terrestrial (1.1a), inland water (1.1b) and coastal and marine (1.1c) areas. That is, countries may have spatial planning tools that consider and include biodiversity, but these are not yet being used to address the effects of land- and sea-use change. Alternatively, a country may have implemented biodiversity-inclusive spatial planning or effective management processes to address land- and sea-use change, but these are limited to a small amount of the surface area of the country (e.g. only in a single region or province).

A "Yes, partially" answer implies that a country is making progress towards having all terrestrial (1.1a), inland water (1.1b) and coastal and marine (1.1c) areas under biodiversity-inclusive spatial planning or effective management processes to address land- and sea-use change. Namely, over half of a country's area, for each type (terrestrial (1.1a), inland water (1.1b) and coastal and marine (1.1c)), is under biodiversity-inclusive spatial planning or effective management processes.

A "Yes, fully" answer implies that all or almost all terrestrial (1.1a), inland water (1.1b) and coastal and marine (1.1c) areas of a country are under biodiversity-inclusive spatial planning or effective management processes to address land- and sea-use change.

There are three possible answers to question 1.2[3]:

(a) For terrestrial spatial planning
(b) For inland water spatial planning
(c) For coastal and marine spatial planning

Each of the answers here is to be chosen using a "select all that apply" approach. Namely, if any of each type of plans (terrestrial, inland water or coastal and marine) developed by a Party, as indicated in 1.1, were created using a participatory process then select the types of plans to which this applies. In other words, select each option for which the answer to 1.2 is "Yes". If no answers are selected, then an overall "No" is understood.

Note: If a nation is a landlocked state, all questions related to coastal and marine spatial planning will be ignored in the aggregation process of answers.

Further note: further information on progress towards the target can be provided in the free text section of the reporting tool.

[3] Assuming the recommendation to remove the answer "none" has been followed.

GBF indicator metadata: 2.1 Area under restoration

1. Indicator name

2.1 Area under restoration

2. Date of metadata update

March 2024

3. Goals and Targets addressed

3a. Goal

N/A

3b. Target

Headline indicator for **Target 2**: Ensure that by 2030 at least 30 per cent of areas of degraded terrestrial, inland water, and marine and coastal ecosystems are under effective restoration, in order to enhance biodiversity and ecosystem functions and services, ecological integrity and connectivity.

4. Rationale

The Food and Agriculture Organization of the United Nations (FAO), as co-lead of the UN Decade on Ecosystem Restoration ("UN Decade") and lead of the Task Force on Monitoring ("the Task Force") follows the request and mandate given by the United Nations General Assembly (UNGA) to report on the status of ecosystem restoration in its eighty-first session (resolution A/RES/73/284 from March 2019): "*The General Assembly, (…) 7. Requests the Secretary-General to report to the General Assembly at its eighty-first session on the status of the implementation of the present resolution, including its contribution to the implementation of the 2030 Agenda for Sustainable Development".*

In 2022, the Framework for Ecosystem Restoration Monitoring (FERM) was collaboratively developed and launched through the joint efforts of the UN Decade FAO-led Task Forces, as the monitoring framework of the UN Decade. The FERM consists of four components: a) a registry that harmonises and collects area-based data on ecosystem restoration projects and programs, by enabling interoperable data exchange with other platforms; b) a geoportal for visualising restoration areas on the map, in order to know where restoration is happening; c) a search engine to share restoration initiatives and good practices that are entered into the FERM registry or are part of the interoperable data exchange and d) a dashboard showing aggregated country-level restoration data from publicly available sources.

Globally, the estimation of degraded land varies from less than 1 billion to over 6 billion hectares (Gibbs and Salmon, 2015). In addition, 60 percent of world's major marine ecosystems are estimated to be either degraded or unsustainably used (UNEP, 2011). Monitoring and transparent reporting on areas under restoration will reveal the global progress towards achieving the 30 percent global target.

Given that currently there is no global mechanism for collecting country reported area-based information on ecosystem restoration that spans all ecosystems, a working group was created to support the development of a methodology for area-based estimates, aiming at removing duplication of effort and ensuring alignment between the UN Decade progress reporting and GBF Target 2. In November 2023, the working group was transformed to a partnership supporting implementation and monitoring of ecosystem restoration (FAO, 2023), with the following partners: UNCCD, UNFCCC, UNEP, UNDP, UNEP-WCMC, the Ramsar Convention, IUCN, WRI, UN SEEA, Restor, SER, CIFOR-ICRAF, Conservation International, WWF and ICRI. The methodology proposes a workflow that contains five main activities: target setting, data compilation, reporting, monitoring, and capacity development. FAO will support in all the five activities. This metadata document focuses on data compilation and reporting.

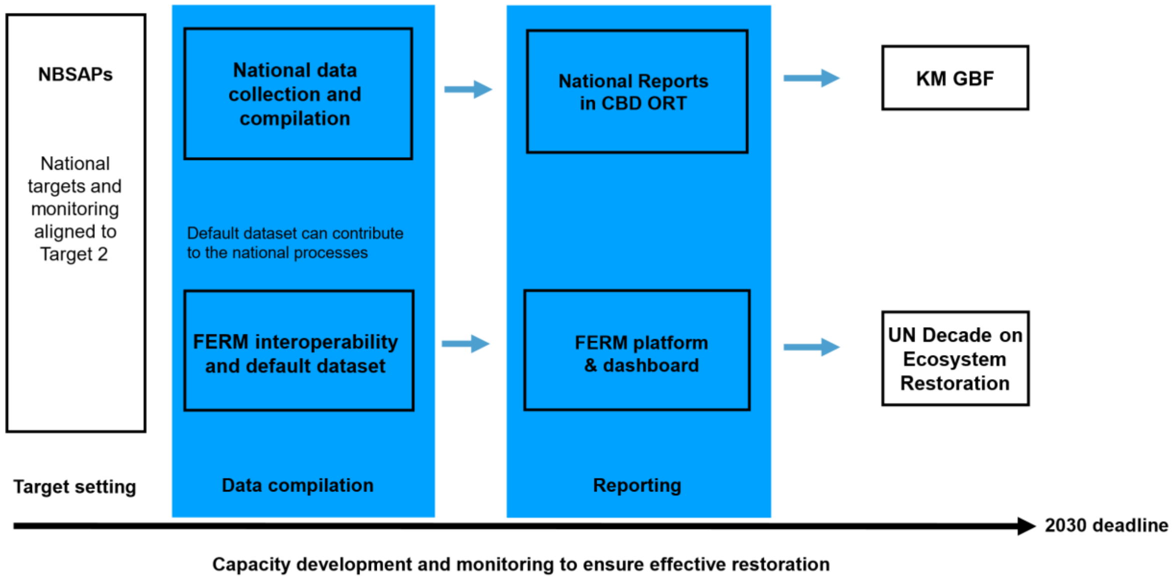

Figure 1. *Proposed workflow for Target 2 indicator.*

According to CBD/COP/DEC/15/6, Parties will report the implementation of KM-GBF directly using CBD's online reporting tool. This reporting, as well as the corresponding data collection and compilation process, is led by Parties. The reporting template is not yet available and FAO aims to work with CBD and AHTEG to develop a template for national reporting on Target 2 indicator in the online reporting tool.

In parallel, FAO is leading a data compilation effort that will integrate restoration data from various available data sources. The objective is to produce a default dataset on restoration that can contribute to the national processes, while providing more information and contextualizing restoration progress, beyond area-based estimate, such as the actor leading the restoration, activities, tenure, etc. Additionally, the FERM will allow the CBD national focal point to directly enter data on restoration initiatives and projects, with the ambition of creating a global map to showcase restoration areas (as polygons or points). In this way, FAO supports transparently monitoring and reporting to Target 2.

5. Definitions, concepts and classifications

5a. Definition:

Ecosystem restoration:

Within the UN Decade, ecosystem restoration is defined as: "The process of halting and reversing degradation, resulting in improved ecosystem services and recovered biodiversity. Ecosystem restoration encompasses a wide continuum of practices, depending on local conditions and societal choice." (UNEP, 2021).

Within the CBD Global Biodiversity Framework, ecosystem restoration is described as follows (CBD, 2021): "Restoration may include: (a) restoring converted areas back to natural states; (b) improving the ecological integrity of degraded natural areas; and (c) rehabilitating converted and degraded areas (e.g. degraded agricultural lands) to improve both productivity and integrity."

Ecological restoration:

Ecological restoration is a type of ecosystem restoration. According to CBD (2016), it is defined as: "The process of managing or assisting the recovery of an ecosystem that has been degraded, damaged or destroyed as a means of sustaining ecosystem resilience and conserving biodiversity."

The Society for Ecological Restoration (SER) defines ecological restoration as: "The process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed. (Ecosystem restoration is sometimes used inter-changeably with ecological restoration, but ecological restoration always addresses biodiversity conservation and ecological integrity, whereas some approaches to ecosystem restoration may focus solely on the delivery of ecosystem services.)" (Gann et al., 2019).

The CBD Secretariat and SER have provided a glossary to help distinguish different versions of restoration and explain how they intersect (CBD Secretariat and SER, 2019).

Rehabilitation:

SER defines rehabilitation as "Management actions that aim to reinstate a level of ecosystem functioning on degraded sites, where the goal is renewed and ongoing provision of ecosystem services rather than the biodiversity and integrity of a designated native reference ecosystem" (Gann et al., 2019).

Rehabilitation is a type of ecosystem restoration. Ecosystem rehabilitation is focused on restoring and improving functions within transformed ecosystems, while ecological restoration is focused on restoration to a natural state.

Effective restoration:

Draft definition provided by SER: "Effective Restoration is standards-based restoration that results in net gain for biodiversity, ecosystem integrity, and/or human well-being-and is assessed against clear goals and objectives using measurable indicators. Different types of restoration will achieve different levels of outcomes for the key elements of Target 2: to enhance biodiversity and ecosystem functions and services, ecological integrity and connectivity".

Effective restoration is defined as restoration that achieves and maintains the short, medium and long-term goals of restoration, that are explicitly defined and measurable.

5b. Method of computation

FAO will examine and compile restoration data from various available data sources to produce a default dataset on ecosystem restoration for countries. The default dataset contains area-based estimates that are aggregated from restoration initiatives and projects, as well as country directly reported tabular data from existing processes (see below a and b). This compilation process is supported by an interoperability framework that will enable data exchange and facilitate the harmonization of heterogeneous data. The default dataset is compilation of data reported from different sources but cannot be aggregated unless complete geospatial data and information matching the reporting parameters for Target 2 is available to avoid double-counting of areas under restoration. The default data is compiled by FAO to track progress in the scope of the UN Decade on Ecosystem Restoration.

Country reported tabular data:

- The default dataset contains country reported tabular data on restoration area from MEAs and existing reporting mechanisms that collect data on restoration. The tabular values of ecosystem restoration from multiple sources may overlap and may contain additional information on the type of ecosystems under restoration, restoration objectives, and other parameters. For example, the Global Forest Resource Assessment (FRA) collects country reported area of forests (ha) with main objective "Conservation of biodiversity" and has included the area of forests under restoration (ha) in its next reporting cycle. The default data will compile data from multiple sources, such as FRA, LDN, country reporting to regional restoration targets such as AFR100, and cannot be further aggregated because of potential overlapping. The default dataset will list all the reported areas under restoration by data source.

Country level data aggregated from restoration initiatives and projects:

- Restoration initiatives and projects are long- or short-term efforts aimed at achieving specific restoration goals and objectives in defined geographic locations. Area under restoration may also be estimated by summing up the area of individual restoration initiatives and projects, removing duplications and overlapping areas (i.e. an area should not be counted more than once). This requires collecting initiative and project level data, using a bottom-up approach. The default dataset also contains national scale data aggregated from initiatives and projects, by each data source. It is not possible to further aggregate data from different sources because of potential double counting (for example, an area may be reported in multiple databases). FAO is leading an effort to identify and reduce double-counting by promoting project level interoperability across different platforms and databases. The Project Information Sharing Framework (Gann *et al.*, 2022) provides a useful framework for interoperability between initiative and project level databases.

The following paragraphs show initiative and project level data parameters needed for calculating area under restoration and allow disaggregation. These parameters include information for directly deriving area under restoration and meeting disaggregation requirements, and additional parameters for ensuring the quality, consistency and transparency of the data reported. All these parameters are available in the FERM registry.

Specifically:

1. **Committed area to restore** includes pledges, targets or commitments and can be reported as time-bounded absolute values with units, e.g., to restore 500 hectares by 2030. This parameter will not be counted as area under restoration but will serve as a reference to monitor restoration progress. Therefore, it should be included in the reporting process, when possible. Data type: tabular.
2. **Area under restoration** and 3. **Ecosystem** describe the extent and the ecosystem where restoration is happening. Restoration areas are geospatially explicit points or polygons. The reporting shall include both the area under restoration in appropriate units (e.g., number of hectares of forests, number of kilometers of rivers), and the ecosystem(s) being restored. At the project or initiative scale, both the current ecosystem and the target ecosystem can be reported, in order to understand and monitor transitions. When an area contains multiple ecosystems, the corresponding area under restoration should be disaggregated by ecosystem, to enable aggregation of areas by ecosystem. Ecosystems should be reported using national ecosystems, and the Ecosystem Functional Groups (EFGs) of the IUCN Global Ecosystem Typology 2.1 (Keith *et al.*, 2022), to which the national/local ecosystem type has been cross-walked. Reporting by EFG is recommended by AHTEG and will be decided by Parties at SBSTTA in May 2024. Guidelines and tools for cross-walking existing national ecosystem classifications to the EFGs of the IUCN Global Ecosystem Typology are currently under development, along with cross-walks with other classifications (e.g. IPCC land use categories). Guidance on using the EFGs and related national ecosystems will be integrated into the metadata once developed.

In the FERM Registry, area under restoration will be a single tabular value (reported) or a pair of values (reported and calculated), depending on how restoration areas are identified, discussed below:

I. Restoration areas identified as points or administrative units, i.e., restoration areas associated to a coordinate that is within the area or the administrative unit where the activities are taking place. In the FERM registry, a point location or administrative boundary (using administrative level 1 or 2) shall be provided as a minimum requirement for a restoration initiative.

II. Restoration areas identified as polygons, representing delineation of restoration areas. For quality assurance and control, the polygon area is calculated and can be compared to the reported tabular value. Note that delineation of areas under restoration is needed for calculating the component indicator of Target 2: maintenance and restoration of connectivity of natural ecosystems.

The delineation of the location of areas under restoration is strongly recommended. Geospatial locations provide higher detail about the ecosystem and facilitate the monitoring and adaptive management practices in the restoration sites. The spatial location will facilitate the calculation of connectivity metrics and biophysical characteristics of the restoration areas. The spatial location allows the identification of the areas under restoration within other areas such as protected areas (PA) and Other Effective Area-based Conservation Measures (OECMs) and thus informs whether there is overlap and the contribution to other GBF targets such as targets 1 and 3. Additionally, sharing spatial information can assist with the quality assessment and control and assist identifying overlapping areas under restoration and potential double counting, where the same area can be repeated when using several platforms that collect spatial information. Finally, the spatial location is important for transparently sharing good restoration practices.

4. **Restoration status** will provide an indication of whether the restoration area can be counted towards a reporting period. The reference period of the GBF is 2011-2020 (CBD/COP/DEC/15/5.2), therefore, only restoration areas that are under restoration within this reference period and up to the end of the GBF, 2030, should be counted and reported. Restoration initiatives may start before the reference period, and either the restoration activities must be within the reference period or there monitoring and actions to ensure there is no degradation of the ecosystem within the area under restoration. The restoration status is characterized by three phases, in preparation, in progress and post-completion monitoring, described as the following:
    - In preparation: enabling environment, funds committed, area gazetted for restoration, activities have not yet begun, and impacts of restoration may not yet be measurable.
    - In progress: ongoing restoration activities and depending on the time that the activities have been ongoing, impacts may start to be measurable.
    - Post-completion monitoring: restoration activities completed and efforts in place to monitor the restoration results.

Areas with the status "in progress" and "post-completion" will be reported as "area under restoration".

Different approaches are available to evaluate the degree of recovery of an ecosystem or the success of restoration, such as the Five-Star System and Ecological Recovery Wheel (Gann *et al.*, 2019) or the IUCN Green Status of Ecosystems, which is currently under development. Data type: descriptive.

5. **Type of restoration**. The possible values are ecological restoration and rehabilitation. This can be determined by analyzing the current and target ecosystem (natural or transformed). Examples of transformed ecosystems are: croplands, forest plantations, urban ecosystems. As a useful rule of thumb, if the target ecosystem is natural, the restoration will be ecological restoration. If the target ecosystem is transformed, the restoration will be rehabilitation (see Figure 2). Target 2 includes both ecological restoration and rehabilitation. Data type: descriptive
6. **Primary aim of restoration**. Possible values are: enhance biodiversity, enhance ecosystem functions and services, improve ecological integrity, improve enhance connectivity. Data type: descriptive.
7. **Restoration activity,** sometimes called intervention, describes what is being implemented on the ground in order to achieve restoration goals and objectives. Activities in the FERM registry are adapted from the Glossary of restoration interventions of the TEER initiative (FAO, 2022a). They are divided into two main categories (biophysical and enabling) and secondary categories according to the IPBES report (IPBES, 2018). The full list of activities is available here: https://www.fao.org/fileadmin/user_upload/forest-landscape-restoration/Glossary_of_restoration_interventions__English_.pdf Data type: descriptive.
8. **Lead entity** and 9. **Tenure status** provide information on the entity (both the name and the type of organization) leading the restoration effort and legal tenure status of the area under restoration. Indigenous and Traditional Territories (ITT) is included as a tenure type to facilitate disaggregation. When a restoration initiative or project is planned on Indigenous and Traditional Territories, it is recommended to respect people's rights and obtain Free, Prior and Informed Consent (FPIC) to ensure adherence to the UN Decade principles (FAO, IUCN CEM & SER, 2021) and the Voluntary Guidelines on the Responsible Governance of Tenure (VGGT) (FAO, 2022b). Data type: descriptive.

Data collected using a bottom-up approach contains more details and can contribute to better monitoring of the restoration initiatives, therefore, countries are encouraged to build their own databases to collect initiative and project level data and align their national databases to the methodology in their national data compilation processes. The FERM also provides a restoration initiative database and invites country focal points to enter data on restoration initiatives and projects directly in the FERM registry. It is important to develop quality assurance and quality control (QA/QC) procedures to make sure that only complete and relevant data is included in the estimates.

5c. Data collection method

In support of the UN Decade on Ecosystem Restoration, engaging stakeholders from across society, and in support of country led reporting on progress on Target 2, FAO has developed the FERM Registry that harmonises and collects area-based data on ecosystem restoration projects and programs, by enabling interoperable data exchange with other platforms. The FERM Registry provides a database for collecting the parameters for reporting on Target 2 (Table 1) at the initiative and project scale. The FERM Registry also provides an interoperability framework to work with other platforms for data compilation and will provide aggregated data by country, by data source, called the default dataset. The default dataset is disaggregated by data source because there is overlap and duplication in restoration areas that cannot be identified. The default dataset cannot be simply aggregated due to potential duplication of restoration area across different data sources.

Country focal points for the GBF will be invited to review the parameters identified in the metadata and utilize the FERM registry itself or adopt the parameters in national data compilation of restoration initiatives and projects. Countries also can report progress on target 2 aggregated at the national scale directly to CBD.

5d. Accessibility of methodology

The methodology is not currently published in a peer-reviewed location.

5e. Data sources

Table 1 is a summary of the data parameters and examples of data sources. The primary platforms and reporting mechanisms that are collecting information on restoration areas identified, include the Framework for Ecosystem Restoration Monitoring (FERM), Sustainable Development Goals (SDGs), Restor, IUCN Restoration Barometer, UNCCD’s Performance Review and Assessment of the Implementation System (PRAIS), World Database for Protected Areas (WDPA), the Global Forest Resource Assessment (FRA), International Coral Reef Initiative (ICRI), Ramsar, UNFCCC and other REDD+ reporting mechanisms.

Data sources are classified as either non-official sources (e.g. data produced by non-government organizations or from scientific literature) or official sources (e.g. country or officially reported MEA data). The working group will analyze each data source to extract the tabular estimates of area under restoration (ha).

Table 1. under revision and subject to change. *Summary of data parameters and example sources.*

Group	**Data parameter**	**Data type**	**Data source examples: official source**	**Data source examples: unofficial source**
Area	Committed area to restore (ha)	Tabular	Nationally Determined Contributions (NDC), National Biodiversity Strategies and Action Plans (NBSAPs), Bonn Challenge, Ramsar Convention, Global Restoration Commitments database (Sewell *et al.*, 2020)	Nature Commitments
	Area under restoration (ha)*	Tabular	Sustainable Development Goals Indicators Database , Forest Resources Assessment (FRA), UNCCD Performance Review and Implementation System (PRAIS), REDD+ reporting – e,g,, UNFCCC Forest Reference Levels (FRL) and Biannual Update Reports (BUR), Architecture for REDD+ Transactions (ART), Lowering Emissions by Accelerating Forest finance (LEAF), The Forest Carbon Partnership Facility (FCPF)	
		Spatially explicit	Framework for Ecosystem Restoration Monitoring (FERM), World Database on Protected Areas (WDPA) ,	International Coral Reef Initiative

			Performance Review and Implementation System (PRAIS)	(ICRI), Global Mangrove Alliance, Restor, Society for Ecological Restoration - Restoration Resource Center
	Ecosystem	Descriptive	UN Decade Ecosystems	
		Spatially explicit	(Ecosystem Functional Groups)	
Status	Restoration status	Descriptive	Framework for Ecosystem Restoration Monitoring (FERM) , World Database on Protected Areas (WDPA), Restoration Barometer	
Additional information	Type of restoration	Descriptive	Framework for Ecosystem Restoration Monitoring (FERM)	
	Activity	Descriptive	Framework for Ecosystem Restoration Monitoring (FERM), The Economics of Ecosystem Restoration (TEER), World Overview of Conservation Approaches and Technologies (WOCAT) See list of activities here: https://www.fao.org/fileadmin/user_upload/forest-landscape-restoration/Glossary_of_restoration_interventions__English_.pdf	
	Lead entity	Descriptive	Framework for Ecosystem Restoration Monitoring (FERM)	
	Tenure status	Descriptive	Framework for Ecosystem Restoration Monitoring (FERM)	

** Required field*

5f. Availability and release calendar

The indicator is currently in development. The methodology is expected to be finalized in 2024 by the Ad hoc Technical Expert Group and FAO. The methodology will be periodically reassessed and updated. The national reports will provide data on Target 2 in 2026 and 2029.

5g. Time series

Expected availability: 2021-2030
First update: Seventh National Report (NR7) in 2026

5h. Data providers

The data are sourced from in-country agencies, thus leveraging in-country resources and ongoing programs. Other data may be obtained from conservation organizations, scientific societies, national and public repositories (e.g., example data sources in Table 1), citizen scientists, and the contributions of Indigenous Peoples, local communities, and traditional knowledge holders.

5i. Data compilers

The Food and Agriculture Organization of the United Nations (FAO) is responsible for maintenance of the methodology and tools for use. The compilation of data and reporting is performed by in-country agencies.

5j. Gaps in data coverage

The data compiling will take place in a step-wise approach and aim for completeness in terms of coverage by ecosystem and by country.
For country-level tabular data on area under restoration, disaggregation by ecosystems may or may not be available depending on the data sources.

5k. Treatment of missing values

FAO will be compiling data from existing processes and platforms. Each custodian agency and platform has its own methodology of treating missing values. Therefore, no further estimates will be made by FAO. Missing values will not be imputed or otherwise estimated.

6. Scale

6a. Scale of use

Scale of application (please check all relevant boxes):

Global: ☒ Regional: ☒ National☒

Scale of data disaggregation/aggregation:

- Global/ regional scale indicator can be disaggregated to national level: ☐
- National data is collated to form global indicator: ☒

6b. National/regional indicator production

The scale of indicator 2.2 is national and can be aggregated globally.

6c. Sources of differences between global and national figures

N/A

6d. Regional and global estimates & data collection for global monitoring

6d.1 Description of the methodology

N/A

6d.2 Additional methodological details

N/A

6d.3 Description of the mechanism for collecting data from countries

The mechanism for collecting data from countries is currently under development.

7. Other MEAs, processes and organisations

7a. Other MEA and processes

The indicator itself is not used in other MEAs or processes. However, data are compiled from existing MEAs and processes. For details please refer to Table 1.

7b. Biodiversity Indicator Partnership

Yes: ☐ No: ☒

8. Disaggregation

The indicator can be disaggregated by Ecosystem Functional Groups from the IUCN Global Ecosystem Typology, where data are available.
Further disaggregations include by type of restoration, and tenure, in particular on Indigenous Territories, or PAs/OECMs.
Disaggregation by restoration activity can also support reporting on target 6 (invasive species) and target 7 (pollution) – see list of restoration actions here: https://www.fao.org/fileadmin/user_upload/forest-landscape-restoration/Glossary_of_restoration_interventions__English_.pdf

9. Related goals, targets and indicators

Target 2 is related to various goals and targets, including Goal A (ecological restoration and restoring converted ecosystems), Goal B (Restoration of ecosystem functions and services), Target 1 (spatial planning) and Target 3 (implementing protected areas).

10. Data reporter

10a. Organisation

Food and Agriculture Organization (FAO)

10b. Contact person(s)

Julian Fox (Julian.Fox@fao.org)

11. References

CBD Secretariat and SER. (2019). A companion to the Short-Term Action Plan on Ecosystem Restoration - Resources, cases studies, and biodiversity considerations in the context of restoration science and practice. Montreal, Canada.CMS. (2020). UNEP/CMS/Resolution 12.26 (Rev.COP13). Available at: https://www.cms.int/aquatic-warbler/sites/default/files/document/cms_cop13_res.12.26_rev.cop13_e.pdf

Dunster J. and Dunster K. (1996). Dictionary of natural resources management. University of British Columbia University Press. Vancouver, BC, 363 pp. + xv.

FAO. (2022). Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security. First revision. Rome. https://doi.org/10.4060/i2801ehttps://www.fao.org/forest-resources-assessment/en/

FAO. (2023). Partnership supporting implementation and monitoring of ecosystem restoration: ROADMAP FOR THE GLOBAL BIODIVERSITY FRAMEWORK TARGET 2. Rome. https://www.fao.org/3/cc6821en/cc6821en.pdf

FAO, IUCN CEM & SER. (2021). Principles for ecosystem restoration to guide the United Nations Decade 2021–2030. Rome, FAO.

Future Earth and GEO BON. (2022). Ecosystem restoration in the Global Biodiversity Framework: A focus on land degradation and terrestrial ecosystem restoration. Available at: https://geobon.org/science-briefs/

Gann, G.D., McDonald, T., Walder, B., Aronson, J., Nelson, C.R., Jonson J., ... & Dixon, K.W. (2019). International principles and standards for the practice of ecological restoration. Restoration Ecology. 27 (S1): S1-S46., 27(S1), S1-S46.

Gann, G.D., Walder B., Gladstone J., Manirajah S.M., Roe S. (2022). Restoration Project Information Sharing Framework. Society for Ecological Restoration and Climate Focus. Washington, D.C.

IPBES. (2018). The IPBES assessment report on land degradation and restoration. Montanarella, L., Scholes, R., and Brainich, A. (eds.). Secretariat of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, Bonn, Germany. 744 pages.Keith, D.A., Ferrer-Paris, J.R., Nicholson, E., … & Kingsford, R.T. (2022). A function-based typology for Earth's ecosystems. Nature 610, 513–518. https://doi.org/10.1038/s41586-022-05318-4Sewell A., van der Esch S. and Löwenhardt H. (2020). Goals and Commitments for the Restoration Decade: A global overview of countries' restoration commitments under the Rio Conventions and other pledges. PBL Netherlands Environmental Assessment Agency, The Hague.

Keith, D.A., Ferrer-Paris, J.R., Nicholson, E., … & Kingsford, R.T. (2022). A function-based typology for Earth's ecosystems. Nature 610, 513–518. https://doi.org/10.1038/s41586-022-05318-4

Sewell A., van der Esch S. and Löwenhardt H. (2020). Goals and Commitments for the Restoration Decade: A global overview of countries' restoration commitments under the Rio Conventions and other pledges. PBL Netherlands Environmental Assessment Agency, The Hague

UN. (1992). Convention on Biological Diversity. Available at: https://www.cbd.int/doc/legal/cbd-en.pdf

UNGA. (2019). Resolution A/RES/73/284. Available at: https://documents-dds-ny.un.org/doc/UNDOC/GEN/N19/060/16/PDF/N1906016.pdf?OpenElement

12. Graphs and diagrams

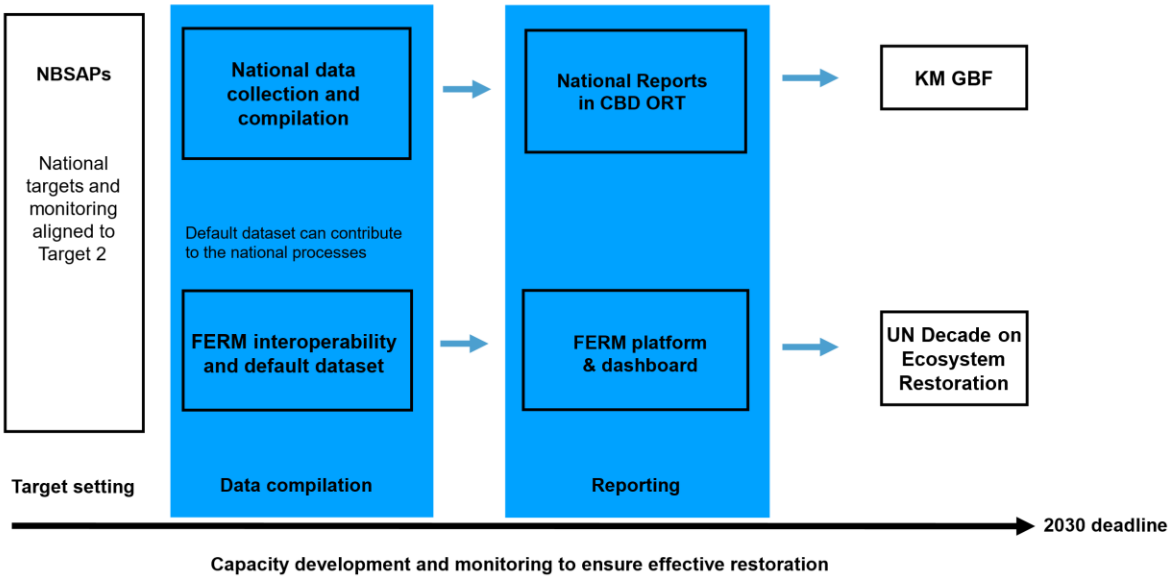

Figure 1. Proposed workflow for reporting area under restoration. The flowchart shows the possible pathways to follow from setting national restoration area targets, data collection and compilation through the FERM as well as national scale, data validation and reporting the area estimates. National estimates of areas under restoration are reported under the Global Biodiversity Framework and the UN Decade on Ecosystem Restoration.

Source: Author.

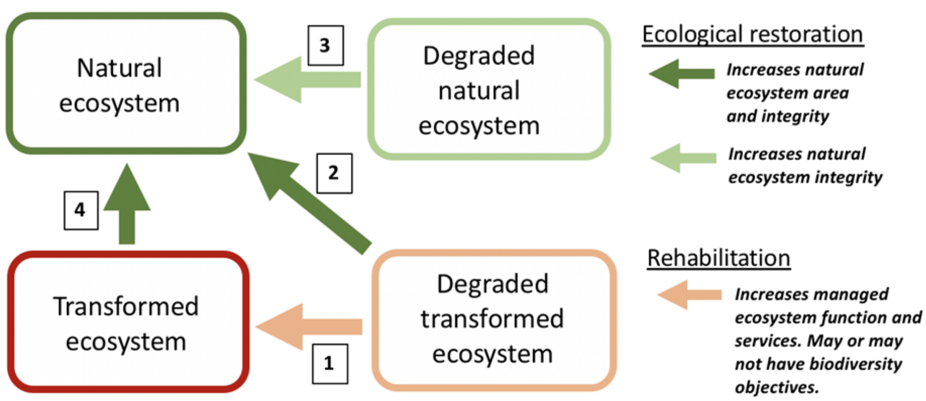

Figure 2. Comparison between ecological restoration and rehabilitation.Source: Future Earth and GEO BON, 2022.

GBF indicator metadata: 3.1 Coverage of protected areas and other effective area-based conservation measures

1. Indicator name
3.1 Coverage of protected areas and other effective area-based conservation measures
2. Date of metadata update
March 2024
3. Goals and Targets addressed
3a. Goal
N/A
3b. Target
Headline indicator for **Target 3.** Ensure and enable that by 2030 at least 30 per cent of terrestrial and inland water areas, and of marine and coastal areas, especially areas of particular importance for biodiversity and ecosystem functions and services, are effectively conserved and managed through ecologically representative, well-connected and equitably governed systems of protected areas and other effective area-based conservation measures, recognizing indigenous and traditional territories, where applicable, and integrated into wider landscapes, seascapes and the ocean, while ensuring that any sustainable use, where appropriate in such areas, is fully consistent with conservation outcomes, recognizing and respecting the rights of indigenous peoples and local communities, including over their traditional territories.
4. Rationale
This indicator measures a policy response to biodiversity loss. An increase in the coverage of protected areas and other effective area-based conservation measures (OECMs) indicates increased efforts by governments and civil society to protect land and sea areas to achieve the long-term conservation of biodiversity, with associated ecosystem services and cultural values.
The indicator and its disaggregations provide insights into progress on the following elements of Target 3: '*30 per cent of terrestrial and inland water areas, and of marine and coastal areas,* especially areas of particular importance for biodiversity and ecosystem functions... *are... conserved and managed through ecologically representative... and equitably governed systems of protected areas and other effective area-based conservation measures*'. (See section 5b below in relation to the element '*recognizing indigenous and traditional territories, where applicable'*).
The indicator enables tracking of the '30 per cent' element, while the following disaggregations enable tracking of other elements: (1) coverage of protected areas versus OECMs, (2) coverage of realms, biomes, and ecosystems (3) coverage of areas of particular importance for biodiversity, (4) coverage by protected areas and OECMs with different levels of effectiveness, and (5) coverage by governance type. The rational for these disaggregations is explained further below:

1. Coverage by protected areas versus OECMs: this enables the relative contributions of these two approaches to meeting the 30% element of the target to be distinguished.
2. Coverage of realms, biomes, ecosystem functional groups, ecoregions etc: coverage of terrestrial, inland water, and marine and coastal realms will enable tracking of progress towards achieving 30 per cent coverage of 'terrestrial and inland water areas', and of 'marine and coastal areas', can provide insights into the degree to which protected area and OECM networks are 'ecologically representative'. Richer understanding can be derived by disaggregating further to assess coverage of biomes within each realm (e.g.Tropical/subtropical forests biome, Rivers and streams biome, Pelagic ocean waters biome etc) and to Ecosystem Functional Groups within each biome (e.g. Tropical/Subtropical Lowland Rainforests, Seagrass meadows, Permanent Upland Streams etc), or terrestrial, freshwater and marine ecoregions.
3. Coverage of areas of particular importance for biodiversity: existing Sustainable Development Goal Indicators 14.5.1 (marine), 15.1.2 (terrestrial and freshwater), and 15.4.1 (mountains) already report protected area coverage of Key Biodiversity Areas for all countries, as a measure of coverage of 'areas of particular importance for biodiversity', using

nationally-defined, developed, and maintained datasets of areas of importance following the global Key Biodiversity Area (KBA) Standard. This provides a standardised dataset with which the headline coverage of areas of importance for biodiversity can be calculated. At a national scale, Parties may wish to include other areas that meet the definition of areas of particular importance for biodiversity (Plumptre et al 2024). A detailed methodology is provided below.

4. Coverage by level of effectiveness: the 'effectively conserved and managed' element of Target 3 can be assessed by disaggregating protected area and OECM coverage using data on management effectiveness, governance quality, conservation outcomes, and the quality of design and planning to group protected areas and OECMs according to their level of effectiveness or change in effectiveness over time. A methodology for disaggregating the indicator in this way at the global level, building on the existing Global Database on Protected Area Management Effectiveness (GD-PAME), is in development, and broadly outlined below.
5. By governance type (government, private organisations, Indigenous Peoples and Local Communities, or shared) using data already documented in the WDPA and WD-OECM. Coverage of protected areas or OECMs with Indigenous peoples' governance, local community governance, or shared governance is relevant to the 'equitably governed' aspect of Target 3, albeit as a proxy, since these governance types have stronger engagement by Indigenous Peoples and Local Communities than governance by government and private governance.

These disaggregations of the indicator reflect the fact that increases in percentage coverage are insufficient in isolation, and that protected areas and OECMs also need to be: located in areas of importance for biodiversity, cover representative areas of different realms, biomes and ecosystems (i.e. be ecologically representative), effective in achieving positive biodiversity outcomes, and equitably governed, as detailed in the wording of Target 3.

Disaggregations to reflect other elements of the target are not yet feasible owing to lack of suitable comprehensive data or methods, including in relation to areas of importance for ecosystem services, connectivity, equitably governance, integration into wider landscapes, seascapes and the ocean, and respect for the rights of Indigenous Peoples and Local Communities. Assessing progress to Target 3 will require consideration of the importance and relevance of Sections C(a), C(b), C(g), and C(n) in the Kunming-Montreal Global Biodiversity Framework, as well as the cross-cutting nature of indicators for Targets 21-23.

5. Definitions, concepts and classifications

5a. Definition:

Indicator definition:

This indicator measures the percentage area covered by protected areas or OECMs. The five disaggregations measure: (1) the percentage area covered by protected areas and the percentage area covered by OECMs; (2) the percentage area of terrestrial, inland water, and marine and coastal realms (and biomes and ecosystems within them) covered by protected areas or OECMs; (3) the mean percentage of areas of particular importance for biodiversity (KBAs) covered by protected areas or OECMs (SDG indicators 14.5.1, 15.1.2, 15.4.1 represent the marine, terrestrial/freshwater and mountain components of this metric); (4) the percentage area covered by protected areas or OECMs that are at different levels of effectiveness (details still under development); (5) the percentage area covered by protected areas or OECMs that are governed by each of: government, private organisations, Indigenous Peoples and Local Communities, or shared.

Other key concepts and definitions:

Protected area: 'A clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values.' (Dudley et al., 2008).

Other effective area-based conservation measure: 'a geographically defined area other than a Protected Area, which is governed and managed in ways that achieve positive and sustained long-term outcomes for the in situ conservation of biodiversity, with associated ecosystem functions and services and where applicable, cultural, spiritual, socio–economic, and other locally relevant values.' (CBD, 2018).

Areas of particular importance for biodiversity: 'sites that contain significant populations/extents of threatened or geographically restricted species or ecosystems, or that have significant ecological integrity or irreplaceability, significance for the maintenance of biological processes, or provide significant ecological connectivity to maintain populations of species' (Plumptre et al 2024). Key Biodiversity Areas have been identified in all countries and represent the most comprehensive network of such sites, and are defined as sites "contributing significantly to the global persistence of biodiversity" (IUCN, 2016).

5b. Method of computation

The indicator is calculated from data in the form of point locations and polygons of protected area and OECM boundaries managed in the WDPA and the WD-OECM. The majority of these sites are available for download at www.protectedplanet.net. However, due to restrictions requested by some data providers, a small number of sites are not made publicly available. These sites are still included in the analyses that generate coverage statistics.

Not all sites in the WDPA are included in the indicator. Proposed protected areas are excluded, as are sites for which the status has not been reported. Sites submitted as points with no reported area are also excluded. Currently, UNESCO Man and Biosphere Reserves (MAB) sites reported to the WDPA are excluded, on the basis that that the MAB sites currently in the WDPA include buffer and transition zones that in many cases are not protected areas. MAB Core areas are usually protected areas designated at a national level and are therefore generally accounted for in our calculations. (UNEP-WCMC is working with the MAB Secretariat to secure an accurate set of boundaries for the core areas to ensure the contribution of these sites is accurately reflected). MAB sites reported as OECMs are, however, included in coverage analyses.

The protected area coverage is calculated using the following steps:

1. The WDPA is filtered to exclude records with the characteristics listed above.
2. A buffer is created around protected areas reported as points using their Reported Area. There are important caveats associated with this method, some of which are explored by Visconti et al. 2013. Buffering points can underestimate or overestimate protected area coverage as the circles created around points might cover areas where protected areas do not exist (overestimation) or overlap with areas where other protected areas already exist (underestimation). It can also give inaccurate values for sites that are partly terrestrial and marine as the absence of boundaries make it difficult to predict which portion of a protected area is in the land or the sea.
3. Both polygon and buffered point layers are combined in a single layer.
4. For calculating the overall coverage, this layer is flattened (dissolved) to eliminate overlaps between designations and avoid double counting.
5. Subsequent steps are described in Section 8.

The OECM coverage is calculated separately:

1. The latest WD-OECM monthly release is used.
2. A buffer is created around OECMs reported as points using their Reported Area.
3. Both polygon and buffered point layers are combined in a single layer.
4. Areas where protected areas and OECMs overlap are erased from this layer using the global protected areas dissolved layer (step 4 above).
5. The output OECMs layer is flattened (dissolved).
6. Subsequent steps are described in section 8.

Methods for the various disaggregations are detailed in Section 8 below.

Note that the indicator follows an established methodology in tracking coverage of protected areas and OECMs, given the wording of Target 3 which refers to "systems of protected areas and other effective area-based conservation measures". The target also includes the wording "recognizing indigenous and traditional territories, where applicable". This could be interpreted as implying (1) a disaggregation of the metric to show trends in the extent of protected areas and OECMs governed by Indigenous peoples or local communities and falling within Indigenous and traditional territories, and/or (2) that Indigenous and traditional territories are a third type of area that can be added to protected areas and OECMs to contribute towards achievement of the target (while noting the overlap in coverage between these areas). Given (1) the existing reporting practices of governments and other data providers to the World Database on Protected Areas and World Database on OECMs, (2) that unlike protected areas and OECMs, Indigenous and traditional territories are not defined according to their objectives or outcomes in relation to biodiversity, and (3) recognition that while global dataset of Indigenous and traditional territories exists, they are not comprehensive, Indigenous and traditional territories outside protected areas and OECMs are not included in the methodology described here.

This approach may evolve to reflect future COP decisions if appropriate (and providing suitable data become available). Parties can use the Complementary indicators "Extent of indigenous peoples and local communities' lands that have some form of recognition" and/or "Coverage of Protected areas and OECMS and traditional territories (by governance type)" to report national trends.

5c. Data collection method

Data on protected areas and OECMs are submitted to UNEP-WCMC by national governments. In some cases, data are submitted directly by the governance authorities of protected areas or OECMs, and are added to the WDPA or WD-OECM following a verification process. The WDPA and WD-OECM are updated monthly.

KBAs are identified nationally through inclusive and consultative processes involving government, academia, non-governmental organisations, indigenous people's groups, and other stakeholders as appropriate, typically coordinated by KBA National Coordination Groups. Anyone with appropriate data may propose a site, but consultation with all stakeholders at the national level is required during the proposal process. Submission of proposals for KBAs to the World Database of Key Biodiversity Areas follows a systematic review process to ensure that the KBA criteria have been applied correctly and that the sites can be recognised as important for the global persistence of biodiversity. Regional Focal Points have been appointed to help KBA proposers develop proposals and then ensure they are reviewed independently. Guidance on Proposing, Reviewing, Nominating and Confirming sites has been published to help guide proposers through the development of proposals and the review process, highlighting where they can obtain help in making a proposal (see https://www.keybiodiversityareas.org/working-with-kbas/proposing-updating/proposal-process and specific guidance at https://www.keybiodiversityareas.org/assets/af7c1fe6-d669-414e-b066-e9733f0de7a8). Site proposals undergo independent review. This is followed by the official site nomination with full documentation meeting the Documentation Standards for KBAs. Sites confirmed by the KBA Secretariat to qualify as KBAs are then published on the KBA Website. For further information, see www.keybiodiversityareas.org/working-with-kbas/proposing-updating.

For details of other data used in generating disaggegations, see below.

5d. Accessibility of methodology

The methods are also described in the metadata to SDG indicators 14.5.1 and 15.1.2 at https://unstats.un.org/sdgs/metadata. Methods for the KBA disaggregation were also published in Butchart et al (2012, 2015), with relevant rationale also provided in Plumptre et al. (2024). The protected area indicator and its realm and KBA disaggregations are calculated nationally, regionally and globally. The ecoregion disaggregation is calculated at the global level. The scale of disaggregation by level of effectiveness and governance type is yet to be determined.

See References.

5e. Data sources

Protected area data are compiled by ministries of environment and other ministries responsible for the designation and maintenance of protected areas. Other data providers can contribute in some cases (see section 5c). Protected area data are aggregated globally into the World Database on Protected Areas by the UN Environment Programme World Conservation Monitoring Centre, according to the mandate for production of the United Nations List of Protected Areas (UN Economic and Social Council, 1959; Deguignet et al. 2014) and subsequent decisions of the CBD CoP. They are disseminated through Protected Planet, which is a joint product of IUCN and UNEP, managed by UNEP-WCMC. Parties are encouraged to ensure that updates to national protected area systems are submitted to the WDPA in a timely fashion.

OECMs are collated in the World Database on Other Effective Area-based Conservation Measures (WD-OECM). This database can be regarded as a sister database to the WDPA as it is also hosted on Protected Planet. Furthermore, the databases share many of the same fields and have an almost identical workflow; differing only in what they list. OECMs are a quickly evolving area of work, as such for the latest information on OECMs and the WD-OECM please contact UNEP-WCMC.

Realms, biomes and ecosystem functional groups are defined in the Global Ecosystem Typology (https://global-ecosystems.org/). Inland water biomes are mapped in the RiverATLAS (Linke et al. 2019) and Global Lakes and Wetlands Database v2 (Lehner et al. 2024). Terrestrial ecoregions are mapped in Dinerstein et al. (2017), marine ecoregions are mapped in Spalding et al. (2007, 2012), and freshwater ecoregions are mapped in Abell et al. (2008).

KBAs are identified nationally through multi-stakeholder processes involving government, academia, non-governmental organisations, indigenous people's groups, and other stakeholders as appropriate, typically coordinated by KBA National Coordination Groups, following standard criteria and thresholds. Key Biodiversity Areas data are aggregated into the World Database on Key Biodiversity Areas, managed by BirdLife International on behalf of the KBA Partnership, and made freely available through the KBA website at www.keybiodiversityareas.org.

5f. Availability and release calendar

The headline indicator disaggregated by coverage by realm, and by protected areas versus OECMs, is published on the Protected Planet website each month. Once fully developed, the disaggregation by level of effectiveness will also be published every month.

The disaggregation by coverage of areas of particular importance for biodiversity is updated annually using the latest versions of the datasets on protected areas, OECMs and Key Biodiversity Areas. This disaggregation is also provided annually in the UN Sustainable Development Goal Database (https://unstats.un.org/sdgs/dataportal) and in the IBAT Country Profiles (https://www.ibat-alliance.org/country_profiles?locale=en), and every two years, alongside the disaggregations by ecoregion, biome and governance type in the Protected Planet Report series. Temporal trends are also provided in this series.

5g. Time series

1819 – current year

5h. Data providers

See Data sources.

5i. Data compilers

UNEP-WCMC, IUCN and BirdLife International

Protected area and OECM data are aggregated globally into the WDPA and WD-OECM by the UN Environment Programme World Conservation Monitoring Centre, according to the mandate for production of the United Nations List of Protected Areas (UN Economic and Social Council, 1959; Deguignet et al. 2014) and subsequent decisions of the CBD CoP. They are disseminated through Protected Planet, which is managed by UNEP-WCMC. Key Biodiversity Areas data are aggregated into the World Database of Key Biodiversity Areas, managed by BirdLife International.

5j. Gaps in data coverage

Quality control criteria are applied to ensure consistency and comparability of the data in the World Database on Protected Areas and WD-OECM. New data are validated at UNEP-WCMC through a number of tools and translated into the standard data structure of the World Database on Protected Areas and WD-OECM. Discrepancies between the data in the World Database on Protected Areas and WD-OECM and new data are minimised by provision of a manual (UNEP-WCMC 2019) and resolved in communication with data providers. Data and knowledge gaps can arise due to difficulties in determining whether a site conforms to the IUCN definition of a protected area or the CBD definition of an Other Effective Area-based Conservation Measure. However, given that both are incorporated into the indicator, misclassifications (as one or the other) do not impact the calculated indicator value. Non-state governed protected areas are under-represented in the WDPA. The majority of countries have not yet reported OECMs.

Regarding areas of importance for biodiversity, Similar processes apply for the incorporation of data into the World Database of Key Biodiversity Areas (BirdLife International 2023), and the KBA Proposal,

Review, Nomination and Confirmation process involves a number of steps to ensure that the data are valid and the KBA criteria have been appropriately applied.
the biggest limitation currently is that site identification to date has focused disproportionately on specific subsets of biodiversity, for example birds (for Important Bird and Biodiversity Areas) and highly threatened species (for Alliance for Zero Extinction sites). While Important Bird and Biodiversity Areas have been documented to be good surrogates for biodiversity more generally (Brooks et al. 2001, Pain et al. 2005), the application of the unified standard for identification of Key Biodiversity Areas (IUCN 2016) across different levels of biodiversity (genes, species, ecosystems) and different taxonomic groups remains a high priority, building from efforts to date (Eken et al. 2004, Knight et al. 2007, Langhammer et al. 2007, Foster et al. 2012). Fortunately, good progress is now being made, with birds now comprise less than 50% of the species for which Key Biodiversity Areas have been identified, and as Key Biodiversity Area identification for other taxa and elements of biodiversity proceeds, such bias will become a less important consideration in the future. Key Biodiversity Area identification has been validated for a number of countries and regions where comprehensive biodiversity data allow formal calculation of the site importance (or "irreplaceability") using systematic conservation planning techniques (Di Marco et al. 2016, Montesino Pouzols et al. 2014).
Future developments of the indicator will include: a) improvements in the data on protected areas by continuing to increase the proportion of sites with documented dates of designation and with digitised boundary polygons (rather than coordinates); b) increased documentation of Other Effective Area-based Conservation Measures in the World Database of OECMs; c) expansion of the taxonomic coverage of Key Biodiversity Areas through application of the Key Biodiversity Areas standard (IUCN 2016) to a wider variety of vertebrates, invertebrates and plants, as well as increased applicatoin of the criteria relating to ecosystem, ecological integrity and irreplaceability; and d) improved data on effectiveness; d) increased use of disaggregations by ecosystem functional groups as these are mapped in increasing numbers of countries.

5k. Treatment of missing values

At country level

Data are available for protected areas and Key Biodiversity Areas in all of the world's countries, and so no imputation or estimation of national level data is necessary. Year of protected area establishment is unknown for a small but significant proportion of protected areas, generating uncertainty in temporal trends in the disaggregation by areas of importance for biodiversity (SDG indicators 14.5.1, 15.1.2, and 15.4.1). To reflect this uncertainty, in such cases a year was randomly assigned from another protected area within the same country, and this procedure was repeated 1,000 times, with the median plotted (Butchart et al. 2012, 2015).

At regional and global levels

Global and regional versions of the indicators are generated from all countries globally or in the relevant region, and so while there is uncertainty around the data, there are no missing values as such and so no need for imputation or estimation.

6. Scale

6a. Scale of use

Scale of application (please check all relevant boxes):

Global: ☒ Regional: ☒ National☒

Scale of data disaggregation/aggregation:

- Global/ regional scale indicator can be disaggregated to national level: ☐
- National data is collated to form global indicator: ☒

6b. National/regional indicator production

The following method is used to calculate coverage of protected areas by realm:

1. Start with the latest WDPA monthly release.
2. The WDPA is filtered to exclude records with the characteristics listed in section 5b.
3. A buffer is created around protected areas reported as points using their Reported Area.

There are important caveats associated with this method, some of which are explored by

Visconti et al. 2013. Buffering points can underestimate or overestimate protected area coverage as the circles created around points might cover areas where protected areas do not exist (overestimation) or overlap with areas where other protected areas already exist (underestimation). It can also give inaccurate values for sites that are partly terrestrial and marine as the absence of boundaries make it difficult to predict which portion of a protected area is in the land or the sea.

4. Both polygon and buffered point layers are combined in a single layer.
5. The layer above is flattened (dissolved) by country/territory to remove overlaps between designations within countries/territories and avoid double counting (please note that this retains overlaps between countries and should therefore only be used to calculate national, not regional or global, coverage.
6. Transboundary sites (those that are attributed to multiple countries) are split geographically according to where each part of the protected area is located and are then allocated to the corresponding countries/territories using the base map of the world (see section 5b).
7. The flattened output is intersected with a base map of the world (see section 5b)
8. The intersected output is converted to Mollweide (an equal area projection) and the land and EEZ protected area of every country and territory is calculated, in km^2.
9. The terrestrial protected area coverage is calculated for each country or territory by dividing the total area of terrestrial protected areas by total terrestrial area of that country/territory. The marine and coastal protected area coverage is calculated for each country or territory by dividing the total marine and coastal area of protected areas by total marine and coastal area of that country/territory.

OECM coverage by realm is calculated separately:

1. Start with the latest WD-OECM monthly release.
2. A buffer is created around OECMs reported as points using their Reported Area.
3. Both polygon and buffered point layers are combined in a single layer.
4. Areas where protected areas and OECMs overlap are erased from the OECMs layer above using the global protected areas flat layer.
5. The output OECMs layer is flattened (dissolved) by country/territory to eliminate overlaps between areas and avoid double counting.
6. The OECMs flattened layer is intersected with a base map of the world (see section 5b)
7. The intersected flat layer is converted to Mollweide (an equal area projection) and the land and EEZ OECM area of every country and territory is calculated, in km^2.

The national total protected area & OECM coverage for each realm in each country and territory is calculated:

1. National terrestrial protected area & OECM coverage = (national total area of terrestrial protected areas + national total area of terrestrial OECMs) / total terrestrial area of the country/territory.
2. National marine and coastal protected area & OECM coverage = (national total area of marine and coastal protected areas + national total area of marine and coastal OECMs) / total marine and coastal area of the country/territory.

Regional indices for the disaggregation by Key Biodiversity Areas are calculated as the mean percentage of each Key Biodiversity Area in the region covered by (i.e. overlapping with) protected areas and/or Other Effective Area-based Conservation Measures: in other words, the percentage of each Key Biodiversity Area covered by these designations, averaged over all Key Biodiversity Areas in the particular region.

6c. Sources of differences between global and national figures

National processes provide the data that are incorporated into the World Database on Protected Areas, the World Database on Other Effective Area-based Conservation Measures, and the World Database of Key Biodiversity Areas, so there are very few discrepancies between national indicators and the global one. One minor source of difference is that the World Database on Protected Areas incorporates internationally designated protected areas (e.g., UNESCO World Heritage sites, Ramsar sites, etc), a few of which are not considered by their sovereign nations to be protected areas.

Note that because countries do not submit comprehensive data on degazetted protected areas to the WDPA, earlier values of the indictor may marginally underestimate coverage. Furthermore, there is also a lag between the point at which a protected area is designated on the ground and the point at which it is reported to the WDPA. As such, current or recent coverage may also be underestimated.

6d. Regional and global estimates & data collection for global monitoring

6d.1 Description of the methodology

See above for the methods for calculating coverage by realm and by Key Biodiversity Areas for regions and globally. Protected Areas and Key Biodiversity Areas in Areas Beyond National Jurisdiction (ABNJs) are included in the global versions of these indicators, but not for national or regional versions.

6d.2 Additional methodological details

N/A

6d.3 Description of the mechanism for collecting data from countries

See section 5.

7. Other MEAs, processes and organisations

7a. Other MEA and processes

Sustainable Development Goals

Marine versions of the indicator are the same as Sustainable development Goal (SDG) indicator 14.5.1. Terrestrial and freshwater versions of the disaggregation by areas of importance for biodiversity are the same as SDG indicator 15.1.2 (while SDG indicator 15.4.1 represents a version for sites of important mountain biodiversity).

Relevant subsets of the KBA disaggregation are also used and or reported in

- daughter agreements of the Convention on Migratory Species (e.g. African-Eurasian Waterbird Agreement, Raptors MOU),
- United Nations Convention to Combat Desertification (UNCCD)
- Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES): Global Assessment and each of the Regional Assessments.

Disaggregation by inland waters and by inland water biomes and realms is also relevant to the Ramsar Convention on Wetlands.

7b. Biodiversity Indicator Partnership

Yes: ☒ No: ☐

https://www.bipindicators.net/indicators/coverage-of-protected-areas-terrestrial-and-marine
https://www.bipindicators.net/indicators/protected-area-coverage-of-key-biodiversity-areas

8. Disaggregation

i. Disaggregation by PAs and OECMs

See section 5.

ii. Disaggregation by realm, biomes, ecosystem functional groups and ecoregions

The indicator was previously disaggregated by coverage of the marine and coastal realm and the terrestrial realm (including inland waters). A methodology for calculating coverage of inland waters separately has now been developed (by TNC, with the support of the Convention on Wetlands Scientific and Review Panel STRP and UNEP-WCMC) and will be implemented moving forwards.

The following steps are used to disaggregrate coverage by realm (following the steps described in section 5):

Protected areas:

1. The global protected areas flat layer is intersected with a base map of the world. The base map used by UNEP-WCMC is a combination of Exclusive Economic Zones (EEZ; VLIZ 2014) and terrestrial country boundaries (World Vector Shoreline, 3rd edition, National Geospatial-Intelligence Agency). A simplified version of this layer has been published at Nature Scientific Data journal (Brooks et al. 2016a) and is available

here: http://datadryad.org/resource/doi:10.5061/dryad.6gb90.2. A more accurate base map is under development by UNEP-WCMC and will replace this base map once complete.

2. The intersected flat layer is converted to Mollweide (an equal area projection) and the area of each polygon is calculated, in km^2.
3. Calculated areas are summed by land, marine and Areas Beyond National Jurisdiction (ABNJ). Marine and coastal areas are those outlined in the EEZ dataset (see above). ABNJ constitute international waters outside the 200 nautical mile limits of national jurisdiction.
4. Currently, the terrestrial protected area coverage is calculated by dividing the total area of terrestrial protected areas by total global terrestrial area, excluding Antarctica. ABNJ protected area coverage is calculated by selecting areas where ISO3 = 'ABNJ'. Marine and coastal protected area coverage is (total global protected areas flat coverage) - (ABNJ Area + Land Area). In future, it will be important to clarify whether terrestrial coverage statistics refer to terrestrial + inlands waters (as currently) or exclude inland waters (once coverage of inland waters is calculated too: see below).
5. Inland water coverage will be calculated as the total extent of inland waters (from GLWD v2) within protected and conserved area boundaries (from WDPA and WD-OECM) divided by the total extent of inland waters.

OECMs:

1. The OECMs flat layer is intersected with a base map of the world (see above)
2. The intersected flat layer is converted to Mollweide (an equal area projection) and the area of each polygon is calculated, in km^2.
3. Calculated areas are summed as described above for protected areas.

Protected areas + OECMs:

Statistics for protected areas and OECMs combined are calculated by summing these.

At the national scale, it is recommended that the indicator is disaggregated to show coverage of Ecosystem Functional Groups within the Global Ecosystem Typology (e.g. Tropical/Subtropical Lowland Rainforests, Seagrass meadows, Permanent Upland Streams etc). This can be achieved by (a) matching national ecosystem maps to the Global Ecosystem Typology and assessing coverage by protected areas and OECMs; or (b) using indicative global maps from the Global Ecosystem Typology and assessing coverage by protected areas and OECMs, excluding any inappropriate ecosystem groups that may have been included erroneously owing to data resolution. Coverage of Ecosystem Functional Groups can be combined to show coverage of biomes (e.g.Tropical/subtropical forests biome, Rivers and streams biome, Pelagic ocean waters biome etc). At the global scale, it may be more appropriate to calculate coverage by protected areas and OECMs of biomes, or a combination of biomes and Ecosystem Functional Groups (to enable distinction between coral reefs and seagrass beds, for example). For inland waters, it is recommended to assess coverage of (the total length of) rivers and streams, and (the area of) lakes and wetlands, and artificial wetlands. At a global scale, or in the absence of better data at regional, national, or sub-national scales, these metrics can be derived using the vectorized linear river network of RiverATLAS (Linke et al. 2019) and the lakes, wetlands and artificial wetland classes in GLWD v2 (Lehner et al. 2022). Coverage can also be assessed for terrestrial ecoregions (Dinerstein et al., 2017), marine ecoregions (Spalding et al., 2007, 2012) and freshwater ecosystems (Abell et al. 2008).

iii Disaggregation by areas of importance for biodiversity:

This disaggregation shows temporal trends in the coverage by protected areas and OECMs of areas of particular importance for biodiversity (see definition above). It can be measured as the mean percentage of each important Key Biodiversity Area that is covered by protected areas and Other Effective Area-based Conservation Measures (OECMs), calculated from data derived from a spatial overlap between digital polygons for protected areas (from the World Database on Protected Areas; UNEP-WCMC & IUCN 2023), digital polygons for Other Effective Area-based Conservation Measures (from the World Database on OECMs) and digital polygons for Key Biodiversity Areas (from the World Database of Key Biodiversity Areas, including Important Bird and Biodiversity Areas, Alliance for Zero Extinction sites, and other Key Biodiversity Areas). The value of the indicator at a given point in time, based on data on the year of protected area establishment recorded in the World Database on Protected Areas and the

World Database on OECMs, is computed as the mean percentage of each Key Biodiversity Area currently recognised that is covered by protected areas and/or Other Effective Area-based Conservation Measures. Protected areas lacking digital boundaries in the World Database on Protected Areas, and those sites with a status of 'proposed' or 'not reported' are omitted. Degazetted sites are not kept in the WDPA and are also not included. Man and Biosphere Reserves are also excluded as these often contain potentially unprotected areas. Year of protected area establishment is unknown for ~12% of protected areas in the World Database on Protected Areas, generating uncertainty around changing protected area coverage over time. To reflect this uncertainty, a year was randomly assigned from another protected area within the same country, and then this procedure repeated 1,000 times, with the median plotted.

Prior to 2017, the indicator was presented as the percentage of Key Biodiversity Areas completely covered by protected areas. However, it is now presented as the mean % of each Key Biodiversity Area that is covered by protected areas in order to better reflect trends in protected area coverage for countries or regions with few or no Key Biodiversity Areas that are completely covered.

The indicator is reported for all Key Biodiversity Areas, and for marine, terrestrial and freshwater realms separately, matching SDG indicators 14.5.1 and 15.1.2 (while SDG indicator 15.4.1 represents the mountain subset). Sites were classified as marine Key Biodiversity Areas by undertaking a spatial overlap between the Key Biodiversity Area polygons and an ocean raster layer (produced from the 'adm0' layer from the database of Global Administrative Areas (GADM 2019)), classifying any Key Biodiversity Area as a marine Key Biodiversity Area where it had ≥5% overlap with the ocean layer (hence some sites were classified as both marine and terrestrial). Sites were classified as freshwater Key Biodiversity Areas if the resident species for which they were identified were documented in the IUCN Red List as dependent on 'Inland Water' systems. For non-resident or migrant species, or species that shift habitats during the annual cycle, the site was tagged as freshwater if the species occurred at the site in the appropriate season of water-dependence (e.g. some species are only dependent on water during the breeding season). Sites were then screened (using the satellite imagery base layer within ArcGIS) as to whether they lay wholly in the Coastal Zone (defined here as within 10 km of the coast), and these sites were then untagged as Freshwater and instead tagged as Marine if the wetland habitats present at the site fell purely within the IUCN Habitat Classification Scheme class 'Marine Supratidal' (i.e. estuaries, lagoons, etc.). If the site was within the Coastal Zone, but contained a mixture of Marine Supratidal and Inland Water classes, then it was tagged as both Freshwater and Marine. Each site was then manually cross-checked against other (less comprehensively available) site attributes, such as the habitat preferences of its trigger species, the site's name (Delta, River, Humedal, etc.), its areal coverage by different habitat types, its overlap with Ramsar Sites etc, so as to confirm or remove the freshwater tag appropriately. Some Key Biodiversity Areas qualify as both marine and terrestrial, and others qualify as both terrestrial and freshwater. Such sites are included in both of the relevant realm disaggregations. The indicator is also disaggregated to show trends in coverage of Key Biodiversity Areas identified for migratory species by protected area and OECMs, as a measure of the protection of ecological connectivity (this disaggregation is also relevant to the Convention on Migratory Species).

While Key Biodiversity Areas provide the most comprehensive dataset available of areas of particular importance for biodiversity identified nationally using a standardised approach that is comparable across all countries, Parties may wish to include other areas that meet the definition of areas of particular importance for biodiversity (Plumptre et al 2024).

iv Disaggregation by level of effectiveness:

Partners of the Protected Planet Initiative are developing a method for disaggregating PA and OECM coverage by 'level of effectiveness'. The proposed approach (UNEP-WCMC et al 2023), subject to change, is designed to bring together results from existing protected area effectiveness assessment methods and frameworks (including some listed as component and complementary indicators in CBD/COP/DEC/15/5 and listed in the Global Database on Protected Area Management Effectiveness). Key metrics have been identified for using these data to report on components of effectiveness (i.e. for Governance; Design & Planning; Management and Outcomes). Consultation on the proposed methods will commence shortly, with the aim of enabling the production of this disaggregation of the indicator in 2025. The proposed method follows a 'phased approach', which would allow data providers to submit data to Protected Planet at different levels of detail, according to their capacity to report and the availability of data. The indicator can already be disaggregated to show coverage of protected areas and OECMs for which a management effectiveness assessment has or has not been conducted, based on data submitted to the Global Database on Protected Area Management Effectiveness.

v. Disaggregation by governance type:

The indicator can be disaggregated by coverage of each IUCN governance type (government, private organisations, IP and LC, or shared) using the WDPA/WD-OECM GOV_TYPE field.

A time series can be created for all disaggregations using the WDPA/WD-OECM STATUS_YR field.

9. Related goals, targets and indicators

Target 1 Complementary indicator "Percentage of spatial plans utilizing information on key biodiversity areas",

Target 2 & 3 Complementary indicator "Status of Key Biodiversity Areas",

Target 3 Complementary indicator "Extent to which protected areas and other effective area-based conservation measures (OECMs) cover Key Biodiversity Areas that are important for migratory species".

10. Data reporter

10a. Organisation

UN Environment Programme World Conservation Monitoring Centre (UNEP-WCMC)
BirdLife International
International Union for Conservation of Nature (IUCN)

10b. Contact person(s)

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11. References

These metadata are based on https://unstats.un.org/sdgs/metadata/files/Metadata-15-01-02.pdf, and https://unstats.un.org/sdgs/metadata/files/Metadata-14-05-01.pdf, supplemented by https://www.bipindicators.net/indicators/coverage-of-protected-areas-terrestrial-and-marine, https://www.bipindicators.net/indicators/protected-area-coverage-of-key-biodiversity-areas , https://www.protectedplanet.net/en/resources/calculating-protected-area-coverage and the references listed below.

References:

ABELL, R. et al (2008) Freshwater Ecoregions of the World: A New Map of Biogeographic Units for Freshwater Biodiversity Conservation. BioScience, 58: 403–414, https://doi.org/10.1641/B580507

BIRDLIFE INTERNATIONAL (2014). Important Bird and Biodiversity Areas: a global network for conserving nature and benefiting people. Cambridge, UK: BirdLife International. Available at datazone.birdlife.org/sowb/sowbpubs#IBA.

BIRDLIFE INTERNATIONAL (2023) World Database of Key Biodiversity Areas. Developed by the KBA Partnership: BirdLife International, International Union for the Conservation of Nature, Amphibian Survival Alliance, Conservation International, Critical Ecosystem Partnership Fund, Global Environment Facility, NatureServe, Rainforest Trust, Re:Wild, Royal Society for the Protection of Birds, Wildlife Conservation Society and World Wildlife Fund. May 2023 version. Available at http://keybiodiversityareas.org/site/search

BROOKS, T. et al. (2001). Conservation priorities for birds and biodiversity: do East African Important Bird Areas represent species diversity in other terrestrial vertebrate groups? Ostrich suppl. 15: 3–12. Available from: http://www.tandfonline.com/doi/abs/10.2989/00306520109485329#.VafbVJPVq75.

BROOKS, T.M., et al. (2016a). Analysing Biodiversity and Conservation Knowledge Products to Support Regional Environmental Assessments. Scientific Data 3(1). Available from: www.nature.com/articles/sdata20167, https://doi.org/10.1038/sdata.2016.7.

BROOKS, T.M. et al. (2016b). Goal 15: Life on land. Sustainable manage forests, combat desertification, halt and reverse land degradation, halt biodiversity loss. Pp. 497–522 in Durán y Lalaguna, P., Díaz Barrado, C.M. & Fernández Liesa, C.R. (eds.) International Society and Sustainable Development Goals. Editorial Aranzadi, Cizur Menor, Spain. Available from: https://www.thomsonreuters.es/es/tienda/pdp/duo.html?pid=10008456

BUTCHART, S. H. M. et al. (2010). Global biodiversity: indicators of recent declines. Science 328: 1164–1168. Available from http://www.sciencemag.org/content/328/5982/1164.short

BUTCHART, S. H. M. et al. (2012). Protecting important sites for biodiversity contributes to meeting global conservation targets. PLoS One 7(3): e32529. Available from http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0032529.

BUTCHART, S. H. M. et al. (2015). Shortfalls and solutions for meeting national and global conservation area targets. Conservation Letters 8: 329–337. Available from http://onlinelibrary.wiley.com/doi/10.1111/conl.12158/full.

CBD (2014). Global Biodiversity Outlook 4. Convention on Biological Diversity, Montréal, Canada. Available from https://www.cbd.int/gbo4/.

CBD (2018). Protected areas and other effective area-based conservation measures. Decision 14/8 adopted by the Conference of the Parties to the Convention on Biological Diversity. Available at https://www.cbd.int/doc/decisions/cop-14/cop-14-dec-08-en.pdf

CBD (2020a). Global Biodiversity Outlook 5. Convention on Biological Diversity, Montréal, Canada. Available from https://www.cbd.int/gbo5/

CBD (2020b). Post-2020 Global Biodiversity Framework: Scientific and technical information to support the review of the updated Goals and Targets, and related indicators and baselines. Document CBD/SBSTTA/24/3. Available at: https://www.cbd.int/doc/c/705d/6b4b/a1a463c1b19392bde6fa08f3/sbstta-24-03-en.pdf .

CHAPE, S. et al. (2005). Measuring the extent and effectiveness of protected areas as an indicator for meeting global biodiversity targets. Philosophical Transactions of the Royal Society B 360: 443–445. Available from http://rstb.royalsocietypublishing.org/content/360/1454/443.short.DEGUIGNET, M., et al. (2014). 2014 United Nations List of Protected Areas. UNEP-WCMC, Cambridge, UK. Available from http://unep-wcmc.org/system/dataset_file_fields/files/000/000/263/original/2014_UN_List_of_Protected_Areas_EN_web.PDF?1415613322.

DEGUIGNET, M., et al. (2014). 2014 United Nations List of Protected Areas. UNEP-WCMC, Cambridge, UK. Available from https://resources.unep-wcmc.org/products/WCMC_RT107

DI MARCO, M., et al. (2016). Quantifying the relative irreplaceability of Important Bird and Biodiversity Areas. Conservation Biology 30: 392–402. Available from http://onlinelibrary.wiley.com/doi/10.1111/cobi.12609/abstract

DINERSTEIN, E., et al. (2017). An Ecoregion-Based Approach to Protecting Half the Terrestrial Realm. Bioscience 67: 534-545. https://doi.org/10.1093/biosci/bix014

DONALD, P. et al. (2018) Important Bird and Biodiversity Areas (IBAs): the development and characteristics of a global inventory of key sites for biodiversity. Bird Conserv. Internat. 29:177–198.

DUDLEY, N. (2008). Guidelines for Applying Protected Area Management Categories. International Union for Conservation of Nature (IUCN). Gland, Switzerland. Available from https://portals.iucn.org/library/node/9243

EDGAR, G.J. et al. (2008). Key Biodiversity Areas as globally significant target sites for the conservation of marine biological diversity. Aquatic Conservation: Marine and Freshwater Ecosystems 18: 969–983. Available from http://onlinelibrary.wiley.com/doi/10.1002/aqc.902/abstract.

EKEN, G. et al. (2004). Key biodiversity areas as site conservation targets. BioScience 54: 1110–1118. Available from http://bioscience.oxfordjournals.org/content/54/12/1110.short.

FOSTER, M.N. et al. (2012) The identification of sites of biodiversity conservation significance: progress with the application of a global standard. Journal of Threatened Taxa 4: 2733–2744. Available from http://www.threatenedtaxa.in/index.php/JoTT/article/view/779.

Global Administrative Areas (2019). GADM database of Global Administrative Areas, version 2.8. Available from www.gadm.org.

HAN, X. et al. (2014). A Biodiversity indicators dashboard: addressing challenges to monitoring progress towards the Aichi Biodiversity Targets using disaggregated global data. PLoS ONE 9(11):

e112046. Available from http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0112046.

HOLLAND, R.A. et al. (2012). Conservation priorities for freshwater biodiversity: the key biodiversity area approach refined and tested for continental Africa. Biological Conservation 148: 167–179. Available from http://www.sciencedirect.com/science/article/pii/S0006320712000298

IUCN (2016). A Global Standard for the Identification of Key Biodiversity Areas. International Union for Conservation of Nature, Gland, Switzerland. Available from https://portals.iucn.org/library/node/46259.

IUCN-WCPA Task Force on OECMs (2019). Recognising and reporting other effective area-based conservation measures. Gland, Switzerland: IUCN.

JONAS, H.D. et al. (2014) New steps of change: looking beyond protected areas to consider other effective area-based conservation measures. Parks 20: 111–128. Available from http://parksjournal.com/wp-content/uploads/2014/10/PARKS-20.2-Jonas-et-al-10.2305IUCN.CH_.2014.PARKS-20-2.HDJ_.en_.pdf .

KBA Secretariat (2019). Key Biodiversity Areas Proposal Process: Guidance on Proposing, Reviewing, Nominating and Confirming sites. Version 1.0. Prepared by the KBA Secretariat and KBA Committee of the KBA Partnership. Cambridge, UK. Available at http://www.keybiodiversityareas.org/assets/35687f50ac0bcad155ab17447b48885a.

KBA Standards and Appeals Committee (2020). Guidelines for using A Global Standard for the Identification of Key Biodiversity Areas. Version 1.1. Prepared by the KBA Standards and Appeals Committee of the IUCN Species Survival Commission and IUCN World Commission on Protected Areas. Gland, Switzerland: IUCN. https://portals.iucn.org/library/node/49131

KNIGHT, A. T. et al. (2007). Improving the Key Biodiversity Areas approach for effective conservation planning. BioScience 57: 256–261. Available from http://bioscience.oxfordjournals.org/content/57/3/256.short.

LANGHAMMER, P. F. et al. (2007). Identification and Gap Analysis of Key Biodiversity Areas: Targets for Comprehensive Protected Area Systems. IUCN World Commission on Protected Areas Best Practice Protected Area Guidelines Series No. 15. IUCN, Gland, Switzerland. Available from https://portals.iucn.org/library/node/9055.

LEHNER, B. et al. (2022). Global hydro-environmental lake characteristics at high spatial resolution. Scientific Data 9: 351. https://doi.org/10.1038/s41597-022-01425-z.

LEVERINGTON, F. et al. (2010). A global analysis of protected area management effectiveness. Environmental Management 46: 685–698. Available from http://link.springer.com/article/10.1007/s00267-010-9564-5#page-1

LINKE, S. et al. (2019). Global hydro-environmental sub-basin and river reach characteristics at high spatial resolution. Scientific Data 6: 283. https://doi.org/10.1038/s41597-019-0300-6.

MONTESINO POUZOLS, F., et al. (2014) Global protected area expansion is compromised by projected land-use and parochialism. Nature 516: 383–386. Available from http://www.nature.com/nature/journal/v516/n7531/abs/nature14032.html.

NOLTE, C. & AGRAWAL, A. (2013). Linking management effectiveness indicators to observed effects of protected areas on fire occurrence in the Amazon rainforest. Conservation Biology 27: 155–165. Available from http://onlinelibrary.wiley.com/doi/10.1111/j.1523-1739.2012.01930.x/abstract.

PLUMPTRE, A. et al. (2024) Targeting site conservation to achieve new global biodiversity goals. *One Earth* (in press).

PAIN, D.J. et al. (2005) Biodiversity representation in Uganda's forest IBAs. Biological Conservation 125: 133–138. Available from http://www.sciencedirect.com/science/article/pii/S0006320705001412.

RICKETTS, T. H. et al. (2005). Pinpointing and preventing imminent extinctions. Proceedings of the National Academy of Sciences of the U.S.A. 102: 18497–18501. Available from http://www.pnas.org/content/102/51/18497.short.

RODRIGUES, A. S. L. et al. (2004). Effectiveness of the global protected area network in representing species diversity. Nature 428: 640–643. Available from http://www.nature.com/nature/journal/v428/n6983/abs/nature02422.html.

RODRÍGUEZ-RODRÍGUEZ, D., et al. (2011). Progress towards international targets for protected area coverage in mountains: a multi-scale assessment. Biological Conservation 144: 2978–2983. Available from http://www.sciencedirect.com/science/article/pii/S0006320711003454.

SIMKINS, A.T., PEARMAIN, E.J., & DIAS, M.P. (2020). Code (and documentation) for calculating the protected area coverage of Key Biodiversity Areas. https://github.com/BirdLifeInternational/kba-overlap .

SPALDING, M.D., et al. (2012). Pelagic provinces of the world: A biogeographic classification of the world's surface pelagic waters. Ocean & Coastal Management, 60: 19–30. https://doi.org/10.1016/j.ocecoaman.2011.12.016

SPALDING, M.D., et al. (2007). Marine Ecoregions of the World: A Bioregionalization of Coastal and Shelf Areas. BioScience, 57(7): 573–583. https://doi.org/10.1641/B570707

TITTENSOR, D. et al. (2014). A mid-term analysis of progress towards international biodiversity targets. Science 346: 241–244. Available from http://www.sciencemag.org/content/346/6206/241.short.

UN Economic and Social Council (1959). *Establishment by the Secretary-General of the United Nations of a list of national parks and equivalent reserves.* E/RES/713(XXVII). Mexico City.

UNEP-WCMC (2019). World Database on Protected Areas User Manual 1.6. UNEP-WCMC, Cambridge, UK. Available from http://wcmc.io/WDPA_Manual .

UNEP-WCMC & IUCN (2023). The World Database on Protected Areas (WDPA). UNEP-WCMC, Cambridge, UK. Available from http://www.protectedplanet.net.

UNEP-WCMC, IUCN & JNCC (2023). Monitoring 'effectiveness' of areas contributing to Target 3. Available from: https://wdpa.s3.eu-west-1.amazonaws.com/PAME/protectedplanet_draft_monitoring_effectiveness_approach.pdf

VISCONTI, P., et al. (2013). "Effects of Errors and Gaps in Spatial Data Sets on Assessment of Conservation Progress." Conservation Biology, 27(5), pp. 1000–1010, https://doi.org/10.1111/cobi.12095.

VLIZ. (2014). Maritime Boundaries Geodatabase: Maritime Boundaries and Exclusive Economic Zones (200NM), version 11. Available online at https://www.marineregions.org/. https://doi.org/10.14284/386

12. Graphs and diagrams

N/A

GBF indicator metadata: 5.1 Proportion of fish stocks within biologically sustainable levels

1. Indicator name

5.1 Proportion of fish stocks within biologically sustainable levels

2. Date of metadata update

March 2024

3. Goals and Targets addressed

3a. Goal

N/A

3b. Target

Headline indicator for **Target 5** Ensure that the use, harvesting and trade of wild species is sustainable, safe and legal, preventing overexploitation, minimizing impacts on non-target species and ecosystems, and reducing the risk of pathogen spillover, applying the ecosystem approach, while respecting and protecting customary sustainable use by indigenous peoples and local communities.

4. Rationale

The United Nations (UN) Convention on the Law of the Sea (UNCLOS), the United Nations Fish Stocks Agreement (UNFSA [UN, 1995]) and the FAO Code of Conduct for Responsible Fisheries (FAO, 1995a) all require maintaining or restoring fish stocks at levels that are capable of producing their maximum sustainable yield (MSY). To fulfil the objectives of these international treaties, fishery management authorities need to undertake assessment of the state of fish stocks and develop effective policies and management strategies. As a UN Agency with a mandate for fisheries, FAO endeavour to provide the international community with the best information on the state of marine fishery resources.

Since 1974, FAO has been periodically assessing and reporting the state of marine fishery resources using a wide spectrum of methods from numerical models to data poor approaches. FAO global and regional estimates were also used as an MDG indicator for Goal 7 on environment during the period 2000-2015. This facilitated its approval as a Tier I SDG indicator by the 2nd IAEG-SDG in October 2015.

The indicator has a peculiar nature compared to more conventional SDG indicators. The indicator estimates the sustainability of fish stocks that often move across national boundaries. This led the indicator to be initially reported only at global and regional levels, with regions not corresponding to continental MDG or SDG regions but to marine regions termed "FAO Major Fishing Areas".

The Global SDG Indicator Framework is a voluntary mechanism, but countries are required to report if data are available. As a custodian agency, the FAO works to put in action the 2030 Agenda's emphasis on country ownership and higher the incentive to take actions at country, regional and global levels. FAO has developed, since 2018, a questionnaire approach to allow individual countries to report on the sustainability of fish stocks. The approach 1) provides a framework for meaningful country-level reporting that complements but does not alter the core methodology of SDG indicator 14.4.1 at the global/regional levels (FAO, 2011), and 2) provides countries with simplified methods to carry out fish stock assessment in data-limited contexts, to some extent overcoming the technical barriers that traditional methods presented. This is because country-level reporting will be limited to the assessment of stocks that are found only within a country's EEZ and/or shared with neighbouring countries' EEZs, and therefore not include straddling stocks, highly migratory species, or stocks in Areas Beyond National Jurisdiction (ABNJ).

As a result, national data alone cannot be meaningfully aggregated at global/regional levels, but it can be used to inform country progress on fish stock sustainability within the EEZ.

In 2019, the FAO began sending a questionnaire to countries to collect national data with the aim to help countries in the reporting process.

5. Definitions, concepts and classifications

5a. Definition:

The indicator, "Proportion of marine fish stocks within biologically sustainable levels", measures the sustainability of the world's marine capture fisheries by the abundance of the exploited fish stocks with respect to MSY levels.

For each level of reporting (National, Regional, Global) the indicator is calculated as the ratio between the number of exploited fish stocks classified as "within biologically sustainable levels" and the total number of stocks in the Reference List that were classified with a determined status (within/not within "biologically sustainable levels").

$$P_s = \frac{N_s}{N} x100 = \frac{N_s}{N_s + N_u} x100$$

where Ps is the percentage of stocks classified as "within biologically sustainable levels" for the Reference List of stocks. Ns is the number of stocks in the Reference List classified as "within biologically sustainable levels", Nu is the number of stocks in the Reference List classified as "outside biologically sustainable levels" and N = Ns + Nu is the total number of stocks in the Reference List that have been classified as within or outside "biologically sustainable levels".

Classifying individual stocks as within/outside "biologically sustainable levels":

In order to keep consistency with the 14.4 target ("at least to levels that can produce maximum sustainable yield as determined by their biological characteristics" and other earlier international agreements, including the United Nations Convention on the Law of the Sea (UNCLOS), a fish stock is classified as "within biologically sustainable levels" if its abundance is estimated (considering uncertainty) to be equal to or greater than the level that can produce the Maximum Sustainable Yield (MSY). In contrast, when abundance falls below the MSY level, the stock is classified as "outside biologically sustainable levels".

A wide array of methods and approaches (including documented expert opinion) is used to classify stock status relative to the abundance producing MSY. This varies among countries, regions and stocks. Nevertheless, the reliability of the classification is assessed by FAO as part of the process of producing the index.

Maximum Sustainable Yield (MSY) is commonly defined as the greatest average amount of catch that can be harvested in the long-term from a stock under constant and current environmental conditions (e.g., habitat, water conditions, species composition and interactions, and anything that could affect birth, growth, or death rates of the stock), without affecting the long-term productivity of the stock. A stock can produce MSY if its abundance is above a certain level, usually around 50% of its unexploited abundance (but actual value can vary around that level, depending on the biological characteristics of the stock). See more at https://www.fao.org/faoterm/en/?defaultCollId=21

MSY-based reference points are the most common type of reference points used in fisheries management today. This is primarily because, for decades, reference points from surplus production models have most often been set based on the concept of MSY and they are the basic benchmarks for the sustainability of fisheries set by the UN Convention on the Law of the Sea (UNCLOS, Article 61(3)). For more on Reference Points in Fish Stock Assessment, see Caddy and Mahon (1995), Cadima (2003) or Haddon (2011).

BMSY: Biomass corresponding to Maximum Sustainable Yield from a production model or from an age-based analysis using a stock recruitment model. Often used as a biological reference point in fisheries management, it is the calculated long-term average biomass value expected if fishing at FMSY.

A population is: “A group of individuals of the same species living in the same area at the same time and sharing a common gene pool, with little or no immigration or emigration.”

A biological stock is: “A subpopulation of a species inhabiting a particular geographic area, having similar biological characteristics (e.g. growth, reproduction, mortality) and negligible genetic mixing with other adjacent subpopulations of the same species." (FAO, 2004-2021).

The Reference List of Stocks: it is not possible to classify the sustainability of exploitation for all the exploited stocks from a country, region or the world. Therefore, the indicator must be calculated based on a subset of these stocks. The list of the stocks that are classified for status and used to calculate the indicators is called the "Reference List of Stocks".

The Reference List of Stocks is built differently for the Regional/Global and the National levels. The process of building the Reference List of Stocks for regional and global level are described in FAO (2011). At National level, countries are requested to define a list of stocks, based on an agreed set of

criteria (Appendix 1). National and shared stocks can be included, but not straddling stocks (stocks that are distributed both in national EEZ and Areas Beyond National Jurisdiction).
At this moment, there is not a direct correspondence between the national level Reference Lists (that are defined by each country) and the regional and global Reference lists (that are defined by FAO).
The detailed description of all necessary concepts can be found in the e-learning course (FAO 2019-2021
Unit of measure: Percent %

5b. Method of computation

FAO currently reports the global and regional indicators calculated from FAO's assessment of a selected list of fish stocks around the world. The methodology is described in the FAO Technical Paper (FAO 2011).
FAO has been developing the new approach for country-level reporting since 2017, and has consulted with countries in three dedicated expert consultation workshops: In November 2017, FAO convened a workshop to exchange views with national practitioners on the new proposed analytical methods to produce Indicator 14.4.1 at country level1. In February 2019, FAO convened an expert consultation workshop on development of the methodologies for the global assessment of fish stock status, with participants from countries and regional fisheries organizations. In order to help countries reporting on the indicator, FAO then organized a series of capacity development workshops on stock status assessment and estimation methods of SDG Indicator 14.4.1 for various regions.
In November 2019, FAO dispatched the first SDG14.4.1 questionnaire calling countries to report on their national indicator. Eighty-three countries submitted their questionnaire and three reported independently. FAO has reported the full results of this first inquiry through UNSD in February 2022.
For each level of reporting (National, Regional, Global) the indicator is calculated as the ratio between the number of exploited fish stocks classified as "within biologically sustainable levels" and the total number of stocks in the Reference List that were classified with a determined status (within/not within "biologically sustainable levels")

$$P_s = \frac{N_s}{N} x100 = \frac{N_s}{N_s + N_u} x100$$

where Ps is the percent of stocks classified as "within biologically sustainable levels" for the Reference List of stocks. Ns is the number of stocks in the Reference List classified as "within biologically sustainable levels", Nu is the number of stocks in the Reference List classified as "outside biologically sustainable Levels" and N = Ns + Nu is the total number of stocks in the Reference List that have been classified as within or outside "biologically sustainable levels".
Classifying individual stocks as within/outside "biologically sustainable levels":
In order to keep consistency with the 14.4 target ("at least to levels that can produce maximum sustainable yield as determined by their biological characteristics" and other earlier international agreements, including the United Nations Convention on the Law of the Sea (UNCLOS)), a fish stock is classified as "within biologically sustainable levels" if its abundance is estimated to be (considering uncertainty) at or greater than the level that can produce the Maximum Sustainable Yield (MSY). In contrast, when abundance falls below the MSY level, the stock is classified as "outside biologically sustainable levels".
A wide array of methods and approaches (including documented expert opinion) is used to classify stock status relative to the abundance producing MSY. This varies among countries, regions and stocks. Nevertheless, the reliability of the classification is assessed by FAO as part of the process of producing the index.

Global/Regional:

Global and regional estimates of stock sustainability have been performed for 584 fish stocks around the world since 1974, representing 70% of global landings. The status of each stock is estimated using the methodology described in the FAO Technical Paper (FAO, 2011).

National:

Countries are requested to report the status of a reference list of fish stocks defined by each country on the basis of the criteria presented in Appendix 1. (https://unstats.un.org/sdgs/metadata/files/Metadata-14-04-01.pdf)

5c. Data collection method

Global/regional:

The fish stocks that FAO has monitored since 1974 represent a wide spectrum of data availability, ranging from data-rich and formally assessed stocks to those that have very little information apart from catch statistics by FAO major fishing area and those with no stock assessment at all. For the purposes of using the best available data and information and maintaining consistency among stocks and assessors, a procedure has been defined to identify stock status information (FAO 2011).

National:

FAO collects national data through a questionnaire sent to the Principal Focal Point (PFP) of each country. The PFP organises an institutional set-up which identifies the competent authorities to develop a reference list of stocks and completes the questionnaire.

During the initial stages of national data reporting, the information or data collected through the questionnaire from a country will initially only inform the indicator for the individual countries, also acknowledging the need for a learning curve along the few first questionnaire inquiries. As a result, the global/regional indicator remains during these initial stages separate from the national indicators. However, FAO is working on a convergence (where possible) of the two processes, and good-quality stock status assessments reported by countries for the national indicators will be included in the regional/global indicator calculations, depending on the evolution and further standardization of country reporting over the next 3-5 years.

Despite this effort, due to the heterogeneity of reporting from countries in the same FAO Major Fishing Area, and the necessary inclusion of straddling and highly migratory stocks and fisheries in the regional and global indicator, it is unlikely that a full convergence will be achieved in a short time-frame

5d. Accessibility of methodology

In each country, the data available for each stock and expertise level to conduct different types of assessments will differ. Some countries may have classic stock assessments already conducted for many of their stocks, while others may have very few or no assessments available.

For some countries, little stock assessment has been done. To help these countries and to facilitate their reporting, FAO prepared online materials and tools, including a selection of methods that can be used to evaluate stock status with data limited methods such as length-based and catch-only methods. The strengths and limitations of these methods are discussed in an eLearning course (Lesson 4), and caveats were also provided to avoid misuse and exercise cautions in practice. Furthermore, capacity building workshops have been organised to provide support to countries in stock assessment and reporting on the SDG 14.4.1.

eLearning course: https://elearning.fao.org/course/view.php?id=502

5e. Data sources

The classification of the status of exploited stocks relatively to the abundance that can produce MSY is often established through a formal stock assessment process. The data to inform stock assessments can come from many different sources, including fishery-dependent and fishery-independent sources. Fishery-dependent data are collected from the fishery itself, using both commercial and recreational sources through reporting or sample-based surveys at sea, at landing sites, or within fishing communities.

They can include information on removals of fish from the sea, which can include landings and discards, and information on the fleet such as number of boats, number of tows, time spent on the sea, as well as economic and social information like fish prices, fuel expenditures, total sales, employment or other.

Fishery-independent data are obtained in ways not related to any fishing activity and are typically collected by scientists via surveys (often scientific cruises) designed to estimate species abundance and biomass over long time series, and over consistent seasons and geographic areas. Typically, fisheries-independent data also include biological information on the species (age, length, weight, maturity, etc.), and habitat and environmental information (temperature, salinity, depth, etc.).
These data and other information are used by Stock Assessment scientists to classify the stock status. References on the methods most commonly used can be found in Cadima (2003), Haddon (2011), Sparre and Venema (1998) and other publications dealing with the methods of stock assessment.
The information used for the indicator at the Global/Regional level is based on a different process and data sources than that used for the national level

Global/Regional:

Because of the high data demands of classical stock assessment methods, only a limited number of fish stocks have been assessed. These species account for ca 50 percent of the global catch (Hilborn et al., 2020), and most are caught by industrial fisheries in developed countries .To balance the global representativeness of the assessment results and the goal of using the best available information, the FAO uses a wide spectrum of data and methods to extend its assessment to the fish stocks that account for the majority (70-80 percent) of the global catch (FAO, 2011).

National:

The national level indicator, on the other hand, is based exclusively on the stock status reported by countries. A multiplicity of methods are used to classify the stock status, including model-based estimates, empirical indicators and documented expert opinion.
For country reporting, a questionnaire was sent out to all FAO member States with marine boundaries (i.e. 165 States) in 2019, and will be resent in 2021, and then on a two-year basis. For the complete list of questions used to inform this indicator, please refer to Appendix 2 (https://unstats.un.org/sdgs/metadata/files/Metadata-14-04-01.pdf)

5f. Availability and release calendar

Data availability:

- Global/regional: the indicator has global and regional data from 1974 to 2019. Regional breakdown is by FAO major fishing area. The regional and global indicators were calculated based on the reference list of fish stocks FAO established in 1974. Countries are not directly involved in the computation of the indicator at global/regional level.
- National: the national-level questionnaire was dispatched for the first time in November 2019; FAO identifies 165 countries with a marine border, and three countries with Caspian Sea border, as being eligible, in principle, to report. As the result of the first questionnaire call, ninety-eight countries expressed interest in the indicator (59%), of which eighty-three replied with completed questionnaires while three countries reported the indicator separately (52%), 11 countries stated that they could not report due to lack of data or time, and one responded with some catch data.

Data release calendar:

- Global/regional: biennially
- National: biennially.

5g. Time series

Global/regional level:

- 1974 to 2019.

National level:

- First questionnaire dispatched in November 2019, considered a trial/testing phase. Upon comprehensive Quality Assurance analysis, FAO reported the full results of this first inquiry through UNSD in February 2022

5h. Data providers

FAO provides global and regional data. National-level data are generally reported by the National Statistics Office or the Ministry of Fisheries and/or Agriculture

5i. Data compilers

FAO

5j. Gaps in data coverage
N/A
5k. Treatment of missing values
Global/regional levels

- To ensure completeness of regional and global information on stocks, FAO gathers additional information outside of what is provided by each country, in particular concerning the highly migratory and straddling fishing stocks. For shared stocks, FAO may consult with Regional Fisheries Bodies (RFBs), who are mandated to assess and manage stocks with their contracting parties, in order to receive information and data and conduct stock assessment when necessary.

National level

- This indicator examines marine fish stocks. If a country has no marine capture fisheries, then the indicator is not calculated for that country. In such case, no imputation is performed to derive estimates. For countries reporting limited marine fish stock data, or data scored of low quality after quality assurance process, these are reported as Low reliability (code “U” of the OBS_STATUS flag)

However, the estimation of the indicator at regional and global levels was estimated not based on country questionnaires, but by the FAO through a systematic assessment of a reference list selected globally.
6. Scale
6a. Scale of use
Scale of application (please check all relevant boxes):
Global: ☒ Regional: ☒ National ☒
Scale of data disaggregation/aggregation:

- Global/ regional scale indicator can be disaggregated to national level: ☐
- National data is collated to form global indicator: ☐

6b. National/regional indicator production
In each country, the data available for each stock and expertise level to conduct different types of assessments will differ. Some countries may have classic stock assessments already conducted for many of their stocks, while others may have very few or no assessments available.
For some countries, little stock assessment has been done. To help these countries and to facilitate their reporting, FAO prepared online materials and tools, including a selection of methods that can be used to evaluate stock status with data limited methods such as length-based and catch-only methods and an online platform for hands-on practice. The strengths and limitations of these methods are discussed in an eLearning course (Lesson 4), and caveats were also provided to avoid misuse and exercise cautions in practice. Furthermore, capacity development workshops have been organised to provide support to countries in stock assessment and reporting on the SDG 14.4.1.
eLearning course: https://elearning.fao.org/course/view.php?id=502

6c. Sources of differences between global and national figures
Sources of discrepancies:
The indicator is estimated by the FAO based on the methodology developed in the 1980s (FAO, 2011). Although regular updates were carried out to incorporate technical advances and changes in major fish species, some discrepancies between regions may occur in the representativeness of the reference list in practical fisheries. However, this will not pose a large impact on the reliability of the Global indicator’s temporal trends which covers 75% of global landings.
6d. Regional and global estimates & data collection for global monitoring
6d.1 Description of the methodology
As explained in the “Rationale” section, national data alone cannot be meaningfully aggregated at global/regional level because country-level reporting will be limited to the assessment of stocks that are found only within a country’s EEZ (including stocks shared with neighbouring countries’ EEZs), and

therefore not include straddling stocks, highly migratory species, or stocks in Areas Beyond National Jurisdiction (ABNJ). Therefore, regional "aggregates" by FAO Major Fishing Area and the global indicator value are calculated with a specific approach, as described in the FAO Technical Paper (FAO 2011)

6d.2 Additional methodological details

FAO carries out a series of validations to assure that the data and information are provided by countries in line with the questionnaire instructions. The validation process consists of: (i) identification of errors, mistakes and missing value in the data and, (ii) correcting errors, mistakes and missing values in close consultation with the countries concerned. Each country is asked either to confirm that the data provided are correct or to provide remarks and / or revise data accordingly if they identify any errors.

6d.3 Description of the mechanism for collecting data from countries

N/A

7. Other MEAs, processes and organisations

7a. Other MEA and processes

Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES): Core Indicator

Sustainable Development Goals (SDG) indicator 14.4.1 https://www.fao.org/sustainable-development-goals-data-portal/data/indicators/1441-fish-stocks-sustainability/en

7b. Biodiversity Indicator Partnership

Yes: ☒ No: ☐

https://www.bipindicators.net/indicators/proportion-of-fish-stocks-in-safe-biological-limits

8. Disaggregation

By FAO major marine fishing areas for statistical purposes.

Taxonomically, FAO publishes the indicator separately for straddling stocks (mostly tuna and tuna like).

9. Related goals, targets and indicators

Target 9

10. Data reporter

10a. Organisation

Food and Agriculture Organization (FAO)

10b. Contact person(s)

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11. References

Websites:

https://www.fao.org/sustainable-development-goals/indicators/1441/en/

https://elearning.fao.org/course/view.php?id=502

https://unstats.un.org/sdgs/dataportal

https://www.fao.org/publications/sofia/2020/en/

References:

Caddy, J.R. and Mahon, R. (1995). Reference Points for fisheries management. FAO Fisheries Technical Paper. No. 337. Rome, FAO. 83p.

Cadima, E.L. (2003) Fish stock assessment manual. FAO Fisheries Technical Paper. No. 393. Rome, FAO. 161p.

FAO (1995) Code of conduct for responsible fisheries. 41 pp.

FAO (2005) Review of the state of world marine fishery resources. FAO Fisheries Technical Paper No. 457. Rome. 235 pp FAO (2011) Review of the state of world marine fishery resources. FAO technical paper 569: http://www.fao.org/docrep/015/i2389e/i2389e00.htm.

Hilborn, R., R.O. Amoroso, C.M. Anderson, J.K. Baum, T.A. Branch, C. Costello, C.L. de Moor, et al. 2020. "Effective Fisheries Management Instrumental in Improving Fish Stock Status." Proceedings of the National Academy of Sciences of the United States of America 117 (4): 2218–24. https://doi.org/10.1073/ pnas.1909726116.

UN (1995) Agreement for the implementation of the provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the conservation and management of straddling fish stocks and highly migratory fish stocks. 40 pp.

12. Graphs and diagrams

N/A

GBF indicator metadata: 6.1 Rate of invasive alien species establishment

1. Indicator name

6.1 Rate of invasive alien species establishment

2. Date of metadata update

March 2024

3. Goals and Targets addressed

3a. Goal

N/A

3b. Target

Headline indicator for **Target 6**:: Eliminate, minimize, reduce and or mitigate the impacts of invasive alien species on biodiversity and ecosystem services by identifying and managing pathways of the introduction of alien species, preventing the introduction and establishment of priority invasive alien species, reducing the rates of introduction and establishment of other known or potential invasive alien species by at least 50 per cent by 2030, and eradicating or controlling invasive alien species, especially in priority sites, such as islands.

4. Rationale

The establishment of invasive alien species (IAS) is a main driver of biodiversity loss. Recent extensive analyses of biological invasions show that the documented numbers of IAS have continued to increase over recent decades (IPBES 2023). Multi-national agreements developed for the purposes of addressing the challenge and negative impacts of IAS require information on the status and trends of IAS establishment – within and across countries. Without a repeated data collection process and up-to-date evidence-base, progress to prevent and reduce the consequences of IAS is hindered, and neither the evaluation nor the achievement of policy targets is feasible.

This indicator links the management success of introduction pathways of IAS to the desired outcome to prevent new IAS country establishments. It directly supports Target 6 of the framework on managing pathways for the introduction of IAS and preventing and reducing their rate of introduction and establishment. It also informs the effectiveness of IAS management actions for the recovery and conservation of species and ecosystems.

5. Definitions, concepts and classifications

5a. Definition:

Rate of invasive alien species establishment indicator: The number of invasive alien species that are expected to have established in a new region or country compared with the reference period, based on modelled trends in IAS observations.

The unit of measurement is the rate of invasive alien species establishments (number/year). From this we can estimate the trend in the rate of change for the reporting period.

5b. Method of computation

Step 1

The indicator is calculated from compiled country checklists of introduced and invasive species, within the Global Register of Introduced and Invasive Species (GRIIS; Pagad et al. 2018; Pagad et al. 2022). GRIIS is maintained by the IUCN SSC Invasive Species Specialist Group (ISSG), published as open-access, interoperable checklist datasets through the Global Biodiversity Information Facility (GBIF), and available via ‘invasive alien species’ links from the country profile pages of the CBD global Clearing House Mechanism (CHM). The checklists are updatable through national expert author teams coordinated globally by GRIIS, and form the backbone of country monitoring frameworks for IAS. The information value of this indicator is dependent on availability of the most up to date data on new IAS established in the country, and ongoing updates to the GRIIS country checklists and the Alien Species First Record Database (Seebens et al. 2017; see e.g. 2023 update (v3) of the Alien Species First Record Database). It is also informed by ongoing collation of in-country evidence on which species have started to cause harm (have a negative impact) or continue to do so, and this information is fed back into the GRIIS country checklists.

Step 2
The indicator can be calculated for different species subsets: (1) Species known to have an impact (i.e., based on the subset of invasive alien species in GRIIS for which there is evidence of impact in at least one country, denoted as 'Invasive' in the 'isInvasive' field of the country checklists); (2) All alien (introduced) species in a country using GRIIS data or alternative sources; (3) All alien species introduced via a particular pathway of introduction.
Step 3
For the subset of 'isInvasive' species in the country (Pagad et al. 2022), the dates of introduction, estimated dates of introduction, or dates of 'first record' are required (Seebens 2023). These data can be collated from in-country sources, or obtained from the IAS First Record Database (Seebens 2023) or similar sources. Date information can be compiled on a taxon-by-taxon basis, starting with those taxa for which the data are most readily available and complete.
Step 4
Raw data trends can be compiled showing the known number of newly-established species per year.
Step 5
To estimate the 'Rate of Establishment Indicator', the above information is then modelled to estimate new species invasions per year, along with an estimate of uncertainty (McGeoch et al. 2023). The model is based on a time series that measures the number of observed species in each time period, and estimates the rate of introduction of new species from these IAS observations. The observed number of IAS is the product of the number of introductions and the observation probability of the introduced species (Figure. 1). See supporting information providing guidance to countries on constructing such indicators for guidance on this estimation procedure.
Step 6
Comparable use of this indicator by Parties relies on the use of the same baseline dataset and a consistent method for estimating the rate parameter. Further tools are currently being prepared by GEO BON to assist countries with this step.

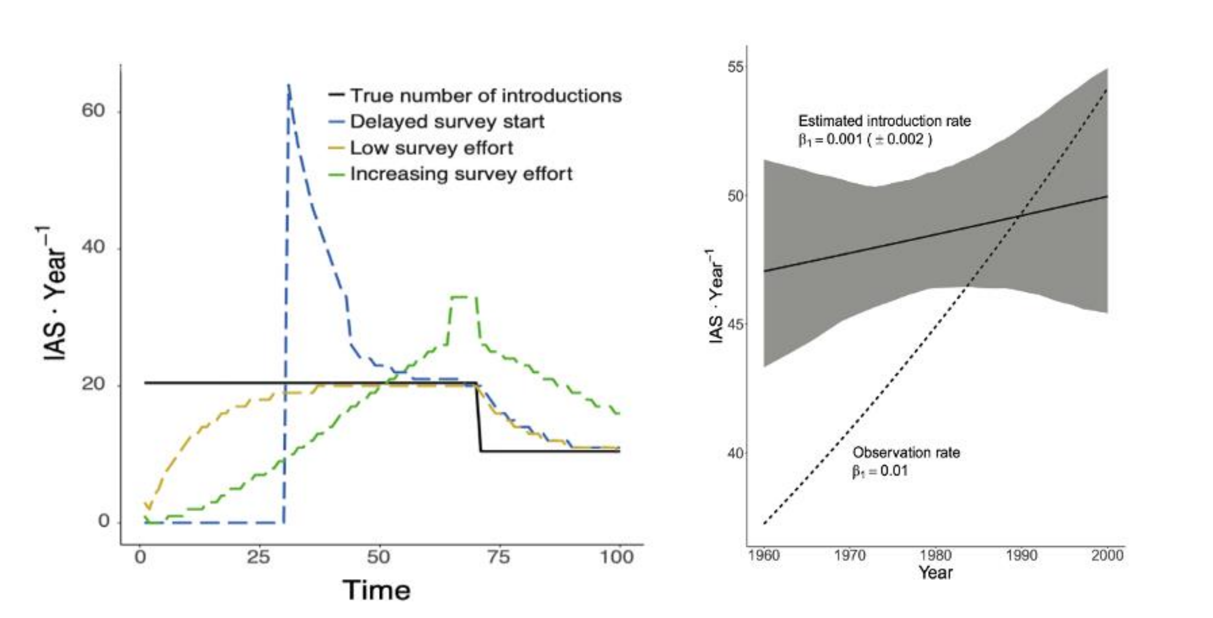

Figure 1*: The graph on the left shows an example of a step change in the true number of introductions (black line). This is estimated from checklist data updated over time. We see that survey effort (coloured dotted line) affects our knowledge of change in the rate of IAS (number per year). The true number is estimated with a model as described by McGeoch et al. (2023). The graph on the right shows the change in the rate of establishment of IAS over a longer period. This trend is estimated as a linear trend (as estimated with a slope from a regression) through a time series of IAS per year.*

5c. Data collection method

Detailed methodology for compiling country checklists within the Global Register of Introduced and Invasive Species (GRIIS, see previous section) is described in Pagad et al. (2018), and included within the metadata associated with each checklist, available through GBIF and linked from the CHM country profile pages.

The methodology for compiling the IAS First Record Database is described in Seebens et al (2017).

5d. Accessibility of methodology

The methodology for the indicator is described in McGeoch et al. (2023) and its national application is supported by GEO BON. As described in this paper governments and institutions responsible for assessing invasive alien species at the national level can follow four straightforward steps to build the data needed to estimate rates of invasive alien species (IAS) establishment (Figure 2).

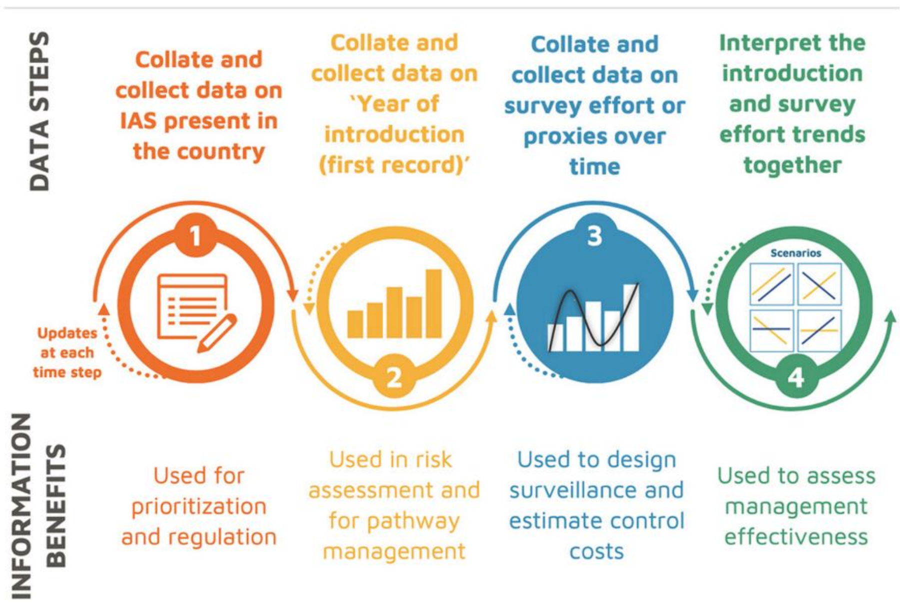

***Figure 2**. Four steps for countries to build data required for this indicator (taken from McGeoch et al. 2023, Fig 3).*

Parties can contribute to these efforts and to their own IAS establishment indicator by updating these data sources where necessary, and over time through ongoing observations of new species introductions and new evidence of IAS impacts within countries (Latombe et al. 2017).

GEO BON is producing additional material and tools to further support Parties in using this indicator, and will support a baseline indicator calculation that Parties can use in their reporting, or replace with their own calculation. Updates on this indicator will be made available at: https://geobon.org/ebvs/indicators/

5e. Data sources

- Country checklists of introduced and invasive Species, available via the Global Register of Introduced and Invasive Species (GRIIS, see 5b above; Pagad et al. 2018; Pagad et al. 2022)
- Date of first records for the country in the Alien Species First Record Database (Seebens 2023, see 5b above)
- The above sources can be replaced or supplemented by additional country data where these are available, including for example national and global citizen science platforms which often provide the most up to date records of IAS observations. Parties are strongly encouraged to share such data with GRIIS to bring the national checklists up to date.

- Aggregated species occurrence data via national biodiversity data platforms and/or the Global Biodiversity Information Facility (GBIF) occurrence search, filtered by species and country. This will bring together a wide variety of data sources including specimen collection events, observations from field surveys, data associated with published research articles, eDNA and citizen science, among others.

5f. Availability and release calendar

The indicator is available now. Indicator values can be produced for major taxonomic groups and countries with IAS checklists. The indicator can be updated annually, although annual updates rely on longer-term trends and interpreting change within the estimated uncertainty bounds.

5g. Time series

Indicator will be available annually, from 1970 – present, although with highly variable levels of confidence depending on data availability at global and national levels.

5h. Data providers

Expert organizations, scientific societies, national and public repositories (e.g. IUCN ISSG, GRIIS, GBIF, CABI, GEO BON infrastructure)

5i. Data compilers

GEO BON, IUCN ISSG, national and subnational agencies responsible for monitoring IAS.

5j. Gaps in data coverage

Gaps in overall data availability are reflected in the large variability of the completeness of the GRIIS country checklists. The methods outlined above are designed to deliver useful information in the face of incomplete data. The IPBES Invasive Alien Species Assessment highlighted the issue of incomplete IAS inventories across realms, taxonomic groups and geographic regions, in particular highlighting marine, tropical and Arctic ecosystems; microorganisms and invertebrates; and Africa and Central Asia (IPBES 2023).

5k. Treatment of missing values

The indicator can be expressed for specific taxonomic groups only, for examples for plants and all vertebrates or subsets such as mammals, and other taxa (e.g. microbes) with inadequate data omitted. Species-poor taxonomic groups can also be aggregated by introduction pathways (e.g. release, escape, contaminant, stowaway, corridors, and unaided natural dispersal) for rate of establishment per pathway.

6. Scale

6a. Scale of use

Scale of application (please check all relevant boxes):

Global: ☒ Regional: ☒ National☒

Scale of data disaggregation/aggregation:

- Global/ regional scale indicator can be disaggregated to national level: ☒
- National data is collated to form global indicator: ☒

This indicator can also be disaggregated to include within-country levels, in particular relating to islands.

6b. National/regional indicator production

This indicator is calculated based on data collected at the national level, supplemented by globally aggregated sources, see above.

6c. Sources of differences between global and national figures

Differences between country and international estimates may originate from limited data availability and the size and impact of IAS interventions and control measures. Filling species data gaps and confirming detections will reduce discrepancies. In countries where resources are limited, global analysis e.g. through literature synthesis, can supplement data available nationally. Because the rate of IAS establishment is estimated over several years, the impact of new national, regional, or global prevention and control interventions will take time to manifest as changes in index values at higher levels.

6d. Regional and global estimates & data collection for global monitoring

6d.1 Description of the methodology

The indicator is based on a model-estimated change in the number of new introductions per year, assuming a sampling effect (Belmaker et al. 2009, McGeoch et al. 2012, McGeoch et al. 2023).

6d.2 Additional methodological details

The compendium of country data to be used for global indicator production is available (Pagad et al. 2022).

6d.3 Description of the mechanism for collecting data from countries

Details available in Pagad et al. (2018).

7. Other MEAs, processes and organisations

7a. Other MEA and processes

An earlier version of this indicator was reported in the

- Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) Invasive Alien Species (IAS) Assessment, by the CBD for Aichi Target 9.
- Sustainable Development Goal (SDG) Target 15.8.

It will be relevant to

- Convention on the Conservation of Migratory Species of Wild Animals (CMS)
- Convention on Wetlands, Ramsar,
- United Nations Convention to Combat Desertification (UNCCD)
- IPBES Global and Regional Assessments.

7b. Biodiversity Indicator Partnership

Yes: ☐ No: ☒

It is a successor of, but different from, the BIP indicator "Trends in the numbers of invasive alien species introduction events" - https://www.bipindicators.net/indicators/trends-in-numbers-of-invasive-alien-species-introduction-events

8. Disaggregation

Where the relevant data is available through GRIIS, this indicator can be disaggregated by species, taxon, region, country, sub-national unit (including islands), protected areas, pathways or type of impact.

9. Related goals, targets and indicators

As invasive species are a key driver of biodiversity loss, there is a clear link with goals A and B and its associated indicators (e.g. Red List Index, Red List of Ecosystems)

10. Data reporter

10a. Organisation

Group on Earth Observations Biodiversity Observation Network (GEO BON)

IUCN Invasive Species Specialist Group (ISSG)

10b. Contact person(s)

Melodie McGeoch, Monash University/GEO BON (melodie.mcgeoch@monash.edu)

GEO BON Secretariat (info@geobon.org)

Shyama Pagad, IUCN ISSG (s.pagad@auckland.ac.nz)

11. References

IPBES (2023) Summary for Policymakers of the Thematic Assessment Report on Invasive Alien Species and their Control of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. Roy, H. E., Pauchard, A., Stoett, P., Renard Truong, T., Bacher, S., Galil, B. S., Hulme, P. E., Ikeda, T., Sankaran, K. V., McGeoch, M. A., Meyerson, L. A., Nuñez, M. A., Ordonez, A., Rahlao, S. J., Schwindt, E., Seebens, H., Sheppard, A. W., and Vandvik, V. (eds.). IPBES secretariat, Bonn, Germany. https://doi.org/10.5281/zenodo.7430692

Latombe (2017). Latombe, G., P. Pysek, J. M. Jeschke et al. (2017). A vision for global monitoring of biological invasions. Biological Conservation 213:295-308. http://dx.doi.org/10.1016/j.biocon.2016.06.013

McGeoch et al. (2023). McGeoch, M. A., Buba, Y., Arlé, E., et al. (2023). Invasion trends: An interpretable measure of change is needed to support policy targets. *Conservation Letters*, 16, e12981. https://doi.org/10.1111/conl.12981

Pagad (2018) Pagad, S., Genovesi, P., Carnevali, L. *et al.* Introducing the Global Register of Introduced and Invasive Species. *Sci Data* **5**, 170202 (2018). https://doi.org/10.1038/sdata.2017.202

Pagad et al. (2022) Pagad, S., Bisset, S., Genovesi, P. *et al.* Country Compendium of the Global Register of Introduced and Invasive Species. *Sci Data* **9**, 391 (2022). https://doi.org/10.1038/s41597-022-01514-z

Seebens et al. (2017) Seebens, H., Blackburn, T., Dyer, E. *et al.* No saturation in the accumulation of alien species worldwide. *Nat Commun* **8**, 14435 (2017). https://doi.org/10.1038/ncomms14435

Seebens (2023), Alien Species First Records Database (Version 3.1). Deposited 25 October 2023.*Zenodo*. https://zenodo.org/doi/10.5281/zenodo.3690741 .NB this link will always resolve to the latest version of this database.

12. Graphs and diagrams

N/A

GBF indicator metadata: 6.b Target 6 binary indicator

Full Indicator Name
tbc

Goals And Targets Addressed

Goal
N/A

Target
Binary indicator for Target 6. Eliminate, minimize, reduce and/or mitigate the impacts of invasive alien species on biodiversity and ecosystem services by identifying and managing pathways of the introduction of alien species, preventing the introduction and establishment of priority invasive alien species, reducing the rates of introduction and establishment of other known or potential invasive alien species by at least 50 per cent by 2030, and eradicating or controlling invasive alien species, especially in priority sites, such as islands.

Rationale

Invasive alien species are one of the main direct drivers of biodiversity loss. In some ecosystems, such as islands, invasive alien species (IAS) are the leading cause of biodiversity decline. Invasive alien species affect biodiversity by competing with native species for resources, by direct predation or by introducing pathogens. They also modify the composition and structure of ecosystems, reducing the services they provide. In addition to their environmental impacts, invasive alien species pose a threat to food security, human health and economic activities. Globalization and an associated increase in human-mediated activities, such as international transport, trade and tourism, have made the movement of species beyond natural bio-geographical barriers easier and quicker, by creating new introduction pathways. Due to the wide and crosscutting impacts of IAS, including environmental, economic, health, social and cultural impacts, it is necessary to strengthen collaboration across sectors and government agencies at all levels and areas to ensure that this threat is managed effectively.

Governments have an important role to play in setting the regulatory landscape to support institutions in reducing the impacts of IAS. Business as usual practices have led to a large number of species being introduced to habitats where they have had significant impact on local biodiversity. Regulations, such as those on ballast water emptying, and appropriate resources to enforce them have a proven effect on reducing the rates of IAS establishment. Specifically, this indicator reports on the number of countries that have adopted regulation, processes and measures, and allocated resources, to reduce the impact of IAS.

Definitions Concepts And Classifications

Definition

Impact of alien invasive species: Impacts are changes to nature, nature's contributions to people and/or good quality of life. Impacts can be observed or unobserved. Generally, negative impacts become more apparent and problematic when invasive alien species are well established, widespread and present for a long time. Along with their adverse effects, some invasive alien species may have positive impacts providing benefits to some people.
Alien invasive species: An alien species whose introduction and/or spread threaten biological diversity.
Establishment: Production of a viable, self-sustaining population.
Control: Direct action(s) taken to reduce or suppress the distribution, abundance, spread and impacts of invasive alien species within a defined geographic area (FAO, 1995)

Eradicate: Eliminate/extirpate an invasive alien species from a defined geographic area even in the absence of all preventive measures obviating the necessity for further control measures (Dowdle, 1998). The time period after which an invasive alien species can be considered eradicated depends on the species and location.

Method of Computation

This indicator is a binary indicator and must be compiled from the answers to three[4] questions:

6.1 Does your country have regulations and processes empowering relevant institutions to implement the measures necessary for a reduction of the impact of invasive alien species?

6.2 Does your country have measures in place for preventing the introduction and establishment of invasive alien species and for eradicating or controlling invasive alien species?

6.3 Has your country allocated resources to reduce the impact of alien invasive species?

There are four possible answers to questions 6.1 and 6.2:
- (a) No
- (b) No, but under development
- (c) Yes, partially
- (d) Yes, fully

A "No" answer implies that Parties have not put in place any regulation nor processes to reduce the impact of IAS (6.1) or measures to prevent the introduction and establishment of IAS nor for control or eradication (6.2). Therefore, no regulations nor policy measures exist in the country for the specific requirements of each question in turn and none have been proposed.

A "No, but under development" answer implies a concerted effort at the national level to design and implement regulation on impacts (6.1) or prevention and control of IAS (6.2). For each of these items in turn, national governments must be in the design stage of such measures (e.g. a bill or measures have been proposed) but none of them have passed nor been implemented yet. The development of these measures must involve legal or governmental bodies with the authority to implement the proposed measures.

A "Yes, partially" answer implies that only some of the elements in the question have been fulfilled. That is:
- regulation or processes have been put in place but not both (6.1)
- measures are in place to prevent introduction or establishment or for eradicating or controlling but not all three (6.2)

If any one of the above has been put in place, then partial achievement has been reached. Additionally, in the case where a subnational authority may have put in place both (6.1) or all three (6.2) of the measures above, Parties may also select "Yes, partially" to represent the efforts being done in their country. In this case however, partial achievement of a question at the subnational level does not reach the threshold for Parties to select "Yes, partially" and Parties should revert to the "No, but under development" answer.

A "Yes, fully" answer implies that all the conditions outlined in "Yes, partially" have been met. Namely, for 6.1 that both regulation and processes are in place to empower institutions in reducing the impact of IAS, and for 6.2 that measure are in place to prevent the introduction and establishment of IAS and control or eradicate IAS. If any one element is missing, then only partial achievement has been reached. For both questions, the regulations, processes and measures must be in place at the national level. All measures put in place by governments need to be resourced (financial and human) to count as "Yes, fully".

[4] Assuming the recommendation to add a question 6.3 has been followed.

There are two possible answers to question 6.3:

(a) No
(b) Yes

A “No” answer implies that no resources, financial nor human, have been allocated to reduce the impact of IAS. A “Yes” answer implies that some resources, financial and/or human, have been allocated to reduce the impact of IAS.

Note: further information on progress towards the target can be provided in the free text section of the reporting tool.

GBF indicator metadata: 7.1 Index of coastal eutrophication potential

1. Indicator name
7.1 Index of coastal eutrophication potential
2. Date of metadata update
March 2024
3. Goals and Targets addressed
3a. Goal
N/A
3b. Target
Headline Indicator for **Target 7**: Reduce pollution risks and the negative impact of pollution from all sources by 2030, to levels that are not harmful to biodiversity and ecosystem functions and services, considering cumulative effects, including: (a) by reducing excess nutrients lost to the environment by at least half, including through more efficient nutrient cycling and use; (b) by reducing the overall risk from pesticides and highly hazardous chemicals by at least half, including through integrated pest management, based on science, taking into account food security and livelihoods; and (c) by preventing, reducing, and working towards eliminating plastic pollution.
4. Rationale
Coastal areas are areas of high productivity where inputs from land, sea, air and people converge. With over 40 percent of the human population residing in coastal areas, ecosystem degradation in these areas can have disproportionate effects on society (IGOS, 2006). One of the largest pressures on coastal environments is eutrophication, resulting primarily from land-based nutrient input from agricultural runoff and domestic wastewater discharge. Coastal eutrophication can lead to serious damage to marine ecosystems and vital sea habitats and can cause the spread of harmful algal blooms.

5. Definitions, concepts and classifications
5a. Definition:
The indicator is a subset of the indicators used for SDG 14.1.1. The indicator aims to measure the contribution to coastal eutrophication from countries and the state of coastal eutrophication. Therefore, two levels of indicators are recommended:
Level 1: Globally available data from earth observations and modelling
Level 2: National data collected from countries (through the relevant Regional Seas Programme where applicable, that is, for countries that are a member of a Regional Seas Programme)

Monitoring parameters	Level 1	Level 2
Indicator for Coastal Eutrophication Potential (N and P loading)	X	
National modelling of indicator for Coastal Eutrophication Potential (ICEP)		X

Unit of measure: Indicator for Coastal Eutrophication Potential (ICEP): kilograms of carbon (from algae biomass) per square kilometre of river basin area per day (kg C km^{-2} day^{-1}).
5b. Method of computation
Level 1: Indicator for coastal eutrophication potential
This indicator is based on loads and ratios of nitrogen, phosphorous and silica delivered by rivers to coastal waters (Garnier et al. 2010), which contribute to the ICEP. The basis for these loads is collected from land-based assessments of land use including fertilizer use, population density, socioeconomic factors and other contributors to nutrient pollution runoff. Given the land-based nature of the indicator, it provides a modelled number indicating the risk of coastal eutrophication at a specific river mouth. The indicator can be further developed by incorporating *in situ* monitoring to evaluate the dispersion of concentrations of nitrogen, phosphorous and silica to ground-truth the index. The indicator assumes that excess concentrations of nitrogen or phosphorus relative to silica will result in increased growth of

potentially harmful algae (ICEP > 0). ICEP is expressed in kilograms of carbon (from algae biomass) per square kilometre of river basin area per day (kg C km^{-2} day^{-1}).
The ICEP model is calculated using one of two equations depending on whether nitrogen or phosphorus is limiting. The equations (Billen and Garnier 2007) are:

$$ICEP\ (N\ limiting) = [NFlx/(14 * 16) - SiFlx/(28 * 20)] * 106 * 12$$

$$ICEP\ (P\ limiting) = [PFlx/31 - SiFlx/(28 * 20)] * 106 * 12$$

where *PFlx, NFlx* and *SiFlx* are respectively the mean specific values of total nitrogen, total phosphorus and dissolved silica delivered at the mouth of the river basin, expressed in *kg P* km^{-2} day^{-1}, in *kg N* km^{-2} day^{-1} and *in kg Si* km^{-2} day^{-1}.

Level 2: National ICEP modelling

Existing ICEP modelling at the national level is limited but could be further developed following the model of a current study analysing basin level data in Chinese rivers (Strokal et al. 2016). The study utilises Global NEWS – 2 (Nutrient Export from WaterSheds) and Nutrient flows in Food chains, Environment and Resources use (NUFER) as models. The Global NEWS-2 model is basin-scale and quantifies river export of various nutrients (nitrogen, phosphorus, carbon and silica) in multiple forms (dissolved inorganic, dissolved organic and particulate) as functions of human activities on land and basin characteristics (Strokal et al. 2016). Furthermore, the model shows past and future trends.
A full methodology for this indicator is available in the “Global Manual on Ocean Statistics for Measuring SDG 14.1.1, 14.2.1 and 14.5.1”.

5c. Data collection method

National data are collected through the Regional Seas Programmes to reduce the reporting burden on countries. For countries that are not included in the Regional Seas Programme, UNEP contacts countries directly. For globally derived data, UNEP has established a partnership with NOAA and GEO Blue Planet and the Global Nutrient Management System (GNMS) to facilitate the production of global data products.

5d. Accessibility of methodology

The methodology for this indicator is published under the following link:
https://wedocs.unep.org/bitstream/handle/20.500.11822/35086/USO.pdf?sequence=3&isAllowed=y
The data for this indicator is also available on the UN SDG Global database: https://unstats.un.org/sdgs/dataportal/database

5e. Data sources

For Level 1 indicators:

- Global models, which are based on official data from national governments as collected from UN organizations.

For Level 2 indicators:

- Data provided by national governments.

5f. Availability and release calendar

For Level 1 indicators:

- ICEP has been calculated for large marine ecosystems. River-basin scale information is expected in 2024. National models will be available beginning in late 2024 with the release of guidance from UNEP for preparing national models.

For Level 2 indicators:

- The first UNEP data collection is planned in 2023. After that, data collection will be synchronised with the Regional Seas data collection calendar.

5g. Time series

For Level 1 indicator:

- ICEP: 1900-2015: data are available for Global large marine ecosystems (LMEs) and River Basins. Data are available for N loading, not P loading.

For Level 2 indicator:

- The first UNEP data collection is planned in 2023. The plan is to align the data collection with Regional Seas every 4 years and the data will be yearly data, as used for SDG 14.1.1.

5h. Data providers

For Level 1 data:

- Geo Blue Planet, NOAA, Esri, IOC-UNESCO.

For Level 2 data:

- National governments, through the Regional Seas, or directly to UNEP.

5i. Data compilers

United Nations Environment Programme (UNEP), in collaboration with partners mentioned in the other sections of this metadata.

5j. Gaps in data coverage

Level 2 Data for ICEP is not yet available (forthcoming in 2024).

- With the use of the index of coastal eutrophication potential (ICEP), freshwater pollution is not addressed; the ICEP is only a marine indicator. There are two related SDG indicators which may be considered as options to supplement national reporting: SDG 6.6.1 looking at trophic state and turbidity, using chl *a*, and SDG 6.3.2 on quality of freshwater (for which there are plans to integrate information from citizen science monitoring).

5k. Treatment of missing values

For Level 1 data:

- Not applicable.

For Level 2 data:

- The United Nations Environment Programme (UNEP) and the Regional Seas do not make any estimation or imputation for missing values, so the number of data points provided are actual country data.

6. Scale

6a. Scale of use

Scale of application (please check all relevant boxes):

Global: ☒ Regional: ☒ National ☒

Scale of data disaggregation/aggregation: Regional and national level. *Sub-national level can also be derived upon request.

- Global/ regional scale indicator can be disaggregated to national level: ☐
- National data is collated to form global indicator: ☐
- Global LMEs and River Basins scale indicator: ☒

6b. National/regional indicator production

The methodology for global (Level 1) and national (Level 2) indicators (Global Manual on Ocean Statistics for Measuring SDG 14.1.1, 14.2.1 and 14.5.1) is available at the following link: https://wedocs.unep.org/handle/20.500.11822/35086

UNEP is preparing guidance for the development of national modelled values of the ICEP. Some countries are not coastal but do contribute to coastal nutrient loads via watersheds; however, the ICEP models are only designed for countries with mouths of river(s).

The national level data for this indicator will be data collected from countries and will measure the ICEP at the mouth of rivers in those countries. Modelled data will not be used unless countries are not able to measure ICEP; it is not yet clear if the use of modelled data will cover landlocked countries.

6c. Sources of differences between global and national figures

For Level 1,

- global models are used.

For Level 2,

- national data is used. National level models of the index of coastal eutrophication will be initiated beginning in 2024.

6d. Regional and global estimates & data collection for global monitoring

6d.1 Description of the methodology

The methodology for global (Level 1) and national (Level 2) indicators (Global Manual on Ocean Statistics for Measuring SDG 14.1.1, 14.2.1 and 14.5.1) is available at the following link: https://wedocs.unep.org/handle/20.500.11822/35086

6d.2 Additional methodological details

UN Environment will continue to provide regional (at the scale of large marine ecosystems and at the scale of basins) data for the ICEP values. UNEP is working (starting in 2024) to provide national modeled values for ICEP, and it is these national values that will be used to feed into CBD reporting.

6d.3 Description of the mechanism for collecting data from countries

National data collection through the Regional Seas already exists for many Regional Seas; this data will be compiled for SDG reporting in 2023.

7. Other MEAs, processes and organisations

7a. Other MEA and processes

Sustainable Development Goals (SDG): indicator 14.1.1 (a) Index of coastal eutrophication

7b. Biodiversity Indicator Partnership

Yes: ☐ No: ☒

8. Disaggregation

A geospatial disaggregation of the state of pollution is proposed. For the ICEP loading indicators, this disaggregation should be at the sub-basin level.

The processes of assessing and reporting on this indicator should be inclusive, following the approach outlined in Section C for implementing the GBF. The planned data collection for this ICEP indicator does not collect or permit disaggregation by gender or IPLCs. The indicator does not assess the impact of pollution; rather, the indicator relies on environmental measurements or models of nutrient levels, human population levels, agricultural chemical use and other contributors to nutrient pollution runoff.

9. Related indicators

N/A

10. Data reporter

10a. Organisation

United Nations Environment Programme (UNEP)

10b. Contact person(s)

Dany Ghafari, (dany.ghafari@un.org)

11. References

Website

Regional Seas website: https://www.unenvironment.org/explore-topics/oceans-seas/what-wedo/working-regional-seas

References

UN Environment (2018). Global Manual on Ocean Statistics. Towards a definition of indicator methodologies. Nairobi (Kenya): UN Environment. 46 pp. plus four appendices.

Wang, M., X. Liu, L. Jiang and S. Son (2017), The VIIRS Ocean Color Product Algorithm Theoretical Basis Document, National Oceanic and Atmospheric Administration, National Environmental Satellite and Data Information Service, 68 pp., doi: TBD.

Wang, M., X. Liu, L. Jiang, S. Son, J. Sun, W. Shi, L. Tan, P. Naik, K. Mikelsons, X. Wang and V. Lance (2014), Evaluation of VIIRS Ocean Color Products, Proc. SPIE 9261, 92610E, doi: 10.1117/12.2069251.

Stumpf, Richard P., Holderied, Kristine, Sinclair, Mark, (2003), Determination of water depth with high-resolution satellite imagery over variable bottom types, Limnology and Oceanography, 1, part, 2, doi: 10.4319/lo.2003.48.1_part_2.0547

Garnier, J., Beusen, A., Thieu, V., Billen, G. and Bouwman, L. (2010) N:P:Si nutrient export ratios and ecological consequences in coastal seas evaluated by the ICEP approach

Billen, G. and Garnier, J. (2007) River basin nutrient delivery to the coastal sea: Assessing its potential to sustain new production of non-siliceous algae *Marine Chemistry 106(1-2):148-160*

Sathyendranath S., Grant M., Brewin R.J.W., Brockmann C., Brotas V., Chuprin A., Doerffer R., Dowell M., Farman A., Groom S., et al. ESA Ocean Colour Climate Change Initiative

(Ocean_Colour_cci): Version 3.1 Data. *Centre for Environmental Data Analysis; Harwell, UK: 2018. Technical Report.*

Strokal, M., Kroeze, C., Wang, M., and Ma, L. (2016) Reducing future river export of nutrients to coastal waters of China in optimistic scenarios *Science of the Total Environment 579.*

12. Graphs and diagrams

N/A

GBF indicator metadata: 7.2 Aggregated Total Applied Toxicity (ATAT)

1. Indicator name
7.2 Aggregated Total Applied Toxicity (ATAT)
2. Date of metadata update
March 2024
3. Goals and Targets addressed
3a. Goal
N/A
3b. Target
Headline Indicator for **Target 7**: Reduce pollution risks and the negative impact of pollution from all sources by 2030, to levels that are not harmful to biodiversity and ecosystem functions and services, considering cumulative effects, including: (a) by reducing excess nutrients lost to the environment by at least half, including through more efficient nutrient cycling and use; (b) by reducing the overall risk from pesticides and highly hazardous chemicals by at least half, including through integrated pest management, based on science, taking into account food security and livelihoods; and (c) by preventing, reducing, and working towards eliminating plastic pollution.
4. Rationale
Three quarters of the world's population is exposed to pesticides [1-3] and global pesticide use is increasing rapidly, with agriculture having by far the largest share [4,5]. Furthermore, at the current high levels, pesticide use and total toxicity have become decoupled from agricultural productivity across a range of spatial and temporal scales [6-8]. Monitoring data for certain types of pesticides shows that the concentrations regularly present in the environment often exceed ecotoxicological thresholds set during regulatory pesticide risk assessments [9,10]. Tang et al (2021)[3] recommend that a global strategy should be established to transition towards sustainable agriculture and sustainable living with low pesticide inputs and reduced food losses and food waste to achieve responsible production and consumption in an acceptable, profitable system. Indeed, literature and experiences from case studies with pesticides show that by increasing efficiency and/or substituting active ingredients (thus lowering toxicity) risk reductions of 20-50% can be achieved without the redesign of production systems. Furthermore, novel pesticide-free production systems can reduce risks even further without yield trade-offs while increasing farmers' incomes [11].
As the only toxic chemicals deliberately applied in the environment with the intention to kill or disrupt living organisms, pesticides have a considerable impact on biodiversity and ecosystem functioning [12-14]. However, estimates of the regional and global pesticide impacts on biodiversity have been difficult to ascertain because: 1) information on the quantities and types of pesticides applied in the environment are often unavailable – particularly for Low and Middle-Income (LMIC) countries [15]; 2) Pesticide products vary widely in their toxicities to target and non-target organisms and, consequently, they have varying impacts on different components of ecological communities [10,16,17]; and 3) pesticide impacts are partly determined by varying levels of biodiversity exposure at local, regional and global scales. In a global context, the greatest impacts occur in crops and regions that support high numbers of unique species [14,18,19].

Several useful indicators of the effects of pesticides on human health and non-target organisms have been developed and many are routinely applied in some countries to reduce the risks from pesticide use [2,5,16,17,20-29]. Furthermore, many countries conduct some monitoring of pesticide contamination in crops and associated habitat, particularly in water bodies [30,31]. However, the quality of data on pesticide use is uneven across regions and countries, and direct measures of the impacts of pesticides on ecological communities is largely limited to case studies with low spatial and temporal coverage. In contrast, information on the toxic effects of pesticides on target and non-target organisms is generally available, particularly for newer pesticide products, from toxicity studies that have mainly been conducted in laboratories as required for pesticide registration [16,26,32].

Based on the above data limitations, any global assessment of pesticide impacts will be necessarily complex, requiring fine-grained mapping of crops and their associated biodiversity, and taking account of location-specific climate, geology and production practices. Such impact assessments have been developed and are improving [1-3,5,27,33]. Simpler risk assessments based on pesticide use and toxicity are currently available and have been used to compare potential effects on a range of non-target groups based on patterns of pesticide use in countries and over time [10,16,17]. Total Applied Toxicity (TAT) is one suitable indicator of the national, regional and global risks from pesticides to biodiversity and can be adapted to monitor trends in global pesticide-associated risks over time, with the intention of attaining or exceeding risk reduction targets set by the Kunming-Montreal Global Biodiversity Framework (e.g., 50% reduction in global risk) [34]. TATs are calculated for individual species or species groups and must be aggregated (ATAT) to present a single risk value to meet the requirement of headline indicators.

5. Definitions, concepts and classifications

5a. Definition:

Aggregated Total Applied Toxicity (ATAT) is defined as the risk to ecological communities based on the combined risks to key species groups from the annual outdoor, agricultural, forestry and public health use of total pesticides in active ingredients for the following categories of pesticides: fungicides, bactericides, herbicides, insecticides, molluscicides, plant growth regulators, seed treatment fungicides, seed treatment insecticides, mineral oils, rodenticides, disinfectants, and other pesticides (not elsewhere specified); and normalized by the area of cropland (which is the sum of arable land and land under permanent crops), sprayed forests, and reported areas applied for vector control (i.e., outdoor public health). Microbial biopesticides will not be considered among pesticide types.

ATAT indicates large-scale temporal trends in how changes in pesticide use and associated toxicities are reflected in different species groups. The ATAT at least amalgamates the risks from applied pesticides to individual species groups as a single community effect. It is proposed that this would also be weighted based on species richness and proportional endemicities within each species group considered.

5b. Method of computation

The ATAT is computed as follows:

Total Applied Toxicity (TAT) was presented by Schultz et al [10,16,17] as the mass (*m*) of pesticide (*s*) applied within a given time period (*t* = one year) within a country (*x*), divided by the regulatory threshold level (*RTL*) that relates to the applied pesticide *s* and the species group *sp*. The pesticide product *s* refers to one of *n* number of pesticide active ingredients applied in outdoor agriculture, with *n* encompassing all registered active ingredients by country. The species groups include fish, birds, mammals, aquatic invertebrates, terrestrial arthropods (excluding pollinators), pollinators, aquatic plants and terrestrial plants. The ATAT intends to extend TAT to calculate a single indicator of risk, by weighting RTLs using a factor that represents species group prominence (*b*) by incorporating species richness and/or endemicity; and by normalizing each country's ATATs by agricultural and forestry areas and major areas applied during national campaigns for vector control (*a*) to allow proportional representation by country prior to global aggregation. The equation for ATAT is:

$$ATAT_{s,sp,t} = \sum_{s=n}^{s} \left(\frac{m_{s,t}b}{(RTL_{s,sp})}\right) / \, a \qquad \text{(equation 1)}$$

The equation for global aggregation of the ATATs is:

$$Global\ ATAT_{s,sp,t,x} = \sum_{x=n}^{x} \left(\frac{m_{s,t,x}bx}{(RTL_{s,sp})}\right) / \, a_x \qquad \text{(equation 2)}$$

Related risk reductions can be assessed through yearly comparisons with estimated baseline risks. Because ATAT requires a protocol that can be applied by all countries, and requires standardization of key inputs across countries, then the functioning and feasibility of including some components for the calculation of ATAT remain to be verified through testing. In particular, issues around the normalization of applied areas that include forestry and areas applied for vector control requires testing; the effects of weighting by species richness and endemicity for each test group requires testing; and the adaptation of ATAT to track risk-reduction targets need to be defined. Furthermore, because RTLs are not complete for all active ingredients, approaches for handling missing data and standardizing computation across countries is required. A method can be developed for estimating RTL equivalents where data is unavailable [35].

5c. Data collection method

Each country can calculate yearly Aggregated TAT (ATAT) values using national statistics on pesticides sales or use and open-source information on pesticide properties that include toxicity values for a range of species. Baseline ATAT values can be calculated for 2011-2020 using historical data on pesticide trade, sales or usage and applying publicly available toxicity values and respective weightings.

Data on pesticide use based on farmer or producer reporting to governments is made available on an annual basis by some countries, whereas data on pesticide sales is available for others. These two parameters can be related to calculate TAT and ATAT. Sales/use data should be disaggregated by active ingredients and expressed as mass (Kg of active ingredient or pesticide product). In the absence of sales and usage data, pesticide trade (import/export) and national production data can be used with annual usage estimated based on crop (including forests) and livestock production and recommended application rates together with areas and products applied for vector control. Trade data is normally available through customs authorities and trade ministries. Agricultural areas and production, disaggregated by crop or livestock species, are normally collected on an annual basis by agricultural or trade ministries; in some cases, these are submitted to FAOSTAT [36] by area, tonnage and/or value.

Toxicity values must be derived from recommended open-sources based on criteria that best match national circumstances (e.g., toxicity for tropical fish versus temperate fish species). The weighting of toxicities for species groups could be based on species richness and reported endemicity for each group in each country. Weighting should include species and endemics that are normally exposed to agricultural pesticides based on an established protocol to be developed and shared across countries.

To facilitate reporting of ATAT, countries can streamline their pesticide reporting infrastructure using inventory systems and automated reporting to centralized authorities or data storage and reporting systems (such as FAOSTAT, USGS, etc.). Enabling legal, structural and technical environments need to be developed in some countries to operationalize the indicator (including component TATs for different species groups, standardized data sources, etc.), this requires some attention to capacity building.

5d. Accessibility of methodology

The methodology for calculating TAT for species groups is available as supplementary information in Schulz et al [29]. The method has been applied to compare trends in environmental toxicity for key species groups across countries and years [10,16,17]. The method needs updating and testing to introduce robust diversity weighting (i.e., weighting of toxicities for individual species or species groups by species richness or endemicity) and allow aggregation of estimates across regions and globally. An updated methodology will be available before 2025.

5e. Data sources

TAT calculations require pesticide sales and/or usage data. Furthermore, this data must be disaggregated by pesticide active ingredient. Disaggregated, open-source, national statistics on pesticide sales and usage are not accessible in many countries; however, data are generally recorded on an annual basis by all countries, if not publicly reported. Data on pesticide use are reported in an aggregated form (by pesticide classes by country) to FAOSTAT and some countries publicly report on sales and/or use. Where necessary, national biodiversity coordinators can source information on pesticide usage from relevant ministries.

Data on pesticide properties are available through a range of open-source databases. Among these is the the Pesticide Properties DataBase (PPDB) that holds data for ca 2500 pesticide active substances and over 700 metabolites, with ca 320 parameters (e.g., toxicity, biodiversity risk assessments, etc.) stored for each substance [32]. The PPDB is publicly available [37] and is used worldwide to support pesticide risk assessments, models and indicators, policy focused monitoring exercises, and general research. To avoid differences in the parameters used during calculation of ATATs and thereby, possible biases in reporting, countries will need to apply a standard set of toxicity results as deemed suitable for the global indicator; the PPDB may be updated to highlight this set of data. Furthermore, because the PPDB is a dynamic database, the selected toxicities should be designed for application across countries and each year – including for the baseline data. Acute and, if available, chronic toxicity data should be used for the groups of organisms (based on laboratory studies using OECD guidelines) and applying respective regulatory threshold levels (=RTL). Chronic metrics can be adjusted using algorithms as applied for the Danish and UK PLIs using substance LD_{50}s thereby accounting for persistence in the environment (soil and water). Means of RTLs for each compound and species group should be calculated – this would result in ca 15 acute and chronic RTL values for 400-600 pesticides.

Data on crop production (crop types, crop acreage, yields) are available for most countries from FAOSTAT [36]. Since FAOSTAT receives its data from national sources, any data that are reported through FAOSTAT are also available through national reporting authorities, often is a more disaggregated form.

National biodiversity inventories are frequently available as a component of open-source databases at national levels. Inventories will generally include data on estimated endemicities among the selected species' groups. In the absence of open-source data, national inventory records or global assessments of regional species richness and endemicities are available for each of the species' groups. The methods used during biodiversity inventories will need to be screened to avoid sampling biases that avoid agricultural landscapes.

Data will be validated by the individual parties to the CBD and data ownership and distribution on national pesticide trade, sales, usage and properties, as well as crop production data, will be at the discretion of the parties. Protocols for data curation, validation and quality control will be developed with parties during testing.

5f. Availability and release calendar

The ATAT indicator was accepted by a group of technical and policy experts at a dedicated meeting in FAO (Rome) in January 2024 as the most parsimonious indicator to meet the criteria for mapping risk reduction to biodiversity from pesticides. Whereas TAT is already available for use as an indicator of pesticide risks, it requires further development and testing to be used as a headline indicator (i.e., with a single value for each country) that provides a single global risk value. Furthermore, a methodology to report the indicator in terms of addressing proposed targets for risk reduction is still under development. Development and testing of the indicator will be addressed by academic and policy experts in 2024/25 and an updated methodology with test results is expected in 2025.

5g. Time series

The 2011-2020 baseline should be provided during initial reporting with comparative risks and risk reductions for each year reported from 2022 to 2030. To avoid biases, all parameters used to calculate baseline values will need to be continued as standards during the calculation of annual ATATs. For some countries, highly toxic pesticides used after 2011 but now de-registered may skew TAT values for certain species or species groups to produce disproportionate estimates of risk reductions when compared to other countries that de-registered the same products before 2011. Procedures to mitigate against such potential artifacts are required.

5h. Data providers

National governments; International Union of Pure and Applied Chemistry/IUPAC and University of Hertfordshire; FAO

5i. Data compilers

FAO will compile the data

5j. Gaps in data coverage

- The indicator is non-cumulative and not dynamic in time—that is, it does not consider the effects of accumulated pesticides and their degradation products in the environment over time, and thus may not fully capture the pervasiveness of certain active ingredients. The PPDB has data for key metabolites, which are then used instead of the parent properties. A similar approach is recommended for the ATAT.
- The indicator does not account for the synergistic or antagonistic effects of pesticide mixtures, which are currently poorly documented and for which useful toxicity data is largely unavailable.
- The indicator omits illegally traded and illegally used pesticides for which information is largely unavailable, in particular, the indicator cannot include non-reported usage of banned pesticides – many of which have severe impacts on key indicator groups.
- The indicator does not include the detrimental effects of obsolete pesticide stocks in nations; these are often inadequately stored and can have severe adverse effects on biodiversity and ecosystems.
- The indicator does not include adjuvants, solvents and industrial contaminants despite detrimental effects of some of these on non-target organisms, including prevalent effects in some formulations for widely used chemicals such as glyphosate; some adjuvants are considered highly hazardous, but these are difficult to quantify based on product labels.
- The indicator does not address risk mitigation measures such as avoiding pesticide drift, avoiding riverine habitats, avoiding bird and fish breeding seasons, maintaining distances from water bodies, etc.; it assumes that pesticide run-off is ubiquitous over wide areas sprayed.
- The indicator does not incorporate cascade effects whereby pesticide impacts on one species or a group of species has detrimental effects on other community components (species or species groups) despite minimal direct pesticide impacts on the latter (e.g., herbicide effects on flowering weeds affects specialized pollinators or pesticide effects on chironomid larvae affects fish).
- The indicator does not account for rare or endangered species that are not endemic to specific countries.
- Biodiversity inventories generally underrepresent certain taxa, including plants, arthropods, microbiota; relations between species richness and ecosystem function are poorly understood
- The indicator does not include coastal and marine habitats and possible detrimental effects to marine organisms.
- The indicator does not include sub-lethal effects on non-target species that might alter behaviors and, consequently, affect ecosystem services.
- The indicator does not link regionally varying exposures based on biodiversity gradients to national ATAT estimates – this can be included to more accurately calculate ATAT values for large nations, but is not necessarily reported by countries and can inhibit adequate risk-mitigation measures.

5k. Treatment of missing values

For some countries, pesticide sales or use data are not widely available or are held-up at ministries; and data is made available only gradually with time lags that can be greater than 5 years. Where sales/use data is unavailable, countries can use trade data (which is more commonly available) to estimate usage based on crop types and areas. Using trade and production data (i.e., availability), pesticide usage can be estimated based on crop composition (up to 100 main crops or at least crop groups), pesticide label information (application rates, etc.), and basing usage on data form similar countries. A standard methodology will be defined to convert trade and sales data into usage; to ensure this is done in a consistent manner by different countries.

Some substances may not have all the data needed for the indicator. The UK PLI has a protocol for plugging gaps which includes using data for related substances or using an average value for the type of pesticide (i.e., insecticide, herbicide, fungicide, etc.) (an alternative is to use a worst-case value, i.e., 95th percentile). The UK PLI also has an exclusion protocol, to remove substances where substantial data are

missing; any substances with less than 60% of the required data are excluded. A similar protocol will be defined for the GATAT to ensure transparency.
In the absence of trade data, estimates of pesticide usage in crops can be generated by using PEST-CHEMGRIDS and CROPGRIDS and applying the related published protocols. These use crop production data by area and infer pesticide usage based on typical application rates for the same or similar crops based on registered sales from data rich countries [5,33].
Non reporting or late reporting of $ATAT_s$ by countries will delay estimates of global risks and risk reductions. This will be more prevalent during the initial years of indicator operationalization and become less prevalent over time, particularly where capacity building is put in place to support countries to evaluate and report pesticide associated risks. For real-time reporting, estimates can be made to fill data gaps based on countries with similar socioecological and agricultural conditions. Gap-fill estimates could be corrected retrospectively when more accurate data and risk estimates are available.

6. Scale

6a. Scale of use

Scale of application (please check all relevant boxes):

Global: ☒ Regional: ☒ National ☒

Scale of data disaggregation/aggregation: Aggregated by pesticide active ingredients, species and species groups, and crop production areas (including forestry and pastures) or application areas (in the case of public health pesticides)

- Global/ regional scale indicator can be disaggregated to national level: ☒
- National data is collated to form global indicator: ☒

6b. National/regional indicator production

Indicator characteristics and calculations are available for national authorities in papers published by Schulz et al (2021) [16], Bub et al (2022)[17] and Wolfram et al (2023) [10]. Data to calculate the indicator is available at national levels including, in many cases, to calculate the baseline indicator (2011-2020) using historical data. Extensions of the TAT for community weighting are not yet published; however, until the methodology is published, national authorities can report component indicators (i.e., 15 or more acute of chronic RTL values for all pesticides combined) with community weighting adjusted retrospectively. Component indicators will include TAT estimates for each species and species group and ATAT estimates for each country. PLIs for key species or species groups [26] are recommended as useful complementary indicators.

6c. Sources of differences between global and national figures

ATAT is calculated individually for each country. Since the data is aggregated at the global level, there should be no differences.

6d. Regional and global estimates & data collection for global monitoring

6d.1 Description of the methodology

The methodology for TAT and its application in comparing environmental toxicities between regions and over time is published by Schulz et al (2021) [16]

6d.2 Additional methodological details

Details for estimating pesticide use based on PEST-CHEMGRIDS and subsequent applications are available in publications by Maggi et al (2019)[5]

6d.3 Description of the mechanism for collecting data from countries

Pesticide trade and usage data will be reported to FAO with pesticides disaggregated by active ingredient.

Pesticide properties are available and continually updated on the Pesticide Properties DataBase [37].

The ATAT will be reported by national biodiversity officers to the CBD using the Online Reporting Tool. Countries may seek support during reporting from FAO.

7. Other MEAs, processes and organisations

7a. Other MEA and processes

ATAT complements SDG 6 and SDG 15, which currently has an emphasis on protected lands and waters; directly contributes to monitoring hazardous pesticide risk reduction under the Global Framework on Chemicals (GFC) target A7 and supports related targets (A5, B6 and D5); IPBES (global and regional assessments, thematic assessments and sustainability); contributes to monitoring implementation of Stockholm, Rotterdam, Basel and Minamata Conventions and the Montreal Protocol. The component indicator further supports the Globally Harmonized System of classification and labelling of chemicals, the Codex Alimentarius and the World Health Organization's pre-qualification of vector control products - among other key international agreements and mechanisms that address pesticide management.

7b. Biodiversity Indicator Partnership

Yes: ☐ No: ☒

8. Disaggregation

The headline indicator can be disaggregated by pesticide types (herbicide, insecticide, molluscicide, fungicide, etc.) and toxicities to non-target organisms. Disaggregation by nationally listed highly hazardous pesticides (e.g., those listed under international agreements or with human carcinogenic, mutagenic and adverse effects of reproduction) and safer alternatives will also be possible. Disaggregation by sector (agriculture, forestry, public health) may be achieved based on the types of pesticide products.

9. Related indicators

The ATAT will complement monitoring of Goal B and the implementation of targets 9, 10, 11, 15, and 18 of the Kunming-Montreal GBF and indicators 10.2 *progress towards sustainable forest management* and 18.2 *Value of subsidies and other incentives harmful to biodiversity, that have been eliminated, phased out or reformed.*

10. Data reporter

10a. Organisation

Food and Agriculture Organization (FAO)

10b. Contact person(s)

Kim-Anh Tempelman (kimanh.tempelman@fao.org)

11. References

Website

Regional Seas website: https://www.unenvironment.org/explore-topics/oceans-seas/what-wedo/working-regional-seas

References

1. Maggi, F.; la Cecilia, D.; Tang, F.H.M.; McBratney, A. The global environmental hazard of glyphosate use. *Science of The Total Environment* **2020**, *717*, 137167, doi:https://doi.org/10.1016/j.scitotenv.2020.137167.
2. Maggi, F.; Tang, F.H.M.; Black, A.J.; Marks, G.B.; McBratney, A. The pesticide health risk index - An application to the world's countries. *Science of The Total Environment* **2021**, *801*, 149731, doi:https://doi.org/10.1016/j.scitotenv.2021.149731.
3. Tang, F.H.M.; Lenzen, M.; McBratney, A.; Maggi, F. Risk of pesticide pollution at the global scale. *Nature Geoscience* **2021**, *14*, 206-210, doi:10.1038/s41561-021-00712-5.
4. Bernhardt, E.S.; Rosi, E.J.; Gessner, M.O. Synthetic chemicals as agents of global change. *Frontiers in Ecology and the Environment* **2017**, *15*, 84-90.
5. Maggi, F.; Tang, F.H.M.; la Cecilia, D.; McBratney, A. PEST-CHEMGRIDS, global gridded maps of the top 20 crop-specific pesticide application rates from 2015 to 2025. *Scientific Data* **2019**, *6*, 170, doi:10.1038/s41597-019-0169-4.
6. Lechenet, M.; Dessaint, F.; Py, G.; Makowski, D.; Munier-Jolain, N. Reducing pesticide use while preserving crop productivity and profitability on arable farms. *Nature plants* **2017**, *3*, 1-6.
7. Schreinemachers, P.; Tipraqsa, P. Agricultural pesticides and land use intensification in high, middle and low income countries. *Food Policy* **2012**, *37*, 616-626, doi:https://doi.org/10.1016/j.foodpol.2012.06.003.

8. Gaba, S.; Gabriel, E.; Chadœuf, J.; Bonneu, F.; Bretagnolle, V. Herbicides do not ensure for higher wheat yield, but eliminate rare plant species. *Scientific Reports* **2016**, *6*, 30112, doi:10.1038/srep30112.
9. Stehle, S.; Schulz, R. Pesticide authorization in the EU—environment unprotected? *Environmental Science and Pollution Research* **2015**, *22*, 19632-19647, doi:10.1007/s11356-015-5148-5.
10. Wolfram, J.; Bub, S.; Petschick, L.L.; Schemmer, A.; Stehle, S.; Schulz, R. Pesticide occurrence in protected surface waters in nature conservation areas of Germany. *Science of The Total Environment* **2023**, *858*, 160074, doi:https://doi.org/10.1016/j.scitotenv.2022.160074.
11. Möhring, N.; Finger, R. Pesticide-free but not organic: Adoption of a large-scale wheat production standard in Switzerland. *Food Policy* **2022**, *106*, 102188, doi:https://doi.org/10.1016/j.foodpol.2021.102188.
12. Beketov, M.A.; Kefford, B.J.; Schäfer, R.B.; Liess, M. Pesticides reduce regional biodiversity of stream invertebrates. *Proceedings of the National Academy of Sciences* **2013**, *110*, 11039-11043, doi:doi:10.1073/pnas.1305618110.
13. Geiger, F.; Bengtsson, J.; Berendse, F.; Weisser, W.W.; Emmerson, M.; Morales, M.B.; Ceryngier, P.; Liira, J.; Tscharntke, T.; Winqvist, C.; et al. Persistent negative effects of pesticides on biodiversity and biological control potential on European farmland. *Basic and Applied Ecology* **2010**, *11*, 97-105, doi:https://doi.org/10.1016/j.baae.2009.12.001.
14. Sánchez-Bayo, F.; Wyckhuys, K.A.G. Worldwide decline of the entomofauna: A review of its drivers. *Biological Conservation* **2019**, *232*, 8-27, doi:https://doi.org/10.1016/j.biocon.2019.01.020.
15. van den Berg, H.; Gu, B.; Grenier, B.; Kohlschmid, E.; Al-Eryani, S.; da Silva Bezerra, H.S.; Nagpal, B.N.; Chanda, E.; Gasimov, E.; Velayudhan, R.; et al. Pesticide lifecycle management in agriculture and public health: Where are the gaps? *Science of The Total Environment* **2020**, *742*, 140598, doi:https://doi.org/10.1016/j.scitotenv.2020.140598.
16. Schulz, R.; Bub, S.; Petschick, L.L.; Stehle, S.; Wolfram, J. Applied pesticide toxicity shifts toward plants and invertebrates, even in GM crops. *Science* **2021**, *372*, 81-84.
17. Bub, S.; Wolfram, J.; Petschick, L.L.; Stehle, S.; Schulz, R. Trends of total applied pesticide toxicity in German agriculture. *Environmental Science and Technology* **2022**, *57*, 852-861.
18. Larsen, A.E.; Farrant, D.N.; MacDonald, A.J. Spatiotemporal overlap of pesticide use and species richness hotspots in California. *Agriculture, Ecosystems and Environment* **2020**, *289*, 106741, doi:https://doi.org/10.1016/j.agee.2019.106741.
19. Schiesari, L.; Waichman, A.; Brock, T.; Adams, C.; Grillitsch, B. Pesticide use and biodiversity conservation in the Amazonian agricultural frontier. *Philosophical Transactions of the Royal Society B: Biological Sciences* **2013**, *368*, 20120378, doi:10.1098/rstb.2012.0378.
20. Brown, C.; Hart, A.; Lewis, K.; Dubus, I. p-EMA (I): simulating the environmental fate of pesticides for a farm-level risk assessment system. *Agronomie* **2003**, *23*, 67-74.
21. Cornell College of Agricultural and Life Sciences. Environmental Impact Quotient: EIQ—A Method to Measure the Environmental Impact of Pesticides. Available online: https://cals.cornell.edu/new-york-state-integrated-pest-management/risk-assessment/eiq#:~:text=The%20Environmental%20Impact%20Quotient%20(EIQ,decisions%20regarding%20their%20pesticide%20selection (accessed on 15 March 2024)
22. Danish Environmental Protection Agency. The Agricultural Pesticide Load in Denmark 2007–2010. *Environmental Review 2* **2012**.
23. Hart, A.; Brown, C.; Lewis, K.; Tzilivakis, J. p-EMA (II): evaluating ecological risks of pesticides for a farm-level risk assessment system. *Agronomie* **2003**, *23*, 75-84.
24. Kudsk, P.; Jørgensen, L.N.; Ørum, J.E. Pesticide Load—A new Danish pesticide risk indicator with multiple applications. *Land Use Policy* **2018**, *70*, 384-393.
25. Lewis, K.; Brown, C.; Hart, A.; Tzilivakis, J. p-EMA (III): overview and application of a software system designed to assess the environmental risk of agricultural pesticides. *Agronomie* **2003**, *23*, 85-96.
26. Lewis, K.; Rainford, J.; Tzilivakis, J.; Garthwaite, D. Application of the Danish Pesticide Load Indicator to UK arable agriculture. *Journal of Environmental Quality* **2021**, *50*, 1110-1122.

27. Maggi, F.; Tang, F.H.M.; Tubiello, F.N. Agricultural pesticide land budget and river discharge to oceans. *Nature* **2023**, *620*, 1013-1017, doi:10.1038/s41586-023-06296-x.
28. Möhring, N.; Gaba, S.; Finger, R. Quantity based indicators fail to identify extreme pesticide risks. *Science of The Total Environment* **2019**, *646*, 503-523, doi:https://doi.org/10.1016/j.scitotenv.2018.07.287.
29. Trevisan, M.; Di Guardo, A.; Balderacchi, M. An environmental indicator to drive sustainable pest management practices. *Environmental Modelling and Software* **2009**, *24*, 994-1002, doi:https://doi.org/10.1016/j.envsoft.2008.12.008.
30. Centanni, M.; Ricci, G.; De Girolamo, A.; Romano, G.; Gentile, F. A review of modeling pesticides in freshwaters: Current status, progress achieved and desirable improvements. *Environmental pollution* **2023**, *316*, 120553.
31. Stehle, S.; Schulz, R. Agricultural insecticides threaten surface waters at the global scale. *Proceedings of the National Academy of Sciences* **2015**, *112*, 5750-5755.
32. Lewis, K.A.; Tzilivakis, J.; Warner, D.J.; Green, A. An international database for pesticide risk assessments and management. *Human and Ecological Risk Assessment: An International Journal* **2016**, *22*, 1050-1064.
33. Tang, F.H.; Nguyen, T.H.; Conchedda, G.; Casse, L.; Tubiello, F.N.; Maggi, F. CROPGRIDS: A global geo-referenced dataset of 173 crops circa 2020. *Earth System Science Data Discussions* **2023**, *2023*, 1-22.
34. Convention on Biodiversity. Decision adopted by the Conference of the Parties to the Convention on Biodiversity: 15/4 Kunming-Montreal Global Biodiversity Framework. Available online: https://www.cbd.int/doc/decisions/cop-15/cop-15-dec-04-en.pdf (accessed on 15 February 2024)
35. Petschick, L.L.; Schulz, R.; Stehle, S. RTLE-A New Model to Predict Regulatory Threshold Level Equivalents for Pesticides from the Open Literature. **2018**.
36. Food and Agriculture Organization of the United Nations. FAOSTAT. https://www.fao.org/faostat/en/ (accessed on 15 February 2024).
37. International Union of Pure and Applied Chemistry. IUPAC Pesticides Properties DataBase. Available online: https://sitem.herts.ac.uk/aeru/iupac/index.htm (accessed on 15 February 2024)

12. Graphs and diagrams

N/A

GBF indicator metadata: 8.b Target 8 binary indicator

Full Indicator Name
tbc

Goals And Targets Addressed

Goal
N/A

Target
Binary indicator for Target 8. Minimize the impact of climate change and ocean acidification on biodiversity and increase its resilience through mitigation, adaptation, and disaster risk reduction actions, including through nature-based solutions and/or ecosystem-based approaches, while minimizing negative and fostering positive impacts of climate action on biodiversity.

Rationale

Climate change is one of the main direct drivers of biodiversity loss. In addition to climate change, rising atmospheric carbon dioxide concentrations have also resulted in ocean acidification. Seawater pH can be further reduced by other processes, such as the decomposition of organic material, aspects of nitrogen cycling and inputs of acidic pollutants. Various mitigation, adaptation and disaster risk reduction measures, including nature-based solutions and/or ecosystem-based approaches, have the potential to increase the resilience of ecosystems and human livelihoods to the impacts of climate change and ocean acidification, including reducing emissions from deforestation and other land-use changes, managing inputs of organic material and nutrients to the marine environment and by enhancing natural carbon sinks. These approaches can also deliver numerous social, economic and environmental co-benefits.

However, while some climate actions have demonstrated beneficial effects on biodiversity (e.g. increased habitat availability from tree planting or mangrove and seagrass restoration) others will have strongly negative effects (e.g. terrestrial or deep-sea mining for rare metals currently used in electric batteries). Also, some proposed climate mitigation strategies, such as marine Carbon Dioxide Removal (mCDR), have the potential to exacerbate the scale and rate of ocean acidification. Therefore, it is important to ensure that negative impacts of climate action on biodiversity are avoided as much as possible whilst positive impacts are promoted. Therefore, policies to fight climate change and ocean acidification must be considerate of biodiversity. As such, this indicator tracks progress towards the national implementation of policies that reduce the impact of climate change and ocean acidification on biodiversity whilst minimizing negative impacts and fostering positive impacts of climate action on biodiversity.

Definitions Concepts And Classifications

Definition
Adaptation: Adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities.
Mitigation: A human intervention to reduce the drivers of climate change and ocean acidification, or enhance the sinks of greenhouse gases.
Disaster risk reduction: The concept and practice of reducing disaster risks through systematic efforts to analyze and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, evidence-based management of land and the environment, and improved preparedness for adverse events.
Climate change: The United Nations Framework Convention on Climate Change (UNFCCC), in its Article 1, defines climate change as: ‘a change of climate which is attributed directly or indirectly to human activity

that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods'.

Ocean acidification: Ongoing reduction in the pH of the ocean, caused primarily by the uptake of carbon dioxide (CO_2) from the atmosphere, but can also be exacerbated by local processes, such as the decomposition of organic material, microbial processes involved in nitrogen cycling and acidic wastewater discharge.

Minimize the impact of climate change and ocean acidification on biodiversity: This requires action to reduce the severity and rate of climate change and ocean acidification by reducing greenhouse gas emissions and managing any additional local factors or drivers. It also requires action to increase the resilience to, or reduce the sensitivity of, biodiversity to the effects of climate change and ocean acidification. These actions may include nature-based solutions and ecosystem-based approaches, as well as considerations such as the siting of protected and conserved areas and species recovery programmes to take into account climate change and ocean acidification.

Minimizing negative and fostering positive impacts of climate action on biodiversity: While efforts and activities to address climate change could have the potential to generate significant positive impacts on biodiversity and those dependent on it, they could also unintentionally result in negative impacts if they are not appropriately designed and implemented. The potential benefits for, and risks to, biodiversity from specific climate actions should be assessed and understood prior to implementation. Once implemented, climate action should include effective monitoring, reporting and verification procedures. Taking into consideration biodiversity when designing, implementing and monitoring climate change adaptation and mitigation activities, can both deliver multiple benefits, and also contribute to avoiding negative impacts of the activities on biodiversity and ecosystems.

Climate action: Climate action refers to efforts taken to combat climate change and its impacts. These efforts include, but are not limited to, reducing greenhouse gas emissions to the atmosphere, reducing concentrations of greenhouse gasses in the atmosphere or ocean (reversing the associated effects of greenhouse gases (e.g. by enhancing ocean alkalinity), and/or taking action to build resilience or promote adaptation.

Resilience: The capacity of a system to absorb disturbance and reorganize while undergoing change so as to still retain essentially the same function, structure, identity, and feedbacks (Walker et al., 2004). A concept initially developed and applied in ecology, which progressively gained usage in the social and environmental sciences.

Method of Computation

This indicator is a binary indicator and must be compiled from the answers to five[5] questions:

8.1 Does your country's national biodiversity strategy and action plan include actions to prevent or minimize the impacts of the following?

8.2 Do your country's [policies] [national strategy on climate change (nationally determined contributions)] address the impacts of climate change and of ocean acidification [,where relevant,] on biodiversity [and employ nature-based solutions and/or ecosystem-based approaches]?

8.3 Are the impacts of climate change and/or ocean acidification on biodiversity monitored and reported on?

8.4 Does your country's[policies] [national strategy on climate change (nationally determined contributions) or][action plans] [on the impact of climate change and ocean acidification] contain the following types of actions designed to increase biodiversity resilience?

[5] Assuming the recommendation to merge 8.4bis and 8.4ter into question 8.5 has been followed.

8.5 Are measures in place to minimize negative impacts and foster positive impacts of climate actions on biodiversity, including in nationally determined contributions?

There are two possible answers to question 8.1:

(a) Climate change
(b) Ocean acidification

Each of the answers here is to be chosen using a “select all that apply” approach. Namely, if a country’s national biodiversity strategy and action plan (NBSAP) includes actions to prevent or minimize the impact of climate change and/or ocean acidification then select the option to which these apply. In other words, select each option for which the answer to 8.1 is “Yes”. If no answers are selected, then an overall “No” is understood. In this question, it is understood that an NBSAP exists, it has been adopted and it meets the criteria for 8.1. Note that if a country is landlocked, answer (b) is deemed not applicable.

There are four possible answers to questions 8.2, 8.3[6] and 8.5:

(a) No
(b) No, but under development
(c) Yes, partially
(d) Yes, fully

A “No” answer implies that there is no mention nor consideration of biodiversity in national strategies to address the impacts of climate change (8.2) or that no monitoring of the impacts of climate change nor ocean acidification on biodiversity are ongoing (8.3). Current policy on climate change may be at any level of implementation (from draft to law) yet it fails to address the specific impacts on biodiversity. Additionally, no measures in place to minimize negative impacts and foster positive impacts of climate actions on biodiversity (8.5).

A “No, but under development” answer implies a concerted effort at the national level to include the impacts of climate change and ocean acidification on biodiversity in climate policy (8.2), to start monitoring and reporting on these impacts (8.3) or to put measures in place to minimize negative impacts and foster positive impacts of climate actions on biodiversity (8.5). New climate policy drafts including biodiversity, or amendments to current policy to include biodiversity, may have been proposed, but these have not been accepted nor implemented yet. Additionally, monitoring programs and reporting systems may be in the design phase or be completed and accepted but not resourced, and therefore have not begun. Finally, new measures to account for biodiversity in climate action may have been designed and/or proposed but not yet implemented.

A “Yes, partially” answer implies that a country’s climate policy addresses the impacts of climate change or ocean acidification on biodiversity but not both (8.2), the impacts of climate change and/or ocean acidification are being monitored and/or reported on but not all (8.3) or measures are in place to minimize negative impacts or foster positive impacts of climate actions on biodiversity but not both (8.5). If any one of the cases outlined applies, only partial achievement has been reached.

A “Yes, fully” answer implies that all the conditions outlined in “Yes, partially” have been met. Namely that the impacts on biodiversity of both climate change and ocean acidification are included in national climate policy (8.2), that monitoring and reporting on these impacts is resourced and ongoing (8.3) and that measures are in place to both minimize negative impacts and foster positive impacts of climate actions on biodiversity (8.5).

There are three possible answers to question 8.4:

(a) Mitigation

[6] Assuming the recommendation to make answers of 8.3 consistent with other questions has been followed.

(b) Adaptation
(c) Risk reduction

Each of the answers here is to be chosen using a “select all that apply” approach. Namely, if a country’s action plans, policies or strategies on reducing the impact of climate change contain actions on mitigation, adaptation or risk reduction to increase biodiversity resilience, then select the option(s) which apply. In other words, select each option for which the answer to 8.4 is “Yes”. If no answers are selected, then an overall “No” is understood. In this question, it is understood that nations have plans to tackle climate change and ocean acidification that include mitigation, adaptation and/or risk reduction and asks whether these actions are also designed to increase biodiversity resilience or not.

Note: for landlocked countries “ocean acidification” as an answer to 8.1 will be considered not applicable and action on the impacts of climate change will be considered sufficient for answering “Yes, fully” to 8.2 and 8.3.

Further note: further information on progress towards the target can be provided in the free text section of the reporting tool.

Note on headline indicator: 9.1 Benefits from the sustainable use of wild species

The monitoring framework for the Kunming-Montreal Global Biodiversity Framework (GBF) adopted by the 15th meeting of the Conference of Parties (COP 15) included a list of indicators to monitor the goals and targets of the GBF as contained in decision 15/5 of the COP 15. This list includes the headline indicator 9.1 *Benefits from the sustainable use of wild species* to monitor Target 9 of the convention, namely:

> Target 9. Manage Wild Species Sustainably to Benefit People
> Ensure that the management and use of wild species are sustainable, thereby providing social, economic and environmental benefits for people, especially those in vulnerable situations and those most dependent on biodiversity, including through sustainable biodiversity-based activities, products and services that enhance biodiversity, and protecting and encouraging customary sustainable use by indigenous peoples and local communities.

Indicator 9.1 was initially understood as a possible disaggregation of indicator B.1 S*ervices provided by ecosystems*, since benefits derived from the use of wild species can be measured through the ecosystem service accounts in indicator B.1 under Goal B. Although for indicator B.1 parties are encouraged to flag, when possible, if ecosystem services are used above certain sustainability thresholds, the sustainable use of ecosystem services is not the primary focus of indicator B.1 while it is a prerequisite for the adequate monitoring of target 9 (indicator 9.1).

The AHTEG, at its 6th meeting in March 2024, discussed indicator 9.1 and acknowledged that in practice it is difficult to capture the **benefits from the sustainable use** of wild species. Various options for indicator 9.1 were considered, including a binary indicator, however, the AHTEG, recognizing the importance of this indicator, agreed to maintain it as a headline indicator for Target 9, noting that more work is needed in order to provide a methodology that allows the sustainability assessment aspect of the use of ecosystem services.

The AHTEG also noted that the benefits from the sustainable use of the wild species are undoubtedly enormous, especially to indigenous people and local communities. However, to monitor progress towards “ensuring that the management and use of wild species are sustainable”, it is important to measure if the overall use of wild species is sustainable or not rather than only looking at the benefits from the sustainable use. Once the sustainable use of wild species is guaranteed, then, it would be possible to assess the benefits provided, as well as the beneficiaries or users through ecosystem service accounts. Indicator B.1 can still provide relevant information toward target 9 on the overall use of wild species by including ecosystem services, such as “Wild animals, plants and other biomass provisioning services” “Wild fish and other natural aquatic biomass provisioning services” or “Recreation-related services” in the reporting under B.1.

GBF indicator metadata: 9.2 Percentage of the population in traditional occupations

1. Indicator name
9.2 Percentage of the population in traditional occupations
Traditional Knowledge - Status and trends in the practice of traditional occupations
Discussion will need to take place for the further development and operationalization of this indicator, including suggestions for a more suitable indicator name (see rationale in section 4).
2. Date of metadata update
March 2024
3. Goals and Targets addressed
3a. Goal
N/A
3b. Target
Headline indicator for **Target 9.** Ensure that the management and use of wild species are sustainable, thereby providing social, economic and environmental benefits for people, especially those in vulnerable situations and those most dependent on biodiversity, including through sustainable biodiversity-based activities, products and services that enhance biodiversity, and protecting and encouraging customary sustainable use by indigenous peoples and local communities.
4. Rationale
Actions to implement Target 9 need to take into account indigenous and local systems for the control, use and management of natural resources and seek to protect and encourage these. The practice of traditional occupations is a key a element of this which is not only essential to the spiritual, cultural, social and economic wellbeing of Indigenous Peoples and local communities but also a key element in ensuring that the management and use of wild species is sustainable.
The traditional knowledge indicator on "Status and trends in the practice of traditional occupations" was adopted by COP-13 in 2016. COP-15 adopted a related but (slightly) different indicator as headline indicator for Target 9. "Percentage of the population in traditional occupations". Discussion has started on how best to further develop and operationalize this indicator.
A potential computation by "dividing the number of Indigenous People (IP) practicing traditional occupations by the total number of working age indigenous people in a country" was originally proposed in the technical paper on *Traditional Occupations of Indigenous and Tribal Peoples in Labour Statistics*, Geneva. International Labour Office,2023). However, based on existing data, it is not yet possible (beyond pilot studies) to measure this indicator on a global and national level due to the lack of identifiers for Indigenous Peoples in countries' census processes. The international Labour Organization (ILO) observed that "*Comprehensive official statistics on traditional occupations are rarely available, partly owing to the continuing poor visibility of indigenous and tribal peoples in official statistics, and partly owing to the absence of an agreed definition of traditional occupations for statistical purposes."*
We therefore propose that this indicator could be measured across scales (from local to global) through the use of structural, process and outcome indicators generated through CBMIS, combined with binary indicators (covering structural and process questions/aspects) being developed by the AHTEG on indicators.
Potential titles for the indicator include:

- *Number of countries/programmes/processes supporting customary sustainable use of indigenous peoples and local communities*
- *Number of Indigenous Peoples and local communities with plans for customary sustainable use/support for traditional occupations*

These aspects and proposals will need to be discussed and agreed before SBSTTA-26.

5. Definitions, concepts and classifications
5a. Definition:

Traditional occupations are generally understood as the activities that indigenous and tribal peoples have traditionally undertaken to provide for their subsistence needs and livelihoods. The practice of these occupations relies on intimate knowledge of ancestral lands, the environment, and natural resources passed on from generation to generation. These occupations and the skills and knowledge underlying them are not static. They have evolved over time and will continue to do so. The concept of traditional occupations to be measured in statistics should not therefore be limited to the economic and cultural activities that indigenous peoples have traditionally undertaken in the past, but should also embrace other occupations in which indigenous peoples are using their traditional knowledge today and will do so in the future, for example in life sciences, climate research and tourism.

The concept of work adopted in 2013 by the 19th International Conference of Labour Statisticians for the purposes of official statistics is very broad and includes any activity performed by persons of any sex and age to produce goods or to provide services for use by others or for own use. Traditional occupations may be practised in any of the forms of work recognized in official labour statistics, including own-use production work, employment for pay or profit, unpaid trainee work, volunteer work, and other work activities.

For the purposes of this indicator, **traditional occupations is defined as**:

> Traditional occupations are occupations in which indigenous knowledge, cultural practices, innovations and technologies may influence the way the work is performed, if the work is performed by a person who identifies as belonging to an indigenous or tribal group. Indigenous knowledge refers to the constantly evolving information, skills, practices, science and technology passed from generation to generation within an indigenous or tribal group. The work performed in traditional occupations embraces production of goods and services for own use and other forms of unpaid work including volunteer work and unpaid trainee work, as well as employment for pay or profit.

For the operational measurement of traditional occupations, it is necessary to reflect this definition in terms of a set of occupations defined in a classification of occupations used for the compilation of official labour statistics.

The International Standard Classification of Occupations (ISCO-08) provides a system for classifying and aggregating occupational information obtained by means of statistical censuses and surveys, as well as from administrative records (see annex 1). Many national classifications are based on ISCO-08 or on its predecessor, ISCO-88. Some countries have national occupation classifications that are not based on ISCO, but in most cases it is possible to map data from detailed levels of the national classification to a relatively detailed level of ISCO08. In countries that have not developed their own national classifications, a version of ISCO may be used directly. ISCO-08 is a four-level, hierarchically structured classification that allows all jobs in the world to be classified into 436 unit groups. These groups form the most detailed level of the classification structure and are aggregated into 130 minor groups, 43 sub-major groups and 10 major groups, on the basis of their similarity in terms of the skill level and skill specialization required for the jobs. This allows the production of relatively detailed internationally comparable data as well as summary information for only ten groups at the highest level of aggregation. A subset of these unit groups (see annex) are used to identify jobs which could be considered as traditional occupations. However national occupation classification schemes may frequently identify specific occupations that fit within the definition of traditional occupations that are not separately identified in ISCO. It would be preferable in such cases, therefore, to identify the groups in the national classification that fit the definition of traditional occupations, using the agreed list of ISCO groups as guidance.

There is no internally agreed definition of "indigenous peoples". However, individuals belonging to such a group would generally have an ancestral connection to the group and self-identify as a member of that group. The most appropriate approach to the design of questions to identify such people will vary between countries and regions depending on cultural perceptions about concepts of ethnicity and indigeneity, and the number and nature of the ethnic groups that need to be identified.

Many countries already have their own definitions or criteria, and information is generally collected through national census or surveys. Such national data collection exercises can be used to calculate the indicator.

5b. Method of computation

The indicator will need to be measured across scales. Using the binary question below could be the first step to compute the indicator. Also, countries could be asked whether they offer programs focused on indigenous peoples and local communities engaged in traditional occupations. It is still to be determined if the question about programs will include the topics of some/co-management/full management of lands by IPs and LCs, use of Indigenous Knolwedges (IK) in land management, access to traditional foods, education policies promoting the learning of IPs and IK, and tourism. Similar questions asked for the land tenure and language indicators could also demonstrate the support of the right of traditional occupations. Case studies and community- based monitoring and information systems would allow countries to demonstrate if countries are upholding their customary sustainable use laws and policies and programs are achieving their goals. However, the exact computation is still to be determined.

Global:

- Data collection found there was very little standardized data about Indigenous Peoples and Local Communities and traditional occupations

National

- Between the discussions with the staff of the International Labour Office and their 2023 *Traditional Occupations of Indigenous and Tribal Peoples in Labour Statistics* it became clear due to the lack of inclusion of IPs and Local Communities (LC) in countries' census processes it is difficult to measure this indicator on a global and national level. Instead as described above of other possible ways to compute this indicator.

Community

- Data collection demonstrated there are available sources of community -based monitoring and information systems and case studies that could provide both quantitative and qualitative date

5c. Data collection method

Forest Peoples Program (FPP) collaborated with a team at the University of Michigan (UM) to research what data is available about traditional occupations, what are the themes, and how is the data presented. After multiple meetings and including a meeting with FPP staff and International Labor Office [ILO] staff the UM team decided to create a spreadsheet and focus on four resources to research. The four resources included the Indigenous Navigator (found 39 entries that matched the key word searches), Local Biodiversity Outlook (49 different case studies/community based monitoring and information systems entries), academic articles (51 articles found and used Google Scholar), and media sources (10 sources found, but limited time spent on search. The UM team used agreed-upon keywords for searches like livelihoods, co-management, traditional occupation, and subsistence. Also, years parameters for searches were 2011-2023. They produced this spreadsheet, which includes 43 countries, which means the country appeared in at least one of the four search areas and sometimes more than one.

5d. Accessibility of methodology

The methodology is not currently published in a peer-reviewed location. The spreadsheet is open to anyone with a link and there are further links in the spreadsheet to the four different types of research areas. However, some of the academic articles are not open source and behind a paywall. People can access the websites of the Indigenous Navigator and the Local Biodiversity Outlook on their own. A 2023 discussion paper *Traditional Occupations of Indigenous and Tribal Peoples in Labour Statistics* has been prepared by the International Labour Organization which provides further information, including on the limitations of this approach (T*raditional Occupations of Indigenous and Tribal Peoples in Labour Statistics*. Geneva: International Labour Office, 2023.).

5e. Data sources

The data collected so far included data and information from the Indigenous Navigator, Local Biodiversity Outlook, media articles from both news, United Nations, and NGO sources, and peer reviewed journal articles. In the ILO report there are micro analysis of multiple countries.

There are multiple Indigenous-led organizations like the Inuit Circumpolar Council-Alaska that provide case studies in order to apply this indicator.

5f. Availability and release calendar

The indicator is currently in development. The global monitoring process for this indicator, the update frequency and release calendar are currently under development. The year when the first round of data will be ready is pending.

5g. Time series

The indicator is under development. To be determined. The University of Michigan team researched from the years 2011-2023

5h. Data providers

International Labor Organization (ILO)

Indigenous Navigator supported by IWGIA, Tebtebba, AIPP, Forest Peoples Programme and the Danish Institute for Human Rights, with the support of the European Union

Local Biodiversity Outlook International Indigenous Forum on Biodiversity, Indigenous Women's Biodiversity Network, Forest Peoples Programe

Media– Mongabay, WWF, Vox, Grist, UNESCO, and IISD

Academic Journals-*Biological Conservation, Forests,The International Journal of Climate Change: Impacts and Responses, Health & Place, Development and Change, Marine Policy, Forest Ecology and Management, Identities, Journal of Ethnobiology and Ethnomedicine, Habitat International, BMC Public Health, International Journal for Equity in Health, and more*

5i. Data compilers

The Forest Peoples Programme (FPP), are leading the development of the indicator, together with the International Labor Organization (ILO) and the team from the University of Michigan. [To be determined] would be a potential custodian for the indicator working in collaboration with CBD Secretariat.

5j. Gaps in data coverage

The indicator is under development. To be determined.

Overall, there is a lack of national statistics for traditional occupations. Part of this comes from the lack of questions asking if someone is Indigenous national censuses (ILO 2023). Even if IPs are included in the national census the population is too small to be considered statistically significant. In their 2023 report ILO recommends microdata analysis, labor force survey, surveys targeting Indigenous Peoples, time-use surveys, population census, economic data collections, and administrative records to create a statistically significant measure.-include global

The data currently includes 43 countries. The Indigenous Navigator currently covers 30 countries with national partners using the Indigenous Navigator surveys with 300 communties. In the Local Biodiversity Outlook just over 20 countries' case studies met the research criteria. There are many more countries signed on to the CBD. To further develop and operationalize this indicator it should be decided what sources are approved to use their case studies and community based monitoring and information systems.

The definition of traditional occupation is very broad so the data compilers narrowed down what occupational to research. Those occupations focused on agricultural, forestry and fishery labourers, education, health, and tourism. The occupation research is a brief summary and more research could be conducted and data gather. Also it excludes other possible occupations.

5k. Treatment of missing values

The indicator is under development. To be determined.

6. Scale

6a. Scale of use

The indicator data will be more qualitative for the time being before it can be scaled to a global level.

6b. National/regional indicator production

The indicator is under development.

6c. Sources of differences between global and national figures

The indicator is under development but no discrepancies are anticipated given the data collection method.

6d. Regional and global estimates & data collection for global monitoring

6d.1 Description of the methodology
Regional and global estimates are produced by aggregating country-level data.

6d.2 Additional methodological details
N/A
6d.3 Description of the mechanism for collecting data from countries
The data for the indicator would be collected across the national and community scales.

7. Other MEAs, processes and organisations

7a. Other MEA and processes

The indicator was adopted by the Conference of the Parties to the Convention on Biological Diversity through decision X/43.

7b. Biodiversity Indicator Partnership

Yes:☐ No:☒

8. Disaggregation

Disaggregation could be possible through case studies and community based monitoring and information systems based on the data provided by the communities. .

9. Related goals, targets and indicators

Depending on the finalization of the indicator, it may be relevant to goal B as well as several other targets, particularly targets 1, 3, 5, 9, 10, 11, 19, and 22, 23.

10. Data reporter

10a. Organisation

Indicator under development. To be determined.

10b. Contact person(s)

Indicator under development. To be determined.
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Lizz Malloy, University of Michigan- (emalloy@umich.edu)
Kyle Whyte, University of Michigan- (kwhyte@umich.edu)

11. References

Websites

Indigenous Navigator: https://indigenousnavigator.org/
Local Biodiversity Outlook: https://localbiodiversityoutlooks.net
Traditional Occupations of Indigenous and Tribal Peoples in Labour Statistics, Geneva: International Labour Office, 2023: https://www.ilo.org/global/publications/WCMS_862144/lang--en/index.htm
Team from University of Michigan's Spreadsheet

12. Graphs and diagrams

N/A

Annex 1

ISCO-08 groups to be used for operational measurement of traditional occupations when information on the use of indigenous knowledge at work is not directly available.
Unit groups The following ISCO-08 unit groups could be used or help guide relevant categories in national occupation classification schemes. In addition, all unit groups in sub-major group 92 (Agricultural, forestry and fishery labourers) should be included if the status in employment of the indigenous worker is employer, independent worker without employees (own-account worker), or contributing family worker.
1113 Traditional Chiefs and Heads of Villages
2131 Biologists, Botanists, Zoologists and Related Professionals
2132 Farming, Forestry and Fisheries Advisers
2133 Environmental Protection Professionals
2230 Traditional and complementary medical practitioners
2341 Primary School Teachers

2342 Early Childhood Educators
2354 Other Music Teachers
2355 Other Arts Teachers
2641 Authors and Related Writers
2642 Journalists
2643 Translators, Interpreters and Other Linguists
2651 Visual Artists
2652 Musicians, Singers and Composers
2653 Dancers and Choreographers
2654 Film, Stage and Related Directors and Producers
2655 Actors
2656 Announcers on Radio, Television and Other Media
2659 Creative and Performing Artists Not Elsewhere Classified
3141 Life Science Technicians (excluding Medical)
3142 Agricultural Technicians
3143 Forestry Technicians
3230 Traditional and Complementary Medicine Associate Professionals
3413 Religious Associate Professionals
3434 Chefs
5113 Travel Guides
5120 Cooks
5311 Child Care Workers
5312 Teachers' Aides
6111 Field Crop and Vegetable Growers
6112 Tree and Shrub Crop Growers
6113 Gardeners; Horticultural and Nursery Growers
6114 Mixed Crop Growers
6121 Livestock and Dairy Producers
6122 Poultry Producers
6123 Apiarists and Sericulturists
6129 Animal Producers Not Elsewhere Classified
6130 Mixed Crop and Animal Producers
6210 Forestry and Related Workers
6221 Aquaculture Workers
6222 Inland and Coastal Waters Fishery Workers
6223 Deep-sea Fishery Workers
6224 Hunters and Trappers
6310 Subsistence Crop Farmers
6320 Subsistence Livestock Farmers
6330 Subsistence Mixed Crop and Livestock Farmers
6340 Subsistence Fishers, Hunters, Trappers and Gatherers
7111 House Builders
7115 Carpenters and Joiners [includes wooden boat builders]
7312 Musical Instrument Makers and Tuners
7313 Jewellery and Precious Metal Workers
7314 Potters and Related Workers
7315 Glass Makers, Cutters, Grinders and Finishers
7316 Signwriters, Decorative Painters, Engravers and Etchers
7317 Handicraft Workers in Wood, Basketry and Related Materials
7318 Handicraft Workers in Textile, Leather and Related Materials.
7511 Butchers, Fishmongers and Related Food Preparers
7512 Bakers, Pastry-cooks and Confectionery Makers
7513 Dairy Products Makers

7514 Fruit, Vegetable and Related Preservers
7531 Tailors, Dressmakers, Furriers and Hatters
7535 Pelt Dressers, Tanners and Fellmongers
7536 Shoemakers and Related Workers
9624 Water and Firewood Collectors.

Minor groups

When data are only available at the ISCO-08 minor group (3-digit) level, indigenous persons employed in the following groups should be considered to be practising traditional occupations.

213 Life Science Professionals
264 Authors, Journalists and Linguists
265 Creative and Performing Artists
323 Traditional and Complementary Medicine Associate Professionals
611 Market Gardeners and Crop Growers
612 Animal Producers
613 Mixed Crop and Animal Producers
621 Forestry and Related Workers
622 Fishery Workers, Hunters and Trappers
631 Subsistence Crop Farmers
632 Subsistence Livestock Farmers
633 Subsistence Mixed Crop and Livestock Farmers
634 Subsistence Fishers, Hunters, Trappers and Gatherers
731 Handicraft Workers
921 Agricultural, Forestry and Fishery Labourers (only if status in employment is employer, independent worker without employees (own-account worker), or contributing family worker).

Sub-major groups

When data are only available at the ISCO-08 sub-major group (2-digit) level, indigenous persons employed in the following groups should be considered to be practising traditional occupations.

61 Market-oriented Skilled Agricultural Workers
63 Subsistence Farmers, Fishers, Hunters and Gatherers
92 Agricultural, Forestry and Fishery Labourers (only if status in employment is employer, independent worker without employees (own-account worker), , or contributing family worker)

GBF indicator metadata: 9.b Target 9 binary indicator

Full Indicator Name
tbc

Goals And Targets Addressed
Goal
N/A

Target
Binary indicator for Target 9. Ensure that the management and use of wild species are sustainable, thereby providing social, economic and environmental benefits for people, especially those in vulnerable situations and those most dependent on biodiversity, including through sustainable biodiversity-based activities, products and services that enhance biodiversity, and protecting and encouraging customary sustainable use by indigenous peoples and local communities.

Rationale

Biodiversity is the source of many goods and services on which people depend. The maintenance, in quantity and quality, of the benefits provided by biodiversity offers an important incentive for the conservation and sustainable use of biodiversity. It will not be possible to reach the 2050 Vision if the benefits provided by biodiversity, particularly those related to nutrition, food security, livelihoods, health and well-being, are not ensured. The main focus of this target is ensuring that the management and use of wild species is sustainable for the benefit of people.

Governments have a major role to play in ensuring that biodiversity is sustainably used and managed and that benefits are fairly shared between people. Through the passing of laws and legislation, governments can regulate how biodiversity is used and traded to protect species and ensure sustainable social, economic and environmental benefits for people. As such, this indicator tracks the existence of policies put in place to sustainably use, manage and trade wild species whilst protecting customary sustainable use by indigenous peoples and local communities.

Definitions Concepts And Classifications

Definition
Biodiversity-based products and services: Biodiversity-based commercial and non-commercial actions and products result from the collection, production or transformation of biological resources. They are found in industries as varied as food and beverage, cosmetics, pharmaceuticals, paper, textiles, energy, and handicrafts. Services based on biodiversity are those that derive value from genetic resources, species and ecosystems, such as nature-based tourism, pollination, and water treatment. The sustainable production, use and trade of biodiversity-derived products and services provide developing countries with valuable opportunities for biodiversity conservation, poverty reduction, economic diversification, value addition, improved livelihoods, and the empowerment of vulnerable groups, including women and ethnic minorities. (UN, Implications of COVID-19 for Biodiversity-based Products and Services, including BioTrade)
Trade in wild species: The selling or trading (i.e. selling of dead or living wildlife and/or products derived from them) of wild species for food and non-food purposes, such as for clothing, medicinal, cultural, scientific, recreational and work-related uses. Adapted from “Trade and use”
Wild species: Populations of any species that have not been domesticated through multigenerational selection for particular traits, and which can survive independently of human intervention that may occur in any environment. This does not imply a complete absence of human management and recognizes various intermediate states between wild and domesticated.

Customary sustainable use by indigenous peoples and local communities: Actions to implement this target should take into account indigenous and local systems for the control, use and management of natural resources and seek to protect and encourage these. Customary use of biological resources includes spiritual, cultural, economic and subsistence functions.
Social, economic and environmental benefits: Wild terrestrial, freshwater and marine species contribute to human well-being in multiple ways, including by providing nutrition, food security, medicines and livelihoods. The use and management of wild species needs to consider the various social, economic and environmental benefits provided by wild species to people. The target further specifies that particular attention should be given to those people living in vulnerable situations and for whom wild species are particularly important to their well-being as they may be engaged in biodiversity-based economic activities, or rely on biodiversity based products and services.
Sustainable use: The use of components of biological diversity in a way and at a rate that does not lead to the long-term decline of biological diversity, thereby maintaining its potential to meet the needs and aspirations of present and future generations.

Method of Computation

This indicator is a binary indicator and must be compiled from the answers to four questions:

9.1 Does your country have legal instruments or other policy frameworks or administrative measures that [address][seek to ensure] [that the management and sustainable use of][the sustainable management and use of] wild species?

9.2 Do your country monitor the sustainable management and use of wild species?[7]

9.3 Does your country have legal instruments [or other policy frameworks][8] to regulate trade in wild species?

9.4 [Is] [Does] your country [have legal instruments or [other] policy frameworks] [implementing a plan] to [protect and encourage][promote]customary sustainable use of [wild species] [biodiversity], [ensuring respect for the customary sustainable use by indigenous peoples and local communities] [] for example, the Plan of Action on Customary Sustainable Use of Biological Diversity [or other relevant initiatives]?

There are four possible answers to questions 9.1, 9.2[9] and 9.4:

(a) No
(b) No, but under development
(c) Yes, partially
(d) Yes, fully

A “No” answer implies that there are currently no legal, policy nor administrative frameworks in place for the sustainable management and use of wild species (9.1), no monitoring of sustainable management and use of wild species is included in the nation’s action plan (9.2) or there are is no legislation in place to protect and encourage customary sustainable use by indigenous peoples and local communities (IPLCs; 9.4). In all cases, there are no national-level efforts to legislate the management and sustainable use of wild species nor their trade.

A “No, but under development” answer implies a concerted effort at the national level to implement legal, policy and administrative frameworks for the sustainable management and use of wild species (9.1), include monitoring of sustainable management and use of wild species the nation’s action plan (9.2) or legislate on

[7] Assuming the recommendation to simplify the language of 9.2 has been followed.
[8] Text recommended by the AHTEG
[9] Assuming the recommendation to make answers of 9.2 consistent with other questions has been followed.

protection and encouragement of customary sustainable use by IPLCs (9.4). In each of these cases, legal, policy and administrative frameworks may be in the draft stages and awaiting ratification. Resources may also be in the process of being mobilized to support these frameworks. Importantly, these processes must be ongoing at the national level and backed by governmental bodies with implementation authority.

A “Yes, partially” answer implies that legal, policy or administrative frameworks for the sustainable management or use of wild species are in place (9.1), monitoring of sustainable management and use of wild species is included in the nation’s action plan but not for all wild species or uses (9.2) or legislation to protect or encourage, but not both, customary sustainable use by IPLCs has been passed (9.4). In all these cases, government initiatives are resourced and implemented but they do not address the entirety of the question’s asks. If any one of the cases outlined above applies, only partial achievement has been reached.

A “Yes, fully” answer implies that all the conditions outlined in “Yes, partially” have been met. Namely that legal, policy or administrative frameworks for both the sustainable management and use of wild species are in place (9.1), monitoring of sustainable management and use of wild species is included in the nation’s action plan for all wild species and uses (9.2) or legislation to both protect and encourage customary sustainable use by IPLCs has been passed (9.4). Note that all these frameworks and legislations must be established at the national level and be appropriately resourced (financial and human).

[10]Note: Question 9.4 has a fifth answer “(e) Not applicable” that is to be selected by Parties who have no recognised indigenous peoples and local communities under their jurisdiction.

There are four possible answers to question 9.3[11]:

(a) Terrestrial species
(b) Freshwater species
(c) Marine species
(d) International trade

Each of the answers here is to be chosen using a “select all that apply” approach. Namely, if a country has legal instruments to regulate trade in wild species then select to which species these legal instruments apply and whether they include international trade. In other words, select each option for which the answer to 9.3 is “Yes”. If no answers are selected, then an overall “No” is understood. In this question, it is understood that nations have already passed legislation through parliament to regulate trade on wild species, if this is not the case or such laws are in development, then do not select any answer. Further, it is understood that for each species group (terrestrial, freshwater and marine) regulation of wild species applies to all wild species of this group and not just a fraction of them.

Note: further information on progress towards the target can be provided in the free text section of the reporting tool.

[10] This note is to be removed if the recommendation to remove answer (e) is followed.
[11] Assuming the recommendation to make 9.3 multiple-choice answers clearer has been followed.

GBF indicator metadata: 10.1 Proportion of agricultural area under productive and sustainable agriculture

1. Indicator name

10.1 Proportion of agricultural area under productive and sustainable agriculture

2. Date of metadata update

March 2024

3. Goals and Targets addressed

3a. Goal

N/A

3b. Target

Headline indicator for **Target 10.** Ensure that areas under agriculture, aquaculture, fisheries and forestry are managed sustainably, in particular through the sustainable use of biodiversity, including through a substantial increase of the application of biodiversity friendly practices, such as sustainable intensification, agroecological and other innovative approaches, contributing to the resilience and long-term efficiency and productivity of these production systems, and to food security, conserving and restoring biodiversity and maintaining nature's contributions to people, including ecosystem functions and services.

4. Rationale

The approaches to framing and defining sustainable agriculture vary in terms of their coverage of the three primary dimensions of sustainability, i.e. economic, environmental and social, and in terms of the scale that is used to assess sustainability, i.e. from field and farm scales, to national and global scales. Some approaches consider different features of sustainability, for example whether current practices are economically feasible, environmentally friendly and socially desirable. Other approaches focus on particular practices such as organic, regenerative or low-input agriculture and can equate these with sustainable agriculture. The conclusion from a literature review associated with the methodological development of this indicator is that the multi-dimensional approach developed by FAO in 1988 is a meaningful framing of the concept. Thus, sustainable agriculture can be considered as "the management and conservation of the natural resource base, and the orientation of technological and institutional change in such a manner as to ensure the attainment and continued satisfaction of human needs for present and future generation. Such development (in agriculture, forestry and fishing etc.) conserves land, water, plant and animal genetic resources, environmentally non-degrading, technically appropriate, economically viable and socially acceptable." (FAO, 1988)

5. Definitions, concepts and classifications

5a. Definition:

The indicator is defined by the formula:

$$Area\ under\ productive\ and\ sustainable\ agriculture\ /Agricultural\ land\ area$$

This implies the need to measure both the extent of land under productive and sustainable agriculture (the numerator), as well as the extent of agriculture land area (the denominator).

- The numerator captures the three dimensions of sustainable production: environmental, economic and social. It corresponds to agricultural land area of the farms that satisfy the sustainability criteria of the 11 sub-indicators selected across all three dimensions.
- The denominator in turn the sum of agricultural land area (as defined by FAO) utilized by agricultural holdings that are owned (excluding rented-out), rented-in, leased, sharecropped or borrowed. State or communal land used by farm holdings is not included. Please see the methodological document prepared by FAO for a more detailed explanation.

The scope of the indicator is the agricultural farm holding, and more precisely the agricultural land area of the farm holdings, i.e. land used primarily to grow crops and raise livestock. This choice of scope is fully consistent with the intended use of a country's agricultural land area as the denominator of the aggregate indicator. Specifically, the following are:

Included within scope:

- Intensive and extensive crops and livestock production systems.
- Subsistence agriculture.
- State and common land when used exclusively and managed by the farm holdings.
- Food and non-food crops and livestock products (e.g. tobacco, cotton, and sheep wool). • Crops grown for fodder or for energy purposes.
- Agro-forestry (trees on the agriculture land areas of the farm) and Aquaculture, to the extent that it takes place within the agricultural land area of the farm as secondary activities. For example, rice fish farming and similar systems.

Excluded from scope:

- State and common land not used exclusively by the farm holding.
- Nomadic pastoralism.
- Production from gardens and backyards. Production from hobby farms
- Holdings focusing exclusively on aquaculture.
- Holdings focusing exclusively on forestry.
- Food harvested from the wild.

5b. Method of computation

Steps undertaken to develop the methodology of the indicator include:

1. Determining the scope of the indicator: The scope of Indicator is the agricultural farm holdings, and more precisely the agricultural land area of the farm holdings, i.e., land used primarily to grow crops and raise livestock. Forestry, fisheries and aquaculture activities may be included to the extent that they are secondary activities conducted on the agricultural area of the farm holdings, for example rice fish farming and similar systems
2. Determining the dimensions to be covered: Indicator includes environmental, economic and social dimensions in the sustainability assessment.
3. Choosing the scale for the sustainability assessment: Indicator is farm level with aggregation to higher levels.
4. Selecting the data collection instrument(s). It is recommended that indicator be collected through a farm survey.
5. Selecting the themes within each dimension, and choosing a sub-indicator for each theme. The sub-indicators should satisfy a number of sustainability criteria (described in annex 1 for each sub-indicator, respectively).
6. Assessing sustainability performance at farm level for each sub-indicator: Specific sustainability criteria are applied in order to assess the sustainability level of the farm for each theme according to the respective sub-indicators.
7. Deciding the periodicity of monitoring the indicator. It is recommended to be collected at least every three years.
8. Modality of reporting the indicator. The set of sub-indicators are presented in the form of a dashboard. The dashboard approach offers a response in terms of measuring sustainability at farm level and aggregating it at national level.

The methodology proposes reporting of indicator through a national-level dashboard, presenting the different sub-indicators together but independently. The dashboard approach offers several advantages, including the possibility of combining data from different sources and identification of critical sustainability issues, facilitating the search for a balance between the three sustainability dimensions. As a result, countries can easily visualize their performance in terms of the different sustainability dimensions and themes, and understand where policy efforts can be focused for future improvements.

Computation of results and construction of the dashboard are performed for each sub-indicator separately using the 'traffic light' approach already defined for each sub-indicator: aggregation at national level is performed for each sub-indicator independently, by summing the agricultural land area of each agricultural holdings by sustainability category (red, yellow or green), and reporting the resulting national total as percentage of the total national agricultural land area of all agricultural farm holdings in the country. In practice, the reported value of Indicator is determined by the results of most limiting sub-indicator in terms of sustainability performance.

5c. Data collection method

A questionnaire is sent to all countries annually since 2020 (http://www.fao.org/sustainabledevelopment-goals/indicators/241/en/). Furthermore, in order to facilitate data collection by countries, a data collection module has been designed, which contains the core set of questions necessary to obtain the data for the indicator. If farm surveys already exist within a country, these questions can be integrated into existing instruments in order to minimize the burden to national statistical offices in data collection.

All data collection activities will be done through the National Statistical Office (NSO) or the offices designated (Ministry of Agriculture in some countries) to collect data for this indicator. FAO, together with the Global Strategy to improve Agriculture and Rural Statistics (GSARS), have developed the capacity development material necessary for this indicator, including a methodological guide, an enumerator manual, data entry guidelines, calculation procedure document, sampling guidance and an e-learning course to train country NSO and other relevant staff on the indictor.

5d. Accessibility of methodology

The methodological, support documents, update on capacity development activities etc. can be found at this link: www.fao.org/sustainable-development-goals/indicators/241/en/

5e. Data sources

In order to propose a manageable and cost-effective solution, a requirement stressed by several countries during the consultations, the methodology offers a single data collection instrument for all sub-indicators: the farm survey.

In the process of capacity development, several countries have suggested using existing data sources or alternative data sources on the grounds that these instruments can be more cost-effective and sometimes provide more reliable results than farm surveys. These instruments include remote sensing, GIS, models, agricultural surveys, household surveys, administrative data or environmental monitoring systems.

Often, environmental data are collected through environmental monitoring systems, including remote sensing. Yet many countries do not have the capacity or resources to do so, and therefore these data are sparse or non-existent.

The methodology considers the possibility to use such instruments, subject to a series of criteria to ensure data quality and international comparability. Other data sources may also be used to complement and/or validate farm survey results. The methodology note also recommends that countries complement the farm survey with a monitoring system that can measure the impact of agriculture on the environment (soil, water, fertilizer and pesticide pollution, biodiversity, etc.) and on health (pesticides residues in food and human bodies). This will provide additional information and help crosscheck the robustness of the indicator with regard to the environmental dimension of sustainability. In this respect, FAO has initiated work streams on alternative data sources to improve reporting of the indicator. In addition, FAO has also commenced development of a proxy approach to report on the indicator as an interim solution to bridge the data gaps while countries get ready to adopt and implement the farm survey based methodology. The proxy approach is under development, once the proposal is finalized, tested and approved and endorsed by IAEG-SDG, it will be shared with member states.

5f. Availability and release calendar

Although new data may not be available annually for each country, all new information are expected to be released annually through FAO SDG portal and UNSD.

5g. Time series

Indicator measures progress towards more sustainable and productive agriculture over a three year periodicity because for many sub-indicators, it is likely that changes will be relatively limited from one year to another. Furthermore, the 3-year periodicity will enable countries to have three data points on the indicator before 2030.

5h. Data providers

National Statistical Offices, Ministries of Agriculture or national offices designated by countries will be responsible for collecting and reporting data for this indicator,

5i. Data compilers

National Statistical Offices or designated offices within countries will be responsible for collecting and compiling data for this indicator. They will in turn report to FAO, which provides capacity development, conducts quality control and disseminates the information through the FAO SDG portal. FAO will in turn report the regional and global estimates to the international statistical community and UNSD.

5j. Gaps in data coverage

The indicator is new and complex and thus current data coverage of the indicator is low. Few countries have reported the entire dashboard, several reported a sub-set of the sub-indicators and the majority have yet to provide data. The data coverage will improve over time (in the short to medium term), thanks to the capacity development efforts that include both regional and national trainings and bilateral technical assistance to member states.

5k. Treatment of missing values

Partial non-response at individual level (farm holding) will be imputed using appropriate statistical techniques, such as nearest-neighbour algorithms. The decision on whether to impute or not and the choice of the method is a function of the nature of the variable to impute and the amount and type of data available for the imputation, such as the availability of auxiliary data coming from different sources (e.g. surveys, administrative information). It is important to clearly distinguish missing data from non-applicable events. As specified above and in the sub-indicator methodology sheets, some sub-indicators can be recorded as ‘not applicable’ for a given farm. In this case, the farm will be considered sustainable from the perspective of the given sub-indicators.

6. Scale

6a. Scale of use

Scale of application (please check all relevant boxes):

Global: ☒ Regional: ☒ National ☒

Scale of data disaggregation/aggregation:

- Global/ regional scale indicator can be disaggregated to national level: ☐
- National data is collated to form global indicator: ☒

6b. National/regional indicator production

https://www.fao.org/3/ca7154en/ca7154en.pdf

6c. Sources of differences between global and national figures

An interim approach to report the indicator using proxies based on national FAOSTAT data is currently under deliberations. This short-term approach once discussed, tested, and finalized will be submitted for IAEG-SDG approval and endorsement (in 2022), and will be used to report on the indicator.
Nevertheless, the capacity development on farm survey-based methodology will continue to bridge the capacity and data gaps to enable countries adopt and implement the indicator.

6d. Regional and global estimates & data collection for global monitoring

6d.1 Description of the methodology

The indicator methodology proposes reporting of the indicator through a national-level dashboard, presenting the different sub-indicators together but independently.
Computation of results and construction of the dashboard are performed for each sub-indicator separately using the ‘traffic light’ approach already defined for each sub-indicator. In practice, the reported value of the indicator is determined by the results of the most limiting sub-indicator in terms of sustainability performance.

6d.2 Additional methodological details

Several levels of analysis will be undertaken with the data received from member countries. Time series of unsustainability for the entire world (both % and area) will allow progress towards a sustainable agriculture worldwide to be measured and tracked. Charts by regions will show the % of unsustainability comparing the results of the same triennium, comparison will be done also analysing the results of three country groups: developed economies, economies in transition, and developing economies. A map will be used to display the % of unsustainability, considering a given year or triennium, to have an immediate visualization of the most critical countries. A similar map will show the distance to the target of sustainability.

6d.3 Description of the mechanism for collecting data from countries

National Statistical Offices, Ministries of Agriculture or designated offices within countries will be responsible for collecting and compiling data for this indicator. They will in turn report to FAO who will conduct quality control and disseminate the information through FAO SDG portal. FAO will in turn report to the international statistical community and UNSD.
A questionnaire is sent by email to all countries annually since 2020 (http://www.fao.org/sustainabledevelopment-goals/indicators/241/en/).
The email is sent to the National focal point relevant to the indicator, National focal point for generic SDG and Heads of NSO. With copy to FAO Representative, Country, Regional and Sub-regional offices, FAO Regional Statisticians in the Region and in the Sub-regional offices, staff officially nominated to be in "CC" of all indicator communications and ESS-Registry, with a deadline for returning the filled in questionnaire within 4 weeks.
Special cases for Bahrain, Cuba, Iran (Islamic Republic of), Nicaragua, Oman, Saudi Arabia, Venezuela, (Bolivarian Republic of), for which the dispatch will be addressed according to the "Data Collection Phase" guidelines (Statistical Standard Series, endorsed by the IDWG-TTF on Statistics, 15 November 2019).
Once the questionnaires are received a validation process is done through the check of the person who replied with the questionnaire returned: indicator focal point / FAO local office / Regional Statistician might be contacted to clarify if the questionnaire returned is considered valid or not.
The received questionnaires are analysed in all their parts. Namely, checking individually, both manually and automatically through an R script, standard rules (unit, text out of the spaces, time series, outliers, inconsistencies, anomalies, missing data).

7. Other MEAs, processes and organisations

7a. Other MEA and processes

The indicator is the Sustainable Development Goal (SDG) indicator 2.4.1 and is linked with SDG Goal 2 and targets 2.3.1, 2.4.1, 2.3.2 and 5.a.1

7b. Biodiversity Indicator Partnership

Yes: ☐ No: ☒

8. Disaggregation

Proposed disaggregation

- Household and non-household sector farms
- Crops, livestock and mixed
- Irrigated and non-irrigated

Although not a mandatory variable for international reporting for SDG 2.4.1, the indicator can in principle be disaggregated by gender of the farm holder. This information is not, and will not be publicly available as a default in FAO and UNSD databases and reporting systems. Nevertheless, a question on gender disaggregation of data is incorporated into the SDG 2.4.1 questionnaire, accompanied by guidance for countries to collect and report information on the gender of the holder of the agriculture holding. Therefore, for national policy-making purposes, the country has the necessary tools, guidance and thus the capability to produce disaggregated estimates by gender should countries wish to collect and report sex-disaggregated data on 2.4.1 at the national level.

9. Related goals, targets and indicators

N/A

10. Data reporter

10a. Organisation

Food and Agriculture Organisation (FAO) Statistics Division, Agri-environment team

10b. Contact person(s)

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11. References

www.fao.org/sustainable-development-goals/indicators/241/en/

12. Graphs and diagrams

N/A

GBF indicator metadata: 10.2 Progress towards sustainable forest management

1. Indicator name

10.2 Progress towards sustainable forest management

2. Date of metadata update

March 2024

3. Goals and Targets addressed

3a. Goal

N/A

3b. Target

Headline indicator for **Target 10.** Ensure that areas under agriculture, aquaculture, fisheries and forestry are managed sustainably, in particular through the sustainable use of biodiversity, including through a substantial increase of the application of biodiversity friendly practices, such as sustainable intensification, agroecological and other innovative approaches, contributing to the resilience and long-term efficiency and productivity of these production systems, and to food security, conserving and restoring biodiversity and maintaining nature's contributions to people, including ecosystem functions and services.

4. Rationale

This indicator aims to monitor the progress towards sustainable forest management (SFM) which is a central concept for Target 10.

The definition of SFM by the UN General Assembly contains several key aspects, notably that sustainable forest management is a concept which varies over time and between countries, whose circumstances – ecological, social and economic – vary widely, but that it should always address a wide range of forest values, including economic, social and environmental values, and take intergenerational equity into account. Clearly a simple measure of forest area is insufficient to monitor sustainable forest management as a whole. The significance of the five sub-indicators can be briefly explained as follows:

1. Trends in forest area are crucial for monitoring SFM. The first sub-indicator focuses on both the direction of change (whether there is a loss or gain in forest area) and how the change rate varies over time; the latter is important to capture progress among countries that are losing forest area but have managed to reduce the rate of annual forest area loss.
2. Changes in the above-ground biomass stock in forest indicate the balance between gains in biomass stock due to forest growth and losses due to wood removals, natural losses, fire, wind, pests and diseases. At country level and over a longer period, sustainable forest management would imply a stable or increasing biomass stock per hectare, while a long-term reduction of biomass stock per hectare would imply either unsustainable management of the forests and degradation or unexpected major losses due to fire, wind, pests or diseases.
3. The change in forest area within legally protected areas is a proxy for trends in conservation of forest biodiversity as well as cultural and spiritual values of forests and thus a clear indication of the political will to protect and conserve forests. This indicator is related to GBF Target 3 which calls for each country to conserve at least 30 per cent of terrestrial and inland water areas.
4. The fourth sub-indicator looks at the forest area that is under a long-term forest management plan. The existence of a documented forest management plan is the basis for long term and sustainable management of the forest resources for a variety of management objectives such as for wood and non-wood forest products, protection of soil and water, biodiversity conservation, social and cultural use, and a combination of two or several of these. An increasing area under forest management plan is therefore an indicator of progress towards sustainable forest management.
5. The fifth sub-indicator is the forest area that is certified by an independently verified forest management certification scheme. Such certification schemes apply standards that generally are higher than those established by the countries' own normative frameworks, and compliance is verified by an independent and accredited certifier. An increase in certified

forest area therefore provides an additional indication of progress towards sustainable forest management. It should however be noted that there are significant areas of sustainably managed forest which are not certified, either because their owners have chosen not to seek certification (which is voluntary and market-based) or because no credible or affordable certification scheme is in place for that area.

5. Definitions, concepts and classifications

5a. Definition:

Indicator definition

“Sustainable forest management” (SFM) has been formally defined, by the UN General Assembly, as follows:

[a] dynamic and evolving concept [that] aims to maintain and enhance the economic, social and environmental values of all types of forests, for the benefit of present and future generations” (Resolution A/RES/62/98)

The indicator is composed of five sub-indicators that measure progress towards all dimensions of sustainable forest management. The environmental values of forests are covered by three sub-indicators focused on the extension of forest area, biomass within the forest area and protection and maintenance of biological diversity, and of natural and associated cultural resources. Social and economic values of forests are reconciled with environmental values through sustainable management plans. The subindicator provides further qualification to the management of forest areas, by assessing areas which are independently verified for compliance with a set of national or international standards.

The sub-indicators are:

1. Annual forest area change rate
2. Above-ground biomass in forest
3. Proportion of forest area within legally established protected areas
4. Proportion of forest area under a long-term management plan
5. Forest area under an independently verified forest management certification scheme

A dashboard is used to assess progress related to the five sub-indicators. The adoption of the dashboard approach aims at ensuring consideration of all dimensions of sustainable forest management and provides for clear view of areas where progress has been achieved.

Other key concepts and definitions:

Forest Land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds *in situ*. It does not include land that is predominantly under agricultural or urban land use.

- Forest is determined both by the presence of trees and the absence of other predominant land uses. The trees should be able to reach a minimum height of 5 meters.
- Includes areas with young trees that have not yet reached but which are expected to reach a canopy cover of at least 10 percent and tree height of 5 meters or more. It also includes areas that are temporarily unstocked due to clear-cutting as part of a forest management practice or natural disasters, and which are expected to be regenerated within 5 years. Local conditions may, in exceptional cases, justify that a longer time frame is used.
- Includes forest roads, firebreaks and other small open areas; forest in national parks, nature reserves and other protected areas such as those of specific environmental, scientific, historical, cultural or spiritual interest.
- Includes windbreaks, shelterbelts and corridors of trees with an area of more than 0.5 hectares and width of more than 20 meters.
- Includes abandonmethed shifting cultivation land with a regeneration of trees that have, or are expected to reach, a canopy cover of at least 10 percent and tree height of at least 5 meters.
- Includes areas with mangroves in tidal zones, regardless whether this area is classified as land area or not.
- Includes rubberwood, cork oak and Christmas tree plantations.
- Includes areas with bamboo and palms provided that land use, height and canopy cover criteria are met.

- Excludes tree stands in agricultural production systems, such as fruit tree plantations, oil palm plantations, olive orchards and agroforestry systems when crops are grown under tree cover. Note: Some agroforestry systems such as the "Taungya" system where crops are grown only during the first years of the forest rotation should be classified as forest.

Above-ground biomass All living biomass above the soil including stem, stump, branches, bark, seeds, and foliage.

- In cases where forest understorey is a relatively small component of the aboveground biomass carbon pool, it is acceptable to exclude it, provided this is done in a consistent manner throughout the inventory time series.

Protected areas Areas especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means.

Forest area within protected areas Forest area within formally established protected areas independently of the purpose for which the protected areas were established.

- Includes IUCN Categories I – IV
- Excludes IUCN Categories V-VI

Forest area with management plan Forest area that has a long-term documented management plan, aiming at defined management goals, which is periodically revised.

- A forest area with management plan may refer to forest management unit level or aggregated forest management unit level (forest blocks, farms, enterprises, watersheds, municipalities, or wider units).
- A management plan must include adequate detail on operations planned for individual operational units (stands or compartments) but may also provide general strategies and activities planned to reach management goals.
- Includes forest area in protected areas with management plan.

Independently verified forest management certification Forest area certified under a forest management certification scheme with published standards and is independently verified by a third-party.

Units of measure

SUB-INDICATOR	**UNIT**
Annual forest area change rate	Percent (%)
Above-ground biomass in forest	Tonnes per hectare
Proportion of forest area within legally established protected areas	Percent (%)
Proportion of forest area under a long-term forest management plan	Percent (%)
Forest area under an independently verified forest management certification scheme	1000 hectares

5b. Method of computation

National data on forest area, biomass stock, forest area within protected areas, and forest area under management plan are reported directly by countries to FAO for pre-established reference years. Based on the country reported data, FAO then makes country-level estimates of the forest area net change rate using the compound interest formula. The proportion of forest area within protected area and under management plan is calculated using the reported areas for each reference year and the forest area for year 2015.

Data on forest area under an independently verified forest management certification scheme are reported to FAO by the head offices of respective forest certification scheme. Reported data include the area certified under each certification scheme, as well as areas that are double-certified by the two schemes. That allows for estimating the total certified forest area, adjusted for double certified area.

No dashboard traffic lights are made at country level.

5c. Data collection method

Sub-indicators 1 to 4

- Data on these sub-indicators are collected through FAO's Global Forest Resources Assessment (FRA) programme. Officially nominated national correspondents and their teams prepare the country reports for the assessment. Some prepare more than one report as they also report on dependent territories. For the remaining countries and territories where no information is provided, a report is prepared by FAO using existing information and a literature search.

- All data are provided to FAO by countries in the form of a country report through an online platform following a standard format, which includes the original data and reference sources and descriptions of how these have been used to estimate the forest area for different points in time. The online platform was used for all data entry, review and quality control.
- In order to obtain internationally comparable data, countries are requested to provide national categories and definitions, and in case these are different than the FAO categories and definitions, countries are requested to perform a reclassification of national data to correspond to the FAO categories and definitions and to document this step in the country report. Countries are also requested to use interpolation or extrapolation of national data in order to provide estimates for the specific reporting years.

Sub-indicator 5

- Data are annually reported by the certification bodies to FAO and consolidated into estimates of total certified forest area, which are made available to the countries through the FRA platform where country officials can view the data that are being submitted.

5d. Accessibility of methodology

The methodology for the SDG 15.2.1 indicator is published in SDG indicators metadata on UNSD website at https://unstats.un.org/sdgs/metadata/

5e. Data sources

Sub-indicators 1 to 4

- Data are collected by FAO through the Global Forest Resources Assessment (FRA). Assessments have been carried out at regular intervals since 1946 and are now produced every five years. The latest of these assessments, FRA 2020, contains information for 236 countries and territories on about 60 variables related to the extent of forests, their conditions, uses and values for several points in time.

Sub-indicator 5

- Currently, forest certification by the Forest Stewardship Council (FSC) and the Programme for the Endorsement of Forest Certification (PEFC) are included in the data submissions. The latter includes several national/regional certification schemes that have been endorsed according to the PEFC standards.
- Data on forest certification are submitted annually to FAO by the head offices of the respective forest certification scheme. Data include the area certified by each scheme, as well as areas that are double certified by the two schemes. That allows for estimating the total certified forest area, adjusted for double certified area.

5f. Availability and release calendar

Data with updated time series and including year 2020 was released in July 2020 as part of FRA 2020 dataset. Next release of a complete FRA dataset is scheduled for 2025. More frequent reporting on forest area and other key indicators will be applied from 2024 onward. Data on forest certification is updated annually.

Data availability:

The Global Forest Resources Assessment 2020 collected data from 236 countries and territories.

Region Name	Total numb	Number of countries reporting latest year	Percentage of countries reporting latest year

	er of countries	**Annual forest area change rate**	**Above-ground biomass in forest**	**Proportion of forest area within legally established protected areas**	**Proportion of forest area under a long-term management plan**	**Forest area under an independently verified forest management certification scheme**	**Annual forest area change rate**	**Above-ground biomass in forest**	**Proportion of forest area within legally established protected areas**	**Proportion of forest area under a long-term management plan**	**Forest area under an independently verified forest management certification scheme**
World	236	236	205	162	128	236	100%	87%	69%	54%	100%
Central and Southern Asia	14	14	12	9	9	14	100%	86%	64%	64%	100%
Central Asia	5	5	4	3	3	5	100%	80%	60%	60%	100%
Southern Asia	9	9	8	6	6	9	100%	89%	67%	67%	100%
Eastern and South-Eastern Asia	16	16	16	11	9	16	100%	100%	69%	56%	100%
Eastern Asia	5	5	5	3	4	5	100%	100%	60%	80%	100%
South-Eastern Asia	11	11	11	8	5	11	100%	100%	73%	45%	100%
Northern Africa and Western Asia	25	25	21	13	10	25	100%	84%	52%	40%	100%
Northern Africa	7	7	7	4	4	7	100%	100%	57%	57%	100%
Western Asia	18	18	14	9	6	18	100%	78%	50%	33%	100%
Sub-Saharan Africa	51	51	48	43	30	51	100%	94%	84%	59%	100%

Europe and Northern America	55	55	47	40	38	55	100%	85%	73%	69%	100%
Europe	50	50	44	36	34	50	100%	88%	72%	68%	100%
Northern America	5	5	3	4	4	5	100%	60%	80%	80%	100%
Latin America and the Caribbean	50	50	43	37	23	50	100%	86%	74%	46%	100%
Oceania	25	25	18	9	9	25	100%	72%	36%	36%	100%
Oceania (exc. Australia and New Zealand)	22	22	16	7	6	22	100%	73%	32%	27%	100%
Australia and New Zealand	3	3	2	2	3	3	100%	67%	67%	100%	100%
Landlocked developing countries (LLDCs)	32	32	28	22	17	32	100%	88%	69%	53%	100%
Least Developed Countries (LDCs)	47	47	42	36	23	47	100%	89%	77%	49%	100%
Small island developing	53	53	42	27	12	53	100%	79%	51%	23%	100%

States (SIDS)											

5g. Time series

sub-indicators 1 to 4.

- 2000, 2010, 2015, 2016, 2017, 2018, 2019, 2020

for sub-indicator 5.

- 2000, 2010, 2015, and every year since

5h. Data providers

sub-indicators 1 to 4

- provided by the countries through a global network of officially nominated national correspondents. For the countries and territories which do not have a national correspondent, a report is prepared by FAO using previously reported information, literature search, remote sensing or their combination.

sub-indicator 5,

- forest certification scheme, data are provided by head offices of respective forest certification scheme.

5i. Data compilers

Food and Agriculture Organization of the United Nations (FAO)

5j. Gaps in data coverage

The geographical coverage of each sub-indicators is provided by region in the above table.

5k. Treatment of missing values

At country level

- For countries and territories where no information was provided to FAO for FRA 2020 (47 countries and territories representing 0.5 percent of the global forest area), a report was prepared by FAO using existing information from previous assessments, literature search, remote sensing or a combination of two or more of them.

For the above-ground biomass sub-indicator, imputation of the missing values has been carried out by FAO for those countries with at least one data point in the time series. The value of the data point closest in time was used as imputed value. For those countries where no value was reported for any of the reporting years, no imputation was done and the values for all years were set as “Not Available”.

At regional and global levels

- For those sub-indicators where there are gaps in the data set, only the countries with complete data for the relevant years (either provided by the countries or estimated by FAO) are included in the regional and global aggregates.

6. Scale

6a. Scale of use

Scale of application (please check all relevant boxes):

Global: ☒ Regional: ☒ National ☒

Scale of data disaggregation/aggregation:

- Global/ regional scale indicator can be disaggregated to national level: ☐
- National data is collated to form global indicator: ☒

6b. National/regional indicator production

Detailed methodology and guidance on how to prepare the country reports through an online reporting platform and to convert national data according to national categories and definitions to FAO’s global categories and definitions is found in the documents “*Guidelines and Specifications*” (www.fao.org/3/I8699EN/i8699en.pdf) and “*Terms and Definitions*” (www.fao.org/3/I8661EN/i8661en.pdf).

FAO supports the reporting process through capacity development on reporting methodology and remote sensing. The reporting platform provides easy access to relevant and freely available global remote sensing data sets and products.

6c. Sources of differences between global and national figures

For those sub-indicators where there are gaps in the data set, only the countries with complete data for the relevant years (either provided by the countries or estimated by FAO) are included in the regional and global aggregates.

6d. Regional and global estimates & data collection for global monitoring

6d.1 Description of the methodology

Sub-indicator 1 - Annual forest area change rate

Unit: Percent

Reference period: 2010-2020

Method of estimation: Compound annual change rate formula as follows:

where:

r = compound annual change rate for the period t_1 -t_2

t_i = time i (year)

AF_{t1} = forest area at t_1

AF_{t2} = forest area at t_2

Translation to dashboard/traffic light

The following flowchart explains the logic behind the translation of this indicator to a dashboard/traffic light:

The forest area change direction is determined by examining the value of the forest area change rate for the most recent period, a negative value indicate a loss of forest area, a zero value means that forest area is stable, and a positive value means that forest area has increased. The change in forest area loss rate is based on a comparison of the annual forest area change rate for the period 2010-2020 with the annual forest area change rate for the period 2000-2010 (baseline). If forest area change rate is negative (= forest loss) then: annual forest area loss rate = - (annual forest area change rate)

Comments:

This traffic light takes into consideration both the direction of forest area change (if forest area increases or decreases) as well as changes in the rate of forest area loss – the latter important in order to indicate progress among countries that are losing forest area but manage to reduce the loss rate.

The baseline should be updated every 5 years. In 2020 a new baseline was calculated for the period 2000-2010 based on updated country data.

Sub-indicator 2 – Above-ground biomass in forest

Unit: tonnes/hectare

Reference year: Latest reporting year

Method of estimation: Reported directly by countries

Translation to dashboard/traffic light:

The indicator value for the latest reporting year is compared with the indicator value reported for 2010. The ratio (r) between the current indicator value and the value reported for 2010 is calculated; r>1 means an increase in stock per hectare, r<1 means a decrease while 1 indicates no change. A narrow interval for r has been established to indicate a stable condition, and traffic-light colors are assigned as follows:

Sub-indicator 3 – Proportion of forest area within legally established protected areas

Unit: Percent

Reference year: Latest reporting year

Method of estimation:

Where:

AFP = Forest area within legally established protected areas

AF = Total forest area

Translation to dashboard/traffic light:

The indicator value for latest reporting year is compared with the indicator value reported for 2010. The ratio (r) between the current indicator value and the value reported for 2010 is calculated; r>1 means an increase in forest area within protected areas, r<1 means a decrease while 1 indicates no change. A narrow interval for r has been established to indicate a stable condition, and traffic-light colors are assigned as follows:

Comment:
Using forest area in 2015 as denominator for estimating this indicator ensures that the time series of percentages reflect real changes in the forest area within legally established protected areas and is not affected by changes (losses or gains) in total forest area.

Sub-indicator 4 – Proportion of forest area under a long-term forest management plan

Unit: Percent
Reference year: Latest reporting year
Method of estimation:

Where:

AFMP = Forest area under a long-term management plan
AF = Total forest area

Translation to dashboard/traffic light: The indicator value for latest reporting year is compared with the indicator value for previous reporting year for assessment of continuity of progress since last report. The ratio (r) between the current indicator value and the value reported for 2010 is calculated; r>1 means an increase in areas under forest management plan, r<1 means a decrease while 1 indicates no change. A narrow interval for r has been established to indicate a stable condition, and traffic-light colors are assigned as follows:

Comment:
Using forest area in 2015 as denominator for estimating this indicator ensures that the time series of percentages reflect real changes in the forest area under forest management plan and is not affected by changes (losses or gains) in total forest area.

Sub-indicator 5 – Forest area under an independently verified forest management certification scheme

Unit: Thousand hectares
Reference year: Latest reporting year (as of June 30)
Method of estimation: Data is collected directly from the databases of each certification scheme and provided to countries for validation.
Translation to dashboard/traffic light: The indicator value for latest reporting year is compared with the indicator value for previous reporting year for assessment of continuity of progress since last report. The ratio (r) between the current indicator value and the previously reported value is calculated; r>1 means an increase in areas under an independent forest management certification scheme, r<1 means a decrease while 1 indicates no change. A small interval for r has been established to indicate a stable condition, and traffic-light colors are assigned as follows:

Comments:
Using June 30 as the date for reporting, allows for the certification bodies to have their databases updated so they can provide information to FAO by end of the year, and then be included in the annual reporting to SDG in the beginning of the following year.

6d.2 Additional methodological details

See above

6d.3 Description of the mechanism for collecting data from countries

The data for sub-indicators 1 to 4 are reported to FAO by National Correspondents, national experts officially nominated by the countries to coordinate compilation of data from different national sources. The FRA National Correspondent network currently covers 187 countries and territories. National Correspondents compile country reports using commonly agreed terms and definitions and a standardized reporting methodology. The actual reporting is facilitated by a dedicated online platform, where all the

National Correspondents are asked to document data sources and how they computed and reclassified data to comply with the international definitions.

For sub-indicator 5, forest certification, data are provided by head offices of respective forest certification scheme.

Data reported by countries to FAO are subject to a rigorous review process to ensure correct use of definitions and methodology as well as internal consistency. A comparison is made with past assessments and other existing data sources. Regular contacts between national correspondents and FAO staff by e-mail and regional/sub-regional review workshops form part of this review process.

All data submitted by countries to FRA, including the FAO estimates made in case of desk studies, are available at the FRA online platform (https://fra-data.fao.org). The platform also includes the sub-indicators for 15.2.1. A request for validation is sent to the respective Head of Forestry before finalization and publishing of data.

7. Other MEAs, processes and organisations

7a. Other MEA and processes

The indicator is the Sustainable Development Goal (SDG) indicator 15.2.1

7b. Biodiversity Indicator Partnership

Yes: ☐ No: ☒

8. Disaggregation

The FRA guidelines includes data disaggregation by Indigenous peoples and local communities for forest ownership and management rights. This means countries have the tools and guidance and thus possibly the capability to produce disaggregated estimates by IPLC ownership/management rights (provided countries wish and have the requirement to collect and report data at the national level). Countries are encouraged to report on the elements related to forest ownership and management rights, noting that these attributes contribute to the long-term effectiveness of forest management.

9. Related goals, targets and indicators

The indicator is linked to Goal A Indicator “extent of natural ecosystems by type” (forest data), and Goal B “Functions and services provided by ecosystems, by service type.

10. Data reporter

10a. Organisation

Food and Agriculture Organisation of the United Nations (FAO)

10b. Contact person(s)

Anne Branthomme,(anne.branthomme@fao.org)

11. References

Websites:

http://www.fao.org/forest-resources-assessment/en/

https://www.fao.org/sustainable-development-goals-data-portal/data/indicators/1521-sustainable-forest-management/en

References:

Global Forest Resources Assessment 2020, Guidelines and Specifications (www.fao.org/3/I8699EN/i8699en.pdf)

Global Forest Resources Assessment 2020, Terms and Definitions (www.fao.org/3/I8661EN/i8661en.pdf).

United Nations. Resolution adopted by the General Assembly on 17 December 2007 (https://undocs.org/en/A/RES/62/98).

12. Graphs and diagrams

N/A

GBF indicator metadata: 12.1 Average share of the built-up area of cities that is green/blue space for public use for all

1. Indicator name
12.1 Average share of the built-up area of cities that is green/blue space for public use for all.
2. Date of metadata update
March 2024
3. Goals and Targets addressed
3a. Goal
N/A
3b. Target
Headline indicator for **Target 12**:. Significantly increase the area and quality, and connectivity of, access to, and benefits from green and blue spaces in urban and densely populated areas sustainably, by mainstreaming the conservation and sustainable use of biodiversity, and ensure biodiversity-inclusive urban planning, enhancing native biodiversity, ecological connectivity and integrity, and improving human health and well-being and connection to nature, and contributing to inclusive and sustainable urbanization and to the provision of ecosystem functions and services
4. Rationale
The value of public spaces is often overlooked or underestimated by policy makers, leaders, citizens and urban developers. There are several reasons for this, such as lack of appreciation of the value of these spaces to the functioning of urban systems and quality of life, prevailing urban planning processes, the lack of resources, or understanding or capacity to use public space as a complete, multi-functional urban system. Often the lack of appropriate enabling frameworks, weak political will and the absence of the means of public engagement compound the situation.
The Sustainable Development Goals (SDGs) have for the first time provided a platform where public spaces can be globally monitored. Indicator 11.7.1 measures the share of land allocated to public spaces and the total population with access of these spaces by age, gender and disability. The share of land that a city allocates to streets and open public spaces is not only critical to its productivity, but also contributes significantly to the social dimensions and health of its population. The size, distribution and quality of a city's overall public space act as a good indicator of shared prosperity. A well developed and properly designed network of streets increases connectivity, promotes walking and social interactions but also income, gender, race or disability status and one that promotes multiple activities not only encourages their use, but also contributes to the urban character and quality of urban life.
Cities that improve and sustain the use of public space, including streets, enhance community cohesion, civic identity, and quality of life. A prosperous city develops policies and actions for sustainable use of, and equitable access to public space. In many cities however, there has been neglect of public space - both in quantity and quality, which has been further exacerbated by uncontrolled rapid urbanization which has created disorderly settlement patterns with alarmingly low shares of public space, as well as a dramatic reduction of public spaces. There is a need to expand the ratio of land allocated to public spaces and improve their qualities to make cities and urban areas more efficient, liveable, prosperous, and sustainable. Reclaiming urban spaces for people encourages development of other street activities that bring life to a city. Equally, a well distributed and hierarchical system of open public spaces that can be accessed by all regardless of is part of how we can humanize our cities and make our streets and public areas more communal.
5. Definitions, concepts and classifications
5a. Definition:
The following is the definition of the SDG 11.7.1 indicator and consequently there could be small variations in the definition for the' Average share of the built-up area of cities that is green/blue space for public use for all'.
Indicator 11.7.1 has several interesting concepts that required global consultations and consensus. These include; built-up area, cities, open spaces for public use, etc. As a custodian agency, UN-Habitat has worked on these concepts along with several other partners.

City: A range of accepted definitions of the "city" exist, from those based on population data and extent of the built-up area to those that are based solely on administrative boundaries. These definitions vary within and between nations, complicating the task of international reporting for the SDGs. Definitions of cities, metropolitan areas and urban agglomerations also vary depending on legal, administrative, political, economic or cultural criteria in the respective countries and regions. Since 2016UN-Habitat and partners organized global consultations and discussions to narrow down the set of meaningful definitions that would be helpful for the global monitoring and reporting process. Following consultations with 86 member states, the United Nations Statistical Commission, in its 51st Session (March 2020) endorsed the Degree of Urbanisation (DEGURBA) as a workable method to delineate cities, urban and rural areas for international statistical comparisons. 1 This definition combines population size and population density thresholds to classify the entire territory of a country along the urban-rural continuum, and captures the full extent of a city, including the dense neighbourhoods beyond the boundary of the central municipality. DEGURBA is applied in a two-step process: First, 1 km2 grid cells are classified based on population density, contiguity and population size. Subsequently, local units are classified as urban or rural based on the type of grid cells in which majority of their population resides. For the computation of indicator 11.7.1, countries are encouraged to adopt the degree of urbanisation to define the analysis area (city or urban area).

Built-up area of cities: Conventionally, built up areas of cities are areas occupied by buildings and other artificial surfaces. For indicator 11.7.1, built up areas, as the indicator denominator has the same meaning as "city" (see definition of city above).

Public space: The Global Public Space toolkit defines Public Space as all places that are publicly owned or of public use, accessible and enjoyable by all, for free and without a profit motive, categorized into streets, open spaces and public facilities. Public space in general is defined as the meeting or gathering places that exist outside the home and workplace that are generally accessible by members of the public, and which foster resident interaction and opportunities for contact and proximity. This definition implies a higher level of community interaction and places a focus on public involvement rather than public ownership or stewardship. For the purpose of monitoring and reporting on indicator 11.7.1, public space is defined as all places of public use, accessible by all, and comprises open public space and streets.

Land allocated to streets refers to the total area of the city/urban area that is occupied by all forms of streets (as defined above). This indicator only includes streets available at the time of data collection and excludes proposed networks.

Open public space: is any open piece of land that is undeveloped or land with no buildings (or other built structures) that is accessible to the public without charge, and provides recreational areas for residents and helps to enhance the beauty and environmental quality of neighbourhoods. UN-Habitat recognizes that different cities have different types of open public spaces, which vary in both size and typology. Based on the size of both soft and hard surfaces, open public spaces are broadly classified into six categories: national/metropolitan open spaces, regional/larger city open spaces, district/city open spaces, neighbourhood open spaces, local/pocket open spaces and linear open spaces. Classification of open public space by typology is described by the function of the space and can include: green public areas, riparian reserves, parks and urban forests, playground, square, plazas, waterfronts, sports field, community gardens, parklets and pocket parks.

Potential open public space: the identification of open public spaces across cities can be implemented through, among other sources, analysis of high to very high resolution satellite imagery, from base-maps provided by different organizations (eg OpenStreetMap, Esri, etc) or as crowd-sourced and volunteered data. While these sources provide important baseline data for indicator 11.7.1, some of the identifiable spaces may not meet the criteria of being "accessible to the public without charge". The term "potential open public space" is thus used to refer to open public spaces which are extracted from the above-mentioned sources (based on their spatial character), but which are not yet validated to confirm if they are accessible to the public without charge.

Streets are defined thoroughfares that are based inside urban areas, towns, cities and neighbourhoods most commonly lined with houses or buildings used by pedestrians or vehicles in order to go from one place to another in the city, interact and to earn a livelihood. The main purpose of a street is facilitating movement and enabling public interaction. The following elements are considered as streets space: Streets, avenues

and boulevards, pavements, passages and galleries, Bicycle paths, sidewalks, traffic island, tramways and roundabouts. Elements excluded from street space include plots (either built-up), open space blocks, railways, paved space within parking lots and airports and individual industries.
For more details and illustrations on the definition of the different types of open spaces considered for indicator 11.7.1 see SDG 11.7.1 step by step training module (https://unhabitat.org/sites/default/files/2020/07/indicator_11.7.1_training_module_public_space.pdf).

5b. Method of computation

The following is the definition of the SDG 11.7.1 indicator and consequently there could be small variations in the definition for the' Average share of the built-up area of cities that is green/blue space for public use for all'.
The method to estimate the area of public space has been globally piloted in over 600 cities and this follows a series of methodological developments that go back to the last 7 years. The finalized methodology is a three-step process:

a. Spatial analysis to delimit the city/urban area which will act as the geographical scope for the spatial analysis and indicator computation;
b. Spatial analysis to identify potential open public spaces, expert consultations and/or field work to validate data and assess the quality of spaces and calculation of the total area occupied by the verified open public spaces;
c. Estimation of the total area allocated to streets;
d. Estimation of share of population with access to open public spaces within 400 meters walking distance out of the total population in the city/ urban area and disaggregation of the population with access by sex, age and persons with disabilities

Spatial analysis to delimit the city/urban area

Following consultations with 86 member states, the United Nations Statistical Commission in its 51st Session (March 2020) endorsed the Degree of Urbanisation (DEGURBA) as a workable method to delineate cities, urban and rural areas for international statistical comparisons. Countries are thus encouraged to adopt this approach, which will help them produce data that is comparable across urban areas within their territories, as well as with urban areas and cities in other countries. More details on DEGURBA and its application are available here: https://unstats.un.org/unsd/statcom/51st-session/documents/BG-Item3j-Recommendation-E.pdf

Spatial analysis to identify potential open public spaces, ground verification and estimating their total area

This step involves mapping of potential open public spaces within the urban boundaries defined in step one above and estimation of their area. Identification of potential open public spaces is based on the spatial character of each space and is also informed by existing country/ city land use maps and open space inventories. To compute this component of the indicator, follow these steps:

1. An inventory of Open Public Spaces should be the initial source of information. Additional legal documents, land use plans and other official sources of information can be used to complement the data from the inventory. If the focus urban area or city has a detailed and up-to-date database of its open public spaces, use the information to plot such spaces in GIS software and compute their areas. Where necessary, clean data to remove components which are not applicable in the computation of this sub-indicator (e.g. recreation areas which attract a fee such as golf courses, etc).
2. Since many cities and countries do not have an open public spaces inventory, satellite imagery can be used to extract information on potential open public spaces. The identification of such spaces from imagery should be based on careful evaluation of the character of each space against the known forms of open public spaces within that city / country. High resolution satellite imagery or Google Earth imagery can be used in this analysis. Open data sources such as OpenStreetMap (OSM) have some polygon data on open spaces in many cities. While this data may not be comprehensive for all cities, it can contribute to the data collection efforts and can be explored.

3. Using the data extracted from step 2 above, undertake validation to remove spaces which are not open for public use (e.g. private non-built up land within the urban area), or to add new spaces that might have been omitted during the extraction stage. This can be achieved through analysing the character of spaces (e.g. size, shape, land cover, etc), comparison of identified spaces with known recreational areas within the city or with data from OpenStreetMap, or consultations with city leaders, local civil society groups, community representatives among others. UN-Habitat, in consultation with partners, experts and data producers have developed a detailed tool to facilitate the verification of each space and collection of additional data on the space quality and accessibility. This tool is freely available and allows for on-site definition/ editing of the space's boundaries. It also contains standard and extended questions which collect data relevant to the indicator, including location of the spaces, their ownership and management, safety, inclusivity and accessibility. This data provides basic information about each space, as well as information relevant for disaggregation - such as access issues linked to age, gender and disabilities, as requested for by the indicator. The tool is dynamic and allows cities to include extra questions which generate information that is useful for their decision making (Tool is available at https://ee.kobotoolbox.org/x/#IGFf6ubq). It should however be noted that the validation approaches which require primary data collection are capital intensive and may not be feasible for most countries in the short term. Validation based on existing city-level data and continuous stakeholder engagement should thus be adopted since they have been shown to produce reliable results at lower costs.
4. Calculate the total area covered by the verified open public spaces. Once all open public spaces have been verified, calculate their area in GIS or other database management software. The share of land occupied by these spaces is then calculated using the formula:

Computation of land allocated to streets (LAS)

Where street data by width and length fields is available/specified, the following methodology could be used:

1. Select only the streets included in the city / urban area (or clip streets to the city/urban boundary)
2. From GIS (or alternative software), calculate the total area occupied by each street by multiplying its length with width. Add up all individual street areas to attain the total amount of land occupied all streets within the defined urban area.

Where detailed data on streets is not available, there is need to map out each street line (or the entire area covered by the streets), measure its length and width, which are required for the area computation. For small urban areas, it is possible to manually digitize all streets, but this is more complex for large urban areas and cities. For these large urban areas, an alternative technique for computing land allocated to the streets is one that adopts sampling principles. An approach that uses the Halton sampling sequence is recommended, specifically because the sequence generates equidistant points, increasing the degree of sample representativeness. To compute LAS using this method, follow the following steps:

1. Using the urban extent boundary identified earlier, generate a Halton sequence of sample points (Halton sequence refers to quasi-random sequence used to generate points in space that are ex-post evenly spread i.e. Equidistant). The number of points used for each city varies based on its area. In large study areas of more than 20 km^2, a density of one circle per hectare is used while in small study areas of less than 20 km^2 a density of 0.5 circle per hectare is used.
2. Buffer the points to get sample areas with an area of 10 hectares each.
3. Within each 10-hectare sample area, digitize all streets in GIS software and compute the total amount of land they occupy.

4. Calculate the average land allocated to streets for all sample areas using the following formula:

The land allocated to streets =

$$\text{The land allocated to streets} = \frac{\text{Sum of LAS from all sampling points}}{\text{Number of sampling points}}$$

$$\frac{\text{Sum of LAS from all sampling points}}{\text{Number of sampling points}}$$

Open-source datasets such as OpenStreetMap (OSM) have a good amount of street data on many cities, which is increasingly being updated and extended to cover new areas. This data can also be used as a starting point to understand the pattern of streets in a city. Upon verification of the OSM street categorization for each city, sampling can be used to estimate the average width of each street category, which can in turn help compute the share of land allocated to streets.

The final computation of the indicator is done using the formula:

$$\textbf{Share of the built} - \textbf{up area of the city that is open space in public use}(\%)$$

$$= \frac{\textbf{Total surface of open public space} + \textbf{Total surface of land allocated to sreets}}{\textbf{Total area of the city}}$$

d) Estimation of share of population with access to open public spaces and disaggregation by population group

To help define an "acceptable walking distance" to open public spaces", UN-Habitat organized a series of consultations with national statistical officers, civil society and community groups, experts in diverse fields, representatives from academia, think tanks, other UN-agencies, and regional commissions among other partners. These consultations, which were held between 2016 and 2018 concluded that a walking distance of 400 meters - equivalent to 5 minutes' walk was a practical and realistic threshold. Based on this, a street network-based service area is drawn around each public open space, using the 400 meters access threshold. All populations living within the service areas are in turn identified as having access to the public open spaces, based on the following key assumptions:

- Equal access to each space by all groups of people – i.e. children, the disabled, women, elderly can walk a distance of 400 meters (for 5 minutes) to access the spaces (in actual sense, these will vary significantly by group).
- All streets are walkable – where existing barriers are known (e.g. un-walkable streets, lack of pedestrian crossings, etc), these can be defined in the delimitation of the space service area.
- All public open spaces have equal area of influence – which is measured as 400 meters along street networks. In real life situations, bigger spaces have a much larger area of influence.
- All buildings within the service area are habitable, and that the population is equally distributed in all buildings/built up areas

The estimation of total population with access to open public spaces is achieved using the two broad steps described below:

1. Create 400 meters walking distance service area from each open public along the street network. This requires use of the network analyst tool in GIS software and street data (such as that from City Authorities or from Open Sources such as OpenStreetMap). A network service area is a region that encompasses all accessible areas via the streets network within a specified impedance/distance. The distance in each direction (and in turn the shape of the surface area) varies depending on, among other things, existence of streets, presence of barriers along each route (e.g. lack of foot bridges and turns) and walkability or availability of pedestrian walkways along each street section. In the absence of detailed information on barriers and walkability along each street network, the major assumption in creating the service areas is that all streets are walkable. Since the analysis is done at the city level, local

knowledge can be used to exclude streets which are not walkable. The recommendation is to run the service area analysis for each OPS separately then merge all individual service areas to create a continuous service area polygon. Step by step guidance on how to create the service area is provided in the detailed SDG 11.7.1 training module (https://unhabitat.org/sites/default/files/2020/07/indicator_11.7.1_training_module_public_space.pdf)

1. In GIS, overlay the created service area with high resolution demographic data, which should be disaggregated by age, gender, and disability. The best source of population data for the analysis is individual dwelling or block level total population which is collected by National Statistical Offices through censuses and other surveys. Where this level of population data is not available, or where data is released at large population units, countries are encouraged to create population grids, which can help disaggregate the data from large and different sized census/ population data release units to smaller uniform sized grids. For more details on the available methods for creation of population grids explore the links provided under the references section on “Some population gridding approaches”. A generic description of the different sources of population data for the indicator computation is also provided in the detailed Indicator 11.7.1 training module (https://unhabitat.org/sites/default/files/2020/07/indicator_11.7.1_training_module_public_space.pdf). Once the appropriate source of population data is acquired, the total population with access to open public spaces in the city/urban area will be equal to the population encompassed within the combined service area for all open public spaces, calculated using the formula below

$$\textbf{Share of population with access to open space in public spaces } (\%) = \frac{\textbf{Total population within 400 m service areas}}{\textbf{Total population within the city/urban extent}}$$

5c. Data collection method

The method to estimate the area of public space has been globally piloted in over 600 cities and this follows a series of methodological developments that go back to the last 7 years. The finalized methodology is a three-step process: a) Spatial analysis to delimit the city/urban area which will act as the geographical scope for the spatial analysis and indicator computation; b) Spatial analysis to identify potential open public spaces, expert consultations and/or field work to validate data and assess the quality of spaces, and calculation of the total area occupied by the verified open public spaces; c) Estimation of the total area allocated to streets; d) Estimation of share of population with access to open public spaces within 400 meters walking distance out of the total population in the city/ urban area and disaggregation of the population with access by sex, age and persons with disabilities.

5d. Accessibility of methodology

Methodology for SDG 11.7.1 is available and has been piloted in over 1000 cities and 123 countries. Data on the indicator is published by UN-Habitat (https://data.unhabitat.org)

5e. Data sources

City land use plans, high to very high-resolution satellite imagery (open sources), documentation outlining publicly owned land and community-based maps are the main sources of data.

5f. Availability and release calendar

The monitoring of the indicator can be repeated at regular intervals of 3-5 years, allowing for three reporting points until the year 2030. However, annual updates to the existing database will be done and hence data releases based on annual updates will be available every year. Monitoring in 3-5-year intervals will allow cities to determine whether the shares of open public space in the built-up areas of cities are increasing significantly over time, as well as deriving the share of the global urban population living in cities where the open public space is below the acceptable minimum.

5g. Time series

Baseline data on SDG 11.7.1 available for 2020

5h. Data providers

Ministries in charge of urban development, national mapping agencies, national statistical offices

5i. Data compilers

UN-Habitat is the lead agency on the global reporting for this indicator and as such, has since 2016 coordinated the efforts of various partners, on methodological developments and piloting of data collection. Key among these partners have included National Statistical Offices, New York University, ESRI, FAO, UNGGIM, UCLG, Local government departments, the European Commission, UN regional commissions, KTH University-Sweden, Urban Observatories, etc. Working in partnership with these partners, UN-Habitat has undertaken trainings and capacity development activities in cities, countries and regions, which have contributed to enhanced data collection and setting up of systems to monitor and report on the indicator.

5j. Gaps in data coverage

The currently available data covers cities and urban areas of different sizes but is not classified by typology of open public space i.e. green, blue and artificial surfaces. A methodology for identifying and classifying green space (shrublands and forest) is being developed and piloted at this time. However, methodology is needed for blue (freshwater or marine) spaces. Other facets of biodiversity are missing, including measures of taxonomic and functional measures of diversity. Protected status should also be added (e.g. protected urban park).

5k. Treatment of missing values

All qualifying cities/countries are expected to fully report on this indicator more consistently following implementation and full roll out of this methodology. In the early years of this indicator, we had data gaps due to no data being collected at the time, as opposed to missing data. In most of the cases, missing values to-date reflect a non-measurement of the indicator for the city. However, because national statistical agencies will report national figures from a complete coverage of all their cities, some cities may take longer to be measured or monitored. As a result, UN-habitat has worked with partners to develop a concept of applying a National Sample of Cities. With this approach, countries will be able to select a nationally representative sample of cities from their system of cities, and these will be used for global monitoring and reporting purposes for the period of the SDGs. The fully developed methodology on this concept has been rolled out and countries that are unable to cover the full spectrum of their cities are already applying this approach. See:
https://unhabitat.org/sites/default/files/2020/06/national_sample_of_cities_english.pdf

6. Scale

6a. Scale of use

Scale of application (please check all relevant boxes):

Global: ☒ Regional: ☒ National☒

Scale of data disaggregation/aggregation:

- Global/ regional scale indicator can be disaggregated to national level: ☐
- National data is collated to form global indicator: : ☐

The indicator is applicable from city to national and regional/global levels. Measurement is done at the city level (for all cities and/or using a sample of representative cities) from where data can be aggregated to national, regional and global levels.

6b. National/regional indicator production

Global SDG 11.7.1 methodology is applicable to national and local city levels (see https://unstats.un.org/sdgs/metadata/files/Metadata-11-07-01.pdf).

Since countries have the responsibility to produce data on the indicator, the underlying data is available to them through existing national and local data sharing mechanisms. Data produced through the efforts of international organizations such as UN-Habitat is openly available to countries for use.

6c. Sources of differences between global and national figures

Minimal to no differences are likely to emerge for this indicator since measurement is done at the city level, with data aggregated to national, regional then global levels. Data produced by international organizations is to be shared with countries for validation, and nationally produced data will be treated as the most authoritative data. The only likely source of variations may be on the application of the globally harmonized approach to defining cities and urban areas, where countries may choose to use their national definitions as opposed to the harmonized approach. Data for this indicator should thus be accompanied by an explanation on the definition of city/urban area used in the computations.

6d. Regional and global estimates & data collection for global monitoring

6d.1 Description of the methodology

Data produced at the city/urban level within each country is aggregated to produce a national value based on the national sample of cities approach developed by UN-Habitat, through which a weighting scheme is developed for each city as a factor of its national representativeness (See: https://unhabitat.org/sites/default/files/2020/06/national_sample_of_cities_english.pdf). The national aggregates from different countries are then used to produce regional and global estimates.

Anticipating the challenge of limited data availability from countries in the earlier years of the indicator, the global sample of cities developed jointly by UN-Habitat, New York University and the Lincoln Institute of Land Policy presents a consistent approach to producing regional and global aggregates. The global sample of cities includes a list of cities which are representative of all regions and for which data can be produced and used to produce weighted regional and global values on the indicator performance (see https://www.lincolninst.edu/sites/default/files/pubfiles/atlas-of-urban-expansion-2016-volume-1-full.pdf).

6d.2 Additional methodological details

N/A

6d.3 Description of the mechanism for collecting data from countries

N/A

7. Other MEAs, processes and organisations

7a. Other MEA and processes

N/A.

7b. Biodiversity Indicator Partnership

Yes: ☐ No: ☒

8. Disaggregation

Based on availability of high-resolution population data, population with access to open public spaces should be disaggregated by age, gender and disability.

Wherever possible, it would also be useful to have information disaggregated by:

- Location of public spaces (intra-urban)
- Quality of the green/blue space by safety, inclusivity, accessibility, greenness, and comfort
- Type of green/blue space as a share of the city area. This includes a classification of green (e.g. forest, shrub land, grassland) and blue (e.g. wetland, lake, river, mangrove) ecosystem type and extent, and a measure of ecosystem condition.
- Measures of ecosystem functions and services (nature's contributions to people) to people such as health and wellbeing are needed to reflect this wording in the target.
- The share of green/blue space in public use which are universally accessible, particularly for persons with disabilities.
- Type of human settlements

9. Related goals, targets and indicators

Indicators for biodiversity used in Goal A are valuable to assessing the contribution of urban green and blue spaces to urban biodiversity targets. Complementary indicators for estimating the integrity, connectivity and resilience of ecosystems are relevant and could be applied to urban ecosystems. Also relevant are indicators for Goal B, such as those to be used for ecosystem services and other contributions of nature to human well-being.

10. Data reporter

10a. Organisation

UN-Habitat

10b. Contact person(s)

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11. References

Axon Johnson Foundation, Public Spaces and Place making, Future of Places http://futureofplaces.com

UN-Habitat (2013) Streets as Public Spaces and Drivers of Urban Prosperity, Nairobi

UN-Habitat (2014) Methodology for Measuring Street Connectivity Index

UN-Habitat (2015) Spatial Capital of Saudi Arabian Cities, Street Connectivity as part of City Prosperity Initiative

UN-Habitat (2015) Global Public Space Toolkit from Global Principles to Local Policies and Practice

UN-Habitat (2018). SDG Indicator 11.7.1 Training Module: Public Space. United Nations Human Settlement Programme (UN-Habitat), Nairobi. Available at https://unhabitat.org/sites/default/files/2020/07/indicator_11.7.1_training_module_public_space.pdf

Kaw, Jon Kher, Hyunji Lee, and Sameh Wahba, editors. 2020. The Hidden Wealth of Cities: Creating, Financing, and Managing Public Spaces. Washington, DC: World Bank. doi:10.1596/978-1-4648-1449-5. License: Creative Commons Attribution CC BY 3.0 IGO

SDG 11.7.1 metadata, 2020. https://unstats.un.org/sdgs/metadata/files/Metadata-11-07-01.pdf

12. Graphs and diagrams

N/A

GBF indicator metadata 12.b Target 12 binary indicator

Full Indicator Name
tbc

Goals And Targets Addressed

Goal
Goal A The integrity, connectivity and resilience of all ecosystems are maintained, enhanced, or restored, substantially increasing the area of natural ecosystems by 2050; Human induced extinction of known threatened species is halted, and, by 2050, the extinction rate and risk of all species are reduced tenfold and the abundance of native wild species is increased to healthy and resilient levels; The genetic diversity within populations of wild and domesticated species, is maintained, safeguarding their adaptive potential.
Goal B Biodiversity is sustainably used and managed and nature's contributions to people, including ecosystem functions and services, are valued, maintained and enhanced, with those currently in decline being restored, supporting the achievement of sustainable development for the benefit of present and future generations by 2050.

Target
Binary indicator for Target 12. Significantly increase the area and quality, and connectivity of, access to, and benefits from green and blue spaces in urban and densely populated areas sustainably, by mainstreaming the conservation and sustainable use of biodiversity, and ensure biodiversity-inclusive urban planning, enhancing native biodiversity, ecological connectivity and integrity, and improving human health and well-being and connection to nature, and contributing to inclusive and sustainable urbanization and to the provision of ecosystem functions and services.

Rationale

Green and blue spaces have a range of positive effects on human physical and mental well-being. Ensuring the availability and accessibility of such areas is particularly important given that the increasing trend towards urbanization risks separating people further from nature, with potential negative effects on human health and reduced understanding of biodiversity, and the ecosystem services it provides. Further, green and blue spaces can provide important habitat for species, improve habitat connectivity, provide ecosystem services and help mediate extreme events, if managed with such objectives in mind. The target focuses on the importance of biodiversity-inclusive urban planning and making space for nature within built landscapes to improve the health and quality of life for citizens and to reduce the environmental footprint of cities and infrastructure. It also recognizes the dependency of urban communities on well-functioning ecosystems and the importance of spatial planning to reduce the negative impacts on biodiversity of urban expansion, roads and other infrastructure.

Poor urban planning has many negative effects on people, affecting wellbeing, health and social relationships. Effective urban planning on the other hand can improve such outcomes for people and biodiversity. Many cities around the world are actively increasing the amount of green and blue spaces available to promote biodiversity and human wellbeing. There is a need to support such action and encourage biodiversity-inclusive urban planning. This indicator tracks the effort made by cities to improve their urban planning to include the conservation and sustainable use of biodiversity and the provision ecosystem services and nature's contribution to people.

Definitions Concepts And Classifications

Definition

Biodiversity-inclusive urban planning: Urban planning is the process that is applied as a way to organize the dynamics of human actions in cities, with the purpose of stipulating guidelines that order spatial occupation through typological patterns of use, mobility, distribution of equipment, services, and natural areas in the territory, in order to provide uniformity in the distribution of the onus and advantages generated by the development of the infrastructures. The planning, furthermore, aims to announce in advance what can be done in the face of solving problems that may hinder the dynamics of functioning that involve cities. The Framework specifically calls for such processes to be biodiversity inclusive.
Green and blue spaces: These are areas of vegetation, inland and coastal waters, generally in or near to urban areas and other densely populated areas. The target specifically calls for the area, quality, connectivity, accessibility and benefits from such areas to be increased for the purposes of enhancing native biodiversity, ecological connectivity and integrity, and improve human health and well-being and connection to nature. This could be accomplished in various ways, including by creating new green and blue spaces, better managing existing areas for biodiversity and health outcomes, and ensuring that such areas are accessible to people.
*Urbanisation***:** The increase in the proportion of a population living in urban areas; the process by which a large number of people becomes permanently concentrated in relatively small areas, forming cities.
Urban and densely populated areas: Variable per country but generally refers to areas highly modified by and for humans where large numbers of people live. United Nations definitions, provided by national statistics offices, by country can be found here.

Method of Computation

This indicator is a binary indicator and must be compiled from the answers to two questions:

12.1 Are there urban areas in your country under biodiversity-inclusive urban planning that incorporates the management of green or blue spaces for the conservation and sustainable use of biodiversity?

12.2 Are there urban areas in your country under biodiversity-inclusive urban planning incorporating the management of green or blue spaces for ecosystem services and nature's contributions to people?

There are four possible answers to each of these questions[12]:

(a) No
(b) No, but under development
(c) Yes, partially
(d) Yes, fully

A "No" answer implies that urban planning strategies within nations contain no wording on biodiversity (12.1) or nature's contributions to people (12.2) and no effort is being made at the national level to include biodiversity and nature's contributions to people in urban planning. In the case where some cities are implementing biodiversity-inclusive urban planning voluntarily on an ad hoc basis with no concerted effort at the national level, select "No".

A "No, but under development" answer implies a concerted effort at the national level to urge cities to produce new plans that are biodiversity-inclusive, such plans must be improved to specifically include green and blue spaces with the intent to conserve and sustainably use biodiversity (12.1) and improve provisioning of nature's contributions to people (12.2). A concerted effort must imply that funding is being mobilized to support cities in upgrading their plans, and policies are put in place to incentivize cities to take action. However, the presence of resources and policies on their own is not sufficient to answer "No, but under development", cities must be actively applying for or using these resources in developing new biodiversity-inclusive urban plans.

[12] Assuming recommendation to make answers consistent with other binary indicators has been followed.

A “Yes, partially” answer implies that biodiversity-inclusive urban planning is already being done and supported in some cities but not fully. That is:

- only green or blue spaces are being managed but not both (12.1 & 12.2)
- biodiversity is only being managed for sustainable use but not conservation or vice versa (12.1)
- only ecosystem services are being managed but not nature’s contributions to people or vice versa (12.2)

If any one of the cases outlined above applies, only partial achievement has been reached.

A “Yes, fully” answer implies that all the conditions outlined in “Yes, partially” have been met. Namely that biodiversity-inclusive urban planning it being done and supported in some cities, it includes both green and blue spaces, biodiversity is managed for both conservation and sustainable use (12.1) and ecosystem services and nature’s contributions to people are incorporated (12.2). The minimum number of cities needed to achieve these criteria and answer “Yes, fully” is 1. However, it is essential that this not be an outlier case but that the city be responding to concerted efforts and policies at the national level, otherwise refer to the description of “No”.

<u>Note</u>: further information on progress towards the target can be provided in the free text section of the reporting tool.

GBF indicator metadata: 13.b Target 13 binary indicator

Full Indicator Name
tbc

Goals And Targets Addressed

Goal
N/A

Target
Binary indicator for Target 13. Take effective legal, policy, administrative and capacity-building measures at all levels, as appropriate, to ensure the fair and equitable sharing of benefits that arise from the utilization of genetic resources and from digital sequence information on genetic resources, as well as traditional knowledge associated with genetic resources, and facilitating appropriate access to genetic resources, and by 2030, facilitating a significant increase of the benefits shared, in accordance with applicable international access and benefit-sharing instruments.

Rationale

The sharing of benefits that arise from the utilization of genetic resources and associated traditional knowledge is one of the three objectives of the Convention and a key pillar for the success of its implementation. It builds an equity dimension among countries providing and using biodiversity with the dual objective of providing incentives for conservation and sustainable use of biodiversity and mobilizing new resources redirected towards biodiversity. Access and benefit-sharing is included in several international instruments. Under the Convention, the framework for the implementation of its third objective is provided in Article 15. In addition, Article 8(j) contains provision to encourage the equitable sharing of the benefits arising from the utilization of knowledge, innovations and practices of indigenous peoples and local communities embodying traditional lifestyles relevant for conservation and sustainable use of biological diversity. The adoption of the Nagoya Protocol on Access and Benefit Sharing (ABS) created greater legal certainty, clarity and transparency for both users and providers of genetic resources and associated traditional knowledge. At COP 15 in December 2022, Parties agreed to develop a solution for the sharing of benefits arising from the use of digital sequence information (DSI) on genetic resources and established a way forward to advance the consideration of this issue under the Convention.

The implementation of these Articles and of the Nagoya Protocol require active governmental involvement and regulation of genetic resources and their use for the benefit of all members of society. Therefore, one of the main elements of this target is to put in place legal, policy and administrative measures on ABS. As such, this indicator tracks Parties' progress towards implementing the necessary measures on ABS.

Definitions Concepts And Classifications

Definition

Benefits arising from the utilization of genetic resources or traditional knowledge associated with genetic resources: Benefits may include monetary and non-monetary benefits, including but not limited to those listed in the Annex of the Nagoya Protocol.
Access and benefit sharing: One of the three objectives of the Convention on Biological Diversity, as set out in its Article 1, is the fair and equitable sharing of the benefits arising out of the utilization of genetic resources, including by appropriate access to genetic resources and by appropriate transfer of relevant technologies, taking into account all rights over those resources and to technologies, and by appropriate funding. The CBD also has several articles (especially Article 15) regarding international aspects of access to genetic resources. Access and benefit-sharing refers to the way in which genetic resources may be

accessed, and how the benefits that result from their use are shared between the people or countries using the resources (users) and the people or countries that provide them (providers). In some cases, this also includes valuable traditional knowledge associated with genetic resources that comes from Indigenous Peoples and Local Communities. The benefits to be shared can be monetary, such as sharing royalties when the resources are used to create a commercial product, or non-monetary, such as the development of research skills and knowledge.
Genetic resources: Genetic resources means genetic material of actual or potential value. (CBD, article 2). Note that genetic material means any material of plant, animal, microbial or other origin containing functional units of heredity.
Traditional knowledge: The concept of Traditional Knowledge (TK) in the Convention for Biological Diversity (CBD) has two characteristics. Firstly, CBD defines TK as one kind of knowledge, innovations and practices which is helpful to conservation and sustainable use of biodiversity. Secondly, CBD limits the TK to link with indigenous peoples and local communities (IPLCs) embodying traditional lifestyles, i.e. these TK were created and preserved by IPLCs and they are accumulated, developed and inherited generation by generation.

Method of Computation

This indicator is a binary indicator and must be compiled from the answers to three[13] questions:

13.1 Does your country have an operational, administrative and policy framework or measures to ensure the fair and equitable sharing of benefits that arise from the utilization of genetic resources?

13.2 Does the framework or measures mentioned in question 13.1 include the utilization of the traditional knowledge associated with genetic resources?

13.3 Does your country monitor the fair and equitable benefit-sharing arising from the utilization of genetic resources and/or traditional knowledge associated with genetic resources?

There are five[14] possible answers to questions 13.1[15]:

(e) No
(f) No, but under development
(g) Yes, partially
(h) Yes, fully
(i) Not applicable

A "No" answer implies that no administrative and policy framework or measures to regulate genetic resources are in place and operational. Therefore, no frameworks nor measures exist in the country for ABS.

A "No, but under development" answer implies a concerted effort at the national level to implement an administrative and policy framework or measures to regulate genetic resources. Such measures may be at various stages of development: proposal or accepted, but they are not operational. If there is progress towards implementing measures but these are not resourced and ongoing then select this answer.
A "Yes, partially" answer implies that some administrative and policy framework or measures on the regulation of genetic resources are in place and operational. If the measures put in place cover only some genetic resources but not all, then only partial achievement has been reached. Additionally, if only a policy or administrative framework is in place, even if it covers all genetic resources, then select this answer.

[13] Assuming the recommendation to remove question 13.4 has been followed.
[14] Assuming the recommendation to include "not applicable" has been followed.
[15] Assuming the recommendation to make answers consistent with the rest of the binary indicators has been followed.

A “Yes, fully” answer implies that all the conditions outlined in “Yes, partially” have been met. Namely that both a policy and administrative framework and measures are in place and operational and that these cover all genetic resources.

A “Not applicable” answer can be selected by parties who have chosen not to regulate access to genetic resources under Article 6 of the Nagoya Protocol.

There are three[16] possible answers to question 13.2:

(a) No
(b) Yes
(c) Not applicable

A “No” answer implies that the framework or measures mentioned in question 13.1 do not include the utilization of the traditional knowledge associated with genetic resources.
A “Yes” answer implies that the framework or measures mentioned in question 13.1 do include the utilization of the traditional knowledge associated with genetic resources.
A “Not applicable” answer is to be selected by Parties who have chosen not to regulate traditional knowledge associated with genetic resources under Article 6 of the Nagoya Protocol.

There are four possible answers to 13.3:

(a) No
(b) No, but under development
(c) Yes, partially
(d) Yes, fully

A “No” answer implies that no monitoring of genetic resources nor traditional knowledge associated with genetic resources is in place.

A “No, but under development” answer implies a concerted effort at the national level to monitor genetic resources nor traditional knowledge associated with genetic resources. Such monitoring may be at various stages of development: proposal or accepted, but it is not operational. If there is progress towards monitoring but it is not resourced and ongoing then select this answer.

A “Yes, partially” answer implies that some monitoring is ongoing for genetic resources or traditional knowledge associated with genetic resources. If the monitoring put in place covers any one of the two, then only partial achievement has been reached.

A “Yes, fully” answer implies that all the conditions outlined in “Yes, partially” have been met. Namely that the ongoing monitoring covers both genetic resources and traditional knowledge associated with genetic resources.

Note: further information on progress towards the target can be provided in the free text section of the reporting tool.

[16] Assuming recommendation to simplify 13.2 as a complement to 13.1 has been followed.

GBF indicator metadata: 14.b Target 14 binary indicator

Full Indicator Name
tbc

Goals And Targets Addressed

Goal
N/A

Target
Binary indicator for Target 14. Ensure the full integration of biodiversity and its multiple values into policies, regulations, planning and development processes, poverty eradication strategies, strategic environmental assessments, environmental impact assessments and, as appropriate, national accounting, within and across all levels of government and across all sectors, in particular those with significant impacts on biodiversity, progressively aligning all relevant public and private activities, and fiscal and financial flows with the goals and targets of this framework.

Rationale

Article 6 (b) of the Convention calls upon Parties, in accordance with their particular conditions and capabilities, to integrate, as far as possible and as appropriate, the conservation and sustainable use of biological diversity into relevant sectoral or cross-sectoral plans, programmes and policies. Such "biodiversity mainstreaming" seeks to ensure that the multiple biodiversity values are duly taken into account in decision- and policy-making of private and public actors, across governments, economic sectors and society more broadly. As many (if not most) activities that rely on biodiversity or have an impact on biodiversity are outside of the remit of biodiversity policies, implementing this target is critical for implementing the objectives of the Convention. Nevertheless, the multiple values of biodiversity are not widely reflected in decision-making. Integrating and reflecting the contribution of biodiversity and the ecosystem services it provides in relevant strategies, policies, programmes, and reporting systems is an important element in ensuring that the diverse values of biodiversity and the opportunities derived from its conservation and sustainable use are recognized and reflected in decision-making.

The aim of this target is to ensure that the values of biodiversity are fully reflected or mainstreamed in all relevant decision-making frameworks so that it is given proper attention in decision-making, leading to alignment of all activities, and of all financial flows, with the goals and targets of the framework. As such, this indicator tracks progress towards the full integration of biodiversity and its multiple values into policy, regulation, planning and strategy in both the public and private sectors. Specifically, it asks processes currently account for the multiple values of biodiversity in their design and implementation.

Definitions Concepts And Classifications
Definition
Multiple values of biodiversity: Biodiversity values include diverse considerations from ecological, genetic, economic, cultural, social, scientific, educational, recreational, aesthetic and intrinsic perspectives. Valuation and values of biodiversity require the recognition of a wide range of worldviews and plural value dimensions of the meaning and importance of nature associated with the quality of human life seen as interdependent in terms of biophysical, sociocultural, economic, health or holistic perspectives.
Mainstreaming: Biodiversity mainstreaming is generally understood as ensuring that biodiversity, and the services it provides, are appropriately and adequately factored into policies, strategies, plans and practices that rely and have an impact on biodiversity, so that it is conserved and sustainably used. A final definition may be proposed during COP16 as part of the Long-term Strategic Approach to Mainstreaming Biodiversity (see CBD/COP/DEC/15/6).

Environmental impact assessment: Environmental impact assessment is a process of evaluating the likely environmental impacts of a proposed project or development, taking into account interrelated socioeconomic, cultural and human-health impacts, both beneficial and adverse.
Environmental economic accounting: A set of national statistical accounts that organize and present statistics on the environment and its relationship with the economy, for example the UN SEEA.
Poverty eradication strategies: Governmental plans designed, and actions taken in line with the United Nations SDG Goal 1 of "ending poverty in all its forms everywhere".
Non-monetary values: The value attributable to an item or a service without relation to any acceptable cash price and for which a fixed or determinable amount of currency is absent (e.g. many ecosystem services, interpersonal good-will, health, etc.).
Fiscal and financial flows: Financial flows consist of transactions and other flows and represent the movement of money in and out of accounts. Fiscal flows refer to transactions in and out of national treasury accounts.

Method of Computation

This indicator is a binary indicator and must be compiled from the answers to four questions:

14.1 Does your country [integrate] [have [integrated] policies,[regulations, plans or strategies for integrating [biodiversity and its multiple] [the multiple biodiversity] values into [sector][17], regulations, planning, development processes, and poverty [reduction][eradication] strategies at all [levels] [of government]?

14.2 [Does your country [have] [implement][use] regular environmental economic accounting to quantify the monetary and non-monetary values of biodiversity?]

14.3 Does [Has] your country [have][integrated the multiple values of biodiversity into] [mechanisms] [guidelines] [policies, regulations, plans or strategies] [to ensure that the] [multiple values of] biodiversity [and its multiple values]] are [mainstreamed across all sectors and] integrated into[assessments of] environmental impacts [assessment] [on biodiversity] [at all levels of government]?

14.4 Does your country have policies, regulations, plans or strategies in place to progressively align, [where relevant], activities with all the goals and targets of the Framework?

There are four possible answers to each of these questions[18]:

(j) No
(k) No, but under development
(l) Yes, partially
(m) Yes, fully

A "No" answer implies that:

- no policies exist to integrate the multiple values of biodiversity into regulations, planning, development processes, and poverty eradication strategies (14.1)
- environmental economic accounting is not being done on a regular basis (14.2)
- no policies support the mainstreaming of the multiple values of biodiversity across private and public sectors nor their integration into environmental impact assessments (14.3)
- there are no policies, regulations, plans or strategies in place to progressively align private and public sectors with all the goals and targets of the Framework (14.4)

[17] Assuming suggestion to remove the term "policies" from question text has been followed.
[18] Assuming recommendation to simplify answers and make them consistent with other binary indicators has been followed.

In all, no progress has been made to draft nor propose policies to further the integration of the multiple values of biodiversity and business as usual continues to be the approach at all levels of government and across sectors.

A “No, but under development” answer implies a concerted effort at the national level to:

- begin the process of integrating the multiple values of biodiversity into regulations, planning, development processes, and poverty eradication strategies (14.1), for example through the drafting of and proposal of bills or policy.
- the implementation of environmental economic accounting is in process, resources are being allocated (e.g. hiring of statisticians) to begin the first set of environmental economic accounts, non-monetary, monetary or both (14.2)
- policy to support the mainstreaming of the multiple values of biodiversity across private and public sectors and their integration into environmental impact assessments is being drafted (14.3). No policy currently is in place, but progress has been made towards designing and putting forward official national policy.
- policies, regulations, plans or strategies in place to progressively align private and public sectors with all the goals and targets of the Framework are being drafted and proposed (14.4)

In all cases, clear national efforts can be seen (e.g. draft bills, new regulation, ...) to progress towards the target but these are not yet in place and producing results.

A “Yes, partially” answer implies that:

- there exist national policies to integrate the multiple values of biodiversity into regulations, planning, development processes or poverty eradication strategies but not all five (14.1)
- environmental economic accounting is being done but only for monetary or non-monetary accounts, not both, and may only be happening on an irregular ad hoc basis (14.2)
- national policies exist to support the mainstreaming of the multiple values of biodiversity across private and/or public sectors or their integration into environmental impact assessments but not all (14.3)
- policies, regulations, plans or strategies are in place to progressively align private and public sectors with some of the goals and targets of the Framework (14.4)

In each case outlined above, some elements implied by the question have not been achieved.

A “Yes, fully” answer implies that all the conditions outlined in “Yes, partially” have been met. Namely that:

- national policies are in place to integrate the multiple values of biodiversity into all of the following: regulations, planning, development processes and poverty eradication strategies (14.1)
- environmental economic accounting is being done regularly for both monetary or non-monetary accounts (14.2)
- policy is in place to support the mainstreaming of the multiple values of biodiversity across both private and public sectors, and their integration into environmental impact assessments (14.3)
- policies, regulations, plans or strategies are in place to progressively align both private and public sectors with all of the goals and targets of the Framework (14.4)

Note: further information on progress towards the target can be provided in the free text section of the reporting tool.

GBF indicator metadata: 15.1 Number of companies disclosing their biodiversity-related risks, dependencies, and impacts

1. Indicator name
15.1 Number of companies disclosing their biodiversity-related risks, dependencies, and impacts
2. Date of metadata update
March 2024
3. Goals and Targets addressed
3a. Goal
N/A
3b. Target
Headline indicator for **Target 15** Take legal, administrative or policy measures to encourage and enable business, and in particular to ensure that large and transnational companies and financial institutions:

a. Regularly monitor, assess, and transparently disclose their risks, dependencies and impacts on biodiversity, including with requirements for all large as well as transnational companies and financial institutions along their operations, supply and value chains and portfolios;
b. Provide information needed to consumers to promote sustainable consumption patterns;
c. Report on compliance with access and benefit-sharing regulations and measures, as applicable; in order to progressively reduce negative impacts on biodiversity, increase positive impacts, reduce biodiversity-related risks to business and financial institutions, and promote actions to ensure sustainable patterns of production.

4. Rationale
Target 15 seeks to foster more sustainable patterns of production and financing. It aims to progressively reduce the risks related to biodiversity loss faced by business and finance as well as their negative impacts on biodiversity, and to increase their positive contributions to nature. By reporting on risks, dependencies, and impacts, companies and financial institutions contribute to a broader understanding of how their operations, supply and value chains, and portfolios interact with biodiversity. While there are several (private sector) reporting initiatives, there is currently no globally comprehensive information on this issue. This indicator - on disclosing biodiversity-related risks, dependencies, and impacts of businesses and finance - would address that important information gap. It encourages large and transnational companies and financial institutions to assess and recognize their role in biodiversity conservation. This involves assessing the impacts of their activities (or the operations they finance) on biodiversity and analysing the risks posed by biodiversity loss to their operations and supply chains. Subsequently, companies are prompted to take steps to address these identified impacts and risks.
Additionally, through comprehending the interconnections between biodiversity, businesses, and finance, governments can better formulate targeted regulations that address the most pressing challenges and promote sustainable practices. This broader understanding enables governments to identify the areas where regulatory intervention and support are most vital, allowing for the strategic allocation of resources to both mitigate adverse impacts and encourage positive contributions.
5. Definitions, concepts and classifications
5a. Definition:
Indicator definition:
This indicator requests countries to measure the number of large and transnational companies and financial institutions that disclose information about their interactions with biodiversity in terms of risks, dependencies, and impacts. Companies and financial institutions reporting on these aspects typically disclose information about how their operations, their supply and value chains, or the operations they finance, affect biodiversity, the dependencies they have on biodiversity, and the risks posed by biodiversity loss to their operations and supply chains.
Other key concepts and definitions:
*Companies***,** under this indicator are understood as enterprises and financial institutions that are nationally recognised as being ‘large’. Alternatively, parties may choose to rely on the World Bank’s definition for

SMEs and consequently of large companies. The World Bank defines SMEs as those enterprises with a maximum of 300 employees, $15 million in annual revenue, and $15 million in assets.

While companies often deliver consolidated reports at a group level, it's important to recognize that many of their impacts manifest locally, and some subsidiaries or franchises produce their own sustainability reports. For the purpose of this indicator, both the group and subsidiary/franchise levels can be counted as distinct entities. Therefore, when using the term "company," it can refer to either the parent company or a franchise/subsidiary, depending on how they disclose information on biodiversity-related risks, dependencies and impacts.

Disclosing, is understood for this indicator as the act of making information available to the general public and stakeholders, in a clear and transparent manner. In this context, it means making information publicly available about a company's impacts and dependencies on biodiversity, and its risks from biodiversity loss.

- Biodiversity-related ***risks*** to businesses are categorised as:
  - Ecological risks, i.e., risks related to biodiversity-related ecological impacts and dependencies, linked to biodiversity loss or ecosystems degradation.
  - Liability risks, where parties who have suffered biodiversity-related loss or damage seek compensation for those they hold responsible.
  - Risks related to achieve transformative change for biodiversity, including regulatory risks, market risks and financial risks.

(OECD, Biodiversity: Finance and the Economic and Business Case for Action, 2019)

Dependencies are aspects of environmental assets and ecosystem services that a person or an organisation relies on to function. A company's business model, for example, may depend on the ecosystem services of water flow, water quality regulation and the regulation of hazards like fires and floods; provision of suitable habitat for pollinators, who in turn provide a service directly to economies; and carbon sequestration. (Sources: TNFD Glossary of Key Terms, version September 2023, and adapted from Science Based Targets Network (2023) SBTN Glossary of Terms)

Impacts refer to a change in the state of nature (quality or quantity), which may result in changes to the capacity of nature to provide social and economic functions. Impacts can be positive or negative. They can be the result of an organisation's or another party's actions.

- Impacts may be:
  - Direct – a change in the state of nature caused by a business activity with a direct causal link;
  - Indirect – a change in the state of nature caused by a business activity with an indirect causal link (e.g. indirectly caused by climate change generated by greenhouse gas emissions); and/or
  - Cumulative – a change in the state of nature (direct or indirect) that occurs due to the interaction of activities of different actors operating in a landscape or freshwater/marine area.

(Sources: TNFD Guidance on the identification and assessment of nature related issues: The LEAP approach, version October 2023; Science Based Targets Network (2023) SBTN Glossary of Terms; Capitals Coalition (2016) The Natural Capital Protocol; Climate Disclosure Standards Board (2021) Application guidance for biodiversity-related disclosures.)

5b. Method of computation

In order to be counted under the indicator, companies and financial institutions need to publicly disclose their biodiversity-related risks, impacts and dependencies on a regular basis, and in line with relevant standards, regulations and/or best practices. For example, through disclosure of risks, impacts and dependencies on biodiversity, in line with:

- International Standards, e.g., as evolving from the International Sustainability Standards Board (ISSB)
- Regional regulation, e.g., European Union Corporate Sustainability Reporting Directive (CSRD)

- o National regulation, e.g., France Energy and Climate Law (LEC), India's Business Responsibility and Sustainability Report (BRSR)
- o Voluntary standards, e.g., Global Reporting Initiative (GRI)
- o Voluntary disclosure frameworks / guidance, e.g. Taskforce for Nature-related Financial Disclosure (TNFD), Science-Based Targets for Nature (SBTN), Biodiversity Disclosure Protocol (South Africa)

The computation of the indicator involves a straightforward counting process. Any entity that adheres to the "company" definition (see 5a) and that discloses its biodiversity-related risks, impacts and dependencies, per description above, is counted as a disclosing company within the context of this indicator.

5c. Data collection method

Governments have various channels through which they can gather information about which and how many companies and financial institutions disclose information about their biodiversity risks, dependencies, and impacts. It's important for governments to use a combination of approaches to ensure a comprehensive overview of biodiversity disclosures within their country. Collaborative efforts with businesses, industry stakeholders, and civil society can contribute to a more robust and effective monitoring system:

- <u>Public institutions</u>: Governments could engage with (inter)national standard setters, regulators, national ministries, or other public institutions to explore collaboration around collating information on the number of businesses disclosing relevant data.

For example, in France, companies send their reports to the Autorité des Marchés Financiers – AMF, to be in compliance with the energy-climate law (article 29) requiring asset management companies and financial companies (for their asset management activities) to disclose their nature-related risks, impacts and dependencies. These reports are then sent to ADEME (a public environmental institution), which makes a comparative analysis.

- <u>International reporting platforms:</u> Companies may report on biodiversity disclosures through international reporting platforms such as the CDP and the World Benchmarking Alliance. Also, the GRI holds a registry of GRI Standards reports. Governments can explore data-sharing arrangements with such platforms to help assess which companies are disclosing biodiversity-related information.
- <u>Framework developers</u>: Organizations providing frameworks and guidance to companies and financial institutions on assessing and disclosing nature related risks, dependencies and impacts (e.g., TNFD and SBTN) may track which companies apply their guidance. For example, starting in 2025, the TNFD plans to publish information about which organizations are TNFD adopters.
- <u>Chambers of Commerce</u>: While specifics can vary by country and local regulations, the Chambers of Commerce often play a key role in the collection and dissemination of certain business documents, including annual reports. The annual reports serve as the main disclosure tool for companies reporting on risks, dependencies, impacts and on biodiversity.
- <u>Industry associations:</u> Industry associations may promote biodiversity disclosures within specific sectors. Governments can work together with these associations to promote sustainable practices and gain insight into the number of companies disclosing relevant information.
- <u>NGOs, IGOs and research organizations:</u> Collaborating with non-governmental organizations (NGOs), <u>and intergovernmental organizations (IGOs)</u> and research institutions can provide governments with valuable insights. These organizations often conduct assessments and gather data on corporate sustainability practices, including biodiversity disclosures. For example, the Global Biodiversity Information Facility (GBIF) facilitates publication and use of private-sector data on biodiversity. This includes the data that companies collect during monitoring and impact assessment activities. Biodiversity data-sharing requirements or recommendations are increasingly becoming part of business and financial standards and best practices, including through the Equator Principles relating to large private financial institutions.

- Surveys and Recognition Programs: Directly engage with companies through surveys or recognition programs may help gather specific information on biodiversity disclosures.
- Corporate filings: Review corporate filings, including annual reports and other regulatory submissions, where companies may provide details about their biodiversity-related practices.
- Artificial Intelligence tools / Online data searches: Many companies voluntarily publish sustainability reports or disclose information on their websites. With the help of Artificial Intelligence Tools or web-based searches, governments can review these publicly available documents to identify companies that provide information on biodiversity-related risks, dependencies, and impacts.
- UNCTAD / UNEP / UN Global Compact: United Nations Conference on Trade and Development (UNCTAD) and United Nations Environment Programme (UNEP) are the Custodian Agencies for the SDG indicator 12.6.1: Number of companies publishing sustainability reports. Some SDG 12.6.1 indicator data is published on UNEP's World Environment Situation Room (WESR) website, as well as through UN SDG Indicator Database. Moreover, the United Nations (UN) Global Compact encourages businesses and organizations worldwide to adopt sustainable and socially responsible policies and to report on their implementation.
- World Business Council for Sustainable Development (WCSD): A global, CEO-led organization of leading businesses working together to accelerate the transition to a sustainable world.

5d. Data sources

See section 5c.

5e. Data providers

In most countries there are no specific entities tasked with gathering and assessing all relevant information regarding the disclosure of companies' biodiversity-related risks, dependencies and impacts.

5f. Data compilers

Not identified, see above.

5g. Gaps in data coverage

Significant data gaps are expected, as most countries lack specific entities tasked with systematically gathering and assessing companies' disclosures on biodiversity-related risks, dependencies and impacts, risks.

6. Scale

6a. Scale of use

Scale of application (please check all relevant boxes):

Global: ☒ Regional: ☒ National☒

Scale of data disaggregation/aggregation:

- Global/ regional scale indicator can be disaggregated to national level: ☒
- National data is collated to form global indicator: ☒

7. Other MEAs, processes and organisations

7a. Other MEA and processes

N/A

7b. Biodiversity Indicator Partnership

Yes: ☐ No: ☒

8. Disaggregation

Recommended disaggregation include: By sector. Aligned with the sector classification proposed by UNCTAD and UNEP for SDG indicator 12.6.1, using the International Standard Industrial Classification of All Economic Activities (ISIC) (first level classification):

A. Agriculture, forestry and fishing
B. Mining and quarrying
C. Manufacturing
D. Electricity, gas, steam and air conditioning supply

E. Water supply; sewerage, waste management and remediation activities
F. Construction
G. Wholesale and retail trade; repair of motor vehicles and motorcycles
H. Transportation and storage
I. Accommodation and food service activities
J. Information and communication
K. Financial and insurance activities
L. Real estate activities
M. Professional, scientific and technical activities
N. Administrative and support service activities
O. Public administration and defense; compulsory social security
P. Education
Q. Human health and social work activities
R. Arts, entertainment, and recreation
S. Other service activities
T. Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use
U. Activities of extraterritorial organizations and bodies

9. Related goals, targets and indicators

N/A

10. Data reporter

10a. Organisation

Not identified

10b. Contact person(s)

In most countries there are no specific entities tasked with gathering and assessing all relevant information regarding the disclosure of companies' biodiversity-related risks, dependencies and impacts.

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11. References

Websites:

The Taskforce on Nature-related Financial Disclosures
The Science Based Target Network
GRI
UNEP-WESR
UNCTAD
UN SDG indicator database; see 12.6.1 report
CDP
World Benchmarking Alliance
UN Global Compact
GBIF
World Business Council for Sustainable Development (WCSD)

12. Graphs and diagrams

N/A

GBF indicator metadata: 15.b Target 15 binary indicator

Full Indicator Name
tbc

Goals And Targets Addressed
Goal
N/A

Target
Binary indicator for Target 15. Take legal, administrative or policy measures to encourage and enable business, and in particular to ensure that large and transnational companies and financial institutions:

(a) Regularly monitor, assess, and transparently disclose their risks, dependencies and impacts on biodiversity, including with requirements for all large as well as transnational companies and financial institutions along their operations, supply and value chains, and portfolios;

(b) Provide information needed to consumers to promote sustainable consumption patterns;

(c) Report on compliance with access and benefit-sharing regulations and measures, as applicable; in order to progressively reduce negative impacts on biodiversity, increase positive impacts, reduce biodiversity- related risks to business and financial institutions, and promote actions to ensure sustainable patterns of production.

Rationale
All businesses are tied in some way to biodiversity through their risks, dependencies and impacts. However, these risks, dependencies and impacts are not always acknowledged or accounted for. By assessing and monitoring their impacts on biodiversity, businesses can better understand their relationship with biodiversity and assess the impacts of their activities on it and the risks posed by biodiversity loss to their operations and supply chains. Once these relationships, impacts and risks have been assessed and disclosed, it becomes easier to take concrete steps to address them. Governments have a particularly important role to play in this respect as they can put in place the legal, administrative or policy measures that can facilitate these assessments to take place in a consistent and equitable manner.

Large and transnational companies and financial institutions have a disproportionately great impact on biodiversity. These types of companies and institutions, owing to their size and areas of operation, supply and value chains and portfolios often have large net impacts on biodiversity. As such improvements in their monitoring, assessment and disclosure processes have significant potential to generate positive outcomes for biodiversity, particularly as issues associated with supply chains and portfolios are often overlooked in sustainability reports. They also have the resources to track their biodiversity related risks and impacts for reporting and action. This indicator aims to track the progress made by governments to encourage and enable businesses, especially large and transnational companies and financial institutions, to reduce their negative impact and increase their positive impacts on biodiversity. Specifically, this indicator reports on the number of countries that have implemented legal, administrative or policy measures to ensure large and transnational companies and financial institutions make progress towards elements (a), (b) and (c) of target 15.

Definitions Concepts And Classifications
Definition
Large and transnational companies and financial institutions: A large private or public firm which owns and controls productive assets and/or holds investments in two or more countries. The most commonly used criteria for company size are employment and annual revenue. The World Bank generally considers companies with over 300 employees and $15 million in annual revenue to be “large”. However, some countries or jurisdictions use different thresholds to define “large”. Parties may choose to rely on the World Bank criteria or nationally recognised criteria of their own.

Measures: The Framework calls for legal, administrative or policy measures to be implemented to support the achievement of its goals and targets. In the context of target 15, such measures could, for example, include:

- Adopt legislation at national level requiring disclosure of biodiversity-related risks, impacts and dependencies for large and transnational companies and financial institutions
- Mandate financial regulators to require disclosure of nature-related risks, impacts and dependencies from financial market participants
- Create an enabling environment to encourage companies and financial institutions to disclose, through capacity building, guidance, best practice, information on existing frameworks (such as TNFD and others)
- Develop financial incentives to encourage companies and financial institutions to disclose biodiversity-related risks, impacts and dependencies
- Biodiversity-related certification of products for businesses.
- Allocate resources towards implementing/enforcing the relevant (above-mentioned) policies or legislative measures

Such measures may be supported by policy frameworks adopted by countries aiming at reducing the impact on biodiversity. Finally, these laws and policies should be supported with personnel resources in administration whose mandate it is to include biodiversity concerns.

Biodiversity-related risks to business and financial institutions: The TNFD defines nature-related risks as potential threats (effects of uncertainty) posed to an organization that arise from its and wider society's dependencies and impacts on nature. Biodiversity-related risks to businesses are categorised as:

- Ecological risks, i.e., risks related to biodiversity-related ecological impacts and dependencies, linked to biodiversity loss or ecosystems degradation.
- Liability risks, where parties who have suffered biodiversity-related loss or damage seek compensation for those they hold responsible.
- Risks related to achieve transformative change for biodiversity, including regulatory risks, market risks and financial risks.

Sustainable consumption and production: The use of services and related products, which respond to basic needs and bring a better quality of life while minimising the use of natural resources and toxic materials as well as the emissions of waste and pollutants over the life cycle of the service or product so as not to jeopardise the needs of future generations.

Operations: All activities carried out by business, including large and transnational companies and financial institutions, to continue functioning and generating revenue.

Dependencies and impacts: Dependencies on biodiversity are environmental assets and ecosystem services that a person or an organization relies on to function, including water flow and quality regulation; regulation of hazards like fires and floods; pollination; carbon sequestration. Impacts on biodiversity refer to a change in the state of nature (quality or quantity), which may result in changes to the capacity of nature to provide social and economic functions. Impacts can be positive or negative, including pollution of air, water, soil; fragmentation or disruption of ecosystems and habitats for species; alteration of ecosystem regimes. (Science-based Targets for Nature (2020))

Method of Computation

This indicator is a binary indicator and must be compiled from the answers to three questions:

15.1 Does your country have a legislative, administrative, and policy framework to ensure that large and transnational companies and financial institutions monitor, assess and transparently disclose risks, dependencies and impacts on biodiversity along their operations, supply and value chains, and portfolios?

15.2 Has your country put in place measures to ensure that large and transnational companies and financial institutions provide relevant information to consumers to promote sustainable consumption patterns?

15.3 Has your country put in place measures to ensure that that large and transnational companies and financial institutions report on compliance with access and benefit-sharing regulations?

There are four possible answers to each of these questions:

(a) No
(b) No, but under development
(c) Yes, partially
(d) Yes, fully

A "No" answer implies that Parties have not put in place any measures to ensure disclosure (15.1), to promote information sharing (15.2) or to ensure compliance with access and benefit-sharing (ABS) regulations (15.3). Therefore, no legislative, administrative nor policy measures exist in the country for the specific requirements of each question in turn and none are being discussed nor designed.

A "No, but under development" answer implies a concerted effort at the national level to design and implement legislative, administrative or policy measures for disclosure (15.1), information sharing (15.2) or ABS compliance (15.3). For each of these items in turn, national governments must be in the design stage of such measures (e.g. a law is being drafted) but none of them have passed yet nor are they required for large transnational companies and financial institutions to follow. The development of these measures must involve governmental bodies with the authority to implement the proposed measures.

A "Yes, partially" answer implies that only some of the elements in the question have been fulfilled. For 15.1 it means that:

- at least one of legislative, administrative or policy measures are in place
- large and transnational companies and/or financial institutions
- at least monitor, assess or disclose
- either their risks, dependencies or impacts on biodiversity
- along their operations, supply or value chains, or portfolios.

If any one of the measures for either type of institution on any kind of activity is in place, then partial achievement has been reached. For 15.2 and 15.3 the measures put in place (for information sharing (15.2) or ABS compliance (15.3)) must apply to either companies or financial institutions but not both. In all cases (15.1, 15.2 and 15.3), resources, financial and human, must also be mobilized to ensure that the measures taken by governments are implemented.

A "Yes, fully" answer implies that all the conditions outlined in "Yes, partially" have been met. Namely, for 15.1, that all legislative, administrative or policy measures are in place. These apply to both large and transnational companies and financial institutions. To ensure they monitor, assess and transparently disclose risks, dependencies and impacts on biodiversity along all their operations, supply and value chains, and portfolios. If any one element is missing, then only partial achievement has been reached. For measures related to information sharing (15.2) and ABS compliance (15.3), these must apply to both companies and financial institutions to count as "Yes, fully". All measures put in place by governments need to be resourced and enforced to count as "Yes, fully".

<u>Note</u>: further information on progress towards the target can be provided in the free text section of the reporting tool.

GBF indicator metadata: 16.b Target 16 binary indicator

Full Indicator Name
tbc

Goals And Targets Addressed
Goal
N/A

Target
Binary indicator for Target 16. Ensure that people are encouraged and enabled to make sustainable consumption choices, including by establishing supportive policy, legislative or regulatory frameworks, improving education and access to relevant and accurate information and alternatives, and by 2030, reduce the global footprint of consumption in an equitable manner, including through halving global food waste, significantly reducing overconsumption and substantially reducing waste generation, in order for all people to live well in harmony with Mother Earth.

Rationale

Unsustainable consumption is an underlying driver of biodiversity loss. Halting and ultimately reversing biodiversity loss will require a shift towards more sustainable consumption patterns. This means consuming resources and producing waste at a level within planetary boundaries. Governments have a central role to play in making information available and accessible to consumers who, in turn, can make better and more informed consumption choices.

This target calls for measures to be put in place to encourage people to make more sustainable consumption choices so that overconsumption and waste generation are significantly reduced. As such, this indicator tracks the development and adoption of policies aimed at informing on the importance of and enabling people to make sustainable consumption choices.

Definitions Concepts And Classifications
Definition
Food waste: Is food and associated inedible parts removed from the human food supply chain in the following sectors: retail and other distribution of food; food service (restaurants, schools, hospitals, other canteens, etc.); and households. "Removed from the human food supply chain" means one of the following end destinations: landfill, controlled combustion, sewer, litter/discards/ refuse, co/anaerobic digestion, compost/aerobic digestion or land application.
Overconsumption: The action or fact of consuming something to excess. Especially in the context of excessive use of natural resources.
Waste: Materials that are not prime products (that is, products produced for the market) for which the generator has no further use in terms of his/her own purposes of production, transformation or consumption, and of which he/she wants to dispose. Wastes may be generated during the extraction of raw materials, the processing of raw materials into intermediate and final products, the consumption of final products, and other human activities.
Waste generation: The process of generating waste, whether through production or consumption.
Sustainable consumption: The use of services and related products, which respond to basic needs and bring a better quality of life while minimizing the use of natural resources as well as the emissions of waste and pollutants over the life cycle of the service or product so as not to jeopardize the needs of future generations.

Method of Computation

This indicator is a binary indicator and must be compiled from the answers to three questions:

16.1 Has your country established mechanisms, policy, or legislative or regulatory frameworks aimed at supporting sustainable consumption?

16.2 Has your country adopted mechanisms to improve awareness or education with regard to the impacts of consumption on biodiversity and access to relevant and accurate information or alternatives supporting sustainable consumption?

16.3 [Has your country adopted or implemented policy instruments aimed at encouraging and enabling people to reduce the impacts of consumption, including through reducing food waste, overconsumption, and waste generation, on biodiversity?]

There are four possible answers to each of these questions[19]:

(e) No
(f) No, but under development
(g) Yes, partially
(h) Yes, fully

A "No" answer implies that there are no established mechanisms, policy, legislative or regulatory frameworks aimed at supporting sustainable consumption (16.1), that no mechanisms are in place to improve awareness or education on the impacts of consumption on biodiversity nor improve access to information or alternatives in support of sustainable consumption (16.2) and no policy instruments aimed at reducing the impacts on consumption, especially with regards to waste, are in place (16.3). In all cases, there are no national efforts to promote sustainable consumption and reduce the impacts of overconsumption on biodiversity. Initiatives may exist to tackle these issues at a grassroots level, but these are not backed by government and legislation is missing.

A "No, but under development" answer implies a concerted effort at the national level to:

- establish mechanisms, policy, or legislative or regulatory frameworks aimed at supporting sustainable consumption (16.1)
- adopt mechanisms to improve awareness of the impacts of consumption and promote alternatives (16.2)
- adopt policy aimed at reducing the impacts on consumption, especially with regards to waste, are in place (16.3).

In each of these cases, national strategies, legislation and novel regulations may be in the draft stages and awaiting ratification. Resources may also be in the process of being mobilized to support these mechanisms. Importantly, these processes must be ongoing at the national level and backed by governmental bodies with implementation authority, ongoing engagement with or support of stakeholders promoting sustainable consumption is insufficient.

A "Yes, partially" answer implies that some actions are being taken to promote sustainable consumption, but not all. That is:

- mechanisms, policy, legislative or regulatory frameworks aimed at supporting sustainable consumption have been established but not all (16.1)
- mechanisms to improve awareness or education about the impacts of consumption on biodiversity are in place but not both, and these include mechanisms to improve access to relevant and accurate information and/or alternatives supporting sustainable consumption (16.2)
- policy instruments aimed at encouraging and enabling people to reduce the impacts of consumption are in place, but these do not include reducing food waste, overconsumption, nor waste generation (16.3)

All these cases imply governmental support (e.g. through legislation or financing) for the mechanisms in place. If any one of the cases outlined above applies, only partial achievement has been reached.

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[19] Assuming the recommendation to make answers of 16.3 consistent with other questions has been followed.

A “Yes, fully” answer implies that all the conditions outlined in “Yes, partially” have been met. Namely that mechanisms, policy, legislative and regulatory frameworks aimed at supporting sustainable consumption have all been established (16.1), mechanisms to improve awareness or education about the impacts of consumption on biodiversity are in place and they include mechanisms to improve access to relevant and accurate information and alternatives supporting sustainable consumption (16.2) and policy instruments aimed at encouraging and enabling people to reduce the impacts of consumption are in place, including through reducing food waste, overconsumption, and waste generation (16.3). Note that all these mechanisms must be established at the national level and be appropriately resourced (financial and human).

Note: further information on progress towards the target can be provided in the free text section of the reporting tool.

GBF indicator metadata: 17.b Target 17 binary indicator

Full Indicator Name
tbc

Goals And Targets Addressed

Goal
N/A

Target
Binary indicator for Target 17. Establish, strengthen capacity for, and implement in all countries, biosafety measures as set out in Article 8(g) of the Convention on Biological Diversity and measures for the handling of biotechnology and distribution of its benefits as set out in Article 19 of the Convention.

Rationale

Biosafety measures are indispensable for ensuring that living modified organisms resulting from biotechnology are handled and used with the necessary safety precautions. Living modified organisms resulting from biotechnologies provide opportunities, but their use and release requires regulation, management and control of potential associated risks. New biotechnological developments are providing ever more promising opportunities, however the concerns over these technologies and the living modified organisms resulting from them are also increasing. Participation in biotechnological research by those Parties, especially developing country Parties, providing the genetic resources for such research would help empower them to address their own research needs. In addition, equitable access by Parties, in particular developing country Parties, to the results and benefits of biotechnologies based on genetic resources provided by these Parties would enable countries to benefit from technological advances based on genetic resources, providing a powerful incentive for conservation. As such, this indicator tracks progress towards the implementation of articles 19 and 8 of the Convention.

Definitions Concepts And Classifications

Definition

Biosafety: This concept refers to the need to protect human health and the environment from the possible adverse effects of the products of modern biotechnology.
Biotechnical research activities: The study of scientific knowledge related to biotechnology (see biotechnology).
Biotechnology: Under the Convention, “biotechnology” means any technological application that uses biological systems, living organisms or derivatives thereof, to make or modify products or processes for specific use (Convention, Article 2).
Living modified organisms: The Cartagena Protocol on Biosafety defines 'living modified organism' as any living organism that possesses a novel combination of genetic material obtained through the use of modern biotechnology.
Modern biotechnology: Under the Cartagena Protocol, “modern biotechnology” means the application of in vitro nucleic acid techniques, including recombinant deoxyribonucleic acid (DNA) and direct injection of nucleic acid into cells or organelles, or fusion of cells beyond the taxonomic family, that overcome natural physiological reproductive or recombination barriers and that are not techniques used in traditional breeding and selection. (Cartagena Protocol, Article 3(i)).
Genetic resources: Means genetic material of actual or potential value.

Risk assessment: The qualitative and quantitative evaluation performed in an effort to define the risk posed to human health and/or the environment by the use or release of a living modified organism.

Method of Computation

This indicator is a binary indicator and must be compiled from the answers to five questions:

17.1 [Has your country adopted [and implemented] biosafety[-related] [policy], legal, administrative and other measures [further][as set out in] [to] Article 8(g) of the Convention?]

17.2 [Does [has]your country [have the legal instruments [and/or capacity], [policy and administrative measures] to] implemented [biosafety] measures [further] [as set out][to] in Article 8(g) of the Convention and [measures for the handling of biotechnology and distribution of its benefits as set out in] Article 19] [, including Articles 19.3 and 19.4]?

17.3 Has your country taken measures for the effective participation, [priority] access to [and the distribution of benefits] results from biotechnological research activities based upon genetic resources of other Parties, as set out in Articles 19.1 and 19.2 of the Convention?

17.4 [Does your country carry out scientifically sound risk assessments on the use and release of living modified organisms [and manage the identified [possible] risks]]?

17.5 [Does your country provide access to biosafety-related information for the safe use of living modified organisms?]

There are four possible answers to each of these questions[20]:

(i) No
(j) No, but under development
(k) Yes, partially
(l) Yes, fully

A "No" answer implies that:

- no biosafety-related legal, policy nor administrative measures in line with Article 8(g) have been adopted (17.1)
- no measures have been put in place for the handling of biotechnology nor the distribution of its benefits, as set out in article 19 (17.2)
- no measures have been taken to ensure the sharing of benefits from genetic resources of other Parties, as set out in article 19 (17.3)
- no risk assessments on the use and release of living modified organisms have been carried out (17.4)
- no information on the safe use of living modified organisms is being provided to other Parties (17.5)

In all, no progress has been made to draft nor propose policies to implement measures relative to articles 8(g) and 19 of the convention and the safe use and management of living modified organisms.

A "No, but under development" answer implies a concerted effort at the national level to:

- biosafety-related legal, policy nor administrative measures in line with Article 8(g) have been proposed and/or drafted but not yet ratified (17.1)
- measures for the handling of biotechnology and the distribution of its benefits, as set out in article 19, have been drafted and/or proposed (17.2)
- measures to ensure the sharing of benefits from genetic resources of other Parties, as set out in article 19, have been drafted and/or proposed (17.3)

[20] Assuming the recommendation to make all answers consistent with other binary indicators has been followed.

- risk assessments on the use and release of living modified organisms are planned and/or designed but not yet carried out (17.4)
- information on the safe use of living modified organisms for other Parties has been commissioned and/or drafted but is not yet complete (17.5)

In all cases, clear national efforts can be seen (e.g. draft bills, new regulation, ...) to progress towards the target but these are not yet in place nor producing results.

A "Yes, partially" answer implies that:

- there exist biosafety-related legal, policy or administrative measures in line with Article 8(g) but not all three (17.1)
- measures for the handling of biotechnology and the distribution of its benefits, as set out in article 19, have been implemented but these may not cover both 19.3 and 19.4 (17.2)
- measures to ensure the sharing of benefits from genetic resources of other Parties, as set out in article 19, have been implemented but these may not cover both 19.1 and 19.2 (17.3)
- risk assessments on the use and release of living modified organisms have been carried out for some living modified organisms but not all (17.4)
- information on the safe use of living modified organisms for other Parties is available for some living modified organisms but not all (17.5)

In each case outlined above, the coverage of the measures in place is incomplete.

A "Yes, fully" answer implies that all the conditions outlined in "Yes, partially" have been met. Namely that:

- biosafety-related legal, policy or administrative measures in line with Article 8(g) are in place and implemented (17.1)
- measures for the handling of biotechnology and the distribution of its benefits, as set out in article 19, are in place according to both 19.3 and 19.4 (17.2)
- measures to ensure the sharing of benefits from genetic resources of other Parties, as set out in article 19, are in place according to both 19.1 and 19.2 (17.3)
- risk assessments on the use and release of living modified organisms have been carried out for all living modified organisms (17.4)
- information on the safe use of living modified organisms for other Parties is available for all living modified organisms (17.5)

Note: further information on progress towards the target can be provided in the free text section of the reporting tool.

GBF indicator metadata: 18.1 Positive incentives in place to promote biodiversity conservation and sustainable use

1. Indicator name

18.1 Positive incentives in place to promote biodiversity conservation and sustainable use
The total number of positive incentives in place is the sum of the number of instruments listed below (that are active, i.e., in force):

Biodiversity-relevant taxes, fees and charges *(number active)*
Biodiversity-positive subsidies *(number active)*
Biodiversity-relevant tradable permits *(number active)*
Payments for ecosystem services *(number active)*
Biodiversity offsets *(number active)*

Countries reporting to PINE could extract data directly from the PINE and those not providing data to PINE could complete this based on simple guidance (see next section).Countries would report on number of active instruments per year from 2020-30.

2. Date of metadata update

March 2024

3. Goals and Targets addressed

3a. Goal

N/A

3b. Target

Headline indicator for **Target 18**: Identify by 2025, and eliminate, phase out or reform incentives, including subsidies, harmful for biodiversity, in a proportionate, just, fair, effective and equitable way, while substantially and progressively reducing them by at least $500 billion per year by 2030, starting with the most harmful incentives, and scale up positive incentives for the conservation and sustainable use of biodiversity.

4. Rationale

Positive incentives for biodiversity conservation and sustainable use (also referred to as economic instruments or incentive-based mechanisms) are policy instruments that provide signals to consumers and producers to behave in a more sustainable manner. In economic terms, they serve to internalise externalities associated with the use of biodiversity. Positive incentives include biodiversity-relevant taxes, fees and charges (e.g. pesticide tax, protected area fees, water abstraction charges), biodiversity-positive subsidies, tradable permit schemes (e.g. fisheries individual transferable quotas), biodiversity offsets and payments for ecosystem services. These positive incentives are key to mainstreaming biodiversity across sectors (e.g., agriculture, forestry, fisheries) and serve to reflect the true value of biodiversity in economic decision-making. They provide continuous incentives to both consumers and producers to behave in a more environmentally sustainable way. Additionally, positive incentives also help to mobilise private sector finance for biodiversity. Several of these positive incentives also generate revenue for governments (e.g., biodiversity-relevant taxes, fees and charges, and tradable permits if auctioned). If this revenue is then earmarked for biodiversity, they also serve to mobilise public sector finance for biodiversity.

5. Definitions, concepts and classifications

5a. Definition:

Positive incentives (also referred to as incentive-based or economic instruments) are the set of fiscal and other economic incentives to incorporate biodiversity-related costs and benefits into production and consumption. They are the policy instruments that use price signals to discourage activities harmful to biodiversity (e.g., a tax on pollution) or encourage activities that benefit biodiversity (e.g., payments for ecosystem services). In contrast to more traditional command-and-control approaches (e.g., restrictions on access or use, standards, etc), economic instruments can, in theory, meet a given environmental objective at a lower total economic cost.

1. Biodiversity-relevant taxes, fees and charges: payment to the government levied on tax bases with a proven, specific negative impact on the biodiversity. They include taxes on pollution and natural resource/land use. Non-exhaustive list of examples: • Fertilisers and

pesticides taxes • Water pollution taxes and water abstraction charges • Fishing and hunting licence fees • Protected area entrance fees • Taxes and fees/charges for timber harvest.

2. Biodiversity-positive subsidies: a subsidy that reduces directly or indirectly the use of something that has a proven, specific negative impact on biodiversity. Subsidies include direct payments from government and preferential tax treatments (e.g. VAT exemptions). Non-exhaustive list of examples: • Payments from government to private land-users/owners to restore land • Preferential land tax for forests under protection or restoration • Agri-environmental payments promoting habitat protection and restoration.

3. Biodiversity-relevant tradable permit schemes: market-based instruments that provide allowance or permission to engage in an activity under an aggregate cap. These permits can be traded. Non-exhaustive list of examples: • Individual transferable quotas (ITQs) for fisheries • Tradable water rights • Salinity trading schemes • Tradable development rights.

4. Biodiversity offsets: Biodiversity offsets are "measurable conservation outcomes resulting from actions designed to compensate for significant residual adverse biodiversity impacts arising from project development after appropriate prevention and mitigation measures have been taken." (BBOP 2018). They are usually established with an overall objective of a No Net Loss (NNL) or Net Gain (NG). Biodiversity offsets can be classified into three main types: 1. One-off biodiversity offsets; 2. Payments in-lieu; and 3. Biobanking schemes.

5. Payments for ecosystem services: A payment for ecosystem services (PES) is a voluntary transaction between ecosystem service users and service providers that are conditional on agreed rules of natural resource management for generating offsite services (Wunder, 2015). Ecosystem service providers and users may be individuals, companies or aggregations of actors. In some cases, a government may act on behalf of users.

6. Unit of measurement: Number of positive incentives (by type).

5b. Method of computation

OECD collects national level data on positive incentives for the conservation and sustainable use of biodiversity. These incentives are also referred to as economic instruments or incentive-based instruments. The data are collected through the OECD database on Policy Instruments for the Environment (PINE). The data meet the headline indicator criteria (i.e., they can be aggregated globally from national level data and can be disaggregated down from totals, as the data are reported in a consistent and comparable way across countries). The positive incentives covered are:

- biodiversity-relevant taxes, fees and charges
- biodiversity-relevant positive subsidies
- biodiversity-relevant tradable permits
- payments for ecosystem services
- biodiversity offsets

The data on positive incentives collected via the OECD PINE database covers:

when the policy instrument was introduced;
what it applies to;
the geographical coverage (e.g. national, local);
the environmental domain (e.g. biodiversity, climate change, air pollution);
the industries concerned;
the revenues, costs or rates;
whether the revenue is earmarked; and
any exemptions.

The OECD Secretariat manages the database and ensures consistency in the way data are classified (incl. compliance with definitions and internationally agreed classifications) and undertakes quality checks.

The questionnaire, data structure, and typology and definitions of instruments can be found on the 'About' section of the PINE database website available at: http://oe.cd/pinedatabase

The data on monetary value of positive incentives (revenues or payments) is reported in millions of local currency per year in current prices. For biodiversity offsets this could include private transactions for example when purchasing offsets through biobanking, payments for one-off offsets and payments to government if payment in lieu scheme.

Information is available by country at the individual policy instrument level. Dashboards aggregated up to the global level are also presented in the data dissemination portal. Data on biodiversity-related economic instruments (positive incentives) are presented and analysed in OECD reports on "Tracking Economic Instruments and Finance for Biodiversity" which is updated on a regular basis. The latest release was in 2021, with the next update to take place in 2024.

All countries are welcome to contribute to the OECD PINE database. Currently more than 130 countries have contributed. can provide information to PINE. Countries may either use the data in PINE to report to the CBD or provide data directly to the CBD from their national reporting systems. Countries are encouraged to establish national systems for collecting data on positive incentives for biodiversity.

5c. Data collection method

Data on positive incentives for biodiversity, reported via the OECD PINE database are collected via a network of 450+ registered country experts from government agencies (Ministries of Finance and Environment, statistical institutes) as well as research institutes and international organisations. Data are collected regularly for OECD members, accession countries and OECD key partners. A growing number of non-member countries also contribute data to PINE. The OECD also conducts targeted data collection initiatives to expand the coverage of countries and update the information. Currently the PINE database includes information from 134 countries (~70% of Parties to the CBD).

Registered experts are asked to update data at least once a year, typically in January or February, through an online password-protected interface. Country experts register to access the database.

5d. Accessibility of methodology

The PINE data are publicly available on the OECD website. See http://oe.cd/pinedatabase

The PINE data can be accessed:

- by type of economic instrument (tax, fee/charge, tradable permit, etc.)
- by country: click on "All information"
- by industry: click on "ISIC/COICOP Codes"
- by environmental domain (e.g. biodiversity, climate change, air pollution, etc)

The data analysis for the indicators on biodiversity-relevant positive incentives is undertaken by extracting the relevant information in the PINE database for the biodiversity environmental domain.

The methodology has been approved by OECD delegates.

5e. Data sources

Data come mainly from government agencies (e.g. Ministries of Finance and Environment; statistical institutes) as well as research institutes and international organisations. See section 5c for further detail.

5f. Availability and release calendar

Data is available from 1980-present. Updated annually.

5g. Time series

Data on positive incentives for biodiversity are available from 1980-present for 134 countries and are updated annually. OECD's Tracking Economic Instruments and Finance reports (updated regularly, for example in 2019, 2020 and 2021) summarises and analyses the biodiversity-related instruments in the PINE database (next update forthcoming 2024). The annually updated data is publicly accessible on the OECD PINE website.

5h. Data providers

Data providers are a network of 450+ registered country experts from government agencies (Ministries of Finance and Environment, statistical institutes) as well as research institutes and international organisations. Data are collected systematically for OECD members as well as the active OECD accession countries. A growing number of non-member countries also provide information. Registered experts are asked to update data at least once a year, typically in January or February, through a password-protected interface. All countries are welcome to contribute data to the OECD PINE database.

Countries can also provide data directly to CBD.

5i. Data compilers

The OECD Secretariat is responsible for collecting and harmonising the data. Data validation is undertaken by the OECD Secretariat in collaboration with the reporting countries.

5j. Gaps in data coverage

The OECD PINE database includes data from 134 countries (and is expanding over time). The data collection method may result in some reporting bias, as OECD members and active accession countries are likely to report data more regularly. All figures should be interpreted in this context. Data updates for countries may be delayed due to staff changes in the national teams providing the information. As the instrument categories on ‘payments for ecosystem services’ and on ‘biodiversity offsets’ were introduced into the PINE database in 2023, the data for these two types of positive incentives is likely to be less comprehensive than for the other types of positive incentives. It is expected that reporting on these two new instruments will improve over time. All countries are welcome to contribute to the PINE database.

5k. Treatment of missing values

If data on positive incentives are missing, they may be imputed from other international data platforms where appropriate (e.g., EUROSTATOECD Revenue Statistics).

6. Scale

6a. Scale of use

Scale of application (please check all relevant boxes):

Global: ☒ Regional: ☒ National☒

Scale of data disaggregation/aggregation:

- Global/ regional scale indicator can be disaggregated to national level: ☒
- National data is collated to form global indicator: ☒

Data on positive incentives are collected at national level. Countries can specify whether the policy instrument is applied nationally or sub-nationally. National data can therefore be collated to provide global indicators (e.g., total number of countries with biodiversity-relevant taxes [over time]; total number of biodiversity-relevant taxes [over time], etc).

6b. National/regional indicator production

All data are publicly available online on the OECD PINE website. The database is overseen by the OECD Working Party on Environmental Information (WPEI) under the OECD Environmental Policy Committee, and the Joint Meeting of Tax and Environment Experts (JMTEE). The biodiversity-relevant data can be viewed by searching for environmental domain: “biodiversity”. The OECD Secretariat also regularly updates the analysis on “Tracking Economic Instruments and Finance for Biodiversity” to facilitate user-friendliness and to highlight policy-relevant messages.

6c. Sources of differences between global and national figures

All data in PINE are provided by governments and academics (if the latter then data is validated by national governments before it is placed on the publicly available OECD PINE website). Divergence between nationally produced data and international data may occur if there are discrepancies in the way instruments are categorised in national data sets and in PINE. Some countries provide more comprehensive information than others.

6d. Regional and global estimates & data collection for global monitoring

6d.1 Description of the methodology

Data is reported at country level

6d.2 Additional methodological details

N/A

6d.3 Description of the mechanism for collecting data from countries

Data are reported via an annual questionnaire (at an instrument level) by national statistical agencies, ministries of finance, environment, etc.

7. Other MEAs, processes and organisations

7a. Other MEA and processes

The data is used as an indicator for Sustainable Development Goal (SDG) 15.a.1 on biodiversity finance.

7b. Biodiversity Indicator Partnership

Yes: ☒ No: ☐

8. Disaggregation

The indicator on positive incentives for biodiversity can be disaggregated by type of instrument (biodiversity-relevant tax, fee or charge; biodiversity-positive subsidy; tradable permit; PES; biodiversity offset), by geographic location, by industry concerned. Etc .. see below.

The OECD PINE database also collects information on:

- Whether the incentive is national or local in scope (for more detail, see above)
- What sector the incentives relate to (via ISIC codes) e.g. agriculture, forestry, fisheries, recreation, etc
- Revenue generated (e.g. from taxes, fees, charges, tradable permits and biodiversity offsets when payments in lieu)
- Payments (e.g. from biodiversity-relevant positive subsidies, payments for ecosystem services, biodiversity offsets when one-off or biobanking)

9. Related goals, targets and indicators

Aligning price signals through positive incentives is fundamental for resource mobilisation (target 19). Positive incentives such as PES, biodiversity offsets and subsidies also disburse finance for biodiversity, while biodiversity-relevant taxes can generate revenue which can (if desired) be earmarked for biodiversity. In addition, Target 19.4 explicitly refers to certain types of positive incentives (i.e., payments for ecosystem services and biodiversity offsets).

Target 19 Substantially and progressively increase the level of financial resources from all sources, in an effective, timely and easily accessible manner, including domestic, international, public and private resources, in accordance with Article 20 of the Convention, to implement national biodiversity strategies and action plans, mobilizing at least $200 billion per year by 2030....

19.2. Significantly increasing domestic resource mobilization, facilitated by the preparation and implementation of national biodiversity finance plans or similar instruments according to national needs, priorities and circumstances;

19.3. Leveraging private finance, promoting blended finance, implementing strategies for raising new and additional resources, and encouraging the private sector to invest in biodiversity, including through impact funds and other instruments;

19.4. Stimulating innovative schemes such as payment for ecosystem services, green bonds, biodiversity offsets and credits, and benefit sharing mechanisms, with environmental and social safeguards;

Target 14: Fully integrate biodiversity values into policies, regulations [...] aligning all relevant public and private activities, fiscal and financial flows with the goals and targets of this framework

Goal D: The gap between available financial and other means of implementation, and those necessary to achieve the 2050 Vision, is closed

10. Data reporter

10a. Organisation

Organisation for Economic Co-operation and Development (Environment Directorate)

10b. Contact person(s)

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11. References

On positive incentives (economic instruments) for biodiversity conservation and sustainable use: OECD 2021, Tracking Economic Instruments and Finance for Biodiversity - 2021.

OECD 2023, Policy Instruments for the Environment (PINE) Database, http://oe.cd/pine , June 2023 version.

12. Graphs and diagrams

GBF indicator metadata 18.2 Value of subsidies and other incentives harmful to biodiversity

1. Indicator name
18.2 Value of subsidies and other incentives harmful to biodiversity.
Disaggregation of the headline indicator:

- Value of agricultural subsidies and other incentives potentially harmful to biodiversity/environment
- Value of subsidies to capture fisheries with a risk (moderate or high) of encouraging unsustainable fishing in the absence of effective fisheries management
- Value of fossil fuel subsidies (production and consumption)
- Value of subsidies and other incentives harmful to biodiversity in another sector (such as water, transportation and mining sectors)

All the values are to be reported in national currency in current values.
Explanation: The disaggregated values are taken from the formerly proposed complementary indicators; the value of subsidies to capture fisheries is new, proposed by the TEG. None of the disaggregation options are mandatory but can be voluntarily chosen by countries. In case of the disaggregation for the fishery sector and fossil fuels, datasets with data for some countries exist and can be used within the template. Further information below.
Justification for revising the proposed headline indicator: The headline indicator as it is worded in Table 2 of CBD/COP/DEC/15/5 would only allow countries to report on (positive) reform, but if this were to be reversed in another year, this information would not be recorded. For example, country X might eliminate/reform 2 million worth of harmful incentives in year 1, but then introduce (other) harmful incentives worth 10 million in year 2 or 3. The original wording of the headline indicator only requires that countries report on the reform of harmful incentives in year 1, but does not require the country to report on the introduction of harmful incentives in year 2 or 3. Furthermore, a country with a high value of harmful subsidies/incentives that reforms even a small fraction of them will look to be performing better than a country that has few or no harmful subsidies/incentives and has therefore reformed few or none.
TEG would like to note that there is no standardized, globally agreed methodology for assessing the value of subsidies and other incentives harmful to biodiversity that are eliminated, phased out or reformed, nor is there a single global dataset providing this information. However, there are datasets and methodologies for assessing the value of (potentially) harmful subsidies and other incentives across particular sectors. Furthermore, changes in these values from one year to the next at national level may represent policy action (reform) but can also reflect other factors e.g., changes in commodity prices. In aggregate, time series data on indicators relevant to evaluating "the value of subsidies and other incentives harmful to biodiversity" allows for the monitoring of progress towards target 18.2. (i.e., by examining trends over time).
In addition to the headline indicator, the TEG proposes a "binary indicator" to capture the very first part of target 18 regarding the identification of incentives harmful to biodiversity (by 2025). Please refer to the corresponding metadata sheet for the binary indicator.

2. Date of metadata update
March 2024
3. Goals and Targets addressed
3a. Goal
N/A
3b. Target
Headline indicator for **Target 18**: Identify by 2025, and eliminate, phase out or reform incentives, including subsidies, harmful for biodiversity, in a proportionate, just, fair, effective and equitable way, while substantially and progressively reducing them by at least $500 billion per year by 2030, starting with the

most harmful incentives, and scale up positive incentives for the conservation and sustainable use of biodiversity.

4. Rationale

This indicator quantifies all the incentives including subsidies harmful to biodiversity provided by the Government. Regular reporting on the indicator will reveal the trend of [the value of] incentives including subsidies harmful to biodiversity over time. A decreasing trend indicates that a government is eliminating, phasing out or reforming incentives harmful to biodiversity. On the other hand, an increasing trend suggests the value of subsidies and other incentives harmful to biodiversity is rising over time.

5. Definitions, concepts and classifications

5a. Definition:

There is no universally agreed definition of subsidies, as it depends on the context in which the term is discussed. The CBD refers to harmful or perverse incentives to biodiversity as "economic, legal and institutional incentives that emanate from policies or practices that induce unsustainable behavior that destroys biodiversity, often as unanticipated side-effects of policies designed to attain other objectives". Subsidies are considered a subset of incentives.

In context of this indicator, the focus is on the monetary value of subsidies and other incentives harmful to biodiversity, including policy measures (e.g. market price support, where relevant).

The WTO defines a subsidy as "a financial contribution by a government, or agent of a government, that confers a benefit on its recipients" for the purposes of the Agreement on Subsidies and Countervailing Measures.

The OECD describes environmental harmful subsidies/support as "all kinds of financial support and regulations that are put into place to enhance the competitiveness of certain products, processes or regions, and that, together with the prevailing taxation regime, (unintentionally) discriminate against sound environmental practices".

Similarly, in the SEEA, the Central Framework explicitly says, "A definition of PEDS [potentially environmentally damaging subsidies] is not included in the SEEA". Eurostat provides the following guidance and information in this context: Guidance material for the Eurostat PEDS compilation, Potentially environmentally damaging transfers and Background document (discussed in the working group on monetary environmental statistics and accounts in 2022). The Eurostat Guidelines on Environmental subsidies and similar transfers state:

"There is no established definition of potentially environmentally damaging subsidies but there are ideas of how such a definition could be elaborated. One idea is to look at reductions and exemptions related to environmental taxes (using the list of environmental tax bases), which includes tax abatements. Another possible idea is to create a list of potentially harmful activities. This approach is an example of an approach 'based on beneficiary' since each subsidy would have to be allocated to the receiving activities and those transfers that are allocated to potentially harmful activities are considered as PEDS. All environmental subsidies and similar transfers should be excluded from the scope."

It is important for each country to identify subsidies and other incentives harmful to biodiversity within their national context when working on the identification of subsidies (see binary indicator 18.2.).

Value of subsidies and other incentives harmful to biodiversity

Total value of incentives, including subsidies, that have been identified to be harmful to biodiversity. This value can be either provided as total sum by the countries, or they can choose to use the disaggregation options (agriculture, fisheries, fossil fuels, others), as relevant. For the latter, the country would be requested to specify which sectors the data relate to.

If the data are reported directly by Parties, they should be reported annually and in the national currency in current values.

Value of agricultural subsidies and other incentives potentially harmful to biodiversity

The OECD database on Producer Support Estimate (PSE) collects data on government support to agriculture. 54 countries provide data to this database (as of March 2024), covering about 75% of global agricultural value-added. In relation to the reporting on the "Value of agricultural subsidies and other incentives potentially harmful to biodiversity", the OECD has found that agricultural support provided through market price support, payments based on output, and the unconstrained use of variable inputs, are

the potentially most harmful to environment, and thereby could affect biodiversity in particular countries (Henderson and Lankoski, 2019; DeBoe, 2020a,b).
Sources: Henderson and Lankoski (2019) http://dx.doi.org/10.1787/add0f27c-en; DeBoe (2020a) https://doi.org/10.1787/6bc916e7-en. DeBoe (2020b), https://doi.org/10.1787/3d459f91-en

Value of fossil fuel subsidies (production and consumption)[21]

Relevant measures include: 1) direct transfer of government funds; 2) induced transfers (price support); and 3) tax expenditure, other revenue foregone, and underpricing of goods and services.
Concepts:

- Use definition of fossil fuels from IEA Statistics Manual, "Fossil fuels are taken from natural resources which were formed from biomass in the geological past. By extension, the term fossil is also applied to any secondary fuel manufactured from a fossil fuel."
- Use the terms set out in CPC Rev. 2.1 for the statistical classification of the individual products. No other commonly accepted definition identified.
- Include electricity and heat generated from fossil fuels in the scope of fossil fuels.
- Include non-energy uses with monitoring optional for the measuring of this indicator.
- Additional details are provided in the methodological document entitled, UNEP (2019), Measuring Fossil Fuel Subsidies in the Context of the Sustainable Development Goals

Direct transfers are generally reported in government budgets, and well documented in sectoral and Finance Ministries, broken down by programme if not by fuel. Those that meet the System of National Accounts (SNA) definition of "subsidies" – i.e., subsidies on products, and other subsidies on production – can also be found in a country's System of National Accounts. Budget documents are publicly available for most countries. The degree to which information on individual programmes is itemized in those reports is highly variable, however. Support to corporations involved in energy production or transformation may sometimes be found in their annual reports, for example. In some cases, researchers may be able to obtain unpublished data from state-owned energy enterprises directly. Induced transfers are measured by calculating the price gap between the producer or consumer price and a reference price and multiplying that differential by the affected volume produced or consumed. Measuring the value of special features introduced into the tax code to favour certain industries or activities of those industries (such as investment in productive capital) can be a complex endeavor. Some countries do this exercise already and report the annual value of those tax breaks in their periodic tax-expenditure reports. However, what is considered a tax expenditure varies from one country to another, in particular depending on the tax code structure. When countries do not produce tax-expenditure reports, the analysist must estimate the difference in the revenues that would be owed to the government under the baseline conditions (that he needs to determine) and with the special tax feature.

Value of subsidies to capture fisheries presenting a risk (moderate or high) of encouraging unsustainable fishing in the absence of effective fisheries management[22]

Fisheries subsidies or "support" can "pose risks to the sustainability and productivity of fisheries when it encourages the build-up of excess fishing capacity; overfishing; and illegal, unreported and unregulated (IUU) fishing" (OECD, 2022). The extent to which measures can encourage unsustainable fishing depends on the type of subsidy offered (and how directly it impacts fishing costs and benefits) as well how well the subsidized fisheries are managed, whether the target fish stocks are healthy and whether, the subsidies are targeted to well-managed fisheries harvesting healthy stocks (OECD, 2022).
However, according to OECD (2022)[23],in the absence of effective fisheries management:

- Support to the following tends to have a **high risk** of encouraging unsustainable fishing:
  - Variable inputs (including fuel)
  - Infrastructure (access)
  - Vessels and gear (capacity enhancing)
  - Access to foreign waters
  - Insurance
- Support to the following tends to have a **moderate risk** of encouraging unsustainable fishing:
  - Vessels and gear
  - Infrastructure (capital)

- Capacity reduction
- Income

Value of subsidies and other incentives harmful to biodiversity in other sectors

When analysing incentives, including subsidies, harmful for biodiversity, countries might choose to consider other sectors than agriculture, fisheries or fossil fuels. Such sectors could be, but are not limited to, transport (e.g. road construction) or water (e.g. price subsidies).

For examples of potentially harmful subsidies in other sectors, see Matthews, A. and K. Karousakis (2022), "Identifying and assessing subsidies and other incentives harmful to biodiversity: A comparative review of existing national-level assessments and insights for good practice."

5b. Method of computation

Value of subsidies and other incentives harmful to biodiversity

Depending on the reporting option selected by the country/institution (i.e. global data base or national data) data may be collected through information already reported to the OECD and others including the FAO and IDB, IMF and IEA (depending on the sectors).

Value of agricultural subsidies and other incentives potentially harmful to biodiversity

The OECD database on Producer Support Estimate (PSE) collects data on government support to agriculture. 54 countries provide data to this database (as of March 2024), covering about 75% of global agricultural value-added. Data is reported annually and classified based on support implementation criteria.

In relation to the reporting on the "Value of agricultural subsidies and other incentives potentially harmful to biodiversity", the OECD has found that agricultural support provided through market price support, payments based on output, and the unconstrained use of variable inputs, are the potentially most harmful to environment, and thereby could affect biodiversity in particular countries (Henderson and Lankoski, 2019; DeBoe, 2020a,b).

Value of fossil fuel subsidies (production and consumption)

This indicator corresponds to the SDG indicator 12c but is presented as total monetary value rather than per unit of GDP. Direct transfers are generally reported in government budgets, and well documented in sectoral and Finance Ministries, broken down by programme if not by fuel. Those that meet the SNA definition of "subsidies" – i.e., subsidies on products, and other subsidies on production – can also be found in a country's System of National Accounts. Budget documents are publicly available for most countries. The degree to which information on individual programmes is itemized in those reports is highly variable, however. Support to corporations involved in energy production or transformation may sometimes be found in their annual reports, for example. In some cases, researchers may be able to obtain unpublished data from state-owned energy enterprises directly. Induced transfer are measured by calculating the price-gap between the producer or consumer price and a reference price, and multiplying that differential by the affected volume produced or consumed. Measuring the value of special features introduced into the tax code to favour certain industries or activities of those industries (such as investment in productive capital) can be a complex endeavour. Some countries do this exercise already and report the annual value of those tax features in their periodic tax-expenditure reports. However, what is considered a tax expenditure varies from one country to another, in particular depending on the tax code structure. When countries do not produce tax-expenditure reports, the analysist must construct a model and estimate the difference in the revenues that would be owed to the government under the baseline conditions and with the special tax feature. For further details on the method of computation as explained in the metadata sheet of SDG 12c. Please refer to the sources below (11. References)

Value of subsidies to capture fisheries with a risk (moderate or high) of encouraging unsustainable fishing in the absence of effective fisheries management

Every two years the OECD publishes the OECD Review of Fisheries. These reports present information on fish stock health and productivity, fisheries management and support for fisheries in OECD countries and other major fishing nations. The estimates of fisheries support are collated in the OECD Fisheries Support Estimates (FSE) database. In 2022, the OECD FSE data covered 30 OECD countries and 10 other large fishing nations, which, together, accounted for 90% of world landings (by volume) over 2018-20. The FSE database records information on direct support to individuals and companies in the fishing sector, such as fuel and vessel subsidies or income support, as well as public financing of fisheries services and infrastructure, such as monitoring, control and surveillance (MCS), port construction and operation, or payments for access to foreign waters. The OECD classifies support to fisheries into four categories reflecting on the risk of encouraging unsustainable fishing posed by each policy type in the absence of effective management The four categories –high risk, moderate risk, uncertain risk and no risk – were defined and agreed by the OECD Fisheries Committee using over two decades of economic and policy research conducted by the OECD and others. The classification and the justification for the breakdown are discussed in the OECD Review of Fisheries 2022. Details on how support to fisheries data are collected by the OECD, with data reporting directly from governments, and how the data is processed and published can be found in the OECD Fisheries Support Estimate (FSE) Manual.

5c. Data collection method

Value of subsidies and other incentives harmful to biodiversity

Depending on the reporting option selected by the country/institution (i.e. global data base or national data) data may be collected through information already reported to the OECD and others including FAO, IDB, the IMF and IEA (depending on the sector).

Value of agricultural subsidies and other incentives potentially harmful to biodiversity

The OECD PSE database collects data on government support to agriculture on an annual basis from national governments within the OECD, as well as from other complementary sources for non-OECD countries covered in the dataset. The data is verified and checked by the OECD Secretariat (Trade and Agriculture Directorate) before it is made publicly available online.

In relation to the reporting on the "Value of agricultural subsidies and other incentives potentially harmful to biodiversity", the OECD has found that agricultural support provided through market price support, payments based on output, and the unconstrained use of variable inputs, are the potentially most harmful to environment, and thereby could affect biodiversity in particular countries (Henderson and Lankoski, 2019; DeBoe, 2020a,b).

Sources: Henderson and Lankoski (2019) http://dx.doi.org/10.1787/add0f27c-en; DeBoe (2020a) https://doi.org/10.1787/6bc916e7-en. DeBoe (2020b), https://doi.org/10.1787/3d459f91-en

For further information see also OECD (2023), *Agricultural Policy Monitoring and Evaluation 2023: Adapting Agriculture to Climate Change*, OECD Publishing, Paris, https://doi.org/10.1787/b14de474-en.

Value of fossil fuel subsidies (production and consumption)

See https://unstats.un.org/sdgs/metadata/files/Metadata-12-0c-01.pdf and Fossil Fuel Subsidy Tracker (fossilfuelsubsidytracker.org))

Data are already collected to report against SDG 12.c.

Value of subsidies to capture fisheries with a risk (moderate or high) of encouraging unsustainable fishing

OECD already collects data from countries and categorises the support by its risk of encouraging unsustainable fishing.

The data are based on information submitted by national authorities, complemented by publicly available information when there is no direct co-operation between national authorities and the OECD Committee for Fisheries.

5d. Accessibility of methodology

The three databases are available publicly on-

5e. Data sources

Value of agricultural subsidies and other incentives potentially harmful to biodiversity

- Agricultural support http://stats.oecd.org/Index.aspx?QueryId=114544

Value of fossil fuel subsidies (production and consumption)

- https://wedocs.unep.org/bitstream/handle/20.500.11822/28111/FossilFuel.pdf?sequence=1&isAllowed=y

Value of subsidies to capture fisheries with a risk (moderate or high) of encouraging unsustainable fishing

- Data will be available on the OECD Data Explorer as of end March 2024. Data can be obtained from the OECD in the meantime (fish.contact@oecd.org)

5f. Availability and release calendar

Value of agricultural subsidies and other incentives potentially harmful to biodiversity

- The data on government support to agriculture is collected and published annually

Value of fossil fuel subsidies (production and consumption)

- The data is collected and published annually - see the Fossil Fuel Subsidy Tracker and the SDG 12 c metadata sheet for further information

Value of subsidies to capture fisheries with a risk (moderate or high) of encouraging unsustainable fishing

- The data is collected and published bi-annually.

5g. Time series

Value of subsidies and other incentives harmful to biodiversity

Data should be provided annually

5h. Data providers

Value of subsidies and other incentives harmful to biodiversity

- The data would be provided at the disaggregated level

Value of agricultural subsidies and other incentives potentially harmful to biodiversity

- OECD via national reporting from OECD governments and other complementary sources for non-OECD countries covered by the dataset.

Value of fossil fuel subsidies (production and consumption)

- National Focal Points from National Statistical Systems.
- International Estimate Providers – OECD, IEA and IMF

Value of subsidies to capture fisheries with a risk (moderate or high) of encouraging unsustainable fishing

- OECD via national reporting from OECD governments and partner economies participating in the work of the OECD Fisheries Committee and other complementary official sources for non-OECD countries covered in the dataset.

5i. Data compilers

Value of subsidies and other incentives harmful to biodiversity

- None. Countries would need to report nationally

Value of agricultural subsidies and other incentives potentially harmful to biodiversity

- OECD

Value of fossil fuel subsidies (production and consumption)

- UN Stats/UNEP
- OECD/IISD’s Fossil Fuel Subsidy Tracker Home - Fossil Fuel Subsidies (fossilfuelsubsidytracker.org)

Value of subsidies to capture fisheries with a risk (moderate or high) of encouraging unsustainable fishing

- OECD

5j. Gaps in data coverage

Value of agricultural subsidies and other incentives potentially harmful to biodiversity

- The OECD collects data on government support to agriculture. As of March 2024, 54 countries across six continents provide data accounting for three quarters of global agricultural value-added

Value of fossil fuel subsidies (production and consumption)

- The data for the SDC12c indicator is available for all or most countries. For most non-OECD countries, these data refer to induced transfers only, estimated by the IEA and the IMF.

Value of subsidies to capture fisheries with a risk (moderate or high) of encouraging unsustainable fishing

- Data covers 30 OECD countries and 10 other major fishing nations, which, together, accounted for 90% of world landings by volume over 2018-2020

5k. Treatment of missing values

N/A

6. Scale

6a. Scale of use

Scale of application (please check all relevant boxes):

Global: ☐ Regional: ☐ National☐

Scale of data disaggregation/aggregation:

- Global/ regional scale indicator can be disaggregated to national level: ☐
- National data is collated to form global indicator: ☐

6b. National/regional indicator production

N/A

6c. Sources of differences between global and national figures

N/A

6d. Regional and global estimates & data collection for global monitoring

6d.1 Description of the methodology

N/A

6d.2 Additional methodological details

N/A

6d.3 Description of the mechanism for collecting data from countries

N/A

7. Other MEAs, processes and organisations

7a. Other MEA and processes

Sustainable Development Goal (SDG) 12.C for the fossil fuel data

7b. Biodiversity Indicator Partnership

Yes: ☐ No: ☒

8. Disaggregation

N/A

9. Related goals, targets and indicators

Goal D: Adequate means of implementation, including financial resources, capacity-building, technical and scientific cooperation, and access to and transfer of technology to fully implement the Kunming-Montreal Global Biodiversity Framework are secured and equitably accessible to all Parties, especially developing country Parties, in particular the least developed countries and small island developing States, as well as countries with economies in transition, progressively closing the biodiversity finance gap of $700 billion per year, and aligning financial flows with the Kunming-Montreal Global Biodiversity Framework and the 2050 Vision for biodiversity.

Target 14: Ensure the full integration of biodiversity and its multiple values into policies, regulations, planning and development processes, poverty eradication strategies, strategic environmental assessments, environmental impact assessments and, as appropriate, national accounting, within and across all levels of government and across all sectors, in particular those with significant impacts on biodiversity, progressively aligning all relevant public and private activities, and fiscal and financial flows with the goals and targets of this framework.

10. Data reporter

10a. Organisation

Depends on the data set. See above for further detail.

10b. Contact person(s)

Value of agricultural subsidies and other incentives potentially harmful to biodiversity

- Martin von Lampe, martin.vonlampe@oecd.org
- Hugo Valin hugo.valin@oecd.org
- Katia Karousakis, katia.karousakis@oecd.org.

Value of fossil fuel subsidies (production and consumption)

https://unstats.un.org/sdgs/metadata/files/Metadata-12-0c-01.pdf and Home - Fossil Fuel Subsidies (fossilfuelsubsidytracker.org))

- joy.kim@un.org
- unep-science-sdgs@un.org

Value of subsidies to capture fisheries with a risk (moderate or high) of encouraging unsustainable fishing

The FSE data is produced by the OECD Fisheries and Aquaculture Unit in the OECD Trade and Agriculture Directorate (TAD), which can be reached at: fish.contact@oecd.org. The overall input of the OECD to the CBD process is led by Katia Karousakis: katia.karousakis@oecd.org

References

OECD (2022), OECD Review of Fisheries 2022, OECD Publishing, Paris. https://doi.org/10.1787/9c3ad238-en

European Commission, Toolbox on Phasing out Environmentally Harmful Subsidies (europa.eu) https://ec.europa.eu/eurostat/documents/3859598/6923655/KS-GQ-15-005-EN-N.pdf/e3be619b-bb19-4486-ab23-132a83f6ff24

The state of Food Security and Nutrition in the World 2022. Repurposing food and agricultural policies to make healthy diets more affordable https://www.fao.org/3/cc0639en/cc0639en.pdf SDG 12c

SDG12c https://unstats.un.org/sdgs/metadata/files/Metadata-12-0c-01.pdf

The OECD Fisheries Support Estimate (FSE) Manual

OECD (2023), *Agricultural Policy Monitoring and Evaluation 2023: Adapting Agriculture to Climate Change*, OECD Publishing, Paris, https://doi.org/10.1787/b14de474-en.

The Nature of Subsidies: A step-by-step guide to repurpose subsidies harmful to biodiversity and improve their impacts on people and nature (2024) The Nature of Subsidies: A step-by-step guide to repurpose subsidies harmful to biodiversity and improve their impacts on people and nature | BIOFIN

Matthews, A. and K. Karousakis (2022), "Identifying and assessing subsidies and other incentives harmful to biodiversity: A comparative review of existing national-level assessments and insights for good practice", *OECD Environment Working Papers*, No. 206, OECD Publishing, Paris, https://doi.org/10.1787/3e9118d3-en

UNEP (2019),Measuring Fossil Fuel Subsidies in the Context of the Sustainable Development Goals, UN Environment, Nairobi, Kenya FossilFuel.pdf (unep.org)

OECD and IISD, Fossil Fuel Subsidy Tracker, Home - Fossil Fuel Subsidies (fossilfuelsubsidytracker.org)

12. Graphs and diagrams

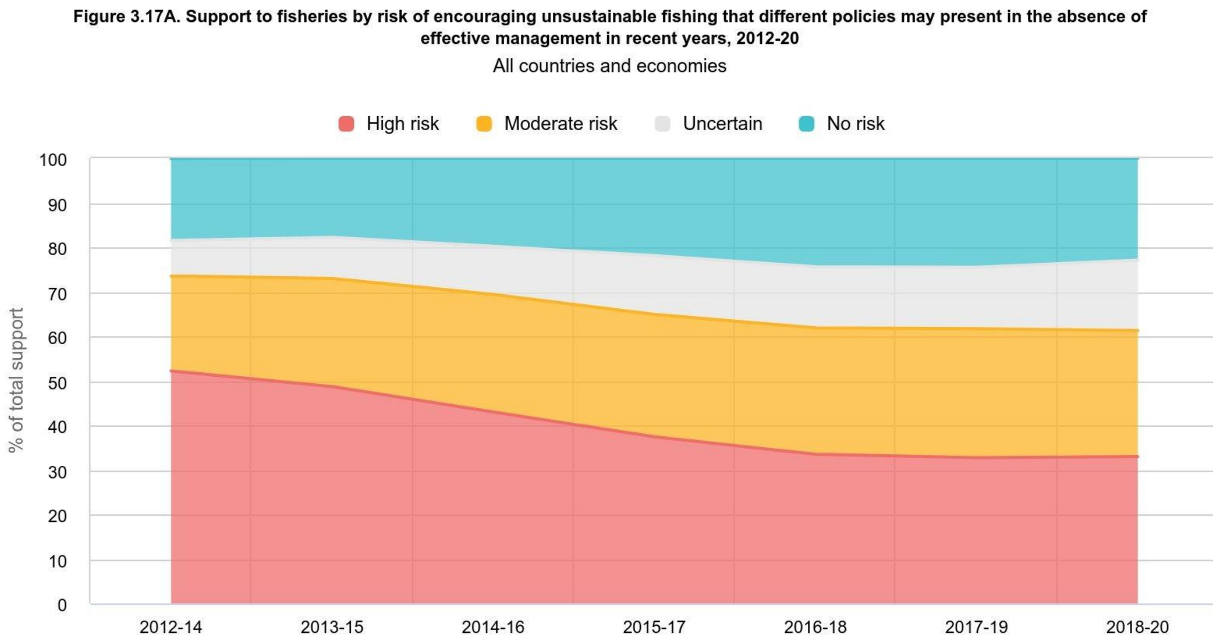

Figure 1: *Value of subsidies to capture fisheries with a risk (moderate or high) of encouraging unsustainable fishing in the absence of effective fisheries management*

GBF indicator metadata: 21.1 Indicator on biodiversity information for monitoring the global biodiversity framework

1. **Indicator name**
   21.1 Indicator on biodiversity information for monitoring the global biodiversity framework

2. **Date of metadata update**
   March 2024

3. **Goals and Targets addressed**
   Target 21. Ensure that the best available data, information and knowledge are accessible to decision-makers, practitioners and the public to guide effective and equitable governance, integrated and participatory management of biodiversity, and to strengthen communication, awareness-raising, education, monitoring, research and knowledge management and, also in this context, traditional knowledge, innovations, practices and technologies of indigenous peoples and local communities should only be accessed with their free, prior and informed consent, in accordance with national legislation.

4. **Rationale**

   Biodiversity information is required to identify threats to biodiversity, to determine priority actions for conservation and sustainable use and to determine if such actions are effective. Biodiversity information, including traditional knowledge, will underpin assessments of progress towards all of the proposed goals and targets of the post-2020 global biodiversity framework.

   Despite the importance of traditional knowledge to biodiversity, there is limited information on how such information is being taken into account in decision making. In particular, the need for a measure of "the trends in which traditional knowledge and practices are respected through their full integration, safeguards and the full and effective participation of indigenous and local communities in the national implementation of the Strategic Plan" was identified in COP decision XIII/28 but remains to be operationalised.

   This indicator is necessary for countries to be able to assess their overall ability to access biodiversity data, information and knowledge required to guide action and report progress under the monitoring framework. The indicator should evaluate the availability of biodiversity information and knowledge for all dimensions of biodiversity required to monitor progress across all targets of the GBF.

   It is recognized that:
   a. A single composite indicator may give an overall summary of status or progress, but appropriate disaggregation will be needed to assess which aspects of biodiversity information are lacking or needed to increase country scores.
   b. Because biodiversity information is cross cutting with other goals and targets of the KM GBF, information used for other indicators will be relevant.
   c. Metrics capturing information related to traditional knowledge are at the heart of the indicator and should be included.
   d. Information in national reports, including how well countries are able to report on all indicators and targets, may support this indicator.

There remains a need to establish quantitative national targets to indicate progress towards improving the coverage and completeness of biodiversity data used and produced by countries to monitor progress to the targets and goals of the GBF. This indicator should present information in a way that fosters action to fill gaps and improve strength of the conclusions that can be drawn from the data (Leung and Gonzalez 2024).

5. Definitions, concepts and classifications

5a. Definition

Definitions for indicators across the monitoring framework are relevant.

5b. Method of computation

Development of a methodology must consider that while most countries have national datasets and monitoring schemes for some species and ecosystems, these schemes rarely cover all the biodiversity information needed for this headline indicator, so some countries may need to refer to international data sources and monitoring programs. Access and use of international databases can often be disaggregated to country level.

An assessment of the availability of information sources captures one element of this indicator. Measures of data coverage and quality are also needed to assess growth in the availability of information of sufficient quality to guide decisions.

High-level indicator conveying information available for monitoring

The monitoring framework requires countries to gather the information and datasets needed to quantify the current status and change in different dimensions of biodiversity for each target.

We recommend that countries report the percentage/number of headline indicators where national biodiversity datasets and monitoring schemes are available and used. Over time this would capture country-level trends in the access and use of data for governance, management and communication of biodiversity outcomes.

The following table summarizes the types of information that can be used for this headline indicator. General examples are given for types of data or information sources, and these will differ from country to country. Countries may maintain a database of sources of biodiversity information and knowledge to report for headline indicator 21.1.

Table: *The four types of biodiversity information and sources to be evaluated for each dimension of biodiversity need for indicator 21.1. We include a non-exhaustive list of examples for the rows of this* *table. This compilation of data and knowledge sources would also serve to assess the information available to calculate many other indicators. Each element would include traditional knowledge, national and international information sources.*

The following additional indicators may be used to assess elements of this indicator:

Information type / Biodiversity dimensions	Monitoring schemes (community-based, national & international)	Primary/raw data (number/completeness of relevant observations)	Model-based information (Assessing quality and coverage)	Information product relevant to indicator (e.g. data on trends per country)
Genetic diversity	e.g. Number of species covered by systematic population monitoring schemes	e.g Time series of censused abundances from monitored populations	e.g. Estimated effective population sizes (Ne) from demographic data across all monitored populations	e.g. Number of populations with an effective population size (Ne) above 500 individuals
Population abundances	e.g. Number of species and taxonomic groups covered by systematic population monitoring schemes	e.g. Time series of abundances available from national or international datasets (e.g. Living Planet Database).	e.g. modeled trends across taxa estimated for monitored taxa.	e.g. Number of taxonomic groups covered by abundance trend metric (e.g. Living Planet Index, Wild Bird Index etc)
Species (occurrences)	e.g. Number of species and taxonomic groups covered by distribution atlases	e.g. Number of occurrence records in GBIF	e.g. modeled trends in species distributions across taxa (e.g. species distribution models).	e.g. Number of species and taxonomic groups covered by national Red Lists
Ecosystem extent	e.g. extent of ecosystem types monitored	e.g. Earth observation, satellite and remote sensing imagery for ecosystem mapping.	e.g. model based assessments of change in ecosystem extent accounting for data gaps	e.g. Number of ecosystems with Red List of Ecosystems assessments
Ecosystem condition	e.g. monitoring of composition, structure and	e.g. in situ and local knowledge of	e.g. The national ecosystem	

	functioning by remote sensing	ecosystem structure and functioning	condition accounts following the UN SEEA EA methodology.	
Ecosystem services/NCPs	e.g. Monitoring of ecosystem service variables	e.g. Time series of supply and use of ecosystem services gathered for national accounts.	e.g. The national flow and use ecosystem service accounts following the UN SEEA EA methodology.	e.g. The national stock and change in stock ecosystem asset accounts following the UN SEEA EA methodology .
…further relevant aspects could be assessed using this same concept				

Survey gap analysis
Survey gap analysis is a tool designed to solve the problem of filling data gaps with additional surveys and monitoring. It uses continuous environmental data to help maximize financial resources for gathering new information on biodiversity status and trends (Funk et al. 2005).

Sampling effectiveness index
This indicator on sampling effectiveness (SSEI) relates the realized geographic distribution of records held by a country to the distribution of data needed to adequately calculate an indicator (Oliver et al. 2021).

Species Information Index
This indicator captures how well existing data on localities of species occurrences covers the expected geographic range of a species. At the species level, the SII can be calculated across the entirety of the species' expected range, ignoring national boundaries, or separately within each nation where it is expected to occur (Oliver et al. 2021).

Ecosystem coverage
A measure capturing the quality of available ecosystem characterisations. This may comprise two aspects:

1) Countries may report whether they have national (or sub-national) ecosystem maps that can support reporting on headline indicators A1 (Red List of ecosystems) and A2 (extent of natural ecosystems).
2) An attribute evaluation (for example, that can then be translated to a 0 - 100 scale) based on the spatial, temporal, and thematic resolution and accuracy of global ecosystem maps available in the country, based on maps of ecosystem functional groups in the Global Ecosystem Typology (https://global-ecosystems.org/).

Coverage of monitoring schemes and networks:
Monitoring programs provide systematic and repeated biodiversity information needed to reliably assess trends in different dimensions of biodiversity.

A count of the monitoring projects (e.g. by Biodiversity Observation Networks, and similar monitoring schemes) gathering relevant biodiversity data, including the scope and coverage of this information (e.g. taxonomic, geographic) in each country.

Note: An open global meta-database of biodiversity monitoring schemes is needed to support the calculation of the change in the capacity of countries to monitor biodiversity and generate required information. For example, a dataset for population monitoring schemes (see Moussy et al. (2022)) is available on the IUCN SSC Species Monitoring Specialist Group https://www.speciesmonitoring.org/schemes.html

Indigenous knowledge:
This refers to the use of traditional knowledge in national monitoring frameworks and used in the equitable governance and management of biodiversity.

The Indigenous Navigator (https://indigenousnavigator.org/) is a framework and set of tools for and by Indigenous Peoples to systematically monitor the level of recognition and implementation of their rights. By using the Indigenous Navigator, Indigenous organisations and communities, duty bearers, NGOs and journalists can access free tools and resources based on community-generated data. The Indigenous Navigator will be a valuable source of information that can be used to calculate a component related to assess the

Another source of information is the number of community-based monitoring and information systems (CBMIS) active in a given country (Ferrari et a. 2015).

Relevant information from complementary indicators:

Additional indicators are relevant and available to support reporting for indicator 21.1

- Growth in number of records and species in the Living Planet Database.
- Growth in species occurrence records accessible through the Global Biodiversity Information Facility.
- Growth in marine species occurrence records accessible through Ocean Biodiversity Information System.
- Proportion of known species assessed through the IUCN Red List of Threatened Species.
- Number of assessments on the IUCN Red List of Threatened Species.
- Number of assessments on the IUCN Red List of Ecosystems (https://iucnrle.org/rle-in-progress)
- World Association of Zoos and Aquariums (WAZA) bio-literacy survey (Biodiversity literacy in global zoo and aquarium visitors).
- Essential Biodiversity Variable data sets freely available for use on the EBV data portal (GEO BON). These are classified by EBV class and geographic extent.
- Growth in biodiversity observing and monitoring systems and technologies deployed.

5c. Data collection method

For the aspects of this indicator related to other indicators in the monitoring framework, this could be automatically calculated based on what is submitted through the national reporting processes.

For the aspects of this indicator related to data which is captured in international databases (for example GBIF), the information on record counts is already currently available. This source of information can be used to assess the completeness and inclusiveness of monitoring processes, from data to collection to indicator production.

5d. Accessibility of methodology

The metadata and methodology for the elements of this indicator are fully public. The SSEI and SSI are available online.

5e. Data sources

The data sources are existing databases for biodiversity observation monitoring, community-based monitoring databases and biodiversity indicator databases.

5f. Availability and release calendar

This indicator would be included in the national reports and follow the release calendar for the 7th and 8th national reports.

5g. Time series

Parties would be asked to report data from 2020 to the most recent year available. Additionally, it would be encouraged to go as far back as possible in time in order to see how monitoring systems are developing over time.

5h. Data providers

National governments are the primary data provider. GEO BON, IIFB, GBIF, IUCN and other organizations maintain information relevant to this indicator. However, this indicator would be reported through the national reporting process.

5i. Data compilers

Countries, including subnational and local counterparts, are the data compilers.

5j. Gaps in data coverage

This indicator is currently being developed. It is expected that it could be operationalized in the 7th national report as the indicator will aim to capture gaps in monitoring systems. An overestimation of the gaps may occur, and this would reflect poor data flows between data collection on the ground and national governments.

5k. Treatment of missing values

Datasets may not be of adequate quality or coverage which represents important sources of uncertainty. This uncertainty can be assessed and addressed to guide the collection of better information. This indicator is assessing where there are missing values and thus this category does not apply.

6. Scale

6a. Scale of use

National, regional and global

6b. National/regional indicator production

Data would primarily be compiled at the national level.

6c. Sources of differences between global and national figures

In some cases, data may flow to the global level without flowing to the national level or vice versa. This could create discrepancies between the global and national figures. Identifying and resolving discrepancies would help make progress toward Target 21.

6d. Regional and global estimates & data collection for global monitoring

As GEO BON, IIFB, GBIF, IUCN and other organizations maintain biodiversity information these organizations would be in a position to provide regional and global data on this indicator which Parties could choose to use, where relevant.

7. Other MEAs, processes and organisations

7a. Other MEA and processes

This indicator is relevant for all the biodiversity MEAs as it could inform where information is available and lacking.

7b. Biodiversity Indicator Partnership

No

8. Disaggregation

9. Related goals, targets and indicators

10. Data reporter

10a. Organisation

Guidelines for indicator development are being prepared by GEO BON, with other partner organizations and groups (GBIF, OBIS, IUCN, IIFB, Birdlife and research centres and universities).
Secretariat of the Convention on Biological Diversity (SCBD) and Group on Earth Observations Biodiversity Observation Network (GEO BON)

10b. Contact person(s)

Andrew Gonzalez (andrew.gonzalez@mcgill.ca), GEO BON; Jillian Campbell (campbell7@un.org, SCBD)

References

Ferrari, M. F. F. et al. (2015) Community-based monitoring and information systems (CBMIS) in the context of the Convention on Biological Diversity (CBD). Biodiversity 16: 57-67.

Funk, V. A. et al. (2005) Survey-gap analysis in expeditionary research: where do we go from here? Biological Journal for the Linnean Society 85: 549-567.

Leung, B. and Gonzalez, A (2024) Global monitoring for biodiversity: Uncertainty, risk, and power analyses to support trend change detection. Science Advances 10: eadj1448

Moussy et al. (2022) A quantitative global review of species population monitoring. Conservation Biology 36: e13721

Oliver, R. Y. et al. (2021). Global and national trends, gaps, and opportunities in documenting and monitoring species distributions [Data set]. PLOS Biology. https://doi.org/10.48600/MOL-3Y3Z-DW77

Oliver, R.Y. et al. (2021) Global and national trends, gaps, and opportunities in documenting and monitoring species distributions. PLoS Biology 19(8): e3001336. doi.org/10.1371/journal.pbio.3001336

GBF indicator metadata: 20.b Target 20 binary indicator

Full Indicator Name

tbc

Goals And Targets Addressed

Goal

N/A

Target

Binary indicator for Target 20. Strengthen capacity-building and development, access to and transfer of technology, and promote development of and access to innovation and technical and scientific cooperation, including through South-South, North-South and triangular cooperation, to meet the needs for effective implementation, particularly in developing countries, fostering joint technology development and joint scientific research programmes for the conservation and sustainable use of biodiversity and strengthening scientific research and monitoring capacities, commensurate with the ambition of the goals and targets of the Framework.

Rationale

To achieve the goals and targets of the Kunming-Montreal Global Biodiversity Framework, Parties and other actors need to have commensurate expertise (including both technical and functional capacities), knowledge, tools, technologies and institutional capacity to effectively prioritize, plan, mobilize resources, and implement and monitor relevant strategies, programmes and activities at the national level. Capacity development, technical and scientific cooperation, technology transfer and innovation are crucial for enhancing the abilities, resilience and effectiveness of individuals, institutions and systems at various levels for improved biodiversity-related decision-making, action and outcomes.

The ultimate aim of this target is to ensure that Parties and other relevant actors have the necessary enabling conditions, capacity, know-how, technologies and other tools for implementation, commensurate with the ambition of the goals and targets of the Framework. Therefore, the indicator tracks progress along the assessment of needs, both in terms of capacity and technology, the development of action plans for capacity-building and technology, and the cooperation between Parties. All three elements, assessing needs, developing an action plan and collaboration are essential to deliver on the Framework.

Definitions Concepts And Classifications

Definition

Capacity: The ability of people, organizations and societies as a whole to achieve the biodiversity-related goals and action targets.
Capacity-building and development: The process whereby people, organizations and society as a whole unleash, strengthen, create, adapt and maintain capacity over time to achieve positive biodiversity results. Capacity‑ building and development is considered at three levels: the enabling environment, organizational and individual levels.
Technical and scientific cooperation: Technical and scientific cooperation refers to a process whereby institutions in two or more countries pursue their individual or collective biodiversity-related goals through cooperative actions. This may include the creation and/or exchange of scientific knowledge, data, expertise, resources, technologies, and technical know-how. It may also include human resource development, institution building, joint training of personnel, exchange of experts, joint research programmes, joint ventures for the development and diffusion of technologies (including indigenous and traditional technologies), and transfer of technology and know-how.
*National capacity self-assessment***:** An official process outlined by the United Nations and the GEF secretariat to assess the existing capacity of a nation to deliver on and implement the convention. The primary goal of an NCSA is to determine national priorities for capacity development to better address global environmental issues. The NCSA will analyse the country's capacity strengths, constraints and needs, and recommend capacity development actions to address them. The focus is on a country's capacity requirements to implement the three "Rio Conventions" – biodiversity (CBD), land degradation (CCD), and climate change (UNFCC) – and other relevant Multilateral Environmental Agreements (MEAs). In addition, the NCSA process aims to identify cross-cutting capacity issues and foster synergies among the MEAs.
National capacity development action plan: National capacity development action plans are part of the formal process for Parties to support the implementation of their NBSAPs. Examples of these action plans can be found here.

Triangular cooperation: Southern-driven partnerships between two or more developing countries, supported by a developed country(ies) or multilateral organization(s), to implement development cooperation programmes and projects.
Indigenous technology: Refers to the technological knowledge, skills, and resources transmitted or handed down from the past indigenous people to the present ones to meet their needs and wants by means of investigating, designing, developing, and evaluating products, processes, and systems with an intention of solving the practical problems. Indigenous technology is used by the native inhabitants of a country or region, and it constitutes an important part of its cultural heritage (Gumbo, 2014; access here).

Method of Computation

This indicator is a binary indicator and must be compiled from the answers to five questions:

20.1 Does your country have a national capacity-building and development action plan for biodiversity?
20.2 Has your country undertaken a national capacity self-assessment as part of the revision of its national biodiversity strategy and action plan?
20.3 Has your country undertaken a national assessment of the capacity building and development needs of indigenous peoples and local communities?
20.4 Has your country assessed its technology needs, including for indigenous and traditional technologies if applicable?
20.5 Is your country involved in joint capacity-building and development, the promotion and access to innovation technical and scientific cooperation and technology transfer activities with other countries, for the conservation and sustainable use of biodiversity?

There are four possible answers to questions 20.1, 20.2, 20.4[21] and 20.5[22]:

(a) No
(b) No, but under development
(c) Yes, partially
(d) Yes, fully

A "No" answer implies that:

- there is no national capacity-building and development action plan for biodiversity (20.1)
- no national capacity self-assessment has been conducted (20.2)
- the technology needs of the country have not been assessed (20.4)
- there is no ongoing cooperation with another nation for capacity-building and technology transfer (20.5)

In all, no progress has been made towards any of the statements in each question and there are no national level efforts to make any.

A "No, but under development" answer implies a concerted effort at the national level to make progress towards each question. That is, there are official plans to develop a national capacity-building and development action plan for biodiversity (20.1), a national capacity self-assessment (20.2), to assess technology needs (20.4) and to cooperate with other nations for capacity-building and technology transfer (20.5). To select this response, a nation must be planning to deliver on each of these elements and be designing the methodology to do so. Intent is not sufficient, official commitments and methodological proposals must be present.

A "Yes, partially" answer implies for each question that a start has been made. Namely, the national capacity-building and development action plan for biodiversity is being produced (20.1), a national capacity self-assessment (20.2) and a technology needs assessment (20.4) have started, and cooperation with another

[21] Assuming the recommendation on removal of "(e) not applicable" has been followed.
[22] Assuming the recommendation to make answers of 20.5 consistent with other questions has been followed.

nation for capacity-building and technology transfer (20.5) is beginning, namely official collaboration has started. Clear unambiguous progress must be seen to select this answer. The planning stages are understood to be over and work towards each question has started.

A "Yes, fully" answer implies that completion of the efforts underlined under "Yes, partially". Namely, a national capacity-building and development action plan for biodiversity exists (20.1), the national capacity self-assessment is complete (20.2), technology needs have been assessed (20.4) and cooperation with other nations for capacity-building and technology transfer is ongoing (20.5). In each of these cases, results have been produced and are observable and shareable.

There are five possible answers to question 20.3:

(a) No
(b) No, but under development
(c) Yes, partially
(d) Yes, fully
(e) Not applicable

A "No" implies that no national assessment of the capacity-building and development needs of indigenous peoples and local communities (IPLCs) has been conducted.
A "No, but under development" implies that plans to carry out a national assessment of capacity-building and development needs of indigenous peoples and local communities (IPLCs) are underway and methods to do so are being designed.
A "Yes, partially" implies that a national assessment of capacity-building and development needs of indigenous peoples and local communities (IPLCs) has started.
A "Yes, partially" implies that a national assessment of capacity-building and development needs of indigenous peoples and local communities (IPLCs) is complete. In this case, results have been produced and are observable and shareable
A "Not applicable" answer is to be selected by Parties who have no recognised indigenous groups under their jurisdiction.

Note: further information on progress towards the target can be provided in the free text section of the reporting tool.

GBF indicator metadata: 22.b Target 22 binary indicator

Full Indicator Name
Tbc

Goals And Targets Addressed

Goal
N/A

Target
Binary indicator for Target 22. Ensure the full, equitable, inclusive, effective and gender-responsive representation and participation in decision-making, and access to justice and information related to biodiversity by indigenous peoples and local communities, respecting their cultures and their rights over lands, territories, resources, and traditional knowledge, as well as by women and girls, children and youth, and persons with disabilities and ensure the full protection of environmental human rights defenders.

Rationale

Indigenous peoples and local communities (IPLCs) have a cultural and holistic understanding of nature based on their traditional knowledge, practices and innovation. This information and understanding of biodiversity in turn play a crucial role in the conservation and sustainable use of biodiversity. The insights of indigenous peoples and local communities on local ecosystems play a fundamental role in developing conservation initiatives that integrate cultural values and traditional governance systems, including sustainable use such as resource management techniques, traditional hunting and fishing, and elective harvesting. Further, their lands encompass diverse ecosystems, ranging from forests and wetlands to mountains and coastal areas with high concentrations of biodiversity and often promote sustainable land use, including agroforestry, rotational farming and community-based conservation management systems. Involving IPLCs in biodiversity conservation and sustainable use, and the recognition of their perspectives and expertise can contribute to the development of context-specific and effective conservation and sustainable use strategies. This participation of IPLCs must further be done in a way that respects their cultures and their rights over lands, territories, resources, and traditional knowledge, promoting access to justice and information in the process. Only through full, equitable, inclusive, effective and gender-responsive representation and participation can the goals of target 22 and the Framework be fully achieved.

The target also recognizes the importance of meaningful participation in decision-making, access to justice, and access to information of women and girls, as well as the inclusion of children, youth and persons with disabilities. This indicator can provide a picture of the processes and means that countries have put in place to promote these rights, toward empowering these groups to actively contribute to biodiversity conservation and sustainable use and promoting social equity for groups in vulnerable situations. It also highlights the need to protect environmental human rights defenders as they are at the forefront of protecting biodiversity by monitoring and exposing environmental violations, promoting sustainable practices and advocating for a human rights-based approach to conservation efforts. Many environmental defenders face threats to their lives and safety in the face of doing this work. As such, this indicator tracks the progress of national efforts towards the protection of these groups.

The elements reflected in this binary indicator are cross-cutting in nature and relate to several aspects in Section C of the Kunming-Montreal Global Biodiversity Framework, including the contributions and rights of indigenous peoples and local communities, whole-of-society approach, intergenerational equity, gender, and a human rights-based approach.

Definitions Concepts And Classifications

Definition

Full protection: Measures that can be taken to safeguard individuals or groups who work to protect the environment, advocate for environmental justice, and defend the rights of indigenous peoples and local communities. Key aspects of protecting environmental human rights defenders could include but are not limited to: preventing violence and intimidation by providing legal protection, effective remedies and secure exercise of their rights free from reprisals and retaliation and raising awareness about the important role of environmental human rights defenders.

Human rights defenders: everyone exercising their right, individually and in association with others, to promote and to strive for the protection and realization of human rights and fundamental freedoms at national and international levels, including trade unionists and some journalists. (UN Declaration on Human Rights Defenders, A/Res/53/144)

Environmental human rights defenders: Individuals and groups who, in their personal or professional capacity and in a peaceful manner, strive to protect and promote human rights relating to the environment, including water, air, land, flora and fauna (UNEP)

Children: A child is recognized as a person under 18, unless national laws recognize the age of majority earlier.

Youth: There is no universally agreed international definition of the youth age group. For statistical purposes, however, the United Nations—without prejudice to any other definitions made by Member States—defines 'youth' as those persons between the ages of 15 and 24 years. This definition, which arose in the context of preparations for the International Youth Year (1985) (see A/36/215), was endorsed by the General Assembly in its resolution 36/28 of 1981. All UN statistics on youth are based on this definition, as is reflected in the annual yearbooks of statistics published by the UN system on demography, education, employment and health.

Persons with disabilities: Persons with disabilities include those who have long-term physical, mental, intellectual or sensory impairments which in interaction with various barriers may hinder their full and effective participation in society on an equal basis with others.

Gender-responsive: A gender responsive approach is one that moves beyond 'do no harm' to 'do better', towards changing gender norms, roles and access to resources. Gender responsiveness refers to processes and outcomes that reflect an understanding of and take into account gender dynamics, roles, and inequalities in a given society, and which encourage equal participation and fair distribution of benefits. Gender responsive approaches are based on gender analysis to understand the norms and expectations for women and girls and men and boys in relevant contexts, to inform the design of appropriate interventions. (CBD, SBI3)

Indigenous peoples and local communities: The Convention on Biological Diversity does not define the terms indigenous and local communities or Indigenous Peoples and Local Communities. The United Nations Declaration on the Rights of Indigenous Peoples does not adopt or recommend a universal definition for Indigenous Peoples (Decision CBD/COP/DEC/14/13). Indigenous people are also known as first peoples, aboriginal peoples, native peoples, or autochthonous peoples, are ethnic groups who are descended from and identify with the original inhabitants of a given region, in contrast to groups that have settled, occupied or colonized the area more recently. The distinctive groups, usually maintaining traditions or other aspects of an early culture that is associated with a given region, are protected in international or national legislation as having a set of specific rights based on their linguistic and historical ties to a particular territory, prior to later settlement, development, and or occupation of a region. Local community is a self-identified human group that relates to a life environment in collective ways that participate to define a shared territory and culture. The members of a local community have frequent chances of direct (possibly face-to-face) encounters and possess some common history, traditions, institutions, language, values and life plans. A local community can be long-standing ('traditional') or relatively new, include a single or multiple ethnic identities and be permanently settled or mobile. A local community should have a form of

political identity that enables it to exercise its rights and responsibilities with respect to its territory and neighbors.
Access to justice: The ability of people to seek and obtain a just resolution of legal problems through a wide range of legal and justice services. These services include legal information, counsel and representation, formal (e.g. courts) and alternative dispute resolution, and enforcement mechanisms. Emphasis should also be placed on legal empowerment, which enables people's meaningful participation in the justice system and builds their capability to understand and use the law for themselves. The rule of law requires impartial and non-discriminatory justice. Without equal access, a large portion of the population can be left behind and their vulnerabilities exposed.
Access to information: Access to Information has two principle components: the obligation for states to have a legal framework that is also implemented in practice, that: entitles public to request access to information (documents and other information recorded in any format) and to respond to such requests in a timely fashion and obliges authorities to ensure that information of public interest is put into the public domain proactively, without the need for requests.

Method of Computation

This indicator is a binary indicator and must be compiled from the answers to five questions and eight sub questions:

22.1 Does your country have **policy, legislative and administrative frameworks** at the national and subnational levels that:
- (a) Ensure the full, equitable, inclusive, effective and gender-responsive representation and participation in biodiversity decision-making related to biodiversity of the following?
- (b) Respect, in ensuring representation and participation in decision--making in relation to biodiversity, [the following rights of][23] indigenous peoples and local communities?
- (c) Ensure the full protection of environmental human rights defenders?
- (d) Ensure public access to information related to biodiversity for the following[24]?
- (e) Provide access to justice for one or more of the following categories?

22.2 Does your country have **operational frameworks and mechanisms** related to the policy, legislative and administrative frameworks listed under question 22.1?

22.3 Does your country have **financial resources or budgets** for the frameworks listed under questions 22.1 and 22.2?

22.4 Has your country undertaken capacity-building activities for the frameworks listed under questions 22.1 and 22.2?

22.5 Does your country **monitor**:
- (a) The full, equitable, inclusive, effective and gender-responsive representation and participation in biodiversity decision-making of the following?
- (b) The following culture and rights of indigenous peoples and local communities?
- (c) The full protection of environmental human rights defenders?

There are four possible answers to questions 22.1a, 22.1d, 22.1e and 22.5a:
- (e) Indigenous peoples and local communities
- (f) Women and girls
- (g) Children and youth
- (h) Persons with disabilities

[23] Recommended text addition from the AHTEG.
[24] Assuming the recommendation to clarify the text has been followed.

Each of the answers here is to be chosen using a "select all that apply" approach. Namely, if a country has policy, legislative and administrative frameworks at the national and subnational levels to ensure the representation and participation in biodiversity decision-making (22.1a), ensure access to information (22.1d) or provide access to justice (22.1e) or if a country monitors the representation and participation in biodiversity decision-making (22.5a) then select the groups to which these apply. In other words, select each option for which the answer to 22.1a, 22.1d, 22.1e and 22.5a is "Yes". If no answers are selected, then an overall "No" is understood. Note that for 22.1 a country needs to have policy, legislative and administrative frameworks at the national and subnational levels already in existence, written in law and implemented, if this is not the case, even if these frameworks are being drafted, then do not select any answers in the sub questions. Additionally, if the frameworks in place are only at the subnational or national level but not both, then do not select any of the answers for which one of them is missing.

There are five possible answers to questions 22.1b and 22.5b:

a) Culture and practices
b) Rights over lands and territories
c) Rights over natural resources
d) Rights over traditional knowledge
e) Not applicable

Each of the answers here is to be chosen using a "select all that apply" approach. Namely, if a country has policy, legislative and administrative frameworks at the national and subnational levels that respect IPLCs rights in ensuring the representation and participation in biodiversity decision-making (22.1b) or monitors the culture and rights of IPLCs (22.5b) then select the options to which these apply. In other words, select each option for which the answer to 22.1b and 22.5b is "Yes". Parties with no recognized IPLC groups may select the "not applicable" answer but are asked to provide a justification for the choice in the free text. If no answers are selected, then an overall "No" is understood.

There are two possible answers to questions 22.1c, 22.3[25], 22.4 and 22.5c:

(a) No
(b) Yes

A "No" answer implies:

- that there are no policy, legislative and administrative frameworks in place to protect environmental human rights defenders (22.1c). No legal and policy protection exists, arrests and lawsuits against environmental human rights defenders are still taking place. Killing and other attacks may have been observed in the last year.
- there are no financial resources available to support the policy, legislative and administrative frameworks (22.3)
- no capacity-building efforts have taken place to support the policy, legislative and administrative frameworks (22.4)
- there is no ongoing effort to monitor the protection of environmental human rights defenders (22.5c). There is no information available on the legal and security threats faced by environmental human rights defenders nor on the efforts being made to protect them.

A "Yes" answer implies:

- that there are policy, legislative and administrative frameworks in place to protect environmental human rights defenders (22.1c). Such legal and policy protection is reducing arrests and lawsuits against environmental human rights defenders and investigating and punishing any killing and attacks that may still be observed.

[25] Assuming the recommendation to simplify the answer of 22.3 has been followed.

- there are financial resources available to support the policy, legislative and administrative frameworks (22.3)
- capacity-building activities have taken place to support the policy, legislative and administrative frameworks (22.4)
- there is ongoing monitoring of the protection of environmental human rights defenders (22.5c). Information is available on the effect that legal and security protections are having in reducing the threats faced by environmental human rights defenders.

There are four possible answers to question 22.2:

(a) No
(b) No, but under development
(c) Yes, partially
(d) Yes, fully

A "No" answer implies that there are no operational frameworks and mechanisms to support the implementation of the policy, legislative and administrative frameworks in 22.1 for any of the groups or rights mentioned in the sub questions.

A "No, but under development" answer implies a concerted effort at the national level to create operational frameworks and mechanisms to support the implementation of the policy, legislative and administrative frameworks in 22.1 but these are still in the drafting or proposal stage.

A "Yes, partially" answer implies that operational frameworks and mechanisms to support the implementation of the policy, legislative and administrative frameworks in 22.1 exist and have been implemented but they do not cover all the groups (IPLCs, women and girls, children and youth, persons with disabilities, environmental human rights defenders) nor all of their culture, practices and rights (over lands and territories, over resources, over traditional knowledge). If only some groups and their culture, practices and rights benefit from these operational frameworks but not others, select this answer.

A "Yes, fully" answer implies that all the conditions outlined in "Yes, partially" have been met. Namely that operational frameworks and mechanisms to support the implementation of the policy, legislative and administrative frameworks in 22.1 exist and have been implemented for all groups (IPLCs, women and girls, children and youth, persons with disabilities, environmental human rights defenders) and all their culture, practices and rights (over lands and territories, over resources, over traditional knowledge). If any one group or culture, practice and right does not benefit from these operational frameworks, then select "Yes, partially".

Note: further information on progress towards the target can be provided in the free text section of the reporting tool.

GBF indicator metadata: 23.b Target 23 binary indicator

Full Indicator Name
tbc

Goals And Targets Addressed

Goal
N/A

Target
Binary indicator for Target 23. Ensure gender equality in the implementation of the Framework through a gender-responsive approach, where all women and girls have equal opportunity and capacity to contribute to the three objectives of the Convention, including by recognizing their equal rights and access to land and natural resources and their full, equitable, meaningful and informed participation and leadership at all levels of action, engagement, policy and decision-making related to biodiversity.

Rationale

Gender roles in many countries influence the conservation and sustainable use of biodiversity by impacting the ability of women to participate in decision-making and by affecting their access to and control of land, biological resources and other productive assets. Considering gender dimensions in biodiversity-related decision-making can lead to positive outcomes for biodiversity and gender equality. Women often play a vital role in managing natural resources and promoting sustainable agriculture, forestry and fisheries. When women have access to resources, land, education, healthcare and economic opportunities on par with men, they are better able to participate in decision-making processes and advocate for environmental protection.

The focus of this target is on ensuring gender equality in the implementation of the Framework through a gender-responsive approach. Gender responsive is the process of ensuring that programmes, policies and institutions take into account the different needs and experiences of people based on their gender identity. It aims to create a society that is responsive to the diverse needs and realities of people, including those who may face discrimination or disadvantage because of their gender. As such, the indicator tracks progress along the development of legal, administrative or policy frameworks that are gender inclusive as well as the deployment of financial resources to support gender equality with a focus on rights and access to land and natural resources.

Definitions Concepts And Classifications

Definition

Equal opportunity and capacity [to contribute]: Can effectively and fully participate in the achievement of the Convention's goals without any discrimination, exclusion or restriction made on the basis of sex, respecting the rules set out in the Convention on the Elimination of All Forms of Discrimination Against Women.
Equal rights: All human beings are born free and equal in dignity and rights. They are endowed with reason and conscience and should act towards one another in a spirit of brotherhood. Everyone is entitled to all the rights and freedoms set forth in this Declaration, without distinction of any kind, such as race, colour, sex, language, religion, political or other opinion, national or social origin, property, birth or other status. Furthermore, no distinction shall be made on the basis of the political, jurisdictional or international status of the country or territory to which a person belongs, whether it be independent, trust, non-self-governing or under any other limitation of sovereignty. As per article 2 of the United Nations Declaration on Human Rights.

Sex-disaggregated data collection and analyses: Collection and analysis of data which is cross classified by sex, and which presents information separately for men and women, boys and girls. Sex-disaggregated data is necessary for effective gender analysis, as it is more difficult to identify real and potential inequalities in its absence.
Gender Plan of Action: An officially negotiated and agreed upon document of the Kunming-Montreal Global Biodiversity framework who's purpose is to support and promote the gender responsive implementation of the post-2020 global biodiversity framework. The plan will also support a gender responsive approach to applying the implementation mechanisms associated with the framework.
The three objectives of the convention: The Convention on Biological Diversity (CBD) has three main objectives: the conservation of biological diversity; the sustainable use of the components of biological diversity; and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources.
Gender equality: The concept that women and men, girls and boys have equal conditions, treatment and opportunities for realizing their full potential, human rights and dignity, and for contributing to (and benefitting from) economic, social, cultural and political development. Gender equality is, therefore, the equal valuing by society of the similarities and the differences of men and women, and the roles they play. It is based on women and men being full partners in the home, community and society. Equality does not mean that women and men will become the same but that women's and men's rights, responsibilities and opportunities will not depend on whether they are born male or female. Gender equality implies that the interests, needs and priorities of both women and men and girls and boys are taken into consideration, recognizing the diversity of different groups and that all human beings are free to develop their personal abilities and make choices without the limitations set by stereotypes and prejudices about gender roles. Gender equality is a matter of human rights and is considered a precondition for, and indicator of, sustainable people-centred development.
Decision-making: The process of making decisions can happen at the individual level or amongst groups and entails the prioritisation of certain values. This prioritization greatly influences which issues are found worthy of consideration, do and do not become part of the agenda, as well as determine which decision-makers are considered socially legitimate to participate in the process.
Explicitly recognise and protect: Women and girl's rights to, access to and control of land and natural or biodiversity resources need to be acknowledged and guaranteed in legislation and policy, in accordance with the Gender Plan of Action. To advance this recognition, it is important that sex-disaggregated data be collected and that gender-related roles and needs be taken into account, as opposed to a gender-blind approach.
Participation and leadership at all levels of action: Women are often not provided with the same opportunities to participate in decision-making as men or to serve in leadership roles. Analysis has shown that opportunities for effective action on biodiversity are missed due to insufficient involvement of women in these ways. Women's participation and representation in decision-making processes related to biodiversity conservation and sustainable use must be promoted. This includes ensuring that women are represented in policy-making bodies, community meetings and other decision-making forums.

Method of Computation

This indicator is a binary indicator and must be compiled from the answers to five[26] questions:

23.1 Does your country have mechanisms for facilitating the full, equitable, meaningful and informed participation and leadership of all women and girls at all levels of action, engagement, policy and decision-making related to biodiversity?

23.2 Has your country adopted legislation or policy measures that explicitly recognize and protect all women and girl's rights and access to land and natural or biodiversity resources?

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[26] Assuming the recommendation to simplify and reduce the number of questions has been followed.

23.3 Does your country take a gender-responsive approach in the national implementation of the Global Biodiversity Framework?

23.4[27] Has your country conducted sex-disaggregated data collection and analyses to assess the differential impacts of biodiversity policies and programmes?

23.5 Are [women and girls contributions and roles] [gender perspectives] considered and incorporated in your country's national reports or national biodiversity strategy and action plan?

There are four[28] possible answers to each of these questions:

(i) No
(j) No, but under development
(k) Yes, partially
(l) Yes, fully

A "No" answer implies that:

- there are no mechanisms in place to facilitate the participation and leadership of women and girls at any level of action, engagement, policy and decision-making related to biodiversity (23.1)
- there is no recognition of women and girls' rights related to land and natural or biodiversity resources in legislation or policy (23.2)
- there is no recognition of gender in the implementation of the Framework (23.3) nor in national reports or the national biodiversity strategy and action plan (23.5)
- no sex-disaggregated data has been collected (23.4)

A "No, but under development" answer implies a concerted effort at the national level to:

- begin the process of facilitating the inclusion of women and girls (23.1) and recognize their rights (23.2) through the proposal of official legislation or measures. For example, there may be a drafted bill, proposed text or consultation but these have not yet been ratified nor implemented.
- recognise gender in the application of the Framework (23.3) or in national reports or the national biodiversity strategy and action plan (NBSAP – 23.5). That is, gender is explicitly mentioned in proposed initiatives for the implementation of the Framework (e.g. the establishment of a new protected area – 23.3) or the NBSAP has been revised to include gender considerations but not yet adopted (23.5).
- collect sex-disaggregated data but none is available yet, e.g. surveys have been revised to include gender considerations but not been distributed yet (23.4)

In all cases, clear efforts can be seen (e.g. draft bills, revised reporting, ...) to progress towards the target but these are not yet in place and producing results.

A "Yes, partially" answer implies that:

- mechanisms are in place (e.g. bills ratified, resources allocated) to facilitate the full, equitable, meaningful and informed participation or leadership of women and girls at different levels of action, engagement, policy or decision-making (23.1). That is, either participation or leadership may still be missing and not all women and girls are represented at all levels of action, engagement, policy or decision-making.
- legislation or policy measures that explicitly recognize and protect women and girl's rights or access to land or natural or biodiversity resources (23.2). That is, either legislation or policy may still be missing or failing to protect both rights and access to either land or natural or biodiversity resources.

[27] Question 23.4 here corresponds to 23.6 in the SBSTTA document as the original 23.4 and 23.5 are recommended to be removed.
[28] Assuming the recommendation to make all answers consistent across questions has been followed.

- gender is recognized in the application of the Framework (23.3) or in national reports or NBSAP (23.5) but the resources, both human and/or financial, are lacking to implement the new gender-responsive approach.
- surveys designed to collect sex-disaggregated data have been produced and are being used and distributed (23.4). Select this answer even if no data is available yet from the release of these surveys.

In each of the cases outlined above some elements of the question have not been achieved or the resources for them to be effectively implemented are lacking.

A “Yes, fully” answer implies that all the conditions outlined in “Yes, partially” have been met. Namely that:

- mechanisms are in place (e.g. bills ratified, resources allocated) to facilitate the full, equitable, meaningful and informed participation and leadership of women and girls at all levels of action, engagement, policy or decision-making (23.1).
- legislation and policy measures that explicitly recognize and protect women and girl’s rights and access to land or natural or biodiversity resources are fully in place and covering all aspects of 23.2.
- gender is recognized in the application of the Framework (23.3) or in national reports or NBSAP (23.5) and these have been implemented in such a way that can be objectively verified (e.g. the impact on women and girls was studied in the proposal of a new protected area – 23.3).
- sex-disaggregated data are being collected and analyzed (23.4)

Note: further information on progress towards the target can be provided in the free text section of the reporting tool.

Annex: Glossary of key terms in the monitoring framework

The following glossary is as a reference only. The definitions included do not represent negotiated or agreed definitions, but they represent definitions that are used in the headline and binary indicators of the monitoring framework for the Kunming-Montreal Global Biodiversity Framework. The definitions are provided to help guide for Parties in applying the monitoring issues, to use as relevant or applicable.

Term	Definition
Above-ground biomass	All living biomass above the soil including stem, stump, branches, bark, seeds, and foliage. (FAO, 2004-2021)
Access and benefit sharing regulations and measures	Measures and regulations pertaining to the access and benefit-sharing of genetic resources set out in Article 1 of the Convention on Biological Diversity.
Access to information	Access to Information has two principle components: the obligation for states to have a legal framework that is also implemented in practice, that: entitles public to request access to information (documents and other information recorded in any format) and to respond to such requests in a timely fashion and obliges authorities to ensure that information of public interest is put into the public domain proactively, without the need for requests. (UN Stats)
Access to justice	The ability of people to seek and obtain a just resolution of legal problems through a wide range of legal and justice services. These services include legal information, counsel and representation, formal (e.g. courts) and alternative dispute resolution, and enforcement mechanisms. Emphasis should also be placed on legal empowerment, which enables people's meaningful participation in the justice system and builds their capability to understand and use the law for themselves. The rule of law requires impartial and non-discriminatory justice. Without equal access, a large portion of the population can be left behind and their vulnerabilities exposed. (OECD, 2021)
Action plan	An official strategy or course of action to deliver on the goals of the Framework.
Adaptation to climate change	Adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities. (IPBES, 2018)
Agricultural land	Land used primarily to grow crops and raise livestock. Forestry, fisheries and aquaculture activities may be included to the extent that they are secondary activities conducted on the agricultural area of the farm holdings, for example rice fish farming and similar systems. (FAO, 2004-2021)
Air filtration services	Air filtration services are the ecosystem contributions to the filtering of air-borne pollutants through the deposition, uptake, fixing and storage of pollutants by ecosystem components, particularly plants, that mitigates the harmful effects of the pollutants. This is most commonly a final ecosystem service. (SEEA, 2021)
Alien invasive species	An alien species whose introduction and/or spread threaten biological diversity. (Convention, Article 8(h))

Alien species	A species, subspecies or lower taxon, introduced outside its natural past or present distribution; includes any part, gametes, seeds, eggs, or propagules of such species that might survive and subsequently reproduce. (Convention, Article 8(h))
All areas	For the purpose of the Convention, the term 'all areas' generally refers to the entire territory of each country and thus include all terrestrial, marine and freshwater ecosystems
Areas of particular importance for biodiversity	Sites that contain significant populations/extents of threatened or geographically restricted species or ecosystems, or that have significant ecological integrity or irreplaceability, significance for the maintenance of biological processes, or provide significant ecological connectivity to maintain populations of species. Key Biodiversity Areas are nationally identified sites using standardised criteria encompassing each of these elements and encompassing existing systems for identifying areas of particular importance for biodiversity, such as Important Bird and Biodiversity Areas and Alliance for Zero extinction sites. (Plumptre et al., 2024)
Benefit	Advantage that contributes to wellbeing from the fulfilment of needs and wants. (IPBES, 2019)
Benefits arising from the utilization of genetic resources or traditional knowledge associated with genetic resources	Benefits may include monetary and non-monetary benefits, including but not limited to those listed in the Annex of the Nagoya Protocol. (Annex of the Nagoya Protocol)
Biodiversity	Refer to the definition of "Biological diversity".
Biodiversity-based activities, products and services	These are the commercial and non-commercial action and products that result from the collection, production or transformation of biological resources. They are found in industries as varied as food and beverage, cosmetics, pharmaceuticals, paper, textiles, energy, and handicrafts. Services based on biodiversity are those that derive value from genetic resources, species and ecosystems, such as nature-based tourism, pollination, and water treatment. The sustainable production, use and trade of biodiversity-derived products and services provide developing countries with valuable opportunities for biodiversity conservation, poverty reduction, economic diversification, value addition, improved livelihoods, and the empowerment of vulnerable groups, including women and ethnic minorities.
Biodiversity-inclusive	Inclusive of biodiversity conservation and sustainable use considerations.
Biodiversity-inclusive urban planning	Urban planning is the process that is applied as a way to organize the dynamics of human actions in cities, with the purpose of stipulating guidelines that order spatial occupation through typological patterns of use, mobility, distribution of equipment, services, and natural areas in the territory, in order to provide uniformity in the distribution of the onus and advantages generated by the development of the infrastructures. The planning, furthermore, aims to announce in advance what can be done in the face of solving problems that may hinder the dynamics of functioning that involve cities. The Framework specifically calls for such processes to be biodiversity inclusive. (Eckert & Padilha, 2021)

Biodiversity offsets	Biodiversity offsets are "measurable conservation outcomes resulting from actions designed to compensate for significant residual adverse biodiversity impacts arising from project development after appropriate prevention and mitigation measures have been taken." (BBOP, 2018). They are usually under a no net loss or a net gain objective. There are three main types of biodiversity offsets: 1. One-off biodiversity offsets; 2. payments in-lieu and 3. biobanking.
Biodiversity-related risks to business and financial institutions	Biodiversity-related risks to businesses and financial institutions are categorised as: Ecological risks, i.e. risks related to biodiversity-related ecological impacts and dependencies, linked to biodiversity loss or ecosystems degradation. Liability risks, where parties who have suffered biodiversity-related loss or damage seek compensation for those they hold responsible. Risks related to achieving transformative change for biodiversity, including regulatory risks, market risks and financial risks. (OECD)
Biodiversity-positive subsidies	A subsidy that reduces directly or indirectly the use of something that has a proven, specific, negative impact on biodiversity. Subsidies include direct payments from government and preferential tax treatments (e.g. VAT exemptions). Non-exhaustive list of examples: Payments from government to private land-users/owners to restore land; Preferential land tax for forests under protection or restoration; Agri-environmental payments promoting habitat protection and restoration.
Biodiversity-relevant taxes, fees and charges	Payment to the government levied on tax bases with a proven, specific, negative impact on the biodiversity. They include taxes on pollution and natural resource/land use. Non-exhaustive list of examples: Fertilisers and pesticides taxes; Water pollution taxes and water abstraction charges; Fishing and hunting licence fees; Protected area entrance fees; Taxes and fees/charges for timber harvest
Biodiversity-relevant tradable permit schemes	Market-based instruments that provide allowance or permission to engage in an activity under a cap. These permits can be traded. Non-exhaustive list of examples: Individual transferable quotas (ITQs) for fisheries; Tradable water rights; Salinity trading schemes; Tradable development rights.
Biological diversity	The variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems. (Convention, Article 2)
Biological resources	Includes genetic resources, organisms or parts thereof, populations, or any other biotic component of ecosystems with actual or potential use or value for humanity. (Convention, Article 2)
Biological stock	A subpopulation of a species inhabiting a particular geographic area, having similar biological characteristics (e.g. growth, reproduction, mortality) and negligible genetic mixing with other adjacent subpopulations of the same species. (FAO, 2004-2021)

Biomass corresponding to Maximum Sustainable Yield (BMSY)	Biomass corresponding to Maximum Sustainable Yield from a production model or from an age- based analysis using a stock recruitment model. Often used as a biological reference point in fisheries management, it is the calculated long-term average biomass value expected if fishing at the maximum rate of fishing mortality. (FAO, 2004-2021)
Biosafety	This concept refers to the need to protect human health and the environment from the possible adverse effects of the products of modern biotechnology. (Cartagena Protocol, 2000)
Biotechnical research activities	The study of scientific knowledge related to biotechnology (see biotechnology).
Biotechnology	Under the Convention, "biotechnology" means any technological application that uses biological systems, living organisms or derivatives thereof, to make or modify products or processes for specific use (Convention, Article 2).
Built-up area of cities	Conventionally, built up areas of cities are areas occupied by buildings and other artificial surfaces. (UN Stats)
Capacity-building	In this strategic framework, capacity is described as "the ability of people, organizations and societies as a whole to achieve the biodiversity-related goals and action targets", and capacitybuilding and development is understood as "the process whereby people, organizations and society as a whole unleash, strengthen, create, adapt and maintain capacity over time to achieve positive biodiversity results." Capacitybuilding and development is considered at three levels: the enabling environment, organizational and individual levels. (Adapted from UNDP, 2017)
Capacity development	The process whereby people, organizations and society as a whole unleash, strengthen, create, adapt and maintain capacity over time to achieve positive biodiversity results. Capacitybuilding and development is considered at three levels: the enabling environment, organizational and individual levels. (UNDP, 2017)
Capacity-building measures	For the purpose of the Framework, capacity building measures refer to administrative, policy and legislative instruments that are used for capacity-building and development.
Census population size	Is the number of adult individuals present in a discrete area.
Children	A child is recognized as a person under 18, unless national laws recognize the age of majority earlier. (UNICEF)

City	A range of accepted definitions of the "city" exist, from those based on population data and extent of the built-up area to those that are based solely on administrative boundaries. These definitions vary within and between nations, complicating the task of international reporting for the SDGs. Definitions of cities, metropolitan areas and urban agglomerations also vary depending on legal, administrative, political, economic or cultural criteria in the respective countries and regions. Since 2016 UN-Habitat and partners organized global consultations and discussions to narrow down the set of meaningful definitions that would be helpful for the global monitoring and reporting process. Following consultations with 86 member states, the United Nations Statistical Commission, in its 51st Session (March 2020) endorsed the Degree of Urbanisation (DEGURBA) as a workable method to delineate cities, urban and rural areas for international statistical comparisons. [1] This definition combines population size and population density thresholds to classify the entire territory of a country along the urban-rural continuum, and captures the full extent of a city, including the dense neighbourhoods beyond the boundary of the central municipality. DEGURBA is applied in a two-step process: First, 1 km2 grid cells are classified based on population density, contiguity and population size. Subsequently, local units are classified as urban or rural based on the type of grid cells in which majority of their population resides. For the computation of SDG indicator 11.7.1, countries are encouraged to adopt the degree of urbanisation to define the analysis area (city or urban area).
Climate action	Climate action refers to efforts taken to combat climate change and its impacts. These efforts include, but are not limited to, reducing greenhouse gas emissions to the atmosphere, reducing concentrations of greenhouse gasses in the atmosphere or ocean (reversing the associated effects of greenhouse gases (e.g. by enhancing ocean alkalinity), and/or taking action to build resilience or promote adaptation. (EU)
Climate change	The United Nations Framework Convention on Climate Change (UNFCCC), in its Article 1, defines climate change as: 'a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods'.
Coastal and marine	All connected saline ocean waters characterised by waves, tides and currents, this includes IUCN Global Ecosystem Typologies (GET): Marine shelfs (M1); pelagic ocean waters (M2); deep sea floors (M3); semi-confined transitional waters biome (FM1); shoreline systems biome (MT1); supralittoral coastal systems biome (MT2); brackish tidal systems biome (MFT1); anthropogenic marine systems (M4); anthropogenic shorelines (MT3). (Adapted from TNFD, 2023)
Community-based monitoring and information systems	Community-based monitoring and information systems (CBMIS) refer to initiatives by indigenous peoples and local community organisations to monitor their community's well-being and the state of their territories and natural resources, applying a mix of traditional knowledge and innovative tools and approaches. (FPP, 2015)
Complementary indicator	A list of optional indicators for thematic or in-depth analysis of each goal and target which may be applicable at global, regional, national, and subnational levels (CBD/COP/DEC/15/5).

Compliance	The fulfilment by the contracting parties of their obligations under a multilateral environmental agreement and any amendments to the multilateral environmental agreement (Source: Guidelines on Compliance with and Enforcement of MEAs, 2002). The systems adopted under MEAs to promote compliance (e.g. UNFCCC compliance refers to a country/company/ individual fulfilment of his emissions and reporting commitments). The components of compliance mechanisms can be analysed into four categories: a) performance information; b) multilateral institutional procedures; c) non-compliance response measures; and d) dispute settlement procedures. (UNEP, 2002)
Component indicator	A list of optional indicators that, together with the headline indicators, cover components of the goals and targets of the Kunming-Montreal Global Biodiversity Framework which may apply at the global, regional, national and subnational levels (CBD/COP/DEC/15/5).
Connection to nature	The positive interaction, experience, way of relating and relationships between people and nature. It usually implies a sense of attachment to nature by people.
Connectivity	Refer to the definition of "Ecological connectivity".
Conservation	The management of human interactions with genes, species, and ecosystems so as to provide the maximum benefit to the present generation while maintaining their potential to meet the needs and aspirations of future generations; encompasses elements of saving, studying, and using biodiversity. (IPBES, 2019)
Consumers	Individuals who acquire, consume or use goods and services for personal use, either for themselves or for others, and not for resale, commercial or trade, business, craft or profession purposes. (CSRD, 2023)
Control of invasive alien species	Direct action(s) taken to reduce or suppress the distribution, abundance, spread and impacts of invasive alien species within a defined geographic area (FAO, 1995)
Culture and practices	Culture has been defined as "that complex whole which includes knowledge, belief, art, morals, law, custom, and any other capacities and habits acquired by man as a member of society". In other words, culture is a patterned way of life shared by a group of people. Culture encompasses all that human beings have and do to produce, relate to each other and adapt to the physical environment. It includes agreed-upon principles of human existence (values, norms and sanctions) as well as techniques of survival (technology). Culture is also that aspect of our existence which makes us similar to some people, yet different from the majority of the people in the world… it is the way of life common to a group of people, a collection of beliefs and attitudes, shared understandings and patterns of behaviour that allow those people to live together in relative harmony but set them apart from other peoples. (Kipuri, 2011)
Customary sustainable use by indigenous peoples and local communities	The uses of biological resources in accordance with traditional cultural practices that are compatible with conservation or sustainable use requirements. (Convention, Article 8(j))

Decision-making	The process of making decisions can happen at the individual level or amongst groups and entails the prioritisation of certain values. This prioritization greatly influences which issues are found worthy of consideration, do and do not become part of the agenda, as well as determine which decision-makers are considered socially legitimate to participate in the process. (IPBES, 2022)
Degraded ecosystem	An ecosystem where, due to any process or activity, the viability of ecosystem functions and processes, and hence biodiversity, have been removed or lessened. (Dunster and Dunster, 1996)
Degraded land	The reduction or loss of the biological or economic productivity and complexity of rain fed cropland, irrigated cropland, or range, pasture, forest and woodlands resulting from a combination of pressures, including land use and management practices. (UNCCD)
Dependencies and impacts	Dependencies on biodiversity are environmental assets and ecosystem services that a person or an organisation relies on to function, including water flow and quality regulation; regulation of hazards like fires and floods; pollination; carbon sequestration. Impacts on biodiversity refer to a change in the state of nature (quality or quantity), which may result in changes to the capacity of nature to provide social and economic functions. Impacts can be positive or negative, including pollution of air, water, soil; fragmentation or disruption of ecosystems and habitats for species; alteration of ecosystem regimes. (SBTN, 2020)
Development of and access to innovation	The development of new, transformative and innovative solutions for biodiversity needs to be fostered and access to those solutions improved. Parties and actors in the innovation space should direct research and development investments into addressing biodiversity challenges. Harnessing emerging technologies, such as artificial intelligence, as well as the innovations and practices of indigenous peoples and local communities with their free, prior and informed consent may offer new opportunities to improve the conservation, sustainable use and valorization of biodiversity and the fair and equitable sharing of benefiting arising from the utilization of genetic resources.
Disaster risk reduction	The concept and practice of reducing disaster risks through systematic efforts to analyze and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, evidence-based management of land and the environment, and improved preparedness for adverse events. (IPBES, 2018)
Disclosing	The act of making information available to the general public and stakeholders, in a clear and transparent manner. In this context, it means making information publicly available about a company’s impacts and dependencies on biodiversity, and its risks from biodiversity loss.
Ecological connectivity	Connectivity (i.e. ecological connectivity) is the unimpeded movement of species and the flow of natural processes that sustain life on Earth (CMS, 2020). It may thus also refer to continuous ecosystems often connected through ecological corridors. There are two types of connectivity: structural (in which the continuity between ecosystems is identified) and functional (in which the movement of species or processes is verified).

Ecological integrity	The degree to which the ecosystem's composition, structure and function resemble those characteristic of its natural range of variation, which may be defined from historical or minimally disturbed reference states, replicated contemporary samples, ecosystem models and/or expert judgement. (Nicholson et al., 2024)
Ecological restoration	The process of managing or assisting the recovery of a natural ecosystem that has been degraded, damaged or destroyed, as a means of improving or sustaining ecosystem resilience, ecological integrity and conserving biodiversity. (Adapted from CBD, 2016) See also ecosystem restoration.
Ecosystem	A dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit (Convention on Biological Diversity, 1992). Specifically, ecosystems are made up of living components (biotic complexes and assemblages of species), the abiotic environment, the processes and interactions within and between the biotic and abiotic components, and the physical space in which these operate (Keith et al., 2013).
Ecosystem collapse	The endpoint of ecosystem decline, when an ecosystem loses its defining features (i.e., species, assemblages, structure, and functions) and is replaced by a different, often depauperate, ecosystem type. Collapse can be irreversible, but some ecosystems may recover, over long timeframes or with restoration. The risk of ecosystem collapse is the likelihood that an ecosystem will collapse over a specified timeframe (Keith et al., 2013).
Ecosystem conversion	Refer to situations in which, for a given location, there is a change in ecosystem type involving a distinct and persistent change in the ecological structure, composition and function which, in turn, is reflected in the supply of a different set of ecosystem services. (SEEA, 2021)
Ecosystem extent	Is the size of an ecosystem asset, which are contiguous spaces of a specific ecosystem type characterized by a distinct set of biotic and abiotic components and their interactions. (SEEA, 2021)
Ecosystem function	The flow of energy and materials through the biotic and abiotic components of an ecosystem. It includes many processes such as biomass production, trophic transfer through plants and animals, nutrient cycling, water dynamics and heat transfer. (IPBES)
Ecosystem functional groups	Ecosystem functional groups comprise "a group of related ecosystems within a biome that share common ecological drivers, which in turn promote similar biotic traits that characterise the group. Derived from the top-down by subdivision of biomes" (Keith et al., 2022, https://global-ecosystems.org/). Examples include: M1.1 seagrass meadows; M1.2 kelp forests and M1.3 photic coral reefs in the marine realm; T1.1 tropical/subtropics lowland rainforests and T4.2 pyric tussock savannas in the terrestrial realm; F1.6 episodic arid rivers and F2.8 artesian springs and oasis in the freshwater realm; and MFT1.3 coastal saltmarshes and reedbeds in the transitional realm between freshwater, marine and terrestrial realms.

Ecosystem restoration	Any intentional activity that initiates or accelerates the recovery of an ecosystem from a degraded state. Active restoration includes a range of human interventions aimed at influencing and accelerating natural successional processes to recover biodiversity ecosystem service provision. Passive restoration includes reliance primarily on natural process of ecological succession to restore degraded ecosystems but may include measures to protect a site from processes that currently prevent natural recovery (e.g. protection of degraded forests from overgrazing by livestock or unintentional human-induced fire). Ecosystem restoration includes: 1) ecological restoration of natural ecosystems; and 2) rehabilitation of converted and degraded areas (e.g. degraded agricultural lands) to improve social-ecological resilience through the provision of ecosystem services.
Ecosystem service	A service that is provided by an ecosystem as an intrinsic property of its functionality (e.g. pollination, nutrient cycling, nitrogen fixation, fruit and seed dispersal) contributing to the benefits (and occasionally disbenefits) that people obtain from ecosystems. These include provisioning services such as food and water; regulating services such as flood and disease control; and cultural services such as recreation and sense of place. This includes the whole pathway from ecological processes through to final ecosystem services, goods and anthropocentric values to people. In the original definition of the Millennium Ecosystem Assessment the concept of ecosystem goods and services is synonymous with ecosystem services. (IPBES, 2016)
Ecosystem type	Reflects a distinct set of abiotic and biotic components and their interactions. Ecosystem types can be described, classified, and identified using the IUCN Global Ecosystem Typology (Keith et al., 2022).
Ecosystem-based approaches	Refer to the use of biodiversity and ecosystem services as part of an overall strategy to help address the adverse effects of climate change. Ecosystem-based mitigation refers to the use of ecosystems for their carbon storage and sequestration service to aid climate change mitigation. Ecosystem-based adaptation aims to maintain and increase the resilience and reduce the vulnerability of ecosystems and people in the face of the adverse effects of climate change. Such approaches can include sustainable management, conservation and restoration of ecosystems, as part of an overall adaptation strategy that takes into account the multiple social, economic and cultural co-benefits for local communities. Ecosystem-based disaster risk reduction is the sustainable management, conservation and restoration of ecosystems to reduce disaster risk, with the aim of achieving sustainable and resilient development.
Effective management processes	Effective management process may be utilised instead of or as a complement to spatial planning to address land use and sea use change. This may include such things as environmental assessment, environmental impact assessment and strategic environmental impact assessment.
Effective population size	Is a way to quantify the rate of genetic change, or genetic erosion. Effective population size of a population is related to the number of adult/ breeding individuals in a population that contribute offspring to the next generation, the relative evenness of their offspring production, sex ratio, and other factors. The current state of Ne has important meaning for genetic biodiversity as it represents ongoing genetic erosion. Any population with Ne below 500 is likely to be losing genetic diversity, and signals ongoing loss of genetic diversity.

Effective restoration	Effective Restoration is standards-based restoration underpinned by agreed principles that results in net gain for biodiversity, ecosystem integrity, and human well-being. It integrates spatial planning, addresses both process and outcomes, achieves multiple benefits, and is assessed against clear goals and objectives using measurable indicators. Different types of restoration will achieve different levels of outcomes: to enhance biodiversity and ecosystem functions and services, ecological integrity and connectivity.
Empowerment	The process by which people gain control over the factors and decisions that shape their lives. It is the process by which they increase their assets and attributes and build capacities to gain access, partners, networks and/or a voice, in order to gain control. (IPBES, 2019)
Enhancement [of biodiversity and nature's contribution to people]	To improve the quality and quantity of biodiversity and nature's contribution to people.
Environmental economic accounting	Environmental-economic accounts are integrated statistics that illuminate the relationship between the environment and the economy, both the impacts of the economy on the environment and the contribution of the environment to the economy. Environmental-economic accounts can provide information about the extraction of natural resources, their use within the economy, natural resource stock levels, the changes in those stocks during a specific period and economic activity related to the environment. Environmental-economic accounts present this information in physical and monetary terms, as appropriate. (SEEA, 2021)
Environmental human rights defenders	Individuals and groups who, in their personal or professional capacity and in a peaceful manner, strive to protect and promote human rights relating to the environment, including water, air, land, flora and fauna (UNEP)
Environmental impact assessment	Environmental impact assessment is a process of evaluating the likely environmental impacts of a proposed project or development, taking into account interrelated socioeconomic, cultural and human-health impacts, both beneficial and adverse. (CBD/COP/DEC/6/7)
Environmentally harmful subsidies	All kinds of financial support and regulations that are put into place to enhance the competitiveness of certain products, processes or regions, and that, together with the prevailing taxation regime, (unintentionally) discriminate against sound environmental practices. (OECD)
Equal opportunity and capacity to contribute	Can effectively and fully participate in the achievement of the Convention's goals without any discrimination, exclusion or restriction made on the basis of sex, respecting the rules set out in the Convention on the Elimination of All Forms of Discrimination Against Women. (Adapted from UN ESA and UN Women)
Equal opportunity, capacity and rights	Equality refers to the idea that everyone, regardless of their gender, should have the same rights, opportunities and access to resources, including land and natural resources. Discrimination and biases that may prevent individuals from achieving their full potential due to their gender or other characteristics need to be eliminated.

Equal rights and access to land and natural resources [for women]	In the context of the Framework, this relates to rights of women in relation to land and natural resources. Women are often the primary stewards of biodiversity, and when women have secure land tenure, they are more likely to engage in sustainable land use practices that conserve biodiversity and protect ecosystems. Women who own and control land are also better able to provide for their families, secure their livelihoods and invest in their communities, leading to improved health and education outcomes. Achieving equal rights may require changes to laws and policies and cultural norms, including those related to rules around land registration and ownership, and practices.
Eradicate	Eliminate/extirpate an invasive alien species from a defined geographic area even in the absence of all preventive measures obviating the necessity for further control measures (Dowdle, 1998). The time period after which an invasive alien species can be considered eradicated depends on the species and location. (IPBES, 2023)
Establishment of invasive alien species	Production of a viable, self-sustaining population. (IPBES, 2023)
Eutrophication	Nutrient enrichment of an ecosystem, generally resulting in increased primary production and reduced biodiversity. In lakes, eutrophication leads to seasonal algal blooms, reduced water clarity, and, often, periodic fish mortality as a consequence of oxygen depletion. The term is most closely associated with aquatic ecosystems but is sometimes applied more broadly. (IPBES, 2019)
Ex situ conservation	Conservation actions implemented in captive breeding/propagation facilities (from which individuals can be reintroduced back into native ranges), i.e. in conditions under which individuals are spatially restricted with respect to their natural spatial patterns or those of their progeny, are removed from many of their natural ecological processes, and are managed on some level by humans. (McGowan et al., 2024)
Extinction	A species is extinct when there is no reasonable doubt that the last individual has died. Detecting extinction requires exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), over a time frame appropriate to the taxon’s life cycle and life form, throughout the species' historic range. (IUCN, 2012)
Extinction rate	The number of species going extinct expressed over a unit of time. The challenges of detecting extinctions mean that there are often time-lags before a species can be declared extinct, so extinction rates are most accurately estimated retrospectively. Moreover, absolute extinction rates are also difficult to estimate given considerable uncertainty over the total number of species on the planet. It is therefore useful to compare relative extinction rates, expressed as extinctions per million species per year (E/MSY). Mean fossil species’ lifetimes produce a background extinction rate of 0.1–1 E/MSY, while human activities have driven species extinct at a rate perhaps 1,000 times higher. (McGowan et al., 2024)

Extinction risk	The probability that a species may go extinct (q.v.). Extinction risk is extremely difficult to quantify for individual species, so the commonest approach to assessing risk is to use the categories and criteria of the IUCN Red List, which range from Least Concern to Critically Endangered and Extinct. Detecting trends in extinction risk cannot be achieved by simply comparing the proportion of species that are threatened (q.v.) or that are in different categories of risk over time, because most reclassifications result from improved knowledge. It is therefore necessary to distinguish those category changes resulting from genuine improvements or deterioration in status of species. The Red List Index (q.v.) is designed to summarise overall trends in extinction risk by doing exactly this. (McGowan et al., 2024)
Financial resources	Money and other financial vehicles available for the purposes of the Convention. These may be from private or public funds and take any form (e.g. investment, bond, loan, grant).
Fiscal and financial flows	Financial flows consist of transactions and other flows and represent the movement of money in and out of accounts. Fiscal flows refer to transactions in and out of national treasury accounts. (Adapted from Eurostat and FDR)
Flood control services	Consist of coastal protection services and river flood mitigation services. Coastal protection services are the ecosystem contributions of linear elements in the seascape, for instance coral reefs, sand banks, dunes or mangrove ecosystems along the shore, in protecting the shore and thus mitigating the impacts of tidal surges or storms on local communities. River flood mitigation services are the ecosystem contributions of riparian vegetation which provides structure and a physical barrier to high water levels and thus mitigates the impacts of floods on local communities. River flood mitigation services are synchronous with peak flow mitigation services in providing the benefit of flood protection. (SEEA, 2021)
Food waste	Food and associated inedible parts removed from the human food supply chain in the following sectors: retail and other distribution of food; food service (restaurants, schools, hospitals, other canteens, etc.); and households. “Removed from the human food supply chain” means one of the following end destinations: landfill; controlled combustion; sewer, litter/discards/refuse; co/anaerobic digestion; compost/aerobic digestion or land application. (UN Stats)
Forest	Land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds in situ. It does not include land that is predominantly under agricultural or urban land use. Forest is determined both by the presence of trees and the absence of other predominant land uses. (FAO, 2020)
Forest area with management plan	Forest area that has a long-term documented management plan, aiming at defined management goals, which is periodically revised. (FAO, 2020)

Free, prior and informed consent	Free implies that indigenous peoples and local communities are not pressured, intimidated, manipulated or unduly influenced and that their consent is given, without coercion; Prior implies seeking consent or approval sufficiently in advance of any authorization to access traditional knowledge respecting the customary decision-making processes in accordance with national legislation and time requirements of indigenous peoples and local communities; Informed implies that information is provided that covers relevant aspects, such as: the intended purpose of the access; its duration and scope; a preliminary assessment of the likely economic, social, cultural and environmental impacts, including potential risks; personnel likely to be involved in the execution of the access; procedures the access may entail and benefit- sharing arrangements; Consent or approval is the agreement of the indigenous peoples and local communities who are holders of traditional knowledge or the competent authorities of those indigenous peoples and local communities, as appropriate, to grant access to their traditional knowledge to a potential user and includes the right not to grant consent or approval; Involvement refers to the full and effective participation of indigenous peoples and local communities, in decision-making processes related to access to their traditional knowledge. Consultation and full and effective participation of indigenous peoples and local communities are crucial components of a consent or approval process. (CBD, CBD/COP/DEC/14/13)
Full equitable meaningful and information participation and leadership	Complete, not missing anything. Fair and impartial. Considered with equal weight and given significant meaning and importance. Informed implies that information is provided that covers relevant aspects of the action, engagement, policy and decision-making under consideration, such as: its intended purpose; its duration and scope; a preliminary assessment of its likely economic, social, cultural and environmental impacts, including potential risks; personnel likely to be involved in its execution and procedures it may entail. Participation is understood as the act of engaging in society's activities. It refers to the possibility to influence decisions and have access to decision-making processes. Social participation creates mutual trust among individuals, which forms the basis for shared responsibilities towards the community and society. The position of being a leader and the action of leading a group of people or an organisation. Leadership implies decision-making authority and recognition of this authority by others.
Full protection of human rights defenders	This refers to measures that can be taken to safeguard individuals or groups who work to protect the environment, advocate for environmental justice, and defend the rights of indigenous peoples and local communities. Key aspects of protecting environmental human rights defenders could include but are not limited to: preventing violence and intimidation by providing legal protection, effective remedies and secure exercise of their rights free from reprisals and retaliation, and raising awareness about the important role of environmental human rights defenders.

Gender equality	The concept that women and men, girls and boys have equal conditions, treatment and opportunities for realizing their full potential, human rights and dignity, and for contributing to (and benefitting from) economic, social, cultural and political development. Gender equality is, therefore, the equal valuing by society of the similarities and the differences of men and women, and the roles they play. It is based on women and men being full partners in the home, community and society. Equality does not mean that women and men will become the same but that women's and men's rights, responsibilities and opportunities will not depend on whether they are born male or female. Gender equality implies that the interests, needs and priorities of both women and men and girls and boys are taken into consideration, recognizing the diversity of different groups and that all human beings are free to develop their personal abilities and make choices without the limitations set by stereotypes and prejudices about gender roles. Gender equality is a matter of human rights and is considered a precondition for, and indicator of, sustainable people-centred development. (UNICEF, 2017)
Gender Plan of Action	An officially negotiated and agreed upon document of the Kunming-Montreal Global Biodiversity framework who's purpose is to support and promote the gender responsive implementation of the post-2020 global biodiversity framework. The plan will also support a gender responsive approach to applying the implementation mechanisms associated with the framework. (CBD/COP/15/L.24)
Gender-responsive	A gender responsive approach is one that moves beyond 'do no harm' to 'do better', towards changing gender norms, roles and access to resources. Gender responsiveness refers to processes and outcomes that reflect an understanding of and take into account gender dynamics, roles, and inequalities in a given society, and which encourage equal participation and fair distribution of benefits. Gender responsive approaches are based on gender analysis to understand the norms and expectations for women and girls and men and boys in relevant contexts, to inform the design of appropriate interventions. (CBD, SBI3)
Genetic diversity	Is variation at the DNA level, including differences among individuals within populations of species and differences among populations of each species.
Genetic material	Any material of plant, animal, microbial or other origin containing functional units of heredity. (Convention, Article 2)
Genetic resources	Means genetic material of actual or potential value. (Convention, Article 2)
Global climate regulation services	The ecosystem contributions to reducing concentrations of GHG in the atmosphere through the removal (sequestration) of carbon from the atmosphere and the retention (storage) of carbon in ecosystems. These services support the regulation of the chemical composition of the atmosphere and oceans. (SEEA, 2021)
Global footprint of consumption	The area used to support the global population's consumption. The consumption Footprint (in GHa) includes the area needed to produce the materials consumed and the area needed to absorb the carbon dioxide emissions. (Adapted from GFN)
Global indicator	Indicator reported at the global level.

Green and blue spaces	Areas of vegetation, inland and coastal waters, generally in or near to urban areas including green roofs and walls, and other green infrastructure. These can have a range of positive effects on human physical and mental well-being and provide opportunities to reconnect with nature. Green and blue spaces also provide important habitats for species, improve habitat connectivity, provide ecosystem services and help mediate extreme events, if managed with such objectives in mind. (CBD/WG2020/5/4)
Habitat	The place or type of site where an organism or population naturally occurs. (Convention, Article 2)
Harmful or perverse incentives to biodiversity	Economic, legal and institutional incentives that emanate from policies or practices that induce unsustainable behaviour that destroys biodiversity, often as unanticipated side-effects of policies designed to attain other objectives
Headline indicator	A minimum set of high-level indicators, which capture the overall scope of the goals and targets of the Kunming-Montreal Global Biodiversity Framework to be used for planning and tracking progress as set out in decision 15/6. They are nationally, regionally and globally relevant indicators validated by Parties. These indicators can also be used for communication purposes. (CBD/COP/DEC/15/5)
Healthy and resilient levels	Levels of population abundance that are not substantially depleted in comparison with historical levels and not diminished to a level that reduces their contribution to ecosystem structure and function, or at which species face the threat of extinction. ‘Resilient levels’ imply that species’ populations are healthy throughout their native range and that no populations have been extirpated. (McGowan et al., 2024)
Human-induced extinction	Extinctions driven by human activities, rather than ‘natural’ extinctions such as those caused by, for example, volcanic eruptions, which would be extremely difficult to avoid. Human-driven extinctions include those resulting from natural phenomena, such as hurricanes, floods and fires, that are occurring at far higher intensity and frequency because of human-driven climate change (recognising that in practice it may be difficult to confirm that climate change has led to particular extinctions). (McGowan et al., 2024)
Human rights defenders	Everyone exercising their right, individually and in association with others, to promote and to strive for the protection and realization of human rights and fundamental freedoms at national and international levels, including trade unionists and some journalists. (UN Declaration on Human Rights Defenders, A/Res/53/144)
Human-wildlife conflict	Struggles that emerge when the presence or behaviour of wildlife poses an actual or perceived, direct and recurring threat to human interests or needs, leading to disagreements between groups of people and negative impacts on people and/or wildlife. (IUCN, 2022)
Impacts from invasive alien species	Impacts are changes to nature, nature’s contributions to people and/or good quality of life. Impacts can be observed or unobserved. Generally, negative impacts become more apparent and problematic when invasive alien species are well established, widespread and present for a long time. Along with their adverse effects, some invasive alien species may have positive impacts providing benefits to some people. (IPBES, 2023)

Impact of climate change	The consequences of realized risks on natural and human systems, where risks result from the interactions of climate-related hazards (including extreme weather/climate events), exposure, and vulnerability. Impacts generally refer to effects on lives, livelihoods, health and well-being, ecosystems and species, economic, social and cultural assets, services (including ecosystem services), and infrastructure. Impacts may be referred to as consequences or outcomes and can be adverse or beneficial. (IPCC)
In situ conservation	Conservation actions implemented in the wild (usually within the distribution of the target species). (McGowan et al., 2024)
Incentives	The opportunities and constraints that influence the behaviour of individuals and organisations in a society, deriving from a wide range of societal factors, including, but not limited to, from measures taken by governments.
Inclusive	Inclusion is defined as the process of improving the terms of participation, particularly for people who are disadvantaged, through enhancing opportunities, access to resources, voice and respect for rights. (UN DESA, 2016)
Independently verified forest management certification	Forest area certified under a forest management certification scheme with published standards and is independently verified by a third-party. (FAO, 2004-2021)
Indigenous and traditional technologies	Technologies employed by the native inhabitants of a country, and which constitute an important part of its cultural heritage and should therefore be protected against exploitation by industrialized countries. (EEA)
Indigenous peoples and local communities (IPLCs)	The Convention on Biological Diversity does not define the terms indigenous and local communities or Indigenous Peoples and Local Communities. The United Nations Declaration on the Rights of Indigenous Peoples does not adopt or recommend a universal definition for Indigenous Peoples (Decision CBD/COP/DEC/14/13). Indigenous people are also known as first peoples, aboriginal peoples, native peoples, or autochthonous peoples, are ethnic groups who are descended from and identify with the original inhabitants of a given region, in contrast to groups that have settled, occupied or colonized the area more recently. The distinctive groups, usually maintaining traditions or other aspects of an early culture that is associated with a given region, are protected in international or national legislation as having a set of specific rights based on their linguistic and historical ties to a particular territory, prior to later settlement, development, and or occupation of a region. Local community is a self-identified human group that relates to a life environment in collective ways that participate to define a shared territory and culture. The members of a local community have frequent chances of direct (possibly face-to-face) encounters and possess some common history, traditions, institutions, language, values and life plans. A local community can be long-standing ('traditional') or relatively new, include a single or multiple ethnic identities and be permanently settled or mobile. A local community should have a form of political identity that enables it to exercise its rights and responsibilities with respect to its territory and neighbors. (Adapted from IPBES, 2019)

Inland waters	All landlocked and/or freshwater bodies, including rivers, lakes, inland seas and groundwater, this includes IUCN Global Ecosystem Typologies: rivers and streams (F1), lakes (F2), palustrine wetlands biome (TF1), artificial freshwaters (F3)
Innovation	The implementation of a new or significantly improved product (good or service), process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations. Innovation is an application of invention so that it improves conservation, sustainable use or monitoring of biodiversity. (UN HCR, 2017)
Institutions	Organisations, both public and private, founded and organised around a common goal.
Integrated assessment	The essential characteristics of integrated assessments are the simultaneous consideration of the multiple dimensions of environmental problems, the integration of various practices and coordinated development. (IPBES, 2016)
Integrated spatial planning	A whole-of-government process to create land and sea use plans to achieve social, economic and ecological objectives for sustainable development." (Adapted from UNDP, 2022).
Integrity	Refer to the definition of “Ecological integrity”.
Key Biodiversity Area	Sites that contribute significantly to the global persistence of biodiversity. (IUCN, 2016)
Known threatened species	Species that have been documented as threatened (qv) on the global IUCN Red List of Threatened Species or on national red lists (often using the guidelines for regional and national application of the IUCN Red List categories and criteria (IUCN 2012). Although many other species are highly likely to be threatened, those for which this is not yet formally ‘known’ (including large numbers of species that have not even been described to science) are excluded. (McGowan et al., 2024)
Land allocated to streets	Refers to the total area of the city/urban area that is occupied by all forms of streets. This indicator only includes streets available at the time of data collection and excludes proposed networks. (UN Habitat, 2018)
Land and sea use change	Land-use change includes the conversion of land cover (e.g. deforestation or mining), changes in the management of the ecosystem or agro-ecosystem (e.g. through the intensification of agricultural management or forest harvesting) or changes in the spatial configuration of the landscape (e.g. fragmentation of habitats). Similarly, sea-use change refers to measures and activities altering the use of marine areas, for example, coastal development, offshore aquaculture, mariculture, oil and gas exploration, and bottom trawling. (IPBES)

Landslide mitigation services	The ecosystem contributions, particularly the land stabilising effects of vegetation, that mitigates or prevents potential damage to human health and safety and damaging effects to buildings and infrastructure that arise from the mass movement (wasting) of soil, rock and snow. (SEEA, 2021)
Large and transnational companies and financial institutions	A large private or public firm which owns and controls productive assets and/or holds investments in two or more countries. The most commonly used criteria for company size are employment and annual revenue. The World Bank generally considers companies with over 300 employees and $15 million in annual revenue to be “large”. However, some countries or jurisdictions use different thresholds to define “large”. Parties may choose to rely on the World Bank criteria or nationally recognised criteria of their own. (Adapted from World Bank, 2020 and IFC)
Legal instruments	Formal written documents that represent a contractual duty or obligation and are recognized and enforceable by law.
Legislative framework	The sets of rules that structure lawmaking.
Living modified organisms	The Cartagena Protocol on Biosafety defines 'living modified organism' as any living organism that possesses a novel combination of genetic material obtained through the use of modern biotechnology. (IPBES, 2022)
Mainstreaming biodiversity	Biodiversity mainstreaming is generally understood as ensuring that biodiversity, and the services it provides, are appropriately and adequately factored into policies, strategies, plans and practices that rely and have an impact on biodiversity, so that it is conserved and sustainably used. A final definition may be proposed during COP16 as part of the Long-term Strategic Approach to Mainstreaming Biodiversity (see CBD/COP/DEC/15/6).
Maintain genetic diversity	The amount of genetic diversity (alleles, heterozygosity) does not decrease, and there is no loss of within-population genetic diversity or among population genetic diversity; the precise genetic composition may shift for adapting to environmental change. The Ne 500 indicator ensures maintenance of within-population genetic diversity. Some scientists have argued for a more conservative minimum Ne of 1000, though the Ne 500 recommendation remains common.
Maintenance of biodiversity and NCP	To keep the existing quantity and quality of biodiversity and nature’s contribution to people.
Managed/ anthropogenic ecosystems	Are predominantly influenced by human activities where a stable natural ecological state is unobtainable and future socio-economic interventions are required to maintain a new stable state. Examples (with reference to IUCN GET) are urban green spaces and croplands, artificial waterbodies and anthropogenic marine systems. Managed/anthropogenic ecosystems are defined based on the IUCN GET biomes. (Keith et al., 2020)
Maximum Sustainable Yield (MSY)	The greatest average amount of catch that can be harvested in the long-term from a stock under constant and current environmental conditions (e.g., habitat, water conditions, species birth, growth, or death rates of the stock), without affecting the long-term productivity of the stock. A composition and interactions, and anything that could affect stock can produce MSY if its abundance is above a certain level, usually around 50% of its unexploited abundance (but actual value can vary around that level, depending on the biological characteristics of the stock). (FAO)

Mitigate	In the context of IPBES, an intervention to reduce negative or unsustainable uses of biodiversity and ecosystems. (IPBES, 2018)
Mitigation of climate change	A human intervention to reduce the drivers of climate change and ocean acidification or enhance the sinks of greenhouse gases. (IPBES, 2018)
Modern biotechnology	Under the Cartagena Protocol, "modern biotechnology" means the application of in vitro nucleic acid techniques, including recombinant deoxyribonucleic acid (DNA) and direct injection of nucleic acid into cells or organelles, or fusion of cells beyond the taxonomic family, that overcome natural physiological reproductive or recombination barriers and that are not techniques used in traditional breeding and selection. (Cartagena Protocol, Article 3(i)).
Monetary ecosystem services flow accounts	Describe the ecosystem services generated by the ecosystem asset in monetary terms. Aggregate indicators in monetary terms, namely Gross Ecosystem Product (GEP) can be derived using relevant entries of ecosystem services in the monetary ecosystem services flow account. Metrics of monetary units are measured in terms of dollar or local currency. Indicators are measured in terms of their percentage change over an accounting period or with respect to the baseline period determined by countries. (SEEA, 2021)
Monitor	Monitoring is the repeated observation of a system in order to detect signs of change. (IPBES, 2019)
Multiple values of biodiversity	Biodiversity values include diverse considerations from ecological, genetic, economic, cultural, social, scientific, educational, recreational, aesthetic and intrinsic perspectives. Valuation and values of biodiversity require the recognition of a wide range of worldviews and plural value dimensions of the meaning and importance of nature associated with the quality of human life seen as interdependent in terms of biophysical, sociocultural, economic, health or holistic perspectives. (for a definition of value systems see the IPBES, 2020)
National biodiversity strategy and action plan	The Convention on Biological Diversity calls on each of its Parties to prepare a National Biodiversity Strategy and Action Plan (Article 6a) that establishes specific activities and targets for achieving the objectives of the Convention. These plans mostly are implemented by a partnership of conservation organizations. Species or habitats which are the subject of NBSAPs are the governments stated priorities for action and therefore raise greater concern where they are threatened. NBSAPs do not carry legal status and listed species and habitat types are not necessarily protected (although some are covered by other legislation) (Hesselink et al., 2007).
National accounting	The implementation of complete and consistent accounting techniques for measuring the economic activity of a nation, for example following the UN System of National Accounts. (UN Stats)
National budget	Total budget (income and expenditure) of a country.

National capacity self-assessment	An official process outlined by the United Nations and the GEF secretariat to assess the existing capacity of a nation to deliver on and implement the Convention. The primary goal of an NCSA is to determine national priorities for capacity development to better address global environmental issues. The NCSA will analyse the country's capacity strengths, constraints and needs, and recommend capacity development actions to address them. The focus is on a country's capacity requirements to implement the three "Rio Conventions" – biodiversity (CBD), land degradation (CCD), and climate change (UNFCC) – and other relevant Multilateral Environmental Agreements (MEAs). In addition, the NCSA process aims to identify cross-cutting capacity issues and foster synergies among the MEAs. (GEF, 2001; UNDP, 2005; UNDP 2010)
National indicator	Indicator reported at the level of nations.
Nationally determined contributions	Nationally determined contributions (NDCs) are at the heart of the Paris Agreement and the achievement of its long-term goals. NDCs embody efforts by each country to reduce national emissions and adapt to the impacts of climate change. The Paris Agreement (Article 4, paragraph 2) requires each Party to prepare, communicate and maintain successive nationally determined contributions (NDCs) that it intends to achieve. Parties shall pursue domestic mitigation measures, with the aim of achieving the objectives of such contributions. (UN FCCC)
Native biodiversity	A species (animal, plant or other organism) within its natural range, including shifting its range, without human involvement. (IPBES, 2023)
Native wild species	Species that occur naturally in the wild in the area under consideration. Invasive alien species and domesticated species are excluded. (McGowan et al., 2024)
Natural ecosystems	Natural ecosystems are predominantly influenced by natural ecological processes, functions drivers, and composed of native/indigenous species, relative to historic baselines or reference states (adapted from Nicholson et al 2021).
Natural or biodiversity resources	Natural or biological assets (raw materials) occurring in nature that can be used for economic production or consumption. (EU Commission, 2023)
Nature-based solutions	Refer to actions to protect, conserve, restore, sustainably use and manage natural or modified terrestrial, freshwater, coastal and marine ecosystems, which address social, economic and environmental challenges effectively and adaptively, while simultaneously providing human well-being, ecosystem services and resilience and biodiversity benefits including on mitigation, adaptation and disaster risk reduction. (UNEA, 2022)
Nature's contributions to people (NCP)	Nature's contributions to people (a concept similar to and inclusive of ecosystem services) refers to all the contributions from biodiversity to people's well-being or quality of life. They include (a) material contributions, such as the production of food, feed, fibre, medicines and energy, (b) regulating services, such as the regulation of air and water quality, climate regulation, pollination, regulation of pests and diseases and provision of habitat, and (c) other non-material contributions, such as learning, inspiration, health, physical, psychological, spiritual well-being and experiences and supporting identities and culture, as well as maintaining options for future generations. (CBD/WG2020/5/4)

Non-monetary values	The value attributable to an item or a service without relation to any acceptable cash price and for which a fixed or determinable amount of currency is absent (e.g. many ecosystem services, interpersonal good-will, health, etc.). (IPBES, 2016)
Nursery population and habitat maintenance services	The ecosystem contributions necessary for sustaining populations of species that economic units ultimately use or enjoy either through the maintenance of habitats (e.g., for nurseries or migration) or the protection of natural gene pools. This service is an intermediate service and may provide input to different final ecosystem services including biomass provision and recreation-related services. The potential metric is the size of biomass stocks dependent upon nursey and habitat services.
Ocean acidification	Ongoing reduction in the pH of the ocean, caused primarily by the uptake of carbon dioxide (CO2) from the atmosphere, but can also be exacerbated by local processes, such as the decomposition of organic material, microbial processes involved in nitrogen cycling and acidic wastewater discharge. (GOOS)
Open public space	Any open piece of land that is undeveloped or land with no buildings (or other built structures) that is accessible to the public without charge, and provides recreational areas for residents and helps to enhance the beauty and environmental quality of neighbourhoods. UN-Habitat recognizes that different cities have different types of open public spaces, which vary in both size and typology. Based on the size of both soft and hard surfaces, open public spaces are broadly classified into six categories: national/metropolitan open spaces; regional/larger city open spaces; district/city open spaces; neighbourhood open spaces; local/pocket open spaces; and linear open spaces. Classification of open public space by typology is described by the function of the space and can include: green public areas, riparian reserves, parks and urban forests, playground, square, plazas, waterfronts, sports field, community gardens, parklets and pocket parks. (UN Habitat, 2018)
Operations	All activities carried out by large and transnational companies and financial institutions to continue running and earning money.
Other effective area-based conservation measure	A geographically defined area other than a Protected Area, which is governed and managed in ways that achieve positive and sustained long-term outcomes for the in-situ conservation of biodiversity, with associated ecosystem functions and services and where applicable, cultural, spiritual, socio–economic, and other locally relevant values. (CBD/SBSTTA/22/L.2)
Outside biologically sustainable levels	When abundance falls below the MSY (maximum sustainable yield) level.
Overconsumption	The action or fact of consuming something to excess. Especially in the context of excessive use of natural resources.
Participatory process	Specific methods employed to achieve active participation by all members of a group in a decision-making process (Chatty et al., 2003).

Participatory research	Participatory research methods are a variety of qualitative and quantitative methods geared towards planning and conducting the research process with those people whose life-world and meaningful actions are under study (Bergold & Thomas, 2012). Participatory methods acknowledge the possibility, the significance, and the usefulness of involving research partners in the knowledge-production process (Bergold, 2007).
Participatory spatial planning	Spatial planning that involves stakeholders and rightsholders in all processes of decision-making and long-term effective management, taking into account traditional knowledge, ensuring that the voices of rightsholders and particularly marginalized groups are appropriately taken into account, to support healthy ecosystems, social equity and human rights.
Pathways of the introduction of alien species	The many ways in which species are moved from one location to another by human activities that give rise to an intentional or unintentional introduction. (IPBES, 2023)
Payments for ecosystem services	A voluntary transaction between ecosystem service users and service providers that are conditional on agreed rules of natural resource management for generating offsite services (Wunder, 2015). Ecosystem service providers and users may be individuals, companies or aggregations of actors. In some cases, a government may act on behalf of users.
Persons with disabilities	Persons with disabilities include those who have long-term physical, mental, intellectual or sensory impairments which in interaction with various barriers may hinder their full and effective participation in society on an equal basis with others. (UN CRPD, Article 2)
Pesticide	Pesticide means any substance, or mixture of substances of chemical or biological ingredients intended for repelling, destroying or controlling any pest, or regulating plant growth. (CBD/WG2020/5/4)
Physical ecosystem services flow accounts	The supply of final ecosystem services by ecosystem assets and the use of those services by economic units, including households, enterprises and government, in physical units. They use a supply and use table structure, the ecosystem service flow accounts record the flows of final ecosystem services supplied by ecosystem assets and used by economic units during an accounting period and also allow for the recording of intermediate services flows between ecosystem assets. (SEEA, 2021)
Plan of Action on Customary Sustainable Use of Biological Diversity	The objective of this plan of action is to promote, within the framework of the Convention, a just implementation of Article 10(c) at local, national, regional and international levels and to ensure the full and effective participation of indigenous peoples and local communities at all stages and levels of implementation. (Convention, Article 8(j))
Policy	A course or principle of action adopted or proposed by an organization or individual. (IPBES, 2016)
Policy framework	Policy frameworks are general structures, often encapsulated in documents or established practices, that provide institutions a guiding architecture for policy action across one or multiple policy areas. (Lahkno, 2023)

Pollination services	The ecosystem contributions by wild pollinators to the fertilization of crops that maintains or increases the abundance and/or diversity of other species that economic units use or enjoy. This may be recorded as a final or intermediate service. (SEEA, 2021)
Population	A group of individuals of the same species living in the same area at the same time and sharing a common gene pool, with little or no immigration or emigration.
Portfolios	The range of investments held by large and transnational companies and financial institutions.
Positive incentives (for biodiversity)	Positive incentives (also referred to as incentive-based or economic instruments) are the set of fiscal and other economic incentives to incorporate biodiversity-related costs and benefits into production and consumption. They are the policy instruments that use price signals to discourage activities harmful to biodiversity (e.g. a tax on pollution) or encourage activities that benefit biodiversity (e.g. payments for ecosystem services). In contrast to more traditional command-and-control approaches (e.g. restrictions on access or use, standards, etc.), economic instruments can, in theory, meet a given environmental objective at a lower total economic cost.
Potential invasive alien species	Species that may become invasive alien species if unchecked.
Potential open public space	The identification of open public spaces across cities can be implemented through, among other sources, analysis of high to very high-resolution satellite imagery, from base-maps provided by different organizations (e.g. OpenStreetMap, Esri, etc.) or as crowd-sourced and volunteered data. While these sources provide important baseline data for indicator 11.7.1, some of the identifiable spaces may not meet the criteria of being "accessible to the public without charge". The term "potential open public space" is thus used to refer to open public spaces which are extracted from the above-mentioned sources (based on their spatial character), but which are not yet validated to confirm if they are accessible to the public without charge. (UN Habitat, 2018)
Poverty eradication strategies	Governmental plans designed and actions taken in line with the United Nations SDG Goal 1 of "ending poverty in all its forms everywhere". (UN SDG)
Preventing introduction and establishment of invasive alien species	Involves taking action to avoid the introduction of an invasive alien species and is often more cost effective then eradicating it once it has become established. Conducting a risk analysis prior to the introduction of an alien species as well as enhancing border controls and quarantine, early warning mechanisms, rapid response measures and management plans are the types of actions that could be taken to help prevent the establishment of alien species.
Priority invasive alien species	Invasive alien species of special importance to a locality, causing particularly large or disproportionate impacts.

Priority sites	Ecosystems and habitats which are sensitive and susceptible to biological invasions and areas where impacts of invasive alien species on native components of biodiversity, as well as on social, economic or cultural values are high. Priority sites may include island ecosystems, protected areas, priority ecosystem restoration sites, areas with endemic species, areas with intensive farming and aquaculture, and sites of particular importance for biodiversity. Priority sites may be designated internationally and/or at the national level on the basis of their conditions and circumstances. (See also CBD/SBSTTA/24/3/Add.2/Rev.1, para. 76)
Protected area	A clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values. (Dudley et al., 2008)
Public and private activities	Commercial and other activities conducted by entities that are subject to control by government units and/or non-government individuals and corporations, with control being defined as the ability to determine general corporate policy by choosing appropriate directors, if necessary. (UN Stats, 1993)
Public space	The Global Public Space toolkit defines Public Space as all places that are publicly owned or of public use, accessible and enjoyable by all, for free and without a profit motive, categorized into streets, open spaces and public facilities. Public space in general is defined as the meeting or gathering places that exist outside the home and workplace that are generally accessible by members of the public, and which foster resident interaction and opportunities for contact and proximity. This definition implies a higher level of community interaction and places a focus on public involvement rather than public ownership or stewardship. For the purpose of monitoring and reporting on indicator 11.7.1, public space is defined as all places of public use, accessible by all, and comprises open public space and streets. (UN Habitat, 2018)
Red List Index	The Red List Index measures change in aggregate extinction risk across groups of species. It is based on genuine changes in the number of species in each category of extinction risk on the IUCN Red List of Threatened Species (www.iucnredlist.org) and is expressed as changes in an index ranging from 0 to 1. Similarly, there exists a Red List Index for ecosystems based on the IUCN Red List of Ecosystems.
Reduce	Minimize impacts, from a previous baseline value, without eliminating them entirely. (SBTN, 2023)
Regulating and maintenance services	Those ecosystem services resulting from the ability of ecosystems to regulate biological processes and to influence climate, hydrological and biochemical cycles, and thereby maintain environmental conditions beneficial to individuals and society. (SEEA, 2021)
Regulation	Rules or directives maintained by law.
Regulatory framework	Regulatory frameworks are legal mechanisms that exist on national and international levels. They can be mandatory and coercive (national laws and regulations, contractual obligations) or voluntary (integrity pacts, codes of conduct, arms control agreements). Together they form a legal background against which conservation efforts are measured. The existence of these frameworks is a pre-requisite for fighting biodiversity loss.

Rehabilitation	Management actions that aim to reinstate a level of ecosystem functioning on degraded sites, where the goal is renewed and ongoing provision of ecosystem services rather than the biodiversity and integrity of a designated native reference ecosystem (Gann et al., 2019). Rehabilitation is a type of ecosystem restoration. Ecosystem rehabilitation is focused on restoring and improving functions within transformed ecosystems, while ecological restoration is focused on restoration to a natural state.
Report	The act of sharing information to a known entity, body, repository that can be internal or external. Reporting can also be a format that disclosure can take when made available externally. (CBD/WG2020/5/4)
Resilience	The capacity of a system to absorb disturbance and reorganize while undergoing change so as to still retain essentially the same function, structure, identity, and feedbacks (Walker et al., 2004). A concept initially developed and applied in ecology, which progressively gained usage in the social and environmental sciences.
Respecting the rights of indigenous peoples and local communities	The rights of indigenous peoples and local communities must be respected and preserved with their free, prior and informed consent, including their full and effective participation in decision making, in accordance with relevant national legislation, international instruments, including the United Nations Declaration on the Rights of Indigenous Peoples, and human rights law. This may include the recognition of local spatial planning of indigenous peoples and local communities, which takes advantage of the local context, including cultural, governance and spiritual dimensions, as well as the planning and management processes being led by indigenous peoples and local communities within their respective lands and waters. (UNDRIP, 2018)
Rights of women and girls, children and youth, and persons with disabilities	Individuals living in vulnerable situations often do not enjoy rights or access to biodiversity and resources. In many places this includes women and girls, children and youth, and persons with disabilities. The Framework calls for measures to ensure that individuals belonging to these groups enjoys the same rights and access as others.
Rights over lands, resources and traditional knowledge	This pertains to recognizing and upholding the rights of indigenous peoples and local communities as outlined in other international frameworks, such as the United Nations Declaration on the Rights of Indigenous Peoples and human rights law, including respecting their right to own, use, develop and control their lands, territories, and resources.
Risk assessments for living modified organisms	In the context of living modified organism management: the qualitative and quantitative evaluation performed in an effort to define the risk posed to human health and/or the environment by the use or release of a living modified organism. (UNEP)
Risk categories of ecosystem collapse	The risk of ecosystem collapse is based on the risk categories each ecosystem is assigned through assessment under the Red List of Ecosystems framework. The risk categories include, in order of increasing risk of collapse: Least Concern; Near Threatened; Vulnerable; Endangered; Critically Endangered; and Collapsed. If there are insufficient data to assign a risk category, a criterion or ecosystem type it is considered Data Deficient, or Not Evaluated if not assessed.

Risks to business	Biodiversity-related risks to businesses are categorised as: o Ecological risks, i.e., risks related to biodiversity-related ecological impacts and dependencies, linked to biodiversity loss or ecosystems degradation. o Liability risks, where parties who have suffered biodiversity-related loss or damage seek compensation for those they hold responsible. o Risks related to achieve transformative change for biodiversity, including regulatory risks, market risks and financial risks. (See OECD for more detail)
Restoration	Refer to the definition of "Ecological restoration".
Safeguard genetic diversity	To protect genetic diversity e.g. with in-situ and ex-situ protective measures (e.g. seed banks and botanic gardens, well managed protected areas, translocations, etc.).
Scientific research	Systematic and creative actions taken to increase knowledge about biodiversity, ecosystems, their functions and services and nature's contributions to people, and to apply it in new areas of interest. Scientific research is the research performed by applying systematic and constructed scientific methods to obtain, analyze, and interpret data. Scientific research is the neutral, systematic, planned, and multiple-step process that uses previously discovered facts to advance knowledge that does not exist in the literature. It can be classified as observational or experimental with respect to data collection techniques, descriptive or analytical with respect to causality, and prospective, retrospective, or cross-sectional with respect to time. (Erol, 2017)
Scientifically sound	Adhering to the requirements of best available science.
Semi-natural ecosystem	An ecosystem with most of its processes and biodiversity intact, though altered by human activity in composition, balance or function relative to the natural state.
Sex-disaggregated data collection and analyses	Collection and analysis of data which is cross classified by sex, and which presents information separately for men and women, boys and girls. Sex-disaggregated data is necessary for effective gender analysis, as it is more difficult to identify real and potential inequalities in its absence. (Adapted from UN Women, 2022)
Soil erosion control services	The ecosystem contributions, particularly the stabilising effects of vegetation, that reduce the loss of soil (and sediment) and support use of the environment (e.g., agricultural activity, water supply). (SEEA, 2021)
Spatial planning	There are different definitions of spatial planning, however it is generally considered to be a method or process for analyzing and allocating the spatial and temporal distribution of human uses and activities in a given area, in order to achieve various social, economic and ecological objectives. It may also include integrating biodiversity considerations using spatial data during land- and sea-use planning exercises. When undertaken in terrestrial areas it is often referred to as "land use planning" while in marine areas it is referred to as "marine spatial planning". For inland water and related ecosystems, planning processes often take place at the watershed level. (Adapted from Metternicht, 2018)

Storm mitigation services	The ecosystem contributions of vegetation including linear elements, in mitigating the impacts of wind, sand and other storms (other than water related events) on local communities. (SEEA, 2021)
Strategic environmental assessment	Strategic environmental assessment is the formalized, systematic and comprehensive process of identifying and evaluating the environmental consequences of proposed policies, plans or programmes to ensure that they are fully included and appropriately addressed at the earliest possible stage of decision- making on a par with economic and social considerations. Strategic environmental assessment, by its nature, covers a wider range of activities or a wider area and often over a longer time span than the environmental impact assessment of projects. Strategic environmental assessment might be applied to an entire sector (such as a national policy on energy for example) or to a geographical area, (for example, in the context of a regional development scheme). (CBD/COP/DEC/6/7)
Streets	Defined thoroughfares that are based inside urban areas, towns, cities and neighbourhoods most commonly lined with houses or buildings used by pedestrians or vehicles in order to go from one place to another in the city, interact and to earn a livelihood. The main purpose of a street is facilitating movement and enabling public interaction. The following elements are considered as streets space: streets, avenues and boulevards; pavements; passages and galleries; bicycle paths; sidewalks; traffic islands; tramways and roundabouts. Elements excluded from street space include: plots; open space blocks; railways; paved space within parking lots; and airports and individual industries. (UN Habitat, 2018)
Supply chain	The linear sequence of processes, actors, and locations involved in the production, distribution, and sale of a commodity from start to finish. (TNFD, 2023)
Sustainable - Sustainability	A characteristic or state whereby the needs of the present and local population can be met without compromising the ability of future generations or populations in other locations to meet their needs. (IPBES, 2018)
Sustainable agriculture	The management and conservation of the natural resource base, and the orientation of technological and institutional change in such a manner as to ensure the attainment and continued satisfaction of human needs for present and future generation. Such development (in agriculture, forestry and fishing etc.) conserves land, water, plant and animal genetic resources, environmentally non-degrading, technically appropriate, economically viable and socially acceptable. (FAO, 1988)
Sustainable consumption	The use of services and related products, which respond to basic needs and bring a better quality of life while minimizing the use of natural resources as well as the emissions of waste and pollutants over the life cycle of the service or product so as not to jeopardize the needs of future generations. (UNEP)
Sustainable development	Development that meets the needs of the present without compromising the ability of future generations to meet their own needs. (UN SDG)
Sustainable forest management	A dynamic and evolving concept that aims to maintain and enhance the economic, social and environmental values of all types of forests, for the benefit of present and future generations (Resolution A/RES/62/98)

Sustainable patterns of production / Sustainable consumption and production	The use of services and related products, which respond to basic needs and bring a better quality of life while minimising the use of natural resources and toxic materials as well as the emissions of waste and pollutants over the life cycle of the service or product so as not to jeopardise the needs of future generations. (UNEP)
Sustainable use	The use of components of biological diversity in a way and at a rate that does not lead to the long-term decline of biological diversity, thereby maintaining its potential to meet the needs and aspirations of present and future generations. (Convention, Article 2)
Sustainably used and managed	The use of components of biological diversity in a way and at a rate that does not lead to the long-term decline of biological diversity, thereby maintaining its potential to meet the needs and aspirations of present and future generations. (EC, 2023)
Technical and scientific cooperation	Technical and scientific cooperation refers to a process whereby institutions in two or more countries pursue their individual or collective biodiversity-related goals through cooperative actions. This may include the creation and/or exchange of scientific knowledge, data, expertise, resources, technologies, and technical know-how. It may also include human resource development, institution building, joint training of personnel, exchange of experts, joint research programmes, joint ventures for the development and diffusion of technologies (including indigenous and traditional technologies), and transfer of technology and know-how.
Technology	The application of scientific knowledge for practical purposes linked to the conservation, sustainable use or monitoring of biodiversity.
Technology development	Refers to the systematic process of advancing and improving existing technologies or creating entirely new ones through research, experimentation, and innovation.
Terrestrial	All lands at or above sea level, this includes IUCN typologies: tropical-subtropical lowland rainforests (T1); tropical-subtropical dry forests and scrubs (T2); shrublands & shrubby woodlands (T3); savannas and grasslands (T4); deserts and semi-deserts (T5); polar-alpine (T6); and intensive land-use systems (T7).
The three objectives of the convention	The Convention has three main objectives: the conservation of biological diversity; the sustainable use of the components of biological diversity; and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources. (UN)
Threatened species	Threatened species are those listed on The IUCN Red List of Threatened Species in the categories Vulnerable, Endangered, or Critically Endangered (i.e., species that are facing a high, very high, or extremely high risk of extinction in the wild in the medium-term future). (IUCN, 2012)
Trade in wild species	The selling or trading (i.e. selling of dead or living wildlife and/or products derived from them) of wild species for food and non-food purposes, such as for clothing, medicinal, cultural, scientific, recreational and work-related uses. (CBD/WG2020/5/4)

Traditional knowledge	The concept of Traditional Knowledge (TK) in the Convention has two characteristics. Firstly, the Convention defines TK as one kind of knowledge, innovations and practices which is helpful to conservation and sustainable use of biodiversity. Secondly, the Convention limits the TK to link with indigenous peoples and local communities (IPLCs) embodying traditional lifestyles, i.e. these TK were created and preserved by IPLCs and they are accumulated, developed and inherited generation by generation. (IPBES, 2022)
Traditional occupations	Occupations in which indigenous knowledge, cultural practices, innovations and technologies may influence the way the work is performed, if the work is performed by a person who identifies as belonging to an indigenous or tribal group. Indigenous knowledge refers to the constantly evolving information, skills, practices, science and technology passed from generation to generation within an indigenous or tribal group. The work performed in traditional occupations embraces production of goods and services for own use and other forms of unpaid work including volunteer work and unpaid trainee work, as well as employment for pay or profit.
Transparently	The condition in which all disclosures are made known and available in a timely fashion to the stakeholders - particularly the end users. (UN Stats, 2012)
Triangular cooperation	Southern-driven partnerships between two or more developing countries, supported by a developed country(ies) or multilateral organization(s), to implement development cooperation programmes and projects. (UNDP, 2012)
Urban and densely populated areas	Variable per country but generally refers to areas highly modified by and for humans where large numbers of people live. United Nations definitions, provided by national statistics offices, by country can be found here (UN Stats, 2005)
Urbanisation	The increase in the proportion of a population living in urban areas; the process by which a large number of people becomes permanently concentrated in relatively small areas, forming cities. (IPBES, 2022)
Urgent management actions	Species-specific management actions required above and beyond efforts to mitigate threats such as loss of natural habitats, unsustainable harvest, invasive alien species, pollution, and climate change, which are the focus of in other targets in the framework. More than half of threatened species from comprehensively assessed groups on the IUCN Red List of Threatened Species require such actions, including supplementary feeding, vaccinations, ex situ management, reintroduction and a range of recovery actions. (McGowan et al., 2024)
Utilization of genetic resources	Utilization of genetic resources means to conduct research and development on the genetic and/or biochemical composition of genetic resources, including through the application of biotechnology as defined in Article 2 of the Convention. (Nagoya Protocol, Article 2, paragraph (c)).

Value chain	The full range of interactions, resources and relationships related to a reporting entity's business model and the external environment in which it operates. A value chain encompasses the interactions, resources and relationships an entity uses and depends on to create its products or services from conception to delivery, consumption and end-of-life, including interactions, resources and relationships in the entity's operations, such as human resources; those along its supply, marketing and distribution channels, such as materials and service sourcing, and product and service sale and delivery; and the financing, geographical, geopolitical and regulatory environments in which the entity operates. (IFRS, 2023)
Vulnerable situation - Vulnerability	The conditions determined by physical, social, economic and environmental factors or processes which increase the susceptibility of an individual, a community, assets or systems to the impacts of hazards. (CBD/WG2020/5/4)
Waste	Materials that are not prime products (that is, products produced for the market) for which the generator has no further use in terms of his/her own purposes of production, transformation or consumption, and of which he/she wants to dispose. Wastes may be generated during the extraction of raw materials, the processing of raw materials into intermediate and final products, the consumption of final products, and other human activities. (UN Stats)
Waste generation	The process of generating waste, whether through production or consumption.
Water flow regulation services	Consist of baseline flow maintenance services and Peak flow mitigation services. Water regulation services are the ecosystem contributions to the regulation of river flows and groundwater and lake water tables. They are derived from the ability of ecosystems to absorb and store water, and gradually release water during dry seasons or periods through evapotranspiration and hence secure a regular flow of water. Likewise, this ability mitigates the effects of flood and other extreme water-related events. (SEEA, 2021)
Wellbeing	A perspective on a good life that comprises access to basic resources, freedom and choice, health and physical, including psychological, well-being, good social relationships, security, equity, peace of mind and spiritual experience. Well-being is achieved when individuals and communities can act meaningfully to pursue their goals and can enjoy a good quality of life. The concept of human well-being is used in many western societies and its variants, together with living in harmony with nature, and living well in balance and harmony with Mother Earth. All these are different perspectives on a good quality of life. (IPBES, 2019)
Wild animals, plants and other biomass provisioning services	The ecosystem contributions to the growth of wild animals, plants and other biomass that are captured and harvested in uncultivated production contexts by economic units for various uses. The scope includes non-wood forest products and services related to hunting, trapping and bio-prospecting activities; but excludes wild fish and other natural aquatic biomass. (SEEA, 2021)
Wild fish and other natural aquatic biomass provisioning services	The ecosystem contributions to the growth of fish and other aquatic biomass that are captured in uncultivated production contexts by economic units for various uses, primarily food production. (SEEA, 2021)

Wild species	Populations of any species that have not been domesticated through multigenerational selection for particular traits, and which can survive independently of human intervention that may occur in any environment. This does not imply a complete absence of human management and recognizes various intermediate states between wild and domesticated. (IPBES, 2022)
Within biologically sustainable levels	Abundance is estimated (considering uncertainty) to be equal to or greater than the level that can produce the Maximum Sustainable Yield (MSY).
Youth	There is no universally agreed international definition of the youth age group. For statistical purposes, however, the United Nations—without prejudice to any other definitions made by Member States—defines 'youth' as those persons between the ages of 15 and 24 years. This definition, which arose in the context of preparations for the International Youth Year (1985) (see A/36/215), was endorsed by the General Assembly in its resolution 36/28 of 1981. All UN statistics on youth are based on this definition, as is reflected in the annual yearbooks of statistics published by the UN system on demography, education, employment and health.

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