The Post-2020 Biodiversity Framework:
Targets, indicators and measurability implications at global and national level

Interim report, November 2019

Prepared by the OECD

Note by the Secretariat

This document presents the second iteration of the OECD report on *The Post-2020 Biodiversity Framework: Targets, indicators and measurability implications at global and national level*. This second iteration builds on an earlier background paper that was circulated for the OECD international expert workshop on this issue, convened on 26 February, 2019. Discussions and insights from the workshop have been incorporated into this document, as well as further analysis on how the measurability of the post-2020 global biodiversity framework could be enhanced.

The analysis on SMART targets and indicators covered herein are therefore also directly relevant to the development of baselines and the monitoring framework of the post-2020 global biodiversity framework (CBD/SBSTTA/23/2/Add.4).

This document reflects work-in-progress and will be further updated as draft post-2020 targets are put forward. More specifically, once target nomenclature and formulation have been further developed, global indicators will be tied to each of the 2030 targets, taking into consideration the need for national and regional targets to scale up to global targets and vice versa (see para 28 in CBD/SBSTTA/23/2/Add.4), so as to further develop the tables in section 5 of this report, which cover possible thematic targets and associated indicators, including headline indicators, on the state of biodiversity, the pressures on biodiversity and the responses to address these.

The document is being circulated as an Information document for the CBD Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) meeting on 25-29 November, 2019.

This report has been prepared under the oversight of the OECD Environmental Policy Committee and its Working Party on Biodiversity, Water and Ecosystems. The OECD Secretariat gratefully acknowledges the valuable insights provided by the participants to the OECD international expert workshop on 26 February, 2019; comments and feedback received from WPBWE delegates; as well as the European Commission for financial support for this project.

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Please cite this document as:

OECD (2019), "The Post-2020 Biodiversity Framework: Targets, indicators and measurability implications at global and national level", November version.

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1.1. The current and evolving international context under the CBD

1.   The 2011-2020 Aichi Biodiversity Targets are a set of five strategic goals and 20 targets that Parties to the UN Convention on Biological Diversity (CBD) are intended to use as a guiding framework for their national commitments towards biodiversity conservation, sustainable use and the equitable sharing of its benefits arising from the use of genetic resources. As these Targets will expire in 2020, Parties to the CBD will need to adopt a revised suite of targets for the post-2020 global biodiversity framework. Agreement on this is also likely to have implications for two of the Sustainable Development Goals (SDGs), namely SDG 14 on Life under Water and SDG 15 on Life on Land, as several of the targets therein come directly from the Aichi Biodiversity Targets, and are therefore also due to expire in 2020.

2.   The 2011-2020 Strategic Plan for Biodiversity was a significant improvement to the one preceding it. The Aichi Biodiversity Targets set out a flexible framework that Parties are encouraged to use at the national level, *inter alia*, to guide their National Biodiversity Strategies and Action Plans (NBSAPs). These 20 targets resulted in the need to re-convene an Ad-Hoc Technical Expert Group (AHTEG) on indicators for the Strategic Plan, in order to provide guidance on global and national indicators needed to measure progress towards the achievement of the Aichi Targets.[1] This process led to the adoption of CBD COP Decision XIII/28, in 2015, on Indicators for the Strategic Plan for Biodiversity 2011-2020 and the Aichi Biodiversity Targets.[2]

3.   While the global biodiversity indicators are improving[3] and efforts are underway to address the remaining data gaps through initiatives such as the Biodiversity Indicators Partnership (BIP), it remains inherently difficult to measure progress towards the Aichi Targets at national level in a consistent and comparable way.

4.   This is in contrast to, for example, measuring efforts to mitigate climate change, which can be measured in a single unit of tCO_2e. Efforts to mitigate biodiversity loss and degradation are not captured in a single indicator; measuring performance on biodiversity requires multiple different indicators (e.g., reduce forest loss, reduce the number of threatened species). Moreover, under the UN Framework Convention on Climate Change and the recent Paris Agreement, an international climate goal has been set (i.e., to keep global temperature rise in this century well below 2 degrees centigrade) and Parties are required to put forward Nationally Determined Contributions (NDCs). The NDCs therefore create a bottom-up approach, to complement the top-down approach, helping to bridge the two and therefore serves to provide transparency on whether the aggregated NDCs are sufficient to achieve the international goal. Such a framework could arguably also be useful in the context of the CBD.

5.   The agreed goals and targets of the post-2020 global biodiversity framework will therefore have implications for their measurability at both a global and national level.

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[1] UNEP/CBD/ID/AHTEG/2015/1/3

[2] CBD/COP/Decision XIII/28

[3] Both in terms of the comprehensiveness of what is being monitored (for the 2011-2020 Aichi Targets) and the means of monitoring.

Further consideration needs to be given to how the actual objectives of any post-2020 framework for biodiversity will enable an assessment of their progress and the contributions that individual nations are making towards the international goals and targets. Ideally, all targets would be specific, measurable, ambitious, realistic and time-bound (SMART).

6.   The post-2020 biodiversity framework will need to address the challenges encountered in 2011-2020, the relevant targets of the SDGs, among other issues. CBD COP14 in Egypt adopted a number of decisions relevant to the post-2020 biodiversity framework, which include:

- Decision 14/1: Updated assessment of progress towards selected Aichi Biodiversity Targets and options to accelerate progress.

- Decision 14/34: Comprehensive and participatory process for the preparation of the post-2020 global biodiversity framework.

7.   Following an initial CBD invitation for views on the preparation, scope and content of the post-2020 global biodiversity framework, 95 submissions, from governments, international organisations, NGOs and others, were received.[4] A synthesis of views was made available on 24 January 2019 [CBD/POST2020/1/INF/1], together with a summary of the synthesis on 25 January 2019 [CBD/Post2020/PREP/1/1]. Para 9 (h) and (j) of this latter document state:

(h) The different elements of the post-2020 global biodiversity framework should be linked through a conceptual framework. Some have suggested that this should be based on the Strategic Plan for Biodiversity while others have suggested alternative approaches, including a pyramid approach with layers of objectives, actions and targets in support of an "apex goal" and combinations of outcome and output targets;

(j) The post-2020 global biodiversity framework should contain targets which are specific, measurable, ambitious, realistic and time-bound. These targets should be knowledge-based, including on scientific and traditional knowledge, address both desired outcomes and processes, be easy to communicate and be designed to galvanize action across society. There is support for using the Aichi Biodiversity Target as a starting point for discussing future targets. Some expressed the view that changes to the Aichi Targets should be kept limited. Others suggested more comprehensive changes, and numerous suggestions for additional or revised targets have been proposed;

8.   Following a second invitation for views, a further synthesis of views was made available on 23 May 2019 [CBD/Post2020/PREP/1/INF2]. In addition, following a series of regional consultation meetings on the post-2020 global biodiversity framework, the first meeting of the Open-Ended Working Group on the post-2020 biodiversity framework took place on 27-30 August in Nairobi, Kenya. All documents for this meeting are available at: https://www.cbd.int/conferences/post2020/wg2020-01/documents. The latest round of submissions on the post-2020 global biodiversity framework are available at: https://www.cbd.int/conferences/post2020/submissions/2019-075, and the CBD issued CBD/SBSTTA/23/2/Add.4 on 15 October, 2019.

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[4] https://www.cbd.int/post2020/submissions/

1.2. Aims and objectives of this work

9.   The objectives of this work are threefold: (i) to take stock of the lessons learned from the current 2011-2020 biodiversity framework, as these relate to targets and indicators; (ii) to examine options to improve on the existing structure and measurability of possible new biodiversity (goals and) targets under the post-2020 global biodiversity framework, at both global and national level; and (iii) to identify key gaps in the indicator suite, the feasibility of addressing these gaps and the implications of this for creating SMARTer targets in the post-2020 framework.

10.   A background paper was prepared in time for an international expert workshop, convened by the OECD, on February 26, 2019.[5] This paper builds on the background paper, the discussions at the OECD international expert workshop, and other recent discussions relevant to the post-2020 global biodiversity framework. Section 2 summarises lessons learned from the Aichi Biodiversity Targets to date, including the successes and challenges, as these relate to measurability. Section 3 examines opportunities for enhancing the measurability of the post-2020 framework, and puts forward a proposal to include a smaller sub-set of *headline indicators* in the post-2020 biodiversity framework, whereby the underlying data is consistent and comparable across countries. It also provides an overview of multi-county datasets that could be used to help identify what type of targets and associated indicators could be developed to enhance measurability, at both global and national level, of the post-2020 biodiversity framework. Section 4 provides a preliminary analysis of the post-2020 targets proposed to date. Section 5 provides a preliminary framework on possible thematic targets for the state of biodiversity, the pressures on biodiversity and the responses to address these, together with initial inputs on the possible indicators available to monitor progress towards these in a consistent and comparable way across countries. Governments could use this as a basis as they consider targets and the associated indicators necessary to monitor progress towards these.

11.   This paper aims to provide technical analysis to help to inform the post-2020 biodiversity decision-making process. This work does not intend to make any presuppositions with regard to the ambition of any possible post-2020 targets.

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[5] The OECD workshop was intended to provide a platform for discussion and exchange of views, notably as it relates to CBD Decision 14/34, para 12, a, b, c, j, to consider:

(a)   **Scope, elements and structure** of the post-2020 global biodiversity framework;
(b)   Considerations related to ambitious, realistic and, **where possible, measurable**, time-bound **targets and corresponding indicators**, reporting and monitoring frameworks and baselines to be developed in a coherent way;
(c)   Mechanisms for monitoring and reviewing implementation, including through the use of indicators and the alignment of national reporting under the Convention and its Protocols;
(j)   Approaches, implications and opportunities for, **enhancing mainstreaming**;

1.3. Environmental targets and indicators: Principles, criteria, concepts

12.   It may be useful, at the outset, to recall some general principles, criteria and concepts relevant to environmental targets and indicators, and how these have been related to biodiversity thus far. Environmental targets should, ideally, be specific, measurable, and time-bound. A set of criteria has been developed by the OECD to help guide the design of environmental indicators. It states that all indicators should be assessed/evaluated according to their (i) policy relevance, (ii) analytical soundness, and (iii) measurability (OECD, 1993[1]). The CBD has also noted that the ideal indicator for measuring progress should be (CBD, 2010[2]):

> *"policy-relevant and meaningful, biodiversity relevant, scientifically sound, accepted by a broad public, lend itself to affordable monitoring and modelling, and be sensitive enough to detect changes in systems with in timeframes and on scales relevant to decision-making"*

These criteria have also been put forward in the so-called "SMART" concept of targets which the CBD defines as (CBD, 2010[2]) :

- Specific
- Measurable
- Ambitious
- Realistic, and
- Time-bound.

13.   The Pressure-State-Response model provides a commonly accepted framework for identifying and structuring indicators. It distinguishes indicators of environmental pressures (both direct and indirect), indicators of environmental conditions, and indicators of societal responses. Societal responses can be further disaggregated into those undertaken by government, households, and business (OECD, 2001[3]). In this paper, responses focus more heavily on those by government. When designing the current biodiversity framework in 2010, the Parties to the CBD adopted a modified Driver-Pressure-State-Impact/Benefit-Response framework[6] for applying the indicators to be consistent with Strategic Plan for Biodiversity and the Aichi targets (CBD, 2010[2]).

14.   With this in mind, and following the literature on the theory of change, the types of response indicators can be further compartmentalised into inputs, processes, outputs, outcomes and impacts (Table 1.1). Thus, if the responses are effective (and lead, in the last stage, to positive impacts), they should manifest in an improvement in the *state* of biodiversity (as depicted in Figure 1.1).

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[6] In the extended DPSIR causal framework, drivers refer to the underlying causes of environmental change, such as economic growth, industry, etc.; and impacts refer to e.g. species loss, habitat fragmentation and economic damage.

Table 1.1. Types of Responses and the Theory of Change

Indicator type	Definition	Examples
Input	Measures the material and immaterial pre-conditions and resources - both human and financial - provided for an activity, project, programme or intervention	● Budget allocated for biodiversity ● Number of staff
Process	Measures the progress of processes or actions that use inputs and ways in which program services and goods are provided	● Establish an inter-Ministerial Committee for biodiversity
Output	Measures the quantity, quality, and efficiency of production of goods or services as a result of an activity, project, programme or intervention	● New legal or policy instruments ● Studies such as National Ecosystem Assessments ● Biodiversity and ecosystem values are integrated into national accounts
Outcome	Measures the intermediate broader results achieved through the provision of outputs	● Reduced pesticide use ● Larger protected areas
Impact	Measures the quality and quantity of long-term results generated as a result of achieving specific outcomes	● Improved condition of biodiversity and sustainability of ecosystem services, such as number of threatened species

Source: Adapted from OECD (2018[4]), Mainstreaming Biodiversity for Sustainable Development.

Figure 1.1. A schematic of the pressure-state-response indicator framework and how it relates to the theory of change
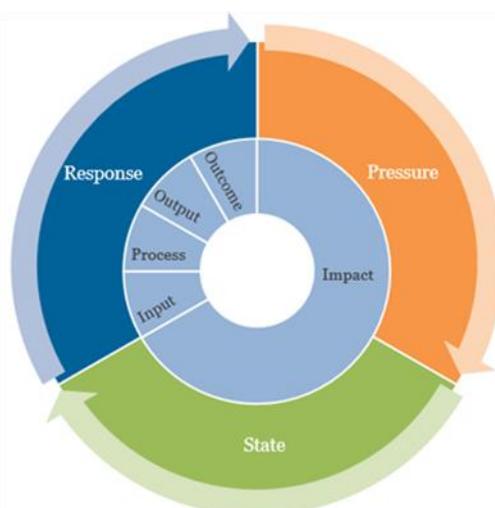
Source: Authors.

15.   In the context of biodiversity, suggestions for target and indicator development are briefly summarised here. (Butchart, Di Marco and Watson, 2016[5]) argue that ideally, targets should avoid using ambiguous language, setting goals that are unquantifiable and introducing redundant or complex terms that are open to interpretation, and clear definitions of the terms used should be readily available with the targets themselves. They also state that specific, quantifiable targets, with an established timeframe create greater clarity and transparency surrounding the actions required.

16.   Di Marco et al. (2016[6]) state: An important part of an efficient global plan for biodiversity conservation is the establishment of an efficient framework for monitoring progress toward targets. However, the set of indicators used for target monitoring is sometimes inadequate, hindering the ability to accurately monitor some of the targets (Shepherd et al., 2016[7]).

17.   Kuempel et al (2016[8]) suggest that identifying a comprehensive set of indicators, which are able to represent the changing state of a study system (e.g., the threatened species of a country), is an important step to be taken every time new targets are being defined. For each indicator, it is important to clarify whether it refers to conservation outputs (e.g., new legislation for protected areas), outcomes (e.g., greater coverage of protected areas) or impacts (e.g. higher species abundance), what is the availability of baseline data, and what is the cost of collecting and maintaining new data.

2. The Aichi Biodiversity Targets and the current set of indicators

2.1. The Aichi Biodiversity Targets: An overview and some characteristics

18.	The Aichi Biodiversity Targets sit within the framework of five strategic goals, with the 20 targets covering a broad range of areas. These areas can be summarised as: Goal A (underlying causes): Awareness, values and strategies, incentives, sustainable production and consumption. Goal B (direct pressures): habitats/forests, fish, agriculture, pollution, invasive alien species, climate change/ocean acidification. Goal C (status of biodiversity): Protected Areas, threatened species, genetic diversity, Goal D (enhance benefits): ecosystems, resilience, Nagoya Protocol. Goal E (enhance implementation): NBSAPs, knowledge, science and technology, and resource mobilisation/finance. The Aichi goals and targets are provided in Annex A.

19.	The SDGs are also relevant to the post-2020 biodiversity framework with SDG targets 14 and 15 focussing specifically on *Life below water* and *Life on land*, respectively. Nearly half of the targets under SDG 14 and 15 stem from the Aichi Biodiversity Targets and are therefore also due to expire in 2020. The SDG 14 and 15 targets also make explicit mention to Small-Island Developing States (SIDS) and small-scale fisheries; and to mountains, amongst a few other issues (see Annex B and C for the SDG targets and indicators).

20.	Table 2.1 summarises the characteristics of the Aichi Biodiversity Targets in terms of whether: (i) they reflect Pressure-State-Response variables; (ii) if a Response variable, whether they relate to inputs, processes, outputs, outcomes or impacts (see Table 1.1); and (iii) the target is quantitatively specific.

Table 2.1. Characteristics of the 2011-2020 Aichi Biodiversity Targets

Aichi Target	Pressure-State-Response	Input-Process-Output-Outcome-Impact	Quantified or quantitatively specific target
1	State		No
2	Response	Process	No
3	Response	Output	No
4	Response	Input, process (and outcome but not defined)	No
5	State (and Pressure)		Partially
6	Response, Pressure, State	Output and outcome	Implicitly (100% target)
7	Response	Output	Implicitly (100% target)
8	Pressure		Implicitly (100% target)
9	State, Response	Process and output	No
10	Pressure		No
11	Response	Output	Yes, partially
12	State	Outcome	Implicitly and partially
13	State, Response	Process	No
14	State	Outcome	No
15	State, Response	Outcome	Partially (15% restoration)
16	Response	Process	Yes, binary
17	Response	Process	Yes, binary
18	State		No
19	State		No
20	Response	Input	No but yes in further decisions (i.e. doubling)

Source: Authors

21.   The Aichi Biodiversity Targets are therefore composed of 10 targets that contain elements referring to the state of biodiversity, 4 that refer to the pressures, and 12 on responses (where sometimes a target covers multiple elements). Of the Aichi targets that can be classified as 'response' targets, 2 focus on inputs, 6 on processes, 5 on outputs and 5 on outcomes.

22.   A similar summary of characteristics for SDG 14 and 15 targets is provided in Table 2.2. Across the range of targets under SDG 14 and 15, the only quantitative target is 14.5, i.e., "By 2020, conserve at least 10% of coastal and marine areas, consistent with national and international law and based on the best available scientific information", which is based on CBD Aichi Biodiversity Target 11.

Table 2.2. Characteristics of SDG 14 and 15 targets

SDG Target	Pressure-State-Response	Input-Process-Output-Outcome-Impact	Quantified or quantitatively-specific target
14.1	Response	Outcome	No
14.2	Response	Process	No
14.3	Response	Outcome	No
14.4	State, Response	Process and Impact	No
14.5	Response	Output	Yes
14.6	Response	Input	No
14.7	State, Response	Process and Outcome	No
14.A	State, Response	Process and Outcome	No
14.B	Response	Input	No
14.C	Response	Process	No
15.1	Response	Process	No
15.2	State, Response	Process and Output	No
15.3	Response	Output and Impact	No
15.4	Response	Impact	No
15.5	State, Response	Process, Outcome, Impact	No
15.6	Response	Process	No
15.7	Response	Process and Outcome	No
15.8	Response	Process and Outcome	No
15.9	Response	Process	No
15.A	Response	Input	No
15.B	Response	Input	No
15.C	Response	Input	No

Source: Authors

2.2. The indicator suite for the Aichi Biodiversity Targets and the BIP

23.   Decision XIII/28 of the CBD COP 13 welcomed an updated list of indicators for the Strategic Plan for Biodiversity 2011-2020. The decision also emphasised that the list of indicators provides a flexible framework for Parties to adapt, as appropriate, to their national priorities and circumstances. The indicative list of indicators covers 98 specific indicators, 35 of which are highlighted as having potential for disaggregation to the national level (BIP, 2018). The BIP (2018) document also notes, however, that the uptake of these indicators by countries has been limited to date.

24.   It would be interesting to undertake an inventory of the indicators being used at national level, as reported in the 6th National Reports, to monitor progress towards each of the Aichi Targets, and to develop summary statistics on the frequency of use of each of the indicators across all the National Reports. Such analysis would, in essence, help to create a baseline of information on what indicators are currently being used at national level, and could help to inform the post-2020 biodiversity framework with respect to the indicators that are most frequently used. This work could perhaps be undertaken by the CBD Secretariat.

25.   Aiming to support the development of indicators via a more top-down approach, the Biodiversity Indicators Partnership (BIP) is a global initiative to promote the

development and delivery of biodiversity indicators.[7] As of September 2019, the BIP has over 60 partner organisations and includes nearly 75 indicators accepted for monitoring progress towards the Aichi targets (Table 2.3)[8]. The BIP uses an extended Pressure-State-Response (P-S-R) framework that includes a fourth category, Benefit, to classify indicators which track the benefits that biodiversity provides to people, such as ecosystem services. The P-S-R-B categories are designated by the creators/developers of the indicators.[9]

26.   In terms of pressure, state, response and benefits indicators, the information in Table 2.3 can be summarised as depicted in Figure 2.1 below. According to this, the BIP currently covers 19 indicators relevant to pressures, 29 relevant to state, 23 indicators relevant to responses, and 1 indicator relevant to benefits.

Figure 2.1. Primary Indicators under the BIP by Aichi Target and Type
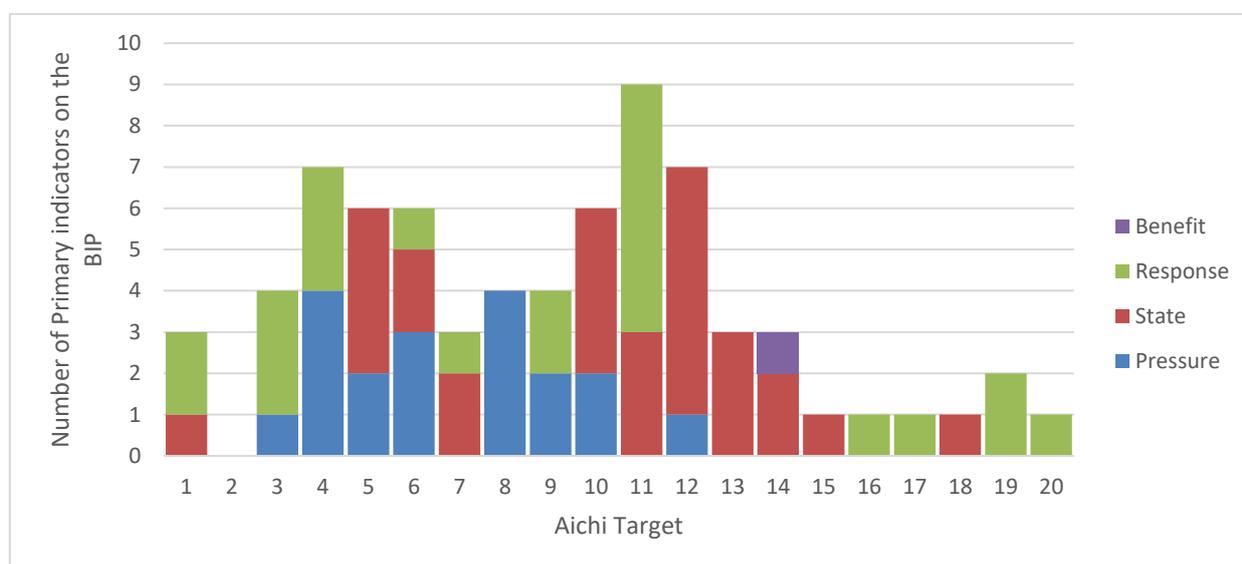
Notes: Only target 14 has a benefit indicator, namely: red list index (species used for food and medicine).
Source: Authors, based on information available at https://www.bipindicators.net

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[7] The primary role of the BIP is to serve the global user community by responding to the indicator requests of the CBD and other biodiversity-related Conventions, for IPBES, for reporting on the Sustainable Development Goals, and for use by national and regional governments.

[8] The BIP and its' Steering Committee acts as a gatekeeper, assessing each indicator for certain data and coverage requirements before being accepted. Another round of review for additional proposed indicators for the BIP is currently underway.

[9] The type of indicator in Table 2.3 is not entirely consistent with the type of target in Table 2.1. This could be due to the ambiguous language present in the targets and that the types of indicator are self-defined/reported by the creators.

Table 2.3. Overview of primary indicators under the BIP for the Aichi Biodiversity Targets

Aichi Target	Operational BIP Indicator	Applicable at national level	Type	Preliminary comments / data coverage [to be completed]
1	Biodiversity Barometer	Y	Response	About public awareness. 16 countries. Perhaps an enabling condition?
1	WAZA bio-literacy survey	N	Response	Not global coverage and data available for 2012-15.
1	Global biodiversity engagement indicator	Y	State	Not yet applied at the national level
3	Trends in potentially environmentally harmful support to agriculture	Y	Pressure	45 countries currently reporting to the OECD PSE database, but data is reported as an aggregate.
3	Number of countries with biodiversity-relevant taxes	Y	Response	More than 90 countries currently contributing to the OECD PINE database but data is not comprehensive
3	Number of countries with biodiversity-relevant fees and charges	Y	Response	More than 90 countries currently contributing to the OECD PINE database but data is not comprehensive
3	Number of countries with biodiversity-relevant tradable permit schemes	Y	Response	More than 90 countries currently contributing to the OECD PINE database but data is not comprehensive
4	Ecological Footprint	Y	Pressure	Derived from multiple datasets. Measures the amount of biological productive land and water area required to produce the food, fibre and raw material an individual, population or activity requires. Can be applied at a range of scales, and flexible.
4	Red List Index (impacts of utilisation)	Y	Pressure	
4	Red List Index (internationally traded species)	Y	Pressure	
4	Percentage of Parties with legislation in Cat. 1 CITES	Y	Response	Indicator of trade driven declines, subject to CITES listings
4	HANPP	Y	Pressure	Measures the percentage of NPP used by humans. Only goes until 2005, update planned for 2019
4	Number of MSC Chain of Custody Certification holders by distribution country	Y	Response	
4	Number and volume of MSC certified consumer-facing products by distribution country	Y	Response	
5	Wetland Extent Trends Index	Y ?	State	Cannot separate human-made from natural wetlands, and not freely available
5	Red List Index (forest specialist species)	Y	Pressure	
5	Forest Area as % of total land area	Y	State	Based on the FAO Global forest resources assessments, only applicable to forest specialist species. Also FAO definition includes plantations so potentially misleading in some areas
5	Proportion of land that is degraded over total land area	Y	State	This measure is aggregated and collected at a relatively low resolution, hence it provides a useful guide, but is not useful for assessing degradation at a sub-national level
5	CGMFC-21 (Continuous Global Mangrove Forest Cover)	Y	State	Time series of changes in mangroves since 2000, next update planned in 2020, but so far nothing beyond 2012 is available online. The indicator also only covers one particular ecosystem and does not provide estimates of uncertainty.
5	Biodiversity habitat index	Y	Pressure	Time series of habitat quality and biodiversity value based on land cover change and PREDICTS database. Good resource but computationally intensive and not freely available.
6	Marine trophic index	Y	Pressure	Measures the extent to which areas are over-fished, but declines can be masked by the geographic expansion of fisheries.
6	Living planet index (trends in target and bycatch species)	Y	State	Measures the decline in populations of by-catch through reported data, does not directly measure sustainability of management

6	Marine Stewardship Council (MSC) certified catch	N	Response	Represents ~10% of global catch and includes all landings under a countries flag
6	Proportion of fish stock within biologically sustainable level	N	Pressure	Cannot be used nationally, but a useful global indicator
6	Red List Index (impact of fisheries)	Y	Pressure	
6	Large Reef Fish	Y	State	
7	Area of forest under FSC and PEFC	Y	Response	Can track progress towards sustainable forest management.
7	Wild Bird Index (forest and farmland specialist)	Y	State	Resource intensive data collection and reliant on other forms of biodiversity varying with Birds
7	Living planet Index (farmland species)	Y	State	Resource intensive data collection but potential to track more than just birds.
8	Trends in loss of reactive nitrogen to the environment	Y	Pressure	Periodically available and expressed as the loss per capita.
8	Trends in nitrogen deposition	Y	Pressure	Applicable at multiple scales and long time-series available. Also able to provide projections of future changes. This is a spatial indicator
8	Red List Index (impacts of pollution)	Y	Pressure	Shows the impacts of pollution, but relies on the accuracy of the underlying Red List assessments.
8	Water Quality Index for Biodiversity	Y	Pressure	Global dataset with potential for use in the future.
9	Red List Index (impacts of invasive alien species)	Y	Pressure	Relies on accuracy of underlying assessments, which is variable.
9	Trends in the number of invasive alien species introduction events	Y	Pressure	Covers 21 countries
9	Proportion of countries adopting relevant national legislation and adequate resourcing the prevention or control of IAS	Y	Response	Measures progress for legislation but not the environmental impact of those policies.
9	Trends in invasive species vertebrate eradication	N	Response	Useful, but mostly limited to islands
10	Ocean Health Index	Y	State	Annual and available at a range of scales, potentially useful for assessing national marine health post 2020
10	Climatic impacts on European and North American birds	Y	State	Useful, but limited in scope both geographically and taxonomically, could be expanded, but data requirements are high.
10	Red List Index (reef-building corals)	Y	Pressure	See other red list indicators
10	Cumulative impact on marine ecosystems	Y	Pressure	Tests a range of stressors, can be applicable at a range of scales. Potentially useful for measuring progress
10	Live Coral Cover	Y	State	Only available for the year 2000
10	Reef Fish Thermal Index	Y	State	
11	Protected area coverage	Y	Response	Simple measure of area inside PA, useful as a basic indicator of progress
11	Protected area coverage of Key Biodiversity Areas	Y	Response	As above, but more targeted as KBA have been identified as essential for maintaining biodiversity
11	Protected area coverage of ecoregions	Y	Response	Useful for assessing PA network representativeness, can be applied at a range of scales (national and global).
11	Proportion of important sites for terrestrial and freshwater biodiversity that are covered by protected areas, by ecosystem type	Y	State*	Sort of a meta indicator that combines some elements of the above with other datasets (available through the integrated biodiversity assessment tool)
11	Protected area connectedness index	Y	Response	Complicated measure of how connected protected areas are to each other; can be calculated at a range of scales. Created by CSIRO in partnership with GEO BON and GBIF
11	Protected Area representativeness index	Y	Response	Uses a range of data inputs and comes up with an index value for how ecologically representative a PA network, is based on CSIRO's own habitat and diversity map. Applicable at a range of scales. Technically challenging.

11	Protected Area Management Effectiveness	Y	Response	Based on the Global database for Protected Area Management Effectiveness (GD-PAME). Potentially useful, but a wide range of methodologies used and most self-assessed.
11	Protected Connected (ProtConn)	Y	State*	
11	Wildlife Picture Index in tropical forest protected areas	Y	State	
12	Red List Index	Y	Pressure	Based on Red List assessments, which utilised a globally standard methodology, constantly updated. Can be sensitive to asymmetrical distribution of monitoring and research efforts globally.
12	Wildlife Picture Index	Y	State	Utilises camera trap (and other sensor) data to monitor changes in wildlife communities in the tropics. Useful but limited to a few sites in 15 countries.
12	Living Planet Index (forest specialists)	Y	State	
12	Living Planet Index	Y	State	Meta-indicator constructed from 19,500 population datasets of 4,180 species. Applicable at a range of scales and useful to measure change. Technically challenging to construct.
12	Number of species extinctions (birds and mammals)	Y	State	
12	Number of extinctions prevented	N	State	Indicates the number of extinctions prevented through conservation actions globally.
12	Biodiversity Intactness Index (BII)	Y	State	Derived from the PREDICTS database, BII indicates the average abundance of a large, taxonomically, and ecologically diverse set of naturally-occurring species in a terrestrial area, relative to a baseline with minimal human impacts. Technically challenging to construct.
13	Red List Index (wild relatives of domesticated animals)	Y	State	
13	Proportion of local breeds classified as being at risk, not-at-risk or at unknown level of risk of extinction	Y	State	
13	Comprehensiveness of conservation of socially and culturally valuable species	Y	State	
14	Red List Index (species used for food & medicine)	Y	Benefit	See other Red List
14	Red List Index (pollinating species)	Y	State	See other Red List
14	PA coverage of montane biodiversity sites	Y	State	
15	Bioclimatic Ecosystem Resilience Index (BERI)	Y	State	
16	Number of Parties to CBD to Nagoya Protocol	Y	Response	Basic indicator of progress
17	Number of Countries with developed or revised NBSAPs	Y	Response	Indicator of an enabling condition/process (as per response)
18	Index of linguistic diversity	Y	State	Data available until 2010. What is the correlation?
19	Growth in species occurrence records accessible through GBIF	Y	Response	
19	Proportion of known species assessed through IUCN Red List	Y	Response	Good measure of progress for the Red List
20	ODA to biodiversity	Y	Response	Covers bilateral ODA to biodiversity based on the OECD DAC Rio-Markers

Notes: * These indicators have been categorised as state (on the BIP website), but could arguably be categorised as responses.
Source: Authors, adapted from https://www.bipindicators.net/ (accessed 27 September 2019).

2.3. Lessons learned from the Aichi targets and associated indicators: successes, challenges and opportunities

27.   The 2011-2020 Aichi Biodiversity Targets replaced the 2010 biodiversity target which was: *to achieve by 2010 a significant reduction of the current rate of biodiversity loss at the global, regional and national level as a contribution to poverty alleviation and to the benefit of all life on Earth.* The CBD 2010 target was also embedded as target 7.B of the Millennium Development Goals (MDGs). While the 2010 target was ambitious and time-bound, it was criticised for being vague and for lacking an appropriate plan of action for its achievement (Perrings et al., 2011[9]). The 2010 target helped increase awareness of biodiversity issues, including through its incorporation into the MDGs, but was unable to galvanise sufficient actions and ultimately did not achieve its stated objective (Mace et al., 2010[10]). The 2011-2020 Aichi Biodiversity Targets were therefore acknowledged to be an improvement on the 2010 target as they are much more precise (Perrings et al., 2011[9])

28.   More specifically, the Aichi targets are much better targeted to the pressures on biodiversity loss than the previous target and much more specific, explicitly covering a wide range of different ecosystems and the pressures that adversely impact on them. In addition, the Aichi targets are a large improvement over the 2010 target as they include not just the state and pressures of biodiversity, but also responses (Table 2.1). Harrop and Pritchard (2011[11]), for example, highlighted how the additional specificity provided by the Aichi targets should facilitate the Parties in developing focussed policy instruments at the national level.

29.   Despite being a clear improvement on the 2010 target, various challenges remain. Butchart et al (2016[5])*,* for example, analysed each element of the 20 targets for measurability, linguistic ambiguity, unnecessary complexity and redundant language. They found that most of the targets (14 of 20) lack quantifiable elements, meaning there was no measurable threshold that could be met in order to judge if the target has been reached. Further, they found only two targets (16 and 17) were composed of entirely quantifiable elements, meaning that in the vast majority of cases the measuring of target attainment is not possible. Butchart et al. (2016[5]) find an average of 2.8 elements per target, and suggest this complexity undermines the ability of countries to identify what actions need to be taken to attain the targets. Further, the use of ambiguous language can lead to divergent interpretations among Parties creating 'wiggle room', further hampering target attainment (Maxwell et al., 2015[12]).

30.   With regard to indicators and the ability to monitor progress towards the Aichi Targets, the lack of quantifiable elements[10] is further undermined by the lack of specific indicators and baselines available. For example, Tittensor et al. (2014[13]) tried to assess progress towards the Aichi targets and were unable to identify any suitable indicators for four of the 20 targets (at that time). Moreover, many of the targets themselves lack sufficient baselines against which progress can be measured (Han et al., 2016[14]). Mcowen et al. (2016[15]) found a significant number of the indicators had shortcomings with respect to their alignment, spatial coverage or temporal relevance, calling into question the ability to measure progress towards the Aichi targets.

31.   Comprehensive efforts to monitor and evaluate progress towards the Aichi Targets include the fourth Global Biodiversity Outlook (GBO4) (CBD, 2014[16]) (Figure 2.2 a) and, more recently, the Intergovernmental Science-Policy Platform on Biodiversity and

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[10] Meaning that there is no clear binary or numeric threshold to be met in order for the target to be achieved.

Ecosystem Services (IPBES) Global Assessment report (IPBES, 2019) (Figure 2.3). Both of these may be considered to be top-down approaches. In contrast, evaluating progress based on CBD National Reports can be considered a bottom-up approach (Figure 2.2b). These evaluations are based, arguably to a large extent, on qualitative approaches. Overall, monitoring progress in a consistent and comparable way across countries remains challenging.

32.   In contrast, the approaches used under, for example, the UNFCCC and the OECD Green Growth Indicators framework are, in many ways, more quantitative (Figure 2.2c). As can been seen in Figure 2.2.c, since the metric used for the indicator is consistent and comparable across countries (and over time), this also allows the assessment of progress against a baseline (i.e., the diamond shape in the figure). The question on enhancing the measurability of the post-2020 framework can thus be considered a question of how to evolve from approaches such as (a) and (b) in Figure 2.2, to (c).

Figure 2.2. Various ways to measure progress
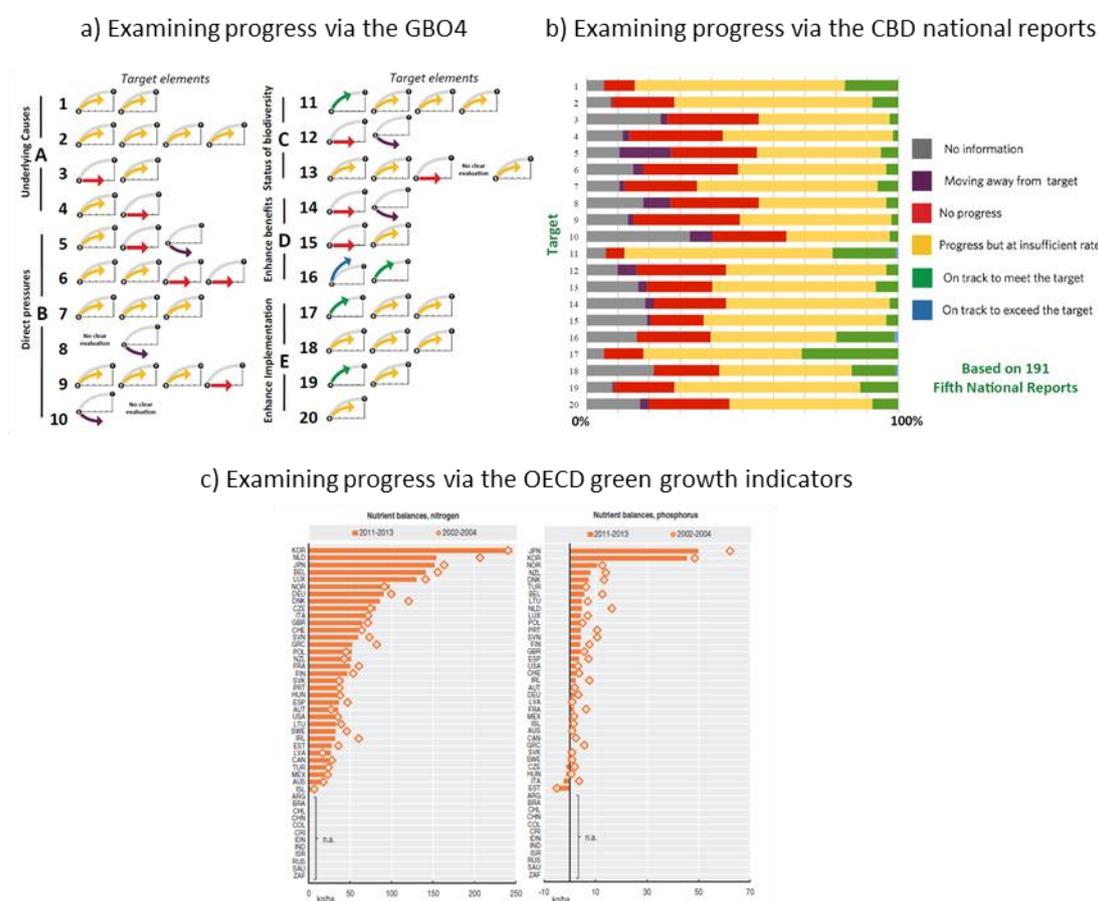
Source: CBD (2014[16]), Global Biodiversity Outlook 4; SCBD presentation at regional consultation workshop, Japan, 28 January, 2019; OECD (2017[17]), Green Growth Indicators 2017.

33.   The Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) released its Global Assessment report (IPBES 2019) in May 2019, wherein they also review progress towards the Aichi Biodiversity Targets. The summary of progress towards target elements is scored as good, moderate, poor or unknown (Figure 2.3).

Figure 2.3. Summary of progress towards the Aichi Targets

Goal	Target	Target element (abbreviated)	Poor	Moderate	Good
A. Address the underlying drivers	1	1.1 Awareness of biodiversity		Moderate	
		1.2 Awareness of steps to conserve		Moderate	
	2	2.1 Biodiversity integrated into poverty reduction		Moderate	
		2.2 Biodiversity integrated into planning		Moderate	
		2.3 Biodiversity integrated into accounting	Poor		
		2.4 Biodiversity integrated into reporting	Poor		
	3	3.1 Harmful subsidies eliminated and reformed	Poor		
		3.2 Positive incentives developed and implemented	Poor		
	4	4.1 Sustainable production and consumption	Poor		
		4.2 Use within safe ecological limits	Poor		
B. Reduce direct pressures	5	5.1 Habitat loss at least halved	Poor		
		5.2 Degradation and fragmentation reduced	Poor		
	6	6.1 Fish stocks harvested sustainably	Poor		
		6.2 Recovery plans for depleted species		Unknown	
		6.3 Fisheries have no adverse impact	Poor		
	7	7.1 Agriculture is sustainable	Poor		
		7.2 Aquaculture is sustainable	Poor		
		7.3 Forestry is sustainable		Moderate	
	8	8.1 Pollution not detrimental	Poor		
		8.2 Excess nutrients not detrimental	Poor		
	9	9.1 Invasive alien species prioritized			Good
		9.2 Invasive alien pathways prioritized		Unknown	
		9.3 Invasive species controlled or eradicated	Poor		
		9.4 Invasive introduction pathways managed	Poor		
	10	10.1 Pressures on coral reefs minimized	Poor		
		10.2 Pressures on vulnerable ecosystems minimized	Poor		
C. Improve biodiversity status	11	11.1 10 per cent of marine areas conserved			Good
		11.2 17 per cent of terrestrial areas conserved			Good
		11.3 Areas of importance conserved		Moderate	
		11.4 Protected areas, ecologically representative		Moderate	
		11.5 Protected areas, effectively and equitably managed		Moderate	
		11.6 Protected areas, well-connected and integrated		Moderate	
	12	12.1 Extinctions prevented	Poor		
		12.2 Conservation status of threatened species improved	Poor		
	13	13.1 Genetic diversity of cultivated plants maintained		Moderate	
		13.2 Genetic diversity of farmed animals maintained		Moderate	
		13.3 Genetic diversity of wild relatives maintained		Moderate	
		13.4 Genetic diversity of valuable species maintained		Unknown	
		13.5 Genetic erosion minimized		Moderate	
D. Enhance benefits to all	14	14.1 Ecosystems providing services restored and safeguarded	Poor		
		14.2 Taking account of women, IPLCs, and other groups		Unknown	
	15	15.1 Ecosystem resilience enhanced		Unknown	
		15.2 15 per cent of degraded ecosystems restored		Unknown	
	16	16.1 Nagoya Protocol in force			Good
		16.2 Nagoya Protocol operational		Moderate	
E. Enhance implementation	17	17.1 NBSAPs developed and updated			Good
		17.2 NBSAPs adopted as policy instruments		Moderate	
		17.3 NBSAPs implemented		Moderate	
	18	18.1 ILK and customary use respected		Moderate	
		18.2 ILK and customary use integrated		Unknown	
		18.3 IPLCs participate effectively		Unknown	
	19	19.1 Biodiversity science improved and shared		Moderate	
		19.2 Biodiversity science applied		Unknown	
	20	20.1 Financial resources for Strategic Plan* increased		Moderate	

Source: IPBES (2019) Chapter 3. Assessing progress towards meeting major international objectives related to nature and nature's contributions to people.
https://www.ipbes.net/system/tdf/ipbes_global_assessment_chapter_3_unedited_31may.pdf?file=1&type=node&id=35279

34.   The open source and flexible nature of the BIP has allowed for the continuous growth of available indicators, from 22 at the beginning of 2008[11] to more than 70 over a decade later in 2019. Through the Minding the Gap[12] initiative, the BIP has attempted to identify and fill gaps in the current suite of indicators. Consequently, there are now a diverse and broad range of indicators for almost all the Aichi targets (with the notable

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[11] https://web.archive.org/web/20080119164010/http://www.twentyten.net:80/target.htm

[12] https://www.bipindicators.net/minding-the-gap-how-the-bip-is-filling-indicator-gaps

exception of target 2), which provide a rich landscape of data on the state, pressures and responses (and benefit) on global biodiversity. As noted earlier, the uptake of these indicators by countries has been limited to date (BIP, 2018). The plurality of information provided by current indicators on each target is also some way from the original intention of creating a "*small set of headline indicators*" suggested by the CBD SBSTTA in 2010 (CBD, 2010[2]).

35.   Mcowen et al (2016[15]) argue the plurality of different available indicators has resulted in information asymmetry across the Aichi targets. For example, the total number of primary indicators for tracking progress towards each target vary from 9 indicators for Target 11, to 0 indicators for Target 2 (see Figure 2.1).

36.   Aichi Targets 2 and 12 illustrate the key interactions and challenges between target and indicator creation. Target 2 lacks any indicators, which is perhaps unsurprising given it contains no quantifiable elements, and there is no agreed definition of what constitutes "biodiversity values" (Butchart, Di Marco and Watson, 2016[5]; Mcowen et al., 2016[15]). Further "national and local development and poverty reduction strategies and planning processes", represent a wide variety of strategies, plans and planning processes, which can differ significantly between countries (OECD, 2018[4]) making internationally comparable metrics (needed for a global indicator) difficult to create (Mcowen et al., 2016[15]). In contrast, target 12 contains only quantifiable elements and no linguistic ambiguity, lending itself well to indicator creation.

37.   Green et al. (2019[18])also find that SMARTer biodiversity targets are associated with greater progress. Some further lessons on indicator development, as noted in BIP (2018[19]), are provided below (see CBD/COP/14/INF/40):

- Comprehensive and reliable indicators are underpinned by a reasonable quantity and quality of data. Key gaps in temporal, spatial and taxonomic coverage need to be addressed which would further strengthen the indicators available for flexibly tracking targets.

- A large number of other freely available data sources exist, that could support countries in reporting on progress; these data sources should be widely promoted to Parties (see UNEP-WCMC (2018[20]))

38.   For studies that have examined the use of indicators at the national level, see Hagerman et al. (2016[21]) for an application to Canada, and Rochette et al (2018[22]) for case studies in Africa. Hagerman et al. (2016[21]), for example, conducted a systematic content analysis of 154 documents to assess the nature and extent of national implementation of the Aichi Targets using Canada as a case study. Results indicated that "most responses are aspirational, with only 28% of responses implemented. Implemented responses tended to be associated with targets with specified levels of ambition that emphasised biophysical values, or targets that are relatively straightforward to achieve in this context (e.g., knowledge capacity and awareness)".

3. Recent developments relevant to the post-2020 biodiversity framework

3.1. On the structure of the post-2020 biodiversity framework - and its measurability implications

39.   The current structure of the Aichi Targets and the indicator suite can be described as flat, where the 20 targets can be considered to be equally important. The 5 strategic goals represent "aspirations for achievement at a global level"[13] which are unquantifiable. Beyond the targets and strategic goals, there is also a short vision statement and longer mission, from which the strategic goals are taken.

40.   Following the first and second submission of views14 on the post-2020 biodiversity framework, CBD/POST2020/PREP/1/INF/2 notes that a range of views have been reflected on the possible scope and content of a post-2020 global biodiversity framework, including on:

(d) the elements of the post-2020 global biodiversity framework, including: (i) the conceptual framework; (ii) the 2050 Vision for Biodiversity; (iii) its mission; (iv) its strategic goals; (v) biodiversity targets; (vi) tools and mechanisms for implementation; (vii) review processes; and (viii) indicators; (e) participation; (f) mainstreaming and synergies; (g) communication and outreach; and (h) gaps in the Strategic Plan for Biodiversity 2011-2020 that could be addressed in the post-2020 global biodiversity framework.

41.   Drawing on several submissions available at the time, OECD (2019) put forward a proposed structure for the targets as depicted in Figure 3.1.

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[13] https://www.cbd.int/sp/elements/

[14] CBD/POST2020/PREP/1/INF/1 and CBD/POST2020/PREP/1/INF/2, respectively. By 24 May, 2019, a total of 74 submissions were received, of which 21 were from Parties, including one from the European Union and its member States.

Figure 3.1. Possible elements of a post-2020 biodiversity framework

Source: OECD (2019), Biodiversity: Finance and the Economic and Business Case for Action.

42.   This proposed structure is in line with option 2 in Non-paper 02, released on 18 July, 2019, which states:

Option 2: Goals and targets can be divided in three groups:

A) Biodiversity goals (status of biodiversity)

B) Targets related to the drivers of biodiversity loss or threat, and

C) Enabling conditions and actions objectives

43.   Some differences between the concepts outlined in this paper versus those in Non-paper 02 are that in this paper, the terms goals, targets and objectives are not used interchangeably. In addition, (and in contrast to the language used in the IPBES Global Assessment report), the term 'pressures' is here preferred to 'drivers', as there is already a well-documented literature on the driver-pressure-state-response framework (see e.g. (Oesterwind, Rau and Zaiko, 2016[23])

44.   This paper also attempts to make a strong case for the need for any post-2020 targets to cover targets on both the pressures and the responses (i.e., and not just on responses that are intended to reduce the pressures). It is argued here that explicit targets are needed on pressures, so that incentives continue to be provided to national statistics offices, intergovernmental organisations and the scientific community to monitor and report on the pressures on biodiversity (and that the quality of this data improves over time). Indicators on pressures are just as important as indicators on the state of biodiversity. If the post-2020 biodiversity framework does not include targets on pressures, this may lead to a decline in the quality of data and indicators on these. Targets and indicators on the state of biodiversity and on the responses put in place to address and reverse biodiversity loss are necessary but not sufficient. There are likely to be long time-lags between the introduction of a response and the resulting impact on the state of biodiversity. Targets and indicators on pressures can help to bridge this gap, allowing to examine whether the responses are also having an impact on reducing the pressures on biodiversity.

45.   Given the prevailing challenges in monitoring progress towards the Aichi Biodiversity Targets in a consistent and comparable way across countries (discussed above), it is proposed that the structure of the post-2020 global biodiversity framework in terms of the targets, are complimented by a tiered approach for the associated indicators. This approach has been adopted in the development the OECD Green Growth Indicators (OECD, 2017[17]) wherein a smaller sub-set of *headline indicators* have been identified from the broader set of about 50 green growth indicators. One of the criteria that needs to be met in order to qualify as a headline indicator is that the indicator is measurable and comparable across countries. Following this approach here, a structure for targets and associated indicators for the post-2020 global biodiversity framework is depicted in Figure 3.2. An internationally agreed sub-set of headline indicators could help prioritise national efforts and those of international organisations to develop indicators whereby the data used is consistent and comparable across countries (OECD, 2019).

Figure 3.2. Possible elements of a post-2020 biodiversity framework, including headline indicators
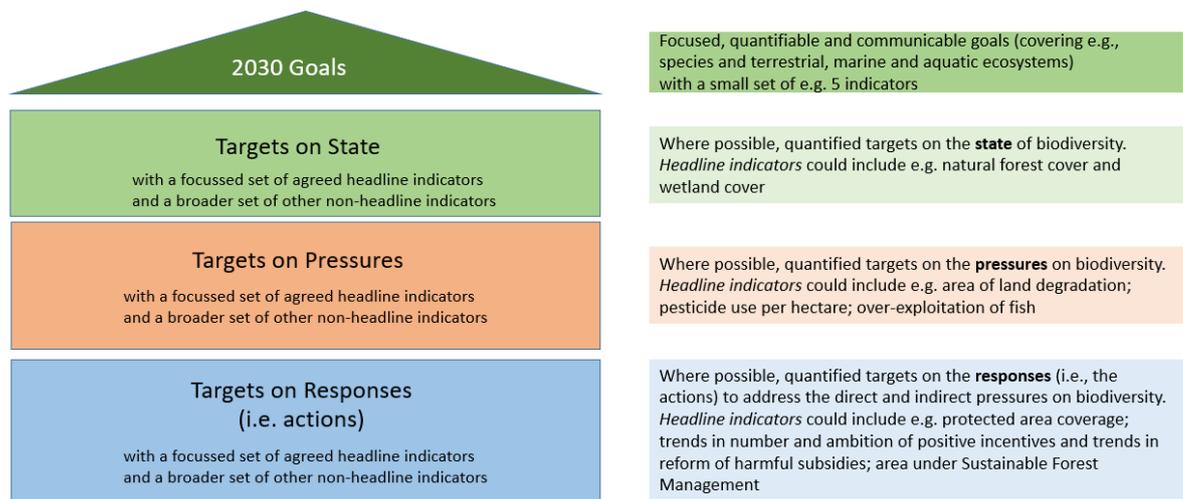
Source: Adapted from OECD (2019), Biodiversity: Finance and the Economic and Business Case for Action.

46.   Agreement on a sub-set of headline indicators that are quantitative, consistent and comparable across countries could help achieve greater transparency and measurability between global and national targets. A strong emphasis of the headline indicators on responses, including on inputs (e.g. finance), outputs (e.g. positive incentives and their level of ambition), and outcomes (e.g. increase in PA coverage) would allow a quantitative comparison of the actions taken by countries to meet the global targets. This would also allow a a cumulative assessment of the actions taken across countries to identify whether national commitments and implementation are on track to meet the global post-2020 targets. Should the need arise to ratchet up national biodiversity commitments over time so as to achieve any of post-2020 global biodiversity targets, it is the targets associated with these response headline indicators that would be the most important to revise (OECD, 2019).

3.2. On enhancing the measurability of the post-2020 framework at global and national level

47.   To help inform the discussions on how to enhance the measurability of the post-2020 biodiversity framework, it is useful to consider the existing data sources for natural assets that are available at the multi-country level. The review below builds on a study on *Measuring Green Growth at Country Level* undertaken by Narloch, Kozluk, and Lloyd (2016[24]). Many of the categories in the report, notably those classified as biodiversity, land and soil resources, forests and timber, oceans and fish stock, are relevant to the CBD and the existing suite of Aichi Biodiversity Targets. Table 3.1 (covering state and pressures) and Table 3.2 (covering responses) present excerpts of the work as relevant for the CBD, and adapt and provide updates with additional data that has become available since then (e.g., CCI-Land Cover data). The tables also include efforts currently underway to collect additional data to increase country coverage (e.g. on government support to fisheries), and highlights which of these multi-country datasets reflect pressure, state, or response variables.[15]

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[15] Other sources of data to consider are those made available by the GBIF and those listed in (UNEP-WCMC, 2018[20]).

Table 3.1. Multi-country data sources for natural assets (*to be further developed*)

Measurement category	Measurement aspect (and type: pressure, state, response)	Potential indicators	Data source	Data coverage	Notes	Link
Biodiversity/ Species	Species abundance *State*	Benefits index for biodiversity	GEF	Global coverage; 2005 and 2008 only	Based on De Pandey et al., 2006	http://data.worldbank.org/indicator/ER.BDV.TOTL.XQ
	Species abundance *State*	Local biodiversity intactness index	PREDICTS	Global, 2005 snapshot, predicted to 2095	Shows the relative change in local biodiversity	https://www.nature.com/articles/nature14324
	Trends in extinction risk *State*	Red List Index	IUCN Red List of threatened species (from IUCN Red List Partnership)	Global coverage; revised regularly	Can be used in many ways already reports on progress towards 10 of the Aichi Targets	http://dx.doi.org/10.1787/data-00605-en
	Species Occurrence *State*	Species range shifts	Global Biodiversity Information Facility	Global coverage over 1 billion records in >40,000 datasets	Largest collection of biodiversity data globally, began from OECD recommendation. Needs to be processed in order to be useful indicator.	https://www.gbif.org/
	Species knowledge, distribution *State*	Species range shifts	Map of Life	Global coverage and time series	Built on data from GBIF and several other sources (to be completed)	https://mol.org
	Species knowledge, population trends, distribution *State*	Species status information index	Map of Life and GBIF	Global coverage updated twice a year	Shows the proportion of known species within a country about which information is available	https://mol.org/indicators/coverage
	Species abundance *State*	Living planet index	WWF/ZSL	Global, updated annually	Already an indicator under the BIP	http://livingplanetindex.org/home/index
	Habitat connectivity *State*	Protected Area connectivity	DOPA/ EC JRC	Global, and available at national level. ProtConn available for 2016 and 2018 (and soon for 2010, 2012, 2014, and for 2019)	Indicator of terrestrial protected area connectivity. ProtConn (Protected Connected)	https://www.sciencedirect.com/science/article/pii/S0006320717312284?via%3Dihub
	Human impacts *Pressure*	Human footprint index	UNBC/WCS/ETH Zurich/UQ/JCU/CUNY/CIESIN	Global at 1km resolution, only available for 1993 and 2009	Made from a composite of 8 different human impact proxies	https://datadryad.org/resource/doi:10.5061/dryad.052q5
	Restoration opportunities State	Atlas of Forest and Landscape Restoration Opportunities	WRI/IUCN/UM	Global 1km resolution periodically updated	Composite dataset based on potential habitat models, human pressure and land cover	http://www.wri.org/applications/maps/flr-atlas/#
	Agricultural land	Current agricultural area under different crops	FAO	Global; yearly updates	Official data, based on country self-reporting	http://faostat3.fao.org/home/E

Land and soil resources						
		Distribution of livestock	FAO//University of Oxford	1km resolution or machine learning generated consensus polygons, 2010 only	Not currently updated annual, based on model predicted distributions from self reported FAO data	http://www.fao.org/livestock-systems/en/
	Value of agricultural land	Net Present Value of production potential of agricultural land	World Bank Wealth of Nations	Ca. 130 countries; for 1995, 2000, 2005, 2008, 2010, 2014	Methodology currently updated	http://data.worldbank.org/data-catalog/wealth-of-nations
Land and soil resources	Land degradation NB: other land degradation indicators to be considered in the next version e.g. soil organic carbon and land productivity (SDG indicators)	Topsoil loss of agricultural land	FAO Global Assessment of Soil Degradation (GLASOD)	Ca. 145 countries; 1991,2008		http://faostat3.fao.org/download/E/ES/E
		Vegetation health index	NOAA/NESDIS STAR Global vegetation health produces	Global, 7km resolution 1986-present and 1km 2012-present	Range of products available but 1km resolution only available from 2012	https://www.star.nesdis.noaa.gov/smcd/emb/vci/VH/index.php
		Erosion Risk map	Global Forest Watch	Global, 15 arc second resolution, 2015 with potential updates	Only available for 2015, update frequency is unclear	http://water.globalforestwatch.org/map/
	Land cover change and conversions	Loss (and gains) of natural and semi-natural vegetated land	OECD based on CCI_CL, JRC Global Human Settlement Layer (JRC-GHSL), JRC Global Surface Water (JRC-GSW)	Global	Land cover data from earth observation can further be overlaid with geospatial data on protected areas to assess protected area's effectiveness	Forthcoming on oecd,stat
		Change in land area covered by buildings	UNCCD, FAO			
	Agri-environmental indicators	Farmland Bird Index	Cf JWPAE documents	12 countries in the EU up until 2014	Can be used as is, but limited geographic and temporal coverage.	http://ec.europa.eu/eurostat/web/agri-environmental-indicators
		Nutrient Surpluses, etc	OECD, Eurostat, FAO	To be checked on FAO site	To be completed	To be completed
		Cropland nutrient balances	Earthstat, UMN IonE, LUGE lab at UBC	Global, 5 arc second, 2000 only (based on input data from 1994-2001)	Only available for 1 year, potential for update is unclear	http://science.sciencemag.org/content/345/6194/325.abstract
	Soil carbon stocks	Changes in soil carbon stocks over time	ISRIC-WIS	Global, regularly updated	Soil carbon is reported at 6 standard depths at 1km and 250m resolution. Derived using ensemble machine learning algorithms from a variety of data sources. Based on the SoilGrids data	https://www.isric.org/explore/soilgrids
	Cropland and Pasture Area	Change in cropland extent	USGS FAO Land Use	Global, regularly updated FAO (1961-present)		https://www.croplands.org/

	Cropland water use	Change in extent of irrigated and rain fed crops	GFSAD1000: Cropland Extent 1km Multi-Study Crop Mask, Global Food-Support Analysis Data	Global, 2000 only	Course resolution and limited to only 5 categories. Also based on 4 other maps with each have considerable associated uncertainty	https://explorer.earthengine.google.com/#detail/USGS%2FGFSAD1000_V1
Forests and timber	Forest land	Land with different forest types and changes over time	FAO Forest Resource Assessment (from FAO Land Use)	Most countries; 1990-present annual updates	Official data based on country self-reporting	http://www.fao.org/forestry/fra/
		Land with tree cover gain (>25% canopy cover density for any vegetation above 5m) and changes over time	WRI Global Forest Watch based on University of Maryland analysis	Global map (30x30m); annual data from 2000, updates are planned	Results shown in Hansen et al. 2013	http://www.globalforestwatch.org/
		Land with tree cover gain	WRI Global Forest Watch based on University of Maryland analysis	Global map (30x30m); annual data 2000-2012	Results shown in Hansen et al. 2013	http://www.globalforestwatch.org/
		Intact forest landscapes	WRI, UMD, Greenpeace, WWF Russia and Transparent World	Global map 30m, 2013 only	Shows landscapes with no signs of human activity	http://www.intactforests.org/
		Tree cover height	UMD	South America only, 1985-2016	Limited geographic and temporal scope,	https://resourcewatch.org/data/explore/UMD-TreeCoverHeight
		Forest tenure	Rights and Resources Initiative	52 of the worlds most forested countries, 2002-2013	Recognises 4 types of tenure, dataset created from a range of sources	http://rightsandresources.org/en/work-impact/tenure-data-tool/#.WSXopBPyvwc
	Value of forest land	NPV of rents from sustainable roundwood production non-timber forest resources	World Bank Wealth of Nations	130 countries; for 1995, 2000, 2005, 2008, 2010, regular updates	Methodology currently updated	http://data.worldbank.org/data-catalog/wealth-of-nations
	Timber stocks (and forest stocks)	Volume of industrial roundwood and woodfuel	FAO Forest Resource Assessment (and Forest Statistics)	Most countries; 1990, 2000, 2005	Official data based on country self-reporting, widely used	http://www.fao.org/forestry/fra/fra2010/en/
		Above ground live woody biomass	Woods Hole Research Centre	Tropics, 2000	Only for the tropics and only for one year. A longer time series might serve as a useful indicator	http://data.globalforestwatch.org/datasets/8f93a6f94a414f9588ce4657a39c59ff_1
		Above ground live mangrove biomass	UNEP-WCMC	Mangroves, 2014	Limited to only mangroves, but time series would be useful	http://data.unepwcmc.org/datasets/39

	Oil Palm concessions	Change in extent of concessions	WRI	7 countries (Indonesia, Malaysia (Sarawak), Cameroon, Liberia, Congo, PNG and Soloman Islands)	Not time series and might not relate to the actual extent of oil palm	http://data.globalforestwatch.org
	Value of forest resource depletion	Value of excess roundwood harvest that is beyond natural growth (in US$ or % of GNI)	World Bank World Development Indicators	Ca. 130 countries; 1970-2013, yearly updates	Methodology currently updated	http://data.worldbank.org/indicator/NY.ADJ.DFOR.GN.ZS
Oceans and fish stocks	Fishing effort	Marine Landings	OECD FAO FISHSTAT	38 countries	Self-reported via questionnaire, data gaps exist	https://stats.oecd.org/
		Global footprint of fisheries	Global fishing watch	0.5 degree resolution, daily updates	Results are in Kroodsma et al 2018, but daily dynamic maps produced by global fishing watch, the data are also freely available at very high resolution	https://globalfishingwatch.org/map-and-data/
	Ocean health *Pressure*	Chlorophyll concentration	NASA	Global 9km resolution, 2002-present, monthly updates	Useful to monitoring ocean health, could easily construct time series	https://oceancolor.gsfc.nasa.gov/atbd/chlor_a/
		Status and exploitation of fish stocks	FAO	Multiple country datasets collated by the Fisheries and resource monitoring system, does not include North or South America or some parts of Asia and Africa	A coordinated database, with multiple datasets	http://firms.fao.org/firms/en
Air pollution emissions	Air pollution emissions accounts (under SEEA)	PM2.5, CO, NMVOC, SOx, NOx, and GHGs (CO2, CH4, N2O, HFC, PFC, SF6),	OECD Air Emissions Accounts	Selected countries, 2000-2013, ISIC Rev. 4	Country coverage will be progressively expanded as countries adopt the SEEA standard.	http://stats.oecd.org/index.aspx?datasetcode=AEA
			Eurostat air emission accounts			
	Greenhouse gas emissions from croplands	total CO2e emissions, CO2e per Kcal of food produced	EarthStat/UMN IonE/LUGE Lab at UBC	Global year 2000 only	Only from the year 2000 but based on 172 crops	http://www.earthstat.org/greenhouse-gas-emissions-croplands/
Water resources	Available renewable freshwater resources, abstractions and	Total renewable water resources	FAO Aquastat	200 countries; yearly updates		http://www.fao.org/nr/water/aquastat/data/query/index.html?lang=en
	Water stress		OECD Environment statistics: water resources FAO Aquastat			

Areas/population exposed to water scarcity	Baseline water stress	WRI Aqueduct FAO Aquastat	Global coverage; 2014 only	When overlaid with spatial population data, the population exposed to water stress can be calculated	http://www.wri.org/our-work/project/aqueduct/aqueduct-atlas
	Agricultural exposure to water stress	WRI Aqueduct FAO Aquastat	Global coverage; 2014 only		http://www.wri.org/our-work/project/aqueduct/aqueduct-atlas
	Overall water risk	WRI Aqueduct	Global coverage; 2014 only		http://www.wri.org/our-work/project/aqueduct/aqueduct-atlas
	Flood Rish	WRI Aqueduct	Global coverage; 2010-2030 (projected)		http://floods.wri.org/#/
	Groundwater Vulnerability to Floods and Droughts	BRG	Global, 2015 only		https://www.whymap.org/whymap/EN/Maps_Data/maps_data_node_en.html
Rainfall deficit	Global Aridity Index	CGIAR – Consortium for Spatial Information	Global coverage (1x1km), average for 1950-2000 only	Based on of precipitation, temperature and potential	http://www.cgiar-csi.org/data/global-aridity-and-pet-database
Severity of drought conditions	Standardized Precipitation and Evaporation Index	Global SPEI database	Global (50x50km), 1901-2015	Based on monthly precipitation and potential evapotranspiration from the Climatic Research Unit	http://sac.csic.es/spei/database.html
Water resources exposed to harmful pollution levels	Surface and groundwater quality	UNEP Global Environment Monitoring System (GEMS) Water Programme	Global (4,100 stations from all around the world) but country coverage and years vary	Measured parameters and frequency varies despite standardized methods	http://www.unep.org/gemswater/GlobalNetwork/tabid/78238/Default.aspx
Freshwater resources and abstractions	Aquifer recharge, evapotranspiration, groundwater for abstraction, inflow, outflow, precipitation, total resource; gross abstraction for public supply, agriculture, manufacturing, electricity production	OECD Environment Statistics	OECD, 1980-2015	Official data based on country self-reporting	http://stats.oecd.org/index.aspx?datasetcode=WATER_ABSTRACT
Lake and river quality	Nitrates, phosphorus	OECD Environment Statistics	OECD, 1980-2013	Official data based on country self-reporting	http://stats.oecd.org/index.aspx?datasetcode=WATER_QUALITY

| | Soil moisture | Changes in average soil moisture over time | NASA-USDA | 2015-present, updated every 3 days, | Satellite monitoring | https://smap.jpl.nasa.gov/ |
| **Other** | Generic | Environmental performance index | Yale Center for Environmental Law and Policy (YCELP), Data-Driven Yale, and the Columbia University Earth Institute Center for International Earth Science Information Network (CEISIN) | 180 countries every two year | in 2018 the methodology changed so recent scores not comparable with past scores | https://epi.envirocenter.yale.edu |

Source: Adapted and updated from Narlof et al (2016).

Table 3.2. Multi-country data sources for responses (to be further developed)

Measurement categories	Measurement aspect (and type: input, process, output, outcome, impact)	Potential indicators	Data source	Data coverage	Notes	Link
Environmental regulation and planning	Protected areas *Response: Outcome*	Terrestrial and marine protected areas	WDPA (UNEP-WCMC) OECD	All countries; 1990-2012 OECD: 47 countries; 1970, 80, 90, 95, 2000, 05, 10, 15, 17	OECD: data without double-counting areas that overlap.	ProtectedPlanet.net http://dx.doi.org/10.1787/5fa661ce-en
	Environmental protection expenditure *Response: Input*	Environmental protection expenditure as % of GDP	OECD	OECD, 1990-2015	Official data based on country self-reporting (OECD/Eurostat questionnaire) Questionnaire under revision to align with the SEEA. Plan to better cover biodiversity related expenditure.	http://stats.oecd.org/index.aspx?datasetcode=EPER
	Biodiversity expenditure *Response: Input*		Eurostat (and OECD) BIOFIN CBD CHM	Varies		
	Fossil fuel support[16] *Outcome*	Price-gap based fossil fuel subsidies	IEA	39 (primarily developing) countries; 2007-2011	IEA has been constructing this dataset for over a decade uses price-gap approach	http://www.worldenergyoutlook.org/resources/energysubsidies/fossilfuelsubsidydatabase/

[16] Difference between IEA and OECD explained: http://www.oecd.org/site/tadffss/. On-going methodological paper being prepared by OECD and others to address these given this is an SDG indicator.

		Budgetary transfer and tax expenditure-based fossil fuel subsidies	OECD	OECD and G20 countries; 2005-2013	OECD uses budgetary transfers and tax expenditures and broader range of measures than IEA	http://www.oecd.org/site/tadffss/
	Fisheries support *Outcome*	Government support to fisheries	OECD	OECD and 4 non-OECD countries; 2008-2018	Official data based on country self-reporting (OECD questionnaire)	http://stats.oecd.org/Index.aspx?datasetcode=FISH_FSE
	Agriculture support *Outcome*	Government support to agriculture	OECD	More than 45 countries	Also shown as trends in potentially environmentally harmful, neutral and other government support to agriculture	OECD PSE database
	Environmental Policy Stringency	Index of stringency of Environmental Policies	OECD	24 OECD countries; 1990-2012	Composite indicators based on individual policies, new update including BRIICS countries in early 2016	http://oe.cd/OQ
	Policies and practices for IUU fishing		OECD	30 countries plus Chinese Tapei; 2005, 2016 (and soon 2018)		
Biodiversity relevant policy incentives	Positive incentives for biodiversity conservation and sustainable use *Outcome*	Biodiversity-relevant taxes, charges and fees (including revenues); biodiversity-relevant tradable permits, subsidies. *Will soon add PES and biodiversity offsets*	OECD	More than 90 countries (OECD and several non-OECD countries); 1994-present	Official data based on country self-reporting (OECD questionnaire)	http://oe.cd/pine Tracking economic instruments and finance for biodiversity

Source: Adapted and updated from Narlof, Kozluk and Loyd (2016).

48.   As noted above, another way that the response variables can be considered is in terms of inputs, process, outputs, outcomes and impacts (see Table 2.1). Earlier work by the OECD has explored how monitoring and evaluation of biodiversity mainstreaming could be undertaken and categorised various indicators as reflected in Table 3.3 below.

Table 3.3. Examples of possible response indicators to monitor progress towards biodiversity mainstreaming

Possible indicators	Response Indicator type					Data source and availability
	Input	Process	Output	Outcome	Impact	
NATIONAL						
Finance mobilised for biodiversity	x					Work under way. Biodiversity-relevant environmental protection expenditures (OECD, European Environment Agency), CBD national financial reporting, UNDP BIOFIN (Biodiversity Finance Initiative)
Trends in incorporation of physical measures of stock and flow of natural capital in natural accounting		x				World Bank Wealth Accounting and Valuation of Ecosystem Services
Implementation of natural resource accounts within the SEEA		x				
Integration of development into NBSAP		x				Not systematically collected. Roe (2010); OECD (2018).
Integration of biodiversity into National Development Plan and other relevant national strategies*		x				Not systematically collected. Prip (2012); OECD (2018).
National ecosystem assessment (or other similar national assessments)			x			Not systematically collected – see http://catalog.ipbes.net/
National assessment of harmful subsidies (e.g. in agriculture, fisheries, forests, mining, tourism)			x			N/A
Inter-ministerial committee for biodiversity (mainstreaming)		x				N/A
SECTORAL						
Generic/Cross-cutting						
- Biodiversity integrated into key sectors' policies and plans (e.g. agriculture, forestry, fisheries, mining, tourism) - Trends in incorporation of natural resource, biodiversity and ecosystem service values into sectoral plans (e.g. agriculture, forestry, fishing, mining, tourism)		x				Not systematically examined
Number of biodiversity-relevant taxes, charges and fees, tradable permit schemes				x		OECD PINE database, about 90 countries
Number of other policy instruments (e.g. payment for environmental services [PES] schemes, biodiversity offset programmes, other)				x		Not systematically examined. Ecosystem marketplace. Work planned for OECD PINE database
Agriculture						
Trends in percentage of agricultural support that is potentially environmentally harmful, neutral and beneficial				x		OECD Producer Support Estimate (PSE) database, about 45 countries
Changes in land use and cover				x		OECD Environmental Statistics; FAO, national sources, e.g. CORINE land cover database
Percentage of agricultural area under sustainable certification				x		
Number of plant and animal genetic resources for food and agriculture secured in medium- or long-term conservation facilities				x		FAO
Amount of pesticide use per hectare				x		FAO and OECD Agri-Environment Indicators (AEI)

						Source
Amount of fertiliser use per hectare				x		FAO and OECD AEI
Agriculture ammonia emissions				x		OECD AEI
Agricultural freshwater withdrawal				x		OECD AEI
Status of water quality				x		OECD AEI
Nitrogen balance				x		OECD AEI
Phosphorous balance				x		OECD AEI
Index of farmland birds				x		OECD AEI
Land degradation (topsoil loss of agricultural land)				x		FAO Global Assessment of Soil Degradation (GLASOD) 1991, about 145 countries
Areas/population exposed to water scarcity				x		World Resources Institute Aquaduct 2014. Global
Water resources exposed to harmful pollution levels				x		
Fisheries						
Number of fisheries with management plans			x			
Number of fisheries with total allowable catch or other quota/licensing			x			N/A
Number of countries with individually transferable quotas for fisheries			x			OECD PINE
Bottom-trawling regulation in environmentally sensitive areas			x			
Percentage of fish from sustainable sources (eco-certification)				x		
Percentage of fish species overexploited or collapsed					x	FAO Global (cannot be disaggregated at national level)
Forestry						
Changes in land use and cover				x		OECD Environmental Statistics, FAO, national sources e.g. CORINE
Land with different forest types and change over time				x		FAO Forest Resource Assessment, most countries
Value of forest resource depletion				x		World Bank World Development Indicators, about 130 countries
Percentage of forests with sustainable forest management (SFM) plans				x		
Percentage of harvested timber under sustainable certification				x		
DEVELOPMENT CO-OPERATION						
National strategy to mainstream biodiversity in development co-operation		x				N/A
Percentage of biodiversity-related bilateral *ODA* in total ODA	x					OECD CRS
Trends in flows and activities marked by development providers as "principal" and "significant" for biodiversity	x					OECD CRS

Note: * Other relevant national strategies include, but are not limited to, national sustainable development strategies, green growth strategies and poverty reduction strategies.
Source: OECD (2018), Mainstreaming Biodiversity for Sustainable Development

4. A preliminary analysis of the proposed targets summarised in document CBD/POST2020/PREP/1/INF/2

49.   A number of proposed targets have been put forward during the submission process and have been summarised in document CBD/POST2020/PREP/1/INF/2. Table 4.1 below categorises these targets in terms of (i) whether they are state, pressure or response targets; (ii) if they are response targets, whether they are inputs, processes, outputs, outcomes or impacts; (iii) whether the targets are specific; and (iv) whether the targets are measurable.

50.   The preliminary assessment undertaken in Table 4.1 on whether the proposed language associated with these post-2020 targets is specific and measurable suggests that very few of these proposed targets, thus far, are both specific and measurable.

51.   In addition, while the proposed targets submitted to date are not likely to be intended to be comprehensive, it may be interesting to note that most of the targets proposed on the pressures on biodiversity refer to species extinction and to trade-related issues. In addition, about a third of the targets proposed on the responses refer to protected areas. Large gaps are therefore prevalent, for example, on other pressures on biodiversity, such as pollution and land and sea use change, and on the range of possible responses, including on mainstreaming.

Table 4.1. Preliminary assessment of the proposed post-2020 targets summarised in CBD/POST2020/PREP/1/INF/2

Proposed target	Pressure	State	Response	Enabling Condition	Input-process-output-outcome-impact	Specificity	Measurability
Utilization of biodiversity and ecosystem resilience for disaster risk reduction			X		Output	LOW	LOW
All Parties possess and maintain the regulatory framework and the capacity to regulate, manage or control the risks associated with the use and release of living modified organisms which are likely to have adverse environmental impacts that could affect the conservation and sustainable use of biological diversity, taking also into account the risks to human health			X		Output	MEDIUM	LOW
Eliminate species extinction risks elevated by human activities	X					MEDIUM	MEDIUM
Improve the extinction risk of all species to natural or background rates	X	X				MEDIUM	LOW
Reduce the risk of collapse of all ecosystems to background rates	X						LOW
By 2030, Parties have established and implemented, or supported the establishment and implementation of, plans to demonstrably maintain the function and integrity of the planet's most irreplaceable, intact and functional coral reef ecosystems by retaining at least 10 per cent live coral cover and at least 500 kg/ha reef fish biomass		X	X		Process, output, outcome	HIGH	HIGH
By 2030, all terrestrial and marine habitats have reached degradation neutrality, and further land and coastal habitat conversion has been halted.	X					HIGH	MEDIUM and HIGH
By 2030, the value of ecosystem integrity is prioritized, and, at a minimum, 2020 levels of ecological intactness are maintained or enhanced across all ecosystems, with a particular emphasis on maintaining the most intact areas		X	X	X		HIGH	MEDIUM / HIGH
Ending degradation, fragmentation and loss of primary ecosystems, combined with very ambitious ecological restoration targets			X		Impact	MEDIUM	HIGH
Put in place, by 2030, regulatory and other policy frameworks that ensure a 100 per cent divestment from activities that cause ecosystem destruction and lead to perverse incentives towards biodiversity destruction and loss			X		Input, output, outcome	MEDIUM	MEDIUM

No more outbreaks due to anthropogenic ecosystem changes that also lead to biodiversity loss	?					LOW	LOW?
Avoiding health and economic burden due to environmentally linked disease epidemics		X					LOW
Countries should quantify net contributions of biodiversity to human health and well-being			X	X	Output	LOW	LOW
Conduct investigations and implement control measures on all wild animal and plant disease outbreaks to identify and control threats to biodiversity where anthropogenic change is the driver							MEDIUM?
By 2030, ensure that women and girls are an active part of decision-making on biodiversity management and stewardship and benefit equally from biodiversity and ecosystem services				X	Outcome?	LOW	LOW?
By 2030, ensure the respect, protection and fulfilment of the (human) right to healthy, clean, safe and sustainable environment and its ecosystems for present and future generations, through effective laws, policies and institutions implementing the three CBD objectives, including full and meaningful participation in decision-making and access to information and justice, in compliance with international human rights law and standards		X	X		Output/outcome?	LOW	LOW
At least 30 per cent fully or highly protected areas to be established by 2030			X		Outcome	HIGH	HIGH
A minimum of 30 per cent of terrestrial and marine habitat to be effectively conserved through context-appropriate, area-based conservation measures by 2030.			X		Outcome	MEDIUM	MEDIUM / HIGH
By 2030 at least 30 per cent of Earth be covered by well-connected systems of protected areas and other effective area-based conservation measures (OECMs), and managed, where appropriate, as ecological networks			X		Outcome	MEDIUM / HIGH	HIGH
Effectively conserve at least 30 per cent of land and sea to conserve biodiversity			X		Outcome	HIGH	MEDIUM / HIGH
Ensure the conservation of biodiversity, further expansion of protected areas and OECMs should take place in sites important for biodiversity such as Key Biodiversity Areas			X		Outcome		HIGH
Protecting at least 30 per cent of the planet by 2030.			X		Outcome	HIGH	HIGH
Risk of overexploitation reduced by 30 per cent for "high risk" shark species in trade	X				Outcome	HIGH	MEDIUM?

	C1	C2	C3	C4	Type		
Reduce the pressure of illegal and unsustainable trade in wild flora and fauna on biodiversity, and enhance the benefits to wildlife conservation and human well-being that derive from legal wildlife trade at sustainable levels	X				Outcome	LOW	LOW?
Illegal trade in elephant, rhino and tiger products reduced by 50 per cent	X				Outcome	HIGH	MEDIUM?
Unauthorized timber exports reduced by 50 per cent or more from countries with significant illegal trade from high conservation value forests.			X		Outcome		MEDIUM?
Best practice guidelines (e.g. the FairWild Standard recognized by the CBD's Global Strategy for Plant Conservation) applied to trade in 50 priority wild plant value chains.			X		Outcome	MEDIUM	LOW?
Robust traceability mechanisms established for high risk wild species in trade.			X	X	Output?		?
Total	7	5	17	4			

Source: Authors.

5. Possible elements of targets and associated indicators to include in a post-2020 global biodiversity framework

52.   The discussions to date on the post-2020 global biodiversity framework are still at a fairly conceptual level (i.e. on structure and scope), and have not yet gone into much detail on a more comprehensive suite of post-2020 targets and the associated indicator needs. The analysis below puts forward some broad suggestions for consideration in terms of how any targets related to state, pressures and responses, and the associated indicators, could be approached. It is important to note that the elements of the targets proposed below are not intended to be exhaustive.

53.   The analysis is based on the following premises: A goal is not necessarily a target. While targets should be SMART, goals do not necessarily have to be. In contrast to the co-chairs paper (i.e. Non-paper 02), the terms goals and targets are not used interchangeably here. The analysis below also does not make any presupposition on the ability for the targets and indicators to be complemented by an overarching vision, a mission, or any strategic goals.

5.1. Possible targets on state, available indicators, and whether they meet the headline indicator criteria

54.   It is proposed that, as a starting point, targets on the state of biodiversity could cover the three elements of biodiversity, as defined by the Convention. These elements are species, ecosystems (terrestrial, marine and other aquatic) and genetic diversity.

55.   With respect to species, discussions at the OECD international expert workshop suggested that this could cover species abundance and extinction risk/species status. In addition, the state variables considered to be those most important to monitor in a consistent and comparable way across countries (in other words, as a headline indicator) were:

- Extinction risk/rate (e.g. Red List Index for species)

- Population trends (e.g. Living Planet Index, Species Habitat index, etc.)

- Biotic integrity (e.g. Biodiversity intactness index, Mean species abundance)

- Genetic diversity (No indicators currently available)

- Ecosystem extent and condition (various indicators)

56.   Drawing on this, Table 5.1 is intended to provide a guiding framework, to help consider the following issues: (i) what the targets should cover; (ii) what indicators are currently available to monitor progress towards these; (iii) whether these indicators meet the headline indicator criteria (i.e., datasets exist whereby the metrics used are consistent and comparable across countries); and finally, (iv) an assessment of whether these targets are indeed important enough to be considered headline indicators.

Table 5.1. Possible elements of targets on state, available indicators and whether they meet headline indicator criteria

A preliminary framework for consideration with initial inputs (*to be further developed*)

Targets on the state of biodiversity	Indicator availability	Meets headline indicator criteria (i.e., consistent and comparable data across countries)?	Priority target to be monitored in a consistent & comparable manner?
Species			
Species abundance/ population trends			Yes
	Wild Bird Index	*	
	Living Planet Index	*	Yes
	Species habitat index	Yes	Yes
	Fish biomass for predatory fish	*	
Extinction risk/species status			Yes
	Red List Index (and various thematic disaggregations)	Yes	Yes
	Proportion of fish stock within safe biological limits	Sufficiently	
	Percentage of terrestrial domesticated animal breeds at risk	Yes	
Community structure/composition			
	Marine trophic index	*	
	Percentage change in local species richness	*	
	Biodiversity Intactness Index	Yes	Yes
	Mean species abundance	Yes	Yes
Ecosystems (terrestrial, marine and other aquatic) – extent and condition			**Yes**
	Percentage natural habitat extent	Yes	
	Wetland Extent Trends Index	Yes	
	Area of mangrove forest cover	*	
	Percentage live coral cover	*	
	Glacial mass balance (mm water equivalent)	*	
	Mean polar sea ice extent	*	
	Vegetation biomass	Yes	
	Biodiversity habitats index	Yes	
	Extent of primary habitat	Yes	
	Proportion of land that is degraded	Yes	
	Ocean Health Index	* ?	
Genetic diversity			
	None currently available		

Note: This table draws heavily on the discussions at the OECD international expert workshop convened on 25 February 2019. "*" refers to data that is only available for a subset of countries or at regional scale.
Source: Summary Record of the OECD international expert workshop on The Post-2020 Biodiversity Framework: Targets, indicators and measurability implications at global and national level.

5.2. Possible targets on pressures, available indicators, and whether they meet headline indicator criteria

57. The IPBES Global Assessment report categorised pressures (referred to as direct drivers) into five broad categories.[17] As a starting point, these broad categories are used in Table 5.2 below to help organise the possible elements of targets that might be relevant for consideration in a post-2020 global biodiversity framework.

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[17] Drivers of biodiversity loss: changes in land and sea use; direct exploitation of organisms; climate change; pollution; and invasion of alien species. Indirect drivers of biodiversity loss, including production and consumption patterns, human population dynamics, and trends, trade, technological innovations and local through global governance.

Table 5.2. Possible elements of targets on pressures, available indicators and whether they meet headline indicator criteria

A preliminary framework for consideration with initial inputs (*to be further developed*).

Targets on pressures	Indicator	Meets headline indicator criteria (i.e., consistent and comparable data across countries)?	Priority to be monitored in a consistent & comparable manner?
IPBES Pressure 1: Changes in land and sea use			
Land use change			
Land cover change	Land cover change and conversions	Yes (for all countries)	
	Area of tree cover loss	Yes	
Marine habitat destruction			
Land degradation	Proportion of land that is degraded over total land area	Tier 2	
Others?			
IPBES Pressure 2: Over-exploitation of natural resources			
Forest over-exploitation	Area of tree cover loss		
Fish over-exploitation	Proportion of fish stock over-exploited	Sufficiently	Yes
Food waste?			
Soil degradation?			
Others?			
IPBES Pressure 3: Pollution			
Plastics			
Marine debris			
Pesticides	Pesticide use per hectare	Yes	
Excessive nutrients	Fertiliser use per hectare		
	Nutrient balance	Yes	
Heavy metals			
POPs			
Other? (e.g. noise)			
IPBES Pressure 4: Climate change			
GHG emissions	tCO2e	Yes	Covered by UNFCCC
Change in global mean surface temperature?			
Atmospheric concentration of CO_2?			
IPBES Pressure 5: Invasive alien species			
	Trends in the numbers of invasive alien species introduction events	Yes (for countries where pressure is high); TBC	
Pressures related to trade?			
Ecological footprint?			

Note: This table draws heavily on the discussions at the OECD international expert workshop convened on 26 February 2019. "*" refers to data that is only available for a subset of countries or at regional scale.
Source: Summary Record of the OECD international expert workshop on The Post-2020 Biodiversity Framework: Targets, indicators and measurability implications at global and national level.

5.3. Possible targets on responses (i.e. actions), available indicators, and whether they meet headline indicator criteria

58.   Targets on responses are potentially more complicated given that there are so many possible options. OECD (2019) had provided a few examples of different types of responses (across selected themes, such as protected areas), according to whether they are inputs, processes, outputs, outcomes or impacts (Table 5.3).

Table 5.3. Examples of potential sets of indicators for selected responses

Response theme	Input	Process	Output	Outcome	Impact
Protected areas	Increase in finance and staff for PAs	Systematic conservation planning	New legislation to increase PAs	Increase in PA coverage	Increase in species abundance
Sustainable fisheries		Inter-Ministerial Committee on Sustainable Ocean	Fisheries management plans	Increase in % of fish from sustainable sources	Reduction in the number of fisheries overexploited
Pesticide use		Assessment of environmental impacts of pesticides	Reduction in pesticide subsidies; Introduction of pesticide taxes	Decline in pesticide use per hectare	Increase in farmland biodiversity (e.g. farmland bird index)
Sustainable agriculture		Assessment of subsidy impacts on biodiversity	Farm-level biodiversity management plans	Increase in uptake of sustainable practices and habitat creation	Increase in farmland biodiversity (e.g. farmland bird index)

Source: OECD (2019), Biodiversity: Finance and the Economic and Business Case for Action.

Table 5.4. Possible targets on responses, available indicators and whether they meet headline indicator criteria

A preliminary framework for consideration with initial inputs (*to be further developed*).

Targets on responses	Indicator	Meets headline indicator criteria (i.e., consistent and comparable data across countries)?	Priority target to be monitored in a consistent and comparable way?
Responses to address land and sea use change			
On Land use			
On Land use change (e.g., restoration target)			
On Marine habitat destruction			
Protected areas (PAs)	PA coverage	Yes	Yes
	PA connectedness index (terrestrial)	Yes	
	PA representativeness index	Yes	
	PA management effectiveness	No	Yes?
Other? (effective EIA, SEA; land use and marine spatial planning – or similar)			
Responses to address over-exploitation of natural resources			
On sustainable forests	Area of forest under FSC and PEFC		
On sustainable fisheries	MSC certified catch	No	
On IUU fishing	Policies and practices against IUU fishing	Yes	
Other?			
Responses to address pollution			
On Plastics			
On Marine pollution / debris			
On Pesticides	Taxes on pesticides?	Yes	
On Excessive nutrients	Taxes on fertilisers?	Yes	
On Heavy metals			
On Persistent organic pollutants			
Other?			
Responses to address climate change			
On Nature-based solutions?			
On Restoration of ecosystems (forests, mangroves, seagrass, etc)?			
Responses to address invasive alien species			
	Proportion of countries adopting national legislation and adequate resourcing for prevention/control of IAS		
	Trends in invasive species eradication on islands	For islands (this is an impact indicator)	
Responses to address pressures related to trade			
Identify and assess biodiversity impacts of trade imports?			
Positive incentives			
Biodiversity-relevant taxes	# and type of instruments	Yes	
Biodiversity-relevant fees and charges	# and type of instruments	Yes	
Biodiversity-relevant tradable permits	# and type of instruments	Yes	
Biodiversity-relevant (positive) subsidies	# and type of instruments	Yes (but reporting not comprehensive)	

Payments for Ecosystem Services	# and type of instruments	Under development (OECD)	
Biodiversity offsets	# and type of instruments	Under development (OECD)	
Mainstreaming targets (some repetition with above)			
National level			
Biodiversity integrated in national development strategies		No	
Implementation of natural resource accounts within SEEA			
National assessment of subsidies harmful to environment/biodiversity		No (but easy to develop: yes/no indicator)	
Business and financial institutions?			
Agriculture			
Extent of sustainable agriculture		Under development (FAO)	?
Reform of potentially environmentally harmful support to agriculture	Trends in type of support	Yes	
Others?			
Forestry			
Sustainable Forest Management (SFM)	Area under SFM	Under development (FAO)	?
Others?			
Fisheries and aquaculture			
SDG 14.6 and ABT 3	Government support to fisheries	Yes	
Others?			
Tourism			
Energy			
Mining			
Infrastructure			
Transport			
Manufacturing and processing			
Enabling conditions			
National planning processes			
NBSAPs		Yes	
Finance / Resource Mobilisation			
Domestic public biodiversity expenditures	Finance	No	Yes?
Private biodiversity expenditures	Finance	No	
Domestic finance generated and mobilised by economic instruments (positive incentives)	Finance	Yes	Yes?
Biodiversity-relevant ODA	Finance	No	Yes?
Governance			
Public awareness			
Environment in all primary education curricula			
Traditional knowledge			
Other?			

Source: Authors.

Annex A. The 2011-2020 Aichi Biodiversity Targets

Strategic Goal A: Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society

Target 1: By 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.

Target 2: By 2020, at the latest, biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes and are being incorporated into national accounting, as appropriate, and reporting systems.

Target 3: By 2020, at the latest, incentives, including subsidies, harmful to biodiversity are eliminated, phased out or reformed in order to minimize or avoid negative impacts, and positive incentives for the conservation and sustainable use of biodiversity are developed and applied, consistent and in harmony with the Convention and other relevant international obligations, taking into account national socio economic conditions.

Target 4: By 2020, at the latest, Governments, business and stakeholders at all levels have taken steps to achieve or have implemented plans for sustainable production and consumption and have kept the impacts of use of natural resources well within safe ecological limits.

Strategic Goal B: Reduce the direct pressures on biodiversity and promote sustainable use

Target 5: By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced.

Target 6: By 2020 all fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits.

Target 7: By 2020 areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity.

Target 8: By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity.

Target 9: By 2020, invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment.

Target 10: By 2015, the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and functioning.

Strategic Goal C: To improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity

Target 11: By 2020, at least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes.

Target 12: By 2020 the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained.

Target 13: By 2020, the genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives, including other socio-economically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity.

Strategic Goal D: Enhance the benefits to all from biodiversity and ecosystem services

Target 14: By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable.

Target 15: By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 per cent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification.

Target 16: By 2015, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization is in force and operational, consistent with national legislation.

Strategic Goal E: Enhance implementation through participatory planning, knowledge management and capacity building

Target 17: By 2015 each Party has developed, adopted as a policy instrument, and has commenced implementing an effective, participatory and updated national biodiversity strategy and action plan.

Target 18: By 2020, the traditional knowledge, innovations and practices of indigenous and local communities relevant for the conservation and sustainable use of biodiversity, and their customary use of biological resources, are respected, subject to national legislation and relevant international obligations, and fully integrated and reflected in the implementation of the Convention with the full and effective participation of indigenous and local communities, at all relevant levels.

Target 19: By 2020, knowledge, the science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss, are improved, widely shared and transferred, and applied.

Target 20: By 2020, at the latest, the mobilization of financial resources for effectively implementing the Strategic Plan for Biodiversity 2011-2020 from all sources, and in accordance with the consolidated and agreed process in the Strategy for Resource Mobilization, should increase substantially from the current levels. This target will be subject to changes contingent to resource needs assessments to be developed and reported by Parties.

Annex B. **Targets and Indicators for SDG 14**

To conserve and sustainably use the oceans

14.1 By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution

> **14.1.1:** Index of coastal eutrophication and floating plastic debris density

14.2 By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans

> **14.2.1:** Proportion of national exclusive economic zones managed using ecosystem-based approaches

14.3 Minimize and address the impacts of ocean acidification, including through enhanced scientific cooperation at all levels

> **14.3.1**: Average marine acidity (pH) measured at agreed suite of representative sampling stations

14.4 By 2020, effectively regulate harvesting and end overfishing, illegal, unreported and unregulated fishing and destructive fishing practices and implement science-based management plans, in order to restore fish stocks in the shortest time feasible, at least to levels that can produce maximum sustainable yield as determined by their biological characteristics

> **14.4.1:** Proportion of fish stocks within biologically sustainable levels

14.5 By 2020, conserve at least 10 per cent of coastal and marine areas, consistent with national and international law and based on the best available scientific information

> **14.5.1:** Coverage of protected areas in relation to marine areas

14.6 By 2020, prohibit certain forms of fisheries subsidies which contribute to overcapacity and overfishing, eliminate subsidies that contribute to illegal, unreported and unregulated fishing and refrain from introducing new such subsidies, recognizing that appropriate and effective special and differential treatment for developing and least developed countries should be an integral part of the World Trade Organization fisheries subsidies negotiation

> **14.6.1:** Progress by countries in the degree of implementation of international instruments aiming to combat illegal, unreported and unregulated fishing

14.7 By 2030, increase the economic benefits to Small Island developing States and least developed countries from the sustainable use of marine resources, including through sustainable management of fisheries, aquaculture and tourism

> **14.7.1:** Sustainable fisheries as a percentage of GDP in small island developing States, least developed countries and all countries

14.A Increase scientific knowledge, develop research capacity and transfer marine technology, taking into account the Intergovernmental Oceanographic Commission Criteria and Guidelines on the Transfer of Marine Technology, in order to improve ocean health and to enhance the contribution of marine biodiversity to the development of developing countries, in particular small island developing States and least developed countries

14.A.1: Proportion of total research budget allocated to research in the field of marine technology

14.B Provide access for small-scale artisanal fishers to marine resources and markets

14.B.1: Progress by countries in the degree of application of a legal/regulatory/policy/institutional framework which recognizes and protects access rights for small-scale fisheries

14.C Enhance the conservation and sustainable use of oceans and their resources by implementing international law as reflected in UNCLOS, which provides the legal framework for the conservation and sustainable use of oceans and their resources, as recalled in paragraph 158 of The Future We Want

14.C.1: Number of countries making progress in ratifying, accepting and implementing through legal, policy and institutional frameworks, ocean-related instruments that implement international law, as reflected in the United Nation Convention on the Law of the Sea, for the conservation and sustainable use of the oceans and their resources.

Annex C. Targets and Indicators for SDG 15

To protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

15.1 By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements

15.1.1 Forest area as a proportion of total land area

15.1.2 Proportion of important sites for terrestrial and freshwater biodiversity that are covered by protected areas, by ecosystem type

15.2 By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally

15.2.1. Progress towards sustainable forest management

15.3 By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world

15.3.1 Proportion of land that is degraded over total land area

15.4 By 2030, ensure the conservation of mountain ecosystems, including their biodiversity, in order to enhance their capacity to provide benefits that are essential for sustainable development

15.4.1 Coverage by protected areas of important sites for mountain biodiversity

15.4.2 Mountain Green Cover Index

15.5 Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species

> **15.5.1** Red List Index

15.6 Promote fair and equitable sharing of the benefits arising from the utilization of genetic resources and promote appropriate access to such resources, as internationally agreed

> **15.6.1** Number of countries that have adopted legislative, administrative and policy frameworks to ensure fair and equitable sharing of benefits

15.7 Take urgent action to end poaching and trafficking of protected species of flora and fauna and address both demand and supply of illegal wildlife products

> **15.7.1** Proportion of traded wildlife that was poached or illicitly trafficked

15.8 By 2020, introduce measures to prevent the introduction and significantly reduce the impact of invasive alien species on land and water ecosystems and control or eradicate the priority species

> **15.8.1** Proportion of countries adopting relevant national legislation and adequately resourcing the prevention or control of invasive alien species

15.9 By 2020, integrate ecosystem and biodiversity values into national and local planning, development processes, poverty reduction strategies and accounts

> **15.9.1** Progress towards national targets established in accordance with Aichi Biodiversity Target 2 of the Strategic Plan for Biodiversity 2011-2020

15.A Mobilize and significantly increase financial resources from all sources to conserve and sustainably use biodiversity and ecosystems

> **15.A.1** Official development assistance and public expenditure on conservation and sustainable use of biodiversity and ecosystems

15.B Mobilize significant resources from all sources and at all levels to finance sustainable forest management and provide adequate incentives to developing countries to advance such management, including for conservation and reforestation

> **15.B.1** Official development assistance and public expenditure on conservation and sustainable use of biodiversity and ecosystems

15.C Enhance global support for efforts to combat poaching and trafficking of protected species, including by increasing the capacity of local communities to pursue sustainable livelihood opportunities

> **15.C.1** Proportion of traded wildlife that was poached or illicitly trafficked

Annex D. Potential targets for enabling actions for biodiversity in the post-2020 framework in submissions to the CBD

Text taken from CBD (2019[25]) Synthesis of the Views of the Parties and Observers on the Scope and Content of the Post-2020 Global Biodiversity Framework:

(f) Enabling actions for biodiversity

1) Each party shall have developed national biodiversity strategies and actions plans with the full involvement of subnational governments, cities and other local authorities and committed to encouraging and supporting local and subnational governments to develop their own biodiversity strategies and action plans with a view to letting at least the immediate subnational governments in each Party to establish their NBSAP by 2030 or possibly 2025, making efforts to enhance the capacity of local and subnational governments to achieve the post-2020 framework;

2) By 2030, the traditional knowledge, innovations and practices of indigenous peoples and local communities relevant for the conservation and sustainable use of biodiversity, and their customary use of biological resources, are respected, subject to national legislation and relevant international obligations, and fully integrated and reflected in the implementation of the Convention with the full and effective participation of indigenous peoples and local communities, at all relevant levels;

3) By 2030, regulatory and other policy frameworks that ensure a 100% divestment from activities that cause ecosystem destruction;

4) By 2030, disclosure of financial risks from biodiversity loss related to investors and businesses becomes mandatory;

5) For all genetic resources that are accessed for their utilization, as well as for subsequent applications and commercialization, fair and equitable benefit-sharing agreements are in place based on free, prior and informed consent and mutually agreed terms with the relevant custodians of the genetic resources;

6) By 2025, biodiversity and sustainability proofing standards have been developed for the integration of biodiversity values into national and local development and poverty reduction strategies and planning processes, which enables good governance in the pursuit of biodiversity objectives;

7) By 2030, 75% of botanic gardens, arboreta and other plant-based organizations are delivering messages on the importance of plant diversity and at least 500 million people are aware of the value of plant diversity and the steps they can take to conserve and use it sustainably.

8) A target on a comprehensive and integrated approach to climate change, sustainable development and nature through improved synergies between the relevant multilateral agreements and through greater cohesion with major fora that influence global trade and economic objectives;

9) By 2030, all countries have accessible and comprehensive online information systems and inventories on their flora and plant based habitats, at least 80% of plant species have

been assessed for their conservation status, and the science base and required technologies are in place to protect plant diversity;

10) By 2022, all the Parties update and revise their NBSAPs in line with post-2020 global biodiversity framework

11) Regional consultation workshops will be held X times in 2021, to support the development of NBSAPs by Parties.

12) A target on recognizing the territorial and land tenure rights of Indigenous Peoples and local communities embodying sustainable lifestyles should be adopted, also because such recognition has proven to be a highly effective measure to conserve and restore biodiversity;

13) A target on recognizing, on the basis of Free Prior and Informed Consent, Indigenous Peoples and local communities conserved territories and areas (ICCAs) and Sacred Natural Sites;

14) A target on enhanced recognition of the role, rights and participation of women in biodiversity conservation and restoration;

15) A target on the need to protect those who defend territories and lands rich in biodiversity;

16) A target on environmental human rights defenders

17) A target on good governance, public and private financing, capacity-building, communications, partnerships and empowerment;

18) A target on the collection, analysis and delivery of marine, freshwater and terrestrial biodiversity observations;

19) A target on gender;

20) A target related to good governance, including effective enforcement of laws, transparency of process, and empowerment of vulnerable groups such as Indigenous Peoples and Local Communities;

21) A target related to building additional capacity and support for the removal of barriers to reduce gaps in implementation and reporting;

22) A target related to generating and sharing information to support implementation

23) A target on incorporating the value of biodiversity into national accounting processes

Annex E. Potential targets for biodiversity in the post-2020 framework in submissions to the CBD (excluding enabling conditions)

Text taken from CBD (2019[25]) Synthesis of the Views of the Parties and Observers on the Scope and Content of the Post-2020 Global Biodiversity Framework:

(a) Species

1) By 2030, 80% of all known rare, threatened and socio-economically important wild plant species are conserved ex situ, and viable populations are effectively managed in situ, preferably in connected ecologically functional biodiverse landscapes. Improve the survival probability of all species;

2) Reduce and/or reverse the losses of all species;

3) Support the conservation of specific species;

4) Prevent species extinctions and reverse the decline of wildlife populations;

5) Reduce the pressure of illegal and unsustainable trade in wild flora and fauna on biodiversity, and enhance the benefits to wildlife conservation and human well-being that derive from legal wildlife trade at sustainable levels;

6) Illegal trade in elephant, rhino and tiger products reduced by 50%;

7) Unauthorized timber exports reduced by 50% or more from countries with significant illegal trade from high conservation value forests;

8) Risk of overexploitation reduced by 30% for "high risk" shark species in trade;

9) Best practice guidelines (e.g. the FairWild Standard recognized by the CBD's Global Strategy for Plant Conservation) applied to trade in 50 priority wild plant value chains;

10) Robust traceability mechanisms established for high risk wild species in trade;

11) Halt and reverse the loss of agricultural biodiversity, particularly in situ;

12) A target on actions aimed at preventing extinctions and recovering threatened species;

13) A target focused on connectivity, embedding conservation of site networks and ecological processes into spatial planning and development activities at land/seascape, range-wide or flyway-scales;

14) A target on plants

15) A target related to migratory species;

(b) Ecosystems and habitats

1) By 2030, at the latest, coherent land use policies have been introduced for all land use types with a view to decrease the overall intensity of land use with the use of financial incentives;

2) Sustainably manage the coastal and marine areas outside of those covered by fully or highly protected marine protected areas (MPAs), as well as other effective area-based conservation measures (OECMs) which ensure at least equivalent conservation outcomes,

thus adding up to 100% of the ocean sustainably managed to prevent significant adverse impacts on the coastal and marine ecosystems;

3) Reduce the risk of collapse of all ecosystems to background rates;

4) Reduction of all deforestation and natural habitat conversion to zero by 2030;

5) Stabilize or increase the extent and quality of natural ecosystems and their services and restore degraded ecosystems to maintain ecological function and the provisioning of ecosystem services such as for food, clean water, clean air;

6) Increasing efforts to restore ecosystems and habitats based on Aichi Target 15, focusing on synergies between resilient and functioning ecosystems and adaptation to climate change, for example through enhancing connectivity;

7) Targets that prioritize the need to secure sufficiently large areas of the remaining intact forests, and that primary forests are protected from exploitation while respecting the rights of indigenous peoples;

8) A target on the promotion of connectivity throughout restoration;

9) A target on developing and implementing national marine spatial planning;

10) A target on soil biodiversity;

11) A target on deep ocean sea beds;

12) A target on agriculture and food systems;

13) A target on enhancing carbon stocks

(c) Genetic Diversity

1) By 2030, 80% of the genetic diversity of crops, including their wild relatives (CWR) and other domesticated socio-economically and culturally valuable plant species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity;

2) The conservation of genetic diversity of wild species;

3) A target related to biosafety;

(d) Direct pressures on biodiversity

1) By 2030, invasive species are controlled or eradicated in 80% of areas important for plant diversity, and measures are in place to manage pathways to prevent new introductions and establishment of invasive [pests and diseases – or organisms];

2) By 2030 there has been a 50% reduction in the number of species threatened by international trade;

3) A target on the number of oceanic islands to have invasive mammals eradicated and its expected cost and benefits;

4) A target on minimizing the impact of infrastructure and related sectors on biodiversity;

(e) Indirect pressures on biodiversity

1) By 2030, 95% of agriculture, aquaculture, and forestry products come from certified sustainable sources;

2) Subsidies in productive sectors (agriculture, fisheries, forestry etc.) harmful to biodiversity are eliminated by 2030;

3) Ensuring full elimination (100%) and redirection of incentives harmful to biodiversity by 2030;

4) By 2030, at the latest, coherent resource use policies have been introduced with a view to decrease global resource use with the use of financial incentives based on the principle of global justice;

5) Divestment from 50 per cent of public and private investments and incentives, including subsidies, harmful to biodiversity by 2025 and 100 per cent by 2030 in order to minimize or avoid negative impacts. The funds redirected from perverse investments and incentives shall be used to support positive incentives for the conservation and sustainable use of biodiversity and systemic alternatives to harmful economic activities, contributing significantly to resource mobilization.

6) A target related to the impacts of trade;

7) A target related to the elimination of subsidies and other mechanisms which promote private or public-sector activities that are harmful to the environment and especially to biodiversity;

8) A target that addresses the shift to more balanced, primarily plant-based diets in countries and societies with high meat and dairy consumption levels;

9) A target on diet shifts and waste reduction;

10) A target on improving yields and making markets more sustainable;

11) A target on ensuring the whole planet is completely sustainably managed;

12) A target regarding a 100% redirection and phasing out of perverse incentives;

13) A target on sustainable consumption and production patterns;

14) A target on the importance of on-farm production of diverse crops and of consumption of diverse diets, including the contribution of wild foods (plant, fish, forest products, fruits, nuts, etc) to health and wellbeing;

15) A target on population dynamics;

(g) Resource mobilization for the post-2020 global biodiversity framework

1) By 2030, all parties will mobilize adequate domestic financial resources, as well as mobilize increased official development assistance for those parties in a position to do so, and ensure effective enabling conditions to facilitate a substantial increase in private investment flows in biodiversity, such that the aggregate level of financial resources flowing to biodiversity conservation are adequate to meet the world's and each Party's biodiversity goals, approximating $400 billion annually

2) 1% of GDP is spent on biodiversity conservation nationally as well as internationally through a global financial mechanism

3) A target related to the provision of sufficient resources from national, bilateral and multilateral sources, and non-state actors;

(h) Benefits from biodiversity

1) By 2030, the value of ecosystem integrity is prioritized, and levels of ecological intactness are maintained or enhanced across all ecosystems, with a particular emphasis on maintaining the most intact areas;

2) Ensure fair and equitable sharing of benefits arising from the use of genetic resources and associated traditional knowledge and promote adequate access to genetic resources and associated traditional knowledge;

3) Retaining intact ecosystems and restoring degraded ecosystems to maintain and improve ecosystem services such as clean water and air, maximising nature's contributions to people;

4) A target on the health problems caused by loss of biodiversity, environmental services and the new dynamics of infectious diseases;

5) A target on the nexus between human health and biodiversity;

6) A target on getting people closer to nature;

7) A target on the management of the rest of the planet sustainably, supported by responsible production and consumption (including mainstreaming actions) and the equitable distribution of resources;

8) A target on the contribution of biodiversity and ecosystems to people;

9) A target recognizing the positive impact of healthy ecosystems on human health;

10) A target on the role of agricultural biodiversity in contributing to human health and the importance of mainstreaming and safeguarding agrobiodiversity to nourish people and sustain the planet;

(i) Protected areas and other effective area based conservation measures:

1) 30 per cent of the territorial waters and contiguous zones of semi-enclosed seas are protected and managed effectively;

2) By 2030 at least 30% of Earth be covered by well-connected systems of protected areas and Other Effective Area-Based Conservation Measures (OECMs), and managed, where appropriate, as ecological networks;

3) At least 30 per cent of terrestrial and inland water areas and 30 per cent of oceans must be conserved through an effectively and equitably managed, ecologically representative, wellconnected systems of highly protected areas and Other Effective Area Based Conservation Measures - covering areas important for biodiversity including Key Biodiversity Areas, Ecologically and Biologically Significant Marine Areas, intact ecosystems and ecosystem services;

4) Protect at least 30% of land and sea by 2030 and at least 50 percent of land and sea by 2050 in interconnected networks of protected areas designed to the conserving Earth's full diversity of life;

5) Increase protected area targets to at least 30% by 2030 with a long-term goal of 50% protection;

6) Increase the percentage of highly protected marine areas to 30 per cent by 2030;

7) Protect at least 30% of the planet's key coastal and marine areas by 2030, through effectively and equitably managed, ecologically representative and well-connected systems of fully or highly protected marine protected areas (MPAs)*, as well as other effective area-

based conservation measures (OECMs) which ensure at least equivalent conservation outcomes and promote thriving wildlife and ecosystems, building on Aichi Target 11;

8) Sustainably manage the coastal and marine areas outside of those covered by fully or highly protected marine protected areas (MPAs), as well as other effective area-based conservation measures (OECMs) which ensure at least equivalent conservation outcomes, thus adding up to 100% of the ocean sustainably managed to prevent significant adverse impacts on the coastal and marine ecosystems;

9) Triple protected area coverage by 2030, and better address: the location of protected areas, implementation, representativeness, connection, and concerns derived from large-scale extractive projects in coastal and oceanic areas;

10) Increase spatial conservation, sustainable use and restoration efforts on land and oceans, including but not limited to strengthened efforts in the governance of protected and indigenous/community conserved areas;

11) Ensure that MPAs and OECMs are well-managed, effective, offering positive and sustained long-term outcomes for the in situ conservation of biodiversity and that OECMs attributed to Aichi Target 11 or the new post-2020 marine spatial target follow all relevant guidelines and offer conservation outcomes at least equal to those of fully or highly protected MPAs;

12) By 2030, at least of 15% of each ecological region and 75% of areas important for plant diversity are identified and protected.

13) At least half of our lands and oceans are protected;

14) A target on World Heritage, at both global and national levels;

15) Appropriately and legally recognize and protect against external threats at least 50 per cent of collective lands, waters and territories of life of Indigenous peoples and local communities by 2025, and 100 per cent by 2030, in accordance with their self-determined governance systems, customary laws and community protocols, and free, prior and informed consent.

16) A target related to expanding protected and conserved areas and strengthening their management, and ensuring similar expansion and strengthening of Other Effective AreaBased Conservation Measures (OECMs), including Indigenous and Conserved Communities Areas (ICCAs).

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