



Convention on
Biological Diversity



Using Spatial Data to Support the Development of Plans for National Monitoring Systems

for the
Kunming-Montreal Global
Biodiversity Framework

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Disclaimer

This technical guidance document is meant to serve as a resource that Parties and others may wish to consider as they work on the development of national monitoring plans for the Kunming-Montreal Global Biodiversity Framework, as an early step towards monitoring implementation of the Framework. It does not replace or qualify the Convention on Biological Diversity (CBD) Conference of Parties (COP) Decisions or related information that is, or will be, provided by the CBD. Countries are welcome to use, adapt, or disregard this guidance, depending on existing capacities, resources, and on-the-ground realities.

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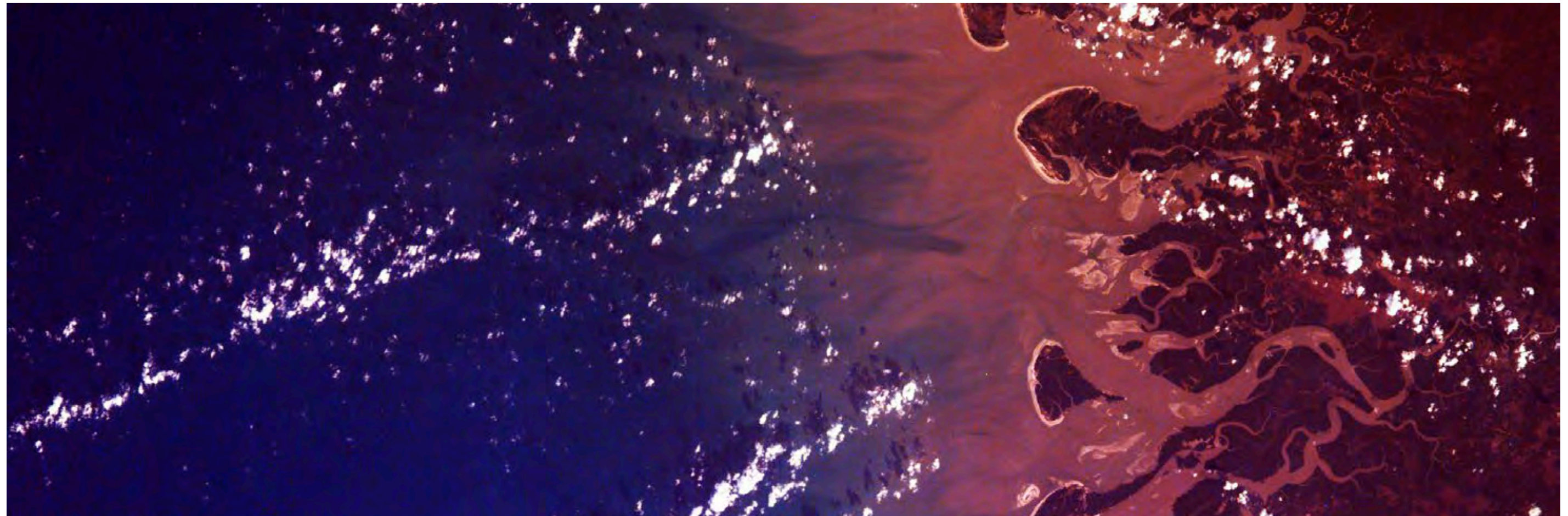
Executive Summary

This guidance aims to support Parties to undertake a detailed assessment of available national spatial data and spatial tools that can be used as part of a national monitoring system for the Kunming-Montreal Global Biodiversity Framework. Parties can use this document to: (1) review indicators that require spatial data for their calculation, (2) identify, view, and download the spatial data that are referenced in the indicator metadata associated with Decision 15/5, and (3) access checklists and guidance to identify existing national spatial data as well as national data gaps. Parties can also view current and forthcoming resources available through the [UN Biodiversity Lab \(UNBL\)](#) spatial data platform that could be used, subject to their national needs and preferences, as part of a monitoring action plan in support of national implementation of the Kunming-Montreal Global Biodiversity Framework and its Monitoring Framework.

This guidance is an offering for the Global Biodiversity Framework Early Action Support (EAS) Project, a country-led effort funded by the Global Environment Facility (GEF) to fast track readiness and early actions to implement the Kunming-Montreal Global Biodiversity

Framework. It was developed by the United Nations Development Programme (UNDP), in collaboration with the UN Biodiversity Lab Partnership. This guidance can support action towards EAS Project Component 2 on monitoring and is intended to be a close companion to the Guidance for Developing Plans for National Monitoring Systems in Support of the Kunming-Montreal Global Biodiversity Framework.

For additional support around using spatial data to support planning for the Kunming-Montreal Global Biodiversity Framework, UNDP-supported countries can additionally access national dossiers prepared for EAS Project Component 3 on Spatial Data to Support Policy Alignment with the Kunming-Montreal Global Biodiversity Framework. These dossiers are early products that provide examples of types of useful data for early action on policy alignment and do not yet incorporate the data recommended for use in the Monitoring Framework of the Kunming-Montreal Global Biodiversity Framework that are introduced in this guidance. Further updates in 2024-25 will work to integrate the information available in both these documents.





Introduction

1.1

The Kunming Montreal Global Biodiversity Framework and the Monitoring Framework

The [Convention on Biological Diversity \(CBD\)](https://www.cbd.int/doc/decisions/cop-15/cop-15-dec-04-en.pdf) aims to guide action at various levels to conserve biodiversity, promote the sustainable use of its components, and ensure the fair and equitable sharing of the benefits arising out of the utilization of genetic resources. At the 15th meeting of the Conference of the Parties (COP15) to the CBD, held in December 2022, countries adopted the [Kunming-Montreal Global Biodiversity Framework](https://www.cbd.int/doc/decisions/cop-15/cop-15-dec-05-en.pdf)¹ to put nature on a path to recovery by 2030, and to live in harmony with nature by 2050. The framework features [4 goals](#) and [23 targets](#) which span three broad topics: reducing threats to biodiversity, meeting people's needs through sustainable use and benefit-sharing, and tools and solutions for implementation and mainstreaming.

The associated [Monitoring Framework for the Kunming-Montreal Global Biodiversity Framework](https://www.cbd.int/doc/decisions/cop-15/cop-15-dec-06-en.pdf)² adopted in Decision 15/5 aims to provide consistent, standardized, and scalable tracking of the global goals and targets. The Framework includes a set of headline indicators that capture the overall scope of the goals and targets and a number of component and complementary indicators that allow a more detailed analysis.

The types of indicators – as defined in Decision 15/5 – are as follows:

- **Headline indicators:** “A minimum set of high-level indicators, which capture the overall scope of the goals and targets of the Kunming-Montreal Global Biodiversity Framework to be used for planning and tracking progress. They are nationally, regionally and globally relevant indicators validated by Parties. These indicators can also be used for communication purposes.”
- **Global level indicators collated from binary yes/no responses in national reports:** “Global indicators based on responses to yes/no questions to be included in the national reporting template. They will provide a count of the number of countries having undertaken specified activities.”
- **Component indicators:** “A list of optional indicators that, together with the headline indicators, cover components of the goals and targets of the Kunming-Montreal Global Biodiversity Framework which may apply at the global, regional, national, and subnational levels.”
- **Complementary indicators:** “A list of optional indicators for thematic or in-depth analysis of each goal and target which may be applicable at global, regional, national, and subnational levels.”

The specific indicators adopted for each of the goals and targets of the Global Biodiversity Framework are set out in Annex 1 of Decision 15/5. Decision 15/6 on the [Mechanisms for Planning, Monitoring, Reporting, and Review](#)³ urges Parties to use the headline indicators for national planning processes and requests they use them for monitoring and reporting, supplemented by component and complementary indicators and other national indicators, according to their national circumstances.

Decision 15/5, Annex 1, states that “headline indicators use methodologies agreed by Parties and are calculated at a national level based on national data from national monitoring networks and national sources, recognizing that in some cases headline indicators may need to draw on global datasets. If national indicators are not available, then the use of global indicators at a national level must be validated through appropriate national mechanisms.”

To further operationalize the monitoring framework for the Kunming-Montreal Global Biodiversity Framework, the COP15, through Decision 15/5, established an Ad Hoc Technical Expert Group on indicators (AHTEG). The AHTEG has four main tasks:

- a. “To provide technical advice on remaining and unresolved issues relating to the monitoring framework, as outlined by the Conference of the Parties at its fifteenth meeting;

- b. To provide guidance to Parties on the use of indicators in national planning and reporting, including by reviewing how indicators are proposed for capture in the Online Reporting Tool for national reporting;
- c. To provide guidance to Parties on ways to fill temporal and spatial data gaps, including through the use of big data, citizen science, community-based monitoring and information systems, remote sensing, modeling and statistical analysis, and other forms of data and other knowledge systems, recognizing the specific challenges faced by developing country Parties to develop and access information tools;
- d. To provide advice on the existing capacity, gaps and needs in terms of capacity development, technology transfer and financing needs related to the monitoring of the Framework.”

This guidance has been developed in parallel with the work of the AHTEG on Indicators. It therefore reflects all information available as of December 2023, and will be updated based on the outcomes of the 26th meeting of the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA26) and the 16th Conference of the Parties (COP16) of the Convention on Biological Diversity.

1 <https://www.cbd.int/doc/decisions/cop-15/cop-15-dec-04-en.pdf>
2 <https://www.cbd.int/doc/decisions/cop-15/cop-15-dec-05-en.pdf>

3 <https://www.cbd.int/doc/decisions/cop-15/cop-15-dec-06-en.pdf>

1.2

How to use this document

This guidance has been developed as a close companion to the related Guidance for Developing Plans for National Monitoring Systems in Support of the Kunming-Montreal Global Biodiversity Framework, with the goal of supporting countries to take early action to undertake a detailed assessment of available spatial data and spatial tools that can be used as part of their national monitoring system. Parties can use this document to: (1) review indicators that require spatial data for their calculation, (2) identify, view, and download the spatial data that are referenced in the indicator metadata associated with Decision 15/5 (available on the [Kunming-Montreal Global Biodiversity Framework indicators website](#)), and (3) access checklists and guidance for to identify existing national spatial data as well as national data gaps. Parties can also access an overview of resources available through the [UN Biodiversity Lab \(UNBL\)](#) spatial data platform that could be used, subject to their national needs and preferences, as part of a monitoring action plan in support of national implementation of the Kunming-Montreal Global Biodiversity Framework and its Monitoring Framework.

This document is organized into three major sections.

1. Introduction: provides an overview of the Kunming-Montreal Global Biodiversity Framework and its Monitoring Framework and summarizes the purpose of the guidance.

2. Assessing national spatial data capacity and needs for the Monitoring Framework of the Kunming-Montreal Global Biodiversity Framework:

offers an overview of the indicators that can be calculated using spatial data, summarizes the global spatial data referenced in the Monitoring Framework, offers a checklist to support the identification of relevant national spatial data, explores how national and global data can be combined for use, and provides recommendations for validation of global data where needed.

3. Using UNBL to support the development of a plan for national monitoring systems for the Kunming-Montreal Global Biodiversity Framework:

summarizes current and new functionalities that will be released on UNBL to support planning, implementation, monitoring, and reporting on the Global Biodiversity Framework. The goal of these functionalities is to offer countries tools that could be used seamlessly with existing national resources to develop a customized spatial plan and monitoring system that meet national needs.

The intended users of this document are the government staff, along with the contractors and collaborators they will work with, developing national monitoring system action plans as part of NBSAP

(National Biodiversity Strategies and Action Plans) revision. These government staff should include those responsible for national reporting to the CBD, as well as any additional staff and collaborators using indicators and related information to support NBSAP planning and implementation.

The United Nations Development Programme (UNDP) developed this guidance, in collaboration with the UNBL Partnership, including the Secretariat to the Convention on Biological Diversity (SCBD), the United Nations Environment Programme (UNEP), and the United Nations Environment Programme World Conservation Monitoring Centre (UNEP-WCMC). It is a product of the Global Biodiversity Framework Early Action Support (EAS) Project (Box 1), funded by the Global Environment Facility (GEF). It is intended to be used along with other guidance documents produced under the EAS Project.

For additional support around using spatial data to support planning for the Kunming-Montreal Global Biodiversity Framework, UNDP-supported countries can additionally access national dossiers prepared for EAS Project Component 3 on 'Spatial Data to Support Policy Alignment with the Kunming-Montreal Global Biodiversity Framework'. These dossiers are early products that provide examples of types of useful data for early action on policy alignment and do not yet incorporate data recommended for use through the Monitoring Framework of the Kunming-Montreal Global Biodiversity Framework that are introduced in this guidance. Further updates in 2024-25 will work to integrate the information available in both these documents.

Box 1. EAS Project overview

The EAS Project is a government-led effort funded by the GEF to fast track readiness and early actions to implement the new framework in this decade. It provides financial and technical support to 138 developing, small island, and middle-income nations in their work to align their NBSAPs with the Kunming-Montreal Global Biodiversity Framework. Efforts focus on four components: national biodiversity targets, monitoring, policy, and finance frameworks. An inclusive, whole-of-government and society approach is followed during this process that strives to account for gender equity, and the full and effective participation of Indigenous Peoples, local communities, and youth. The project is country-led with joint implementation support from the UNDP and the UNEP, in partnership with the CBD Secretariat and the GEF.

Assessing national
spatial data capacity
and needs for
the Monitoring
Framework of the
Kunming-Montreal
Global Biodiversity
Framework

2.1

Indicators for which spatial data are essential

Spatial data will play a critical role for monitoring progress towards the implementation of various goals and targets of the Kunming-Montreal Global Biodiversity Framework, since many indicators under the Monitoring Framework require spatial data for their calculation. The UNBL Partnership completed a rapid assessment of the indicators for the Monitoring Framework to provide an overview of indicators that can be calculated using spatial data. To do this, we analyzed the published indicator methodology as of December 2023, including the Monitoring Framework

([Decision 15/5](#)) and the associated metadata for each indicator (available on the [Kunming-Montreal Global Biodiversity Framework Indicators Website](#)). For this initial analysis, we focused on the headline indicators and component indicators.

We identified indicators as falling within one of four classes from fully spatial to likely non-spatial (Table 1). Indicators that are reported as statistics at the country level, but are also visualizable as maps (e.g., a world map representing different country-level values) are classified as non-spatial.

Table 1. Definitions used in this analysis to classify indicators

Spatial	Likely Spatial	Nonspatial	Likely Nonspatial
<ul style="list-style-type: none"> Methodology is available. Indicator metadata refers to spatial data. Spatial data is encouraged for indicator calculation or to provide disaggregated information required by the indicator on the metadata page. 	<ul style="list-style-type: none"> Methodology is in development. Indicator metadata refers to spatial data. Spatial data is encouraged for indicator calculation or to provide disaggregated information required by the indicator on the metadata page. In the absence of indicator metadata, expert opinion believes spatial data will be required. 	<ul style="list-style-type: none"> Methodology is available. Indicator metadata does NOT refer to spatial data/information. 	<ul style="list-style-type: none"> Methodology is in development. Indicator metadata does NOT refer to spatial data/information. In the absence of indicator metadata, expert opinion believes spatial data is not required.

Through this assessment, we found that of the indicators in the Monitoring Framework, 44% of headline indicators and 50% of component indicators have methodology encouraging the use of spatial data based on indicator metadata associated with Decision 15/5 ([Figure 1](#)). These numbers include indicators identified as ‘Spatial’ or ‘Likely Spatial’ based on the definitions in Table 1. The detailed breakdown of headline and component indicators that can be calculated using spatial data is available in [Annex 1](#). In summary, the percentage of headline and component indicators encouraging use of spatial data in the major sections of the Monitoring Framework is as follows:

- Reducing threats to biodiversity (Targets 1-8):** All the targets in this section have at least one indicator that can be calculated using spatial data or for which spatial data can be used to provide disaggregated information required by the indicator. In total, 61% of the headline and component indicators for Targets 1-8 require or encourage the use of spatial data.

- Meeting people’s needs through sustainable use and benefit-sharing (Targets 9-13):** All targets except Target 13 in this section have at least one indicator that can be calculated using spatial data or for which spatial data can be used to provide disaggregated information required by the indicator. In total, 45% of the headline and component indicators for Targets 9-13 require or encourage the use of spatial data.
- Tools and solutions for implementation and mainstreaming (Targets 14-23):** One of the targets (Target 21) in this section have at least one indicator that can be calculated using spatial data or for which spatial data can be used to provide disaggregated information required by the indicator. In total, 10% of the headline and component indicators for Targets 14-23 require or encourage the use of spatial data. This is lower than the other two sections as the targets focus more on the policy solutions and the implementation process.



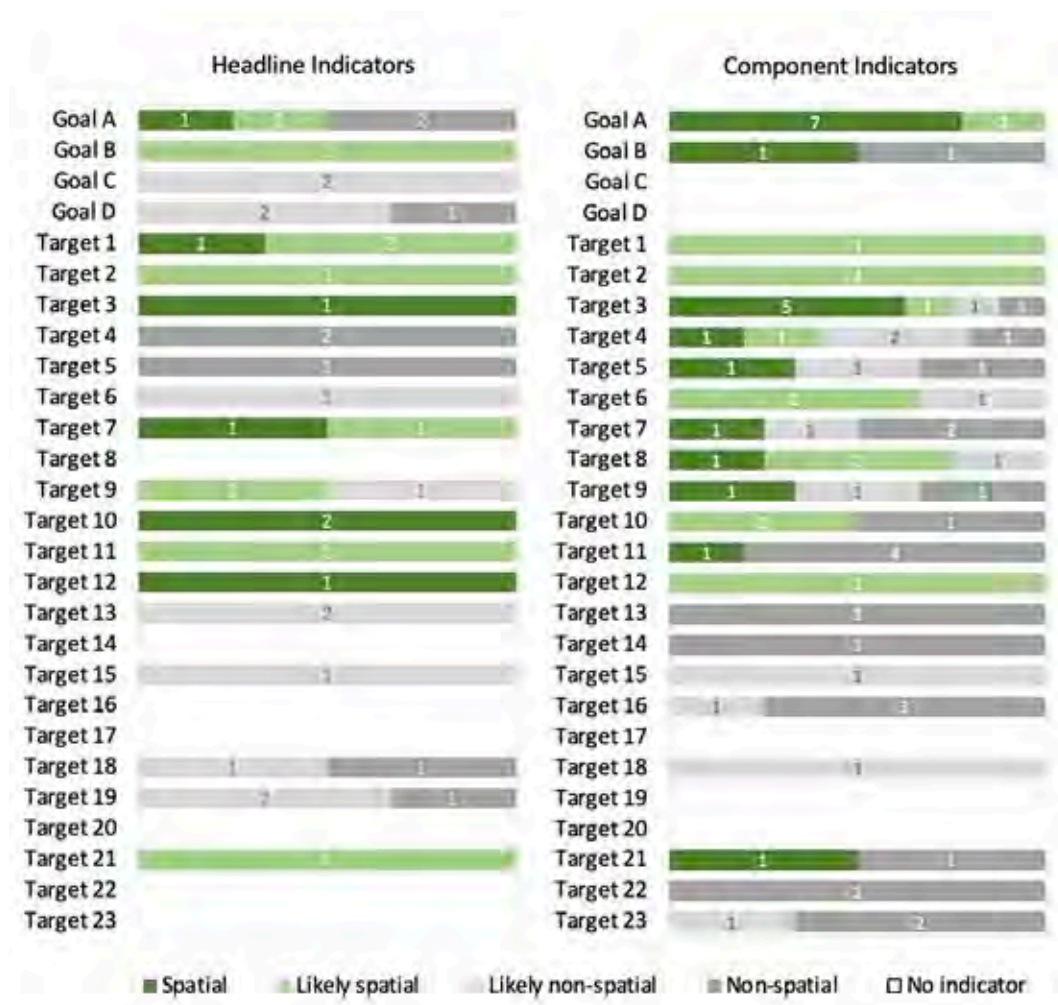


Figure 1. Identification of the number of Kunming-Montreal Global Biodiversity Framework headline and component indicators per goal/target that encourage the use of spatial data for the calculation of the indicator or to provide disaggregated information required by the indicator. Dark green bars indicate spatial indicators, light green likely spatial indicators, light gray likely non-spatial indicators, and dark gray non-spatial indicators (see [Table 1](#) for definitions and [Annex 1](#) for a detailed list of indicators). The number within each bar is the number of indicators identified within that class for each goal/target. Goals/Targets with no bar are those for which no indicators have been identified.



2.2

Identifying relevant spatial data for indicator calculation at the national level

As CBD Parties work to develop their national monitoring plan, they will need to develop several key items, as explored in the Guidance for Developing Plans for National Monitoring Systems in Support of the Kunming-Montreal Global Biodiversity Framework ([Box 2](#)). A critical component will be the assessment, for each national action or target, of data availability and data needs for calculation of selected indicators ([Item 1, Box 2](#)). Decision 15/5, Annex 1, states that “headline indicators use methodologies agreed by Parties and are calculated at a national level based on national data from national monitoring networks and national sources, recognizing that in some cases headline indicators may need to draw on global datasets.” Likewise, per Decision 15/5, “the use of global indicators at a national level must be validated through appropriate national mechanisms”.

To support these efforts, in [Section 2.2.1](#) we begin by providing some overall guidance on identifying relevant national spatial data for indicator calculation and assessing the utility of global spatial data for indicator calculation at the national level. In [Section 2.2.2](#), we link to data tables for headline, component, and complementary indicators that can be calculated with spatial data, global reference data for calculation of each of these indicators available on UNBL, and guiding questions to support government policymakers and technical specialists to identify relevant national spatial data. In [Section 2.2.3](#), we explore how national and global datasets could be combined for use, based on national needs and context. In [Section 2.2.4](#), we provide information on how Parties may be able to validate global datasets for national use, subject to their needs.

Box 2. Elements of a National Monitoring System Plan

The structure of an action plan is suggested to include the following sections:

1. A separate section or chapter for each target in the NBSAP (which may have been updated or revised to align with the GBF). The section for each target will give information on the indicators that will be used to measure its progress, and any needs for development of additional indicators. A suggested template for the detailed description of an indicator and its development needs is provided [Annex 3](#) of this guidance. The main information to be documented includes:
 - a. The name of the indicator,
 - b. The agencies responsible for collecting the data and compiling the indicator,
 - c. The indicator's data sources and calculation method,
 - d. Any staff or organisational capacity development needs to produce the indicator,
 - e. A costed plan for the production or further development of the indicator and meeting any capacity needs.
2. A section that lists any national targets that are yet to be revised or created, and identifies possible indicators for these.
3. A section that defines the organization and activities timetable for a national monitoring system, including the definition of:
 - a. The lead agency to co-ordinate the national monitoring system and implementation of the action plan.
 - b. The roles and resource requirements of the government agencies and non-government actors involved in the monitoring system.
 - c. When and how to produce the indicators which are already available. This may include addressing any capacity and resources gaps, and costings and funding sources.
 - d. When and how to define and produce indicators for any elements of targets which do not yet have established indicators.
 - e. How to define and establish indicators for targets still in development, with costings and funding sources.

All text recreated with permission from: Guidance for Developing Plans for National Monitoring Systems in Support of the Kunming-Montreal Global Biodiversity Framework.

2.2.1

Overall considerations and checklist to support the identification of national spatial data for indicator calculation

As Parties work to develop their monitoring plan, they will need to consider data needs for headline, component, complementary, and/or national indicators selected for national use. To support this work, we offer a simple checklist of considerations that could be followed to help identify the best compilation of spatial data to meet national needs for indicators that can be calculated using spatial data. This checklist explores in more detail some of the considerations that may be helpful to produce Item 1 of a National Monitoring System Plan ([Box 2](#)). A similar process could also be followed for all indicators that are calculated with non-spatial data. The general guidance provided here is complemented by specific considerations for each indicator offered in [Section 2.2.2](#).

Checklist for assessing national spatial data availability for indicators

- Review the indicators that your country will include in a national monitoring plan and confirm which can be calculated using spatial data or for which spatial data can be used to provide disaggregated information required by the indicator (see [Section 2.1](#) of this document for further information).
- Assess national spatial data availability and quality for each indicator. [Box 3](#) and [4](#) provide overall questions that can support this assessment. Tables [2](#), [3](#), and [4](#) in Annex 3 provide guiding questions to help identify the most relevant national spatial datasets.
- Identify gaps where national spatial data do not exist and determine if new national spatial data should and could be produced.
- If national spatial data do not exist, and cannot be produced, review global reference datasets to see if they may be suitable for national needs (see [Box 5](#) for some overall criteria).
- Validate global reference datasets that will be used to fill gaps for official national use (see [Section 2.2.4](#) of this document for further information).
- Ensure that all relevant spatial data for your country's monitoring plan is available to all relevant stakeholders through accessible repositories or other similar means (see [Section 3](#) for options available through the UNBL).
- Include information on how spatial data will be sourced and used in the calculation and presentation of the headline indicator in any relevant indicator specification sheets.

Box 3. Guiding questions on data availability

When reviewing spatial data availability and needs, there are several general questions that will be applicable regardless of the specific target or indicator.

1. **Data availability:** Does your country have access to appropriate government-produced spatial data needed to report on each of the indicators? Are there other data sources available that would be acceptable for use? If so, are they freely accessible and from a trusted source?
2. **Data custodians:** Who are the government data holders (ministry, directorate within a ministry, government-supported research group, etc)? Are there data produced by non-state actors (research institutions, NGOs, Indigenous Peoples, etc) that would be acceptable for use? How/where are the data stored and who has access? Are there national working groups around these data?
3. **Data validation:** Are the data scientifically validated? Are the data validated and approved for official government use?

Box 4. Guiding questions on data quality and limitations

When using spatial data for national monitoring and reporting, it is important to understand the suitability, quality, and/or limitations of available data, regardless of whether it is a national or global dataset.

- **Data suitability:** Are there available data for the time period and location required? Can the data directly measure the indicators? Is the data from a reliable and verifiable source?
- **Data quality:** How accurate is the data in reflecting reality over time and space? What is the spatial resolution of the data (for rasters)? Is the spatial coverage of data available for the entire country? Is the data consistent across reporting areas? Is there ground validation work required before applying the data in decision-making and actions? How is the accuracy of the data assessed, e.g., is there ancillary data provided or geostatistical summaries of classification accuracy?

2.2.2

Global reference datasets for indicator calculation and customized questions to identify relevant national data

[Annex 2](#) provides lists of headline ([Table 2](#)), component ([Table 3](#)), and complementary ([Table 4](#)) indicators that require or encourage use of spatial data, and the global reference dataset identified for their calculation. These tables can support the development of Item 1 in the National Monitoring System Plan ([Box 2](#)). Each table provides basic metadata on the datasets, including:

- A basic description of each dataset;
- Whether the dataset is a time series or has a temporal component to it;
- The dataset's spatial resolution (for raster datasets);
- Other key data fields and data attributes that provide government staff and contractors working on the national monitoring plan with a better understanding of the type(s) of data recommended or needed for indicator calculation;
- A link to view the dataset on UNBL; and
- A series of guiding questions that can support the identification of relevant nationally approved spatial data for use in headline indicator calculations.

It should be noted that by highlighting these global reference datasets it is not

implied that countries should be using these datasets for reporting but rather:

1. These are datasets that act as a data standard that countries can use to evaluate their own national datasets against.
2. In circumstances where no national data exists these global reference data can be used to enable reporting against the associated indicator.

These tables were produced through an analysis of Decision 15/5 and the associated indicator metadata. The metadata for all indicators was provided to COP15 as a reference, has been updated through an expert process under the Ad Hoc Technical Expert Group on Indicators established by COP15, and is available on the [Kunming-Montreal Global Biodiversity Framework indicators website](#). This analysis was conducted comprehensively for the headline and component indicators and on an ad hoc basis for the complementary indicators. We hope to expand the analysis to include all complementary indicators in the future.

These global reference data are also available to view in the [UNBL Global Biodiversity Framework Data Collection](#), which is explored further in [Section 3.2](#).

2.2.3

Guidelines on combining national and global data for use at the national level

It is preferable to use a single, consistent, and validated dataset to address a particular data need. However, there are use cases where national data is both available and preferred, but not comprehensive across a country (e.g., it does not cover the entire country) and global data source(s) may be useful to fill in the gaps that are missing in the available national data. This section addresses some considerations and data processing requirements that government policymakers and technical experts should consider when combining global and national data in a country. To illustrate this, in this section we use habitat distribution data in vector format as an example. The considerations raised here should be carefully considered when combining these or other national and global data for use.

Compatibility of data sources

National habitat data likely offers detailed information on habitat types, particularly as recognised by national legislation. In contrast, global dataset may fill coverage gaps in national data, but with less specificity regarding habitat types, particularly in relation to national legislative requirements. When it comes to granularity and resolution of data, national data is often characterized by precise shapes for each habitat type, complete with detailed classifications of those habitat types and their conservation statuses. Global data will likely adopt different classification methods, leading

to potential discrepancies. Variables across both datasets include geographic boundaries and types of habitats, yet they might diverge in their criteria for habitat classification, emphasis on conservation status, or ecological value. These will all need to be accounted for by the technical expert combining the data.

Data formats

Combining datasets requires they both be in a common GIS (Geographic Information Systems) vector data format, such as ESRI Shapefile or Geopackage, and use a consistent CRS (Coordinate Reference System). Data cleaning needs to pay special attention to harmonizing the classification schemes for habitat types to ensure comparability and reduce confusion.

Merging data

Developing a clear method for integrating the two datasets is essential and will involve using spatial analysis tools in GIS software. This process might include overlaying the global dataset on the national one to identify and subsequently fill gaps in national coverage without duplicating data (i.e., the same place cannot be classed as more than one habitat type – an area classed as a forest cannot also be classed as a grassland). Identifying and filling-in the areas where national data is lacking with information from the global dataset should be done with care to respect and give precedence to the boundaries and classifications of the national dataset.

Adjustments

Government staff and contractors combining the data may want to apply weightings to certain areas or habitat types to account for the confidence level in the data source, in order to more accurately reflect the underlying data quality. Conducting sensitivity analyses to understand how changes in data integration methods and classification schemes might influence habitat status and trends conclusions is also crucial.

2.2.4

Guiding questions and steps for validating global data for national use

In cases where national data for indicator calculation are not yet currently available or do not provide full coverage of the country, the global datasets highlighted in [Section 2.2](#) could be used by countries to fill spatial data gaps in the interim, until national datasets are built. As noted in Decision 15/5, “the use of global indicators at a national level must be validated through appropriate national mechanisms”. Typically data validation can occur in two, often interlinked, ways: (1) scientific validation to ensure that the data are accurate and valid at national and/or subnational levels; and (2) institutional validation (or approval) to ensure that data can be used for official government purposes, including reporting. This section explores key questions and steps for government staff and contractors working on the national monitoring plan to consider in the context of validating global data for inclusion in a national monitoring plan.

Documentation, transparency, and attribution

Maintaining detailed records of the methods used for data cleaning, data integration, and any analyses, including any assumptions made and the rationale behind chosen integration strategies, is paramount. It is important to clearly detail how datasets were combined, where global data was used to supplement national data, as well as any limitations or uncertainties this introduces. Similarly, proper attribution of the sources of both datasets, including any licensing agreements, is crucial.

Scientific validation of global data for national use

Using global data comes with advantages and disadvantages at the national level (Box 5). Scientific validation of global datasets for national use is critical to ensure the accuracy and applicability of globally-validated datasets within specific national contexts. However, the direct application of these datasets will nearly always require validation to account for local conditions, regional variations, and specific national requirements. The validation process involves rigorous statistical analysis and may include techniques such as correlation and regression analysis, error metric assessment, and sensitivity testing. While these validation techniques may fall beyond the expertise of the readers of this guidance, and may require the expertise of outside specialists, it is a vital step to ensure that global data accurately reflects local realities and is amenable for

use in national reporting and calculation of indicators. Although it is beyond the scope of this guidance document to fully explore all aspects of a scientific validation process, we provide an overview of important considerations for assessing data quality. This is intended to provide context to government staff and contractors working on the national monitoring plan to

understand considerations around the use of global data.

One important caveat exists that would be remiss to not include here: all geospatial data, whether global or national, will always have some amount of uncertainty and error within it -- this is part of trying to map a complex and changing planet.

Box 5. Global data advantages and disadvantages

As government policymakers and technical specialists review existing national data availability and quality, it may be helpful to consider the pros and cons of using global data to fill any existing data gaps.

Advantages:

- Understand status and changes on a global level
- Data already exists, and follows accepted methodologies
- Option to fill data gaps when national data is not available
- Ability to compare across countries / ecoregions
- Data may be updated more regularly

Disadvantages:

- Data may not be accurate or representative of local conditions
- Data may not be created using nationally mandated methodologies.
- The resolution of data may be insufficient for use (particularly for smaller countries)
- National entities need to validate and approve global data for official use
- Limited access to certain data sources
- Data may be updated less regularly

At its core, scientific validation of a dataset works to understand and evaluate the quality and limitations of spatial data at the national level. Spatial datasets can be evaluated based on six metrics: accuracy, precision, resolution, completeness, consistency, and currentness.

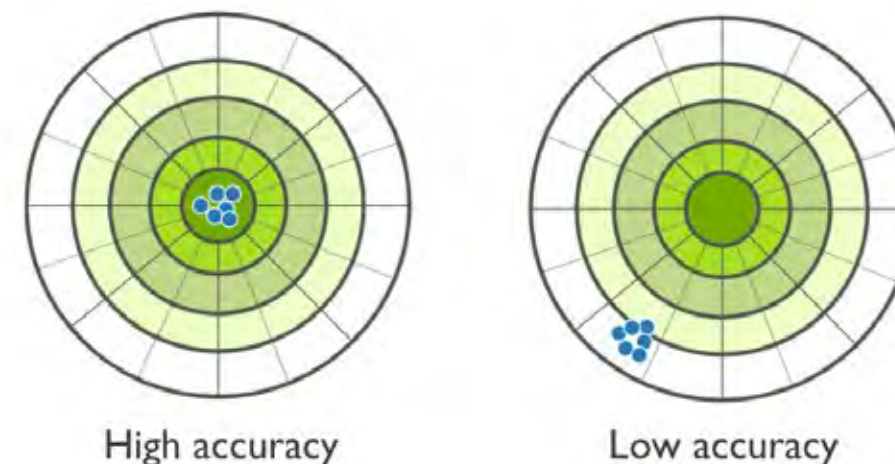
1. Accuracy

Accuracy of spatial data refers to how closely the data reflects true real-world values. For example, in the context of a landuse/landcover (LULC) classification (raster), accuracy refers to the degree to which the classified data correctly represents the actual land cover or feature types on the ground. An accuracy assessment in the raster classification is crucial to evaluate the performance of the classification algorithms and the reliability of the resulting landcover map. This typically will involve comparing classified

raster pixels against ground-truth data, often obtained through field surveys or high-resolution imagery.

Key measures of accuracy include **overall accuracy**, which is the proportion of correctly classified pixels across all classes, and class-specific measures such as **user** and **producer accuracies**. It is important to recognise, however, that overall accuracy may not seemingly be as high as users' may expect or hope for; for example, one review of three recent global landuse/landcover (LULC) datasets, including Google's Dynamic World (DW), the European Space Agency's (ESA) WorldCover (WC), and ESRI/ImpactObservatory's Land Cover (ESRI/IO)), found that ESRI/IO had the highest overall accuracy (75%) compared to DW (72%) and WC (65%), but with notable variation between classes and regions⁴.

Validation of global data should produce measures of accuracy of the data and the confidence associated with using data at the national and subnational scale to meet country needs for monitoring progress to achieve the Kunming-Montreal Global Biodiversity Framework.



Source: PacMARA & UNDP [NBSAP Forum] 2021⁵.

4 Venter ZS, Barton DN, Chakraborty T, Simensen T, Singh G. 2022. Global 10 m Land Use Land Cover Datasets: A Comparison of Dynamic World, World Cover and Esri Land Cover. Remote Sensing 14:4101. Multidisciplinary Digital Publishing Institute.
 5 PacMARA & UNDP [NBSAP Forum] 2021. #4- Spatial data considerations [Video]. YouTube. https://www.youtube.com/watch?v=IG-tM_ralGY&list=PL8vwCyAB16RoktR9TQDEAXZFpDQNR1vL&index=4&ab_channel=NBSAPForum

2. Precision

Precision in spatial data refers to the level of detail and consistency of measurements. In Geographic Information Systems (GIS) and remote sensing, precision often reflects the spatial resolution of data (see below). For instance, the size of a pixel in a raster dataset or the exactness in the position of a point in a vector dataset (such

as a polygon representing a national boundary). High precision means that the measurements are consistent and detailed, allowing for a very fine-scale representation of spatial features and a more granular understanding of the underlying processes being mapped. However, it does not necessarily mean that the data is true to the real-world features it represents.

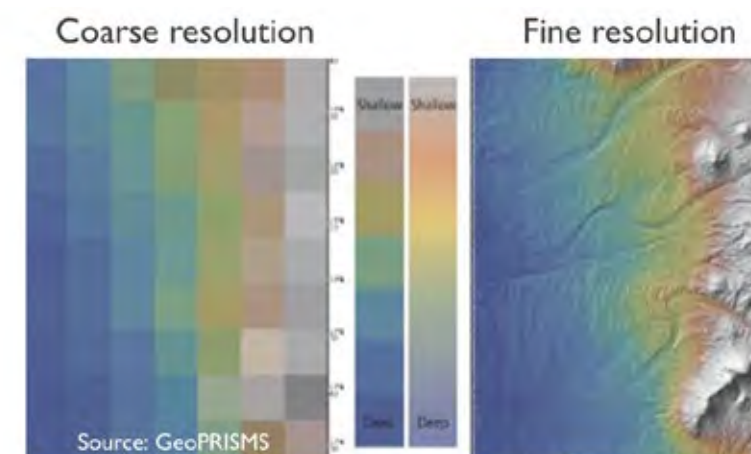
Validation of global data should ensure that the precision of global data is sufficient to allow for correct mapping and application of data monitoring at national and subnational scales to meet country needs to achieve the Kunming-Montreal Global Biodiversity Framework.

3. Resolution

Spatial data resolution refers to the smallest size of a feature that can be reliably identified in a dataset. In the realm of earth observation, remote sensing and GIS, resolution is often segmented into two primary categories: spatial and temporal. **Spatial resolution** pertains to the size of a pixel in a raster dataset, such as a satellite image or a digital elevation model. The smaller the pixel size, the higher the spatial resolution, allowing for more detailed and finer representation of the Earth's surface. For instance, a remotely sensed image with a 1-meter resolution can distinguish features that are at least 1 meter apart (smaller than a tree). Several real world examples of earth observation sensors include the MODIS sensors that capture imagery down to ~250-m resolution, the LANDSAT satellites that capture multispectral

imagery at ~30-m resolution, and the ESA Sentinel-2 sensors that can capture imagery at resolutions as small as ~10-m for several spectral bands. **Temporal resolution**, on the other hand, relates to the frequency at which data is captured or updated. High temporal resolution means that data is collected frequently, enabling the monitoring of changes over time with greater regularity. Several real world examples of the temporal resolution of earth observation sensors include the MODIS sensors that revisit the same point on earth every 1-2 days, the LANDSAT satellites that have a 16-day revisit cycle, and the ESA Sentinel-2 that has a revisit time of around 5 days (at the equator). Higher resolution data, in both the spatial and temporal senses, entails larger file sizes and more processing power, presenting a trade-off to users between detail and resource processing requirements.

Validation of global data should ensure that both spatial and temporal resolution of data is suitable for use at the national and subnational scales to meet country needs for monitoring progress to achieve the Kunming-Montreal Global Biodiversity Framework.



4. Completeness

Completeness in spatial data is typically defined in terms of errors of omission. This is to ensure that the data used to represent a particular feature is consistent across the study region. For example, considering a layer depicting national

forest cover, the data would be incomplete if it only includes forest cover in one province. When datasets are inconsistent, unintended biases may be introduced. The team also needs to account for sampling methods, which can introduce different degrees of completeness in a dataset.

Validation of global data should ensure that they are complete and do not represent significant bias at the national and subnational scales to meet country needs for monitoring of progress to achieve the Kunming-Montreal Global Biodiversity Framework.



Source: PacMARA & UNDP [NBSAP Forum]⁶

⁶ PacMARA & UNDP [NBSAP Forum] (2021, Dec 13) #4- Spatial data considerations [Video]. YouTube. https://www.youtube.com/watch?v=IG-tM_ralGY&list=PL8vwCyAB16RoktR9TQDEAXZFpDQNRiVl&index=4&ab_channel=NBSAPForum

5. Consistency

For geospatial data, consistency refers to conformity with certain topological rules. For example, a polygon must be closed; a non-closed polygon is considered a geometric error. Errors in spatial attributes

can also make a dataset inconsistent. For example, an entity that has the value “Colombia” for the attribute “country” but the value “New York City” for the attribute “city”, is considered inconsistent since New York City is not in Colombia.⁷

Validation of global data should ensure that they are consistent and represent approved and required naming conventions at the national and subnational scales to meet country needs for monitoring progress to achieve the Kunming-Montreal Global Biodiversity Framework.

6. Currentness

Currentness in spatial data analysis is a nuanced concept that hinges on the timeliness, and therefore relevance, of data in relation to its intended use. This includes whether data is up to date, as well as whether data is accurately able to reflect historical conditions. This aspect is crucial, as the accuracy of spatial analyses and the efficacy of resulting decisions heavily depend on the data’s reflection of the present situation. For instance, using grossly outdated forest cover data can mislead environmental policies, whereas the same historical data is invaluable for understanding long-term ecological changes, planning reforestation

efforts, or mitigating forest loss in high-risk areas. In predictive modeling, such forecasting agricultural changes under future climate scenarios, forward-looking data becomes essential. The demand for currentness thus varies with context: real-time decision-making and monitoring necessitates access to the latest data available, while historical analyses or trend identification rely on utilizing more temporally complete datasets. Our planet is dynamic and so are improvements of the sensors we use to observe it; accessing and adopting regularly updated and contextually relevant data sources is key to maintaining the integrity and applicability of data sources used in monitoring frameworks.

Validation of global data should ensure that that data is timely and able to correctly represent the current state at the national and subnational scales to meet country needs for monitoring progress to achieve the Kunming-Montreal Global Biodiversity Framework.

In summary, the scientific validation of global spatial datasets for national use is imperative to ensure their accuracy, relevance, and applicability within national contexts, as well as to ensure that resultant analyses, aggregated outputs, and indicator calculations are scientifically

robust and defensible. As Parties create their national monitoring plan for the Kunming-Montreal Global Biodiversity Framework, they have the opportunity to decide what data are most suitable for their national planning, monitoring, and reporting context. In some cases

where minimal data are available, Parties may wish to use sub-optimal data, in the absence of another option. This is a complex process that should not be overlooked or given insufficient priority, the full depth of which is beyond the scope of this guidance document, and external expert consultation should be sought where expertise is not available.

Institutional validation of global data for official government use

Institutional validation of global data for official government use ensures the reliability and applicability of internationally-sourced datasets within the frameworks of national governance and policy-making. This validation will vary in each country, subject to national processes. It can involve a comprehensive assessment of the data by government agencies or authorized institutions to confirm its accuracy, relevance, and compatibility with national standards and requirements. Given the diverse sources of global data, which can range from satellite imagery and climate models to socio-economic and species-range distribution models, institutional validation plays a pivotal role in integrating this data into national decision-making processes. Beyond only the technical assessment of data validity in a country, it also considers the legal, ethical, financial, and policy implications of utilizing such data. This is particularly important in areas like climate policy, where global climate data must be

rigorously assessed for its applicability in national climate action plans.

The process of institutional validation can involve collaboration between various governmental bodies and in some countries, there is also consultation with external experts, including from academia or civil society. This collaborative approach can help to address the multifaceted aspects of data validation, including its methodological soundness, contextual relevance, and alignment with national priorities. For instance, in land cover and biodiversity conservation projects, spatial data from global sources is examined for its accuracy and resolution to ensure it meets the specific needs of national conservation planning and development initiatives. Global datasets must be scrutinized to ensure they align with national statistical methods and definitions. This comprehensive institutional validation is crucial for maintaining the integrity and efficacy of policy decisions based on global data. It helps in mitigating the risks associated with data misinterpretation and ensures that the data is used responsibly and effectively. Ultimately, institutional validation reinforces the bridge between global knowledge and local application, fostering data-driven, informed decision-making at the national level.

Here, we provide government policymakers and technical specialists some considerations that could be considered while validating global data

⁷ PacMARA & UNDP [NBSAP Forum] (2021, Dec 13) #4- Spatial data considerations [Video]. YouTube. https://www.youtube.com/watch?v=IG-tM_ralGY&list=PL8vwCyAB16RoktR9TQDEAXZFpDQNRfvL&index=4&ab_channel=NBSAPForum

for use in the context of the national monitoring system for the Kunming-Montreal Global Biodiversity Framework. Steps may include:

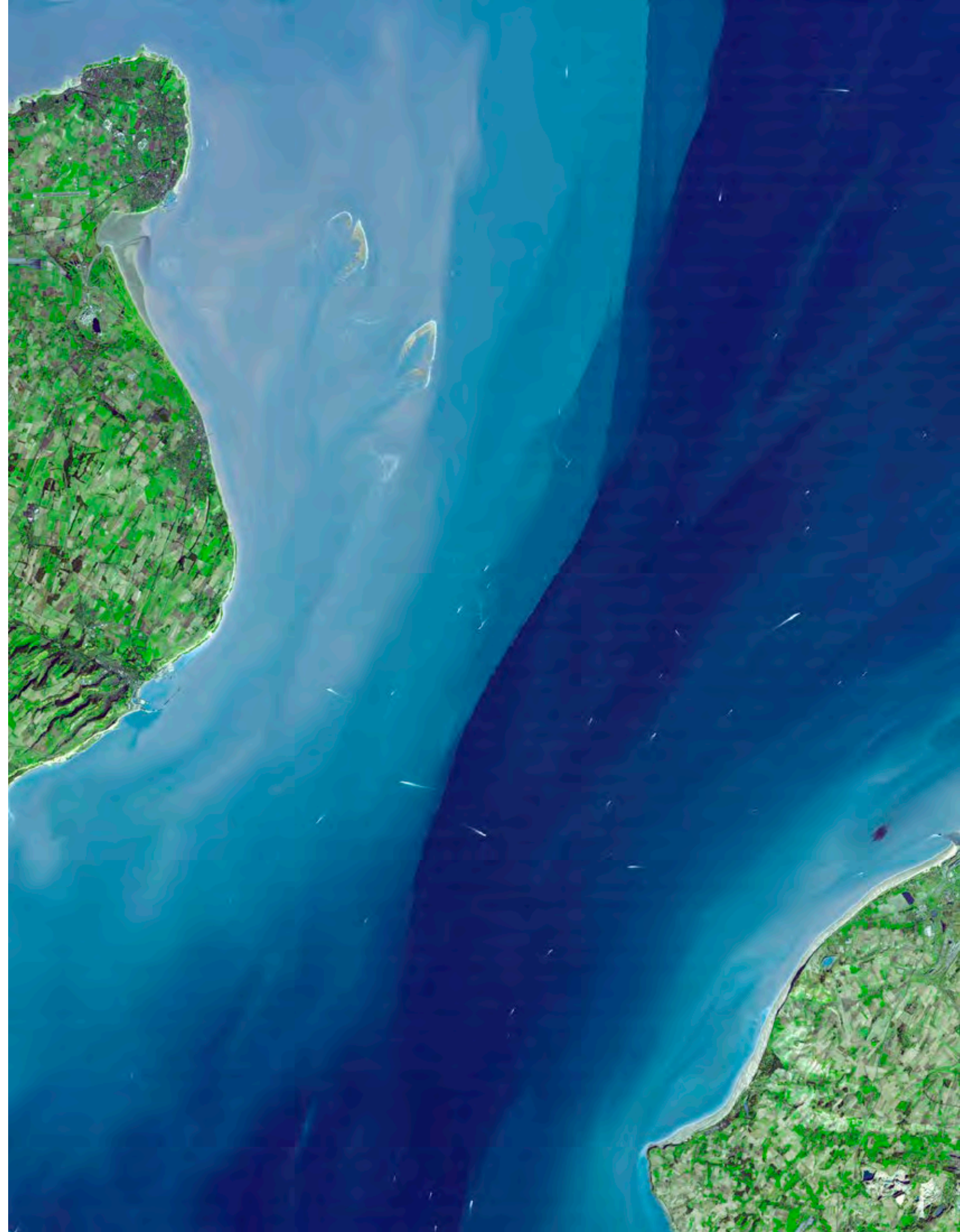
- **Identify technical staff within the government institution responsible for the development of the national monitoring system and/or national research institutions included as part of the monitoring and indicators advisory group who have expertise in the subject of the indicator:**

The information about relevant institutions typically would already have been gathered in early phases of development of the monitoring plan. It will also be important to identify the specific individuals within these institutions who have the relevant technical skills relating to the indicator.

- **Conduct a review process with these individuals to scientifically validate the dataset for national use:** This process should take into account the considerations listed in 2.3.1. In some countries, a whole-of society-approach, that takes into account reviews by non-state actors, such as key stakeholders with detailed knowledge of local ecosystems, such as Indigenous Peoples and Local Communities, may be valuable to ensure that the spatial data is accurate.

- **Conduct a review process with these individuals to review and validate methodology for national indicator calculation:** The group should review and seek to apply methodology provided for the indicator to calculate the indicator to ensure that it is appropriate and accurate for national context.
- **Produce recommendations for clearance by senior decision makers:** Different countries will likely have different mechanisms for final clearance to use global data for national planning, monitoring, review and reporting to the CBD. In some cases, recommending it for inclusion in the national monitoring plan may be sufficient. In other cases, specific briefs may need to be produced and shared with key decision makers summarizing the existing national data gap, steps taken to scientifically validate the global data, and recommendations for using the global data for national monitoring purposes.

UNBL is one of the available tools that provides options to visualize the global data and explore the resulting map at the national level during both the review process and the final approval process. For more detail on the functionalities offered through UNBL, please see [Section 3](#).



Using UNBL
to support the
development of
a plan for national
monitoring systems
for the Global
Biodiversity
Framework

3.1

Overview: What data and tools does UNBL offer to support Parties in their work around the Global Biodiversity Framework?

[UNBL](#) is a free, open source platform that supports country-led efforts to use spatial data and analytic tools to generate insight and impact for conservation and sustainable development. At the heart of UNBL's work is supporting Parties around their commitments to the Convention on Biological Diversity. UNBL does not require any GIS expertise to use and is fully available in English, French, Portuguese, Russian, and Spanish (Box 6). UNBL's goal is to provide a resource to government policymakers and technical specialists to facilitate use of the best possible spatial data for planning, implementing, monitoring, and reporting for the Kunming-Montreal Global Biodiversity Framework, based on national needs and context.

To support national implementation of the Kunming-Montreal Global Biodiversity Framework, in early 2024 UNBL is releasing a Global Biodiversity Framework Data Collection to provide direct access to global reference datasets for the Monitoring Framework and new data filters to easily search additional data relevant data layers. Over the period 2024-2025, with support from the Gordon and Betty Moore Foundation, UNBL will further develop functionalities to support users to develop prioritized spatial plans for Global Biodiversity Framework goals, targets, and indicators ("ELSA for All"), to more

easily upload national data and connect to existing national spatial data repositories, to access and directly calculate headline indicators for their countries using national and global spatial data, and to streamline connections to other relevant tools for monitoring and reporting, including the [Data Reporting Tool for Multilateral Environmental Agreements \(DaRT\)](#), [Target Tracker](#), and the [CBD Online Reporting Tool](#). Through these new developments, UNBL will offer an end-to-end package of features for iterative planning, monitoring, and reporting.

Section 3 provides an overview of the current and forthcoming data and tools on UNBL that can support Parties to develop their plans for national monitoring systems for the Global Biodiversity Framework. We introduce features that can enable users to: (1) access and download global reference datasets for the Monitoring Framework on UNBL ([Section 3.2](#)); (2) seamlessly bring together national and global data in a single repository to support the development of a monitoring system ([Section 3.3](#)); (3) view and/or calculate the headline indicators and other metrics using global or national data ([Section 3.4](#)); (4) connect to other relevant platforms and tools ([Section 3.4](#)); and (5) develop a prioritized spatial plan based on national targets and indicators to deliver on Target 1 ([Section 3.5](#)).

Box 6. What features does UNBL offer to users?

At the core of UNBL's offering is:

- access to over 600 curated global spatial data layers on biodiversity, ecosystem services, and human well-being;
- secure workspaces for countries to upload and manage national spatial data and visualize them alongside global data of interest;
- push-button calculation of dynamic indicators for any national or subnational area of interest;
- curated data collections for policymakers on protected areas, restoration, nature-based solutions for climate change, and the Monitoring Framework of the Global Biodiversity Framework;
- extensive documentation and guidance to enable new users to easily apply UNBL for their needs; and
- direct support to respond to user needs and requests.

Learn more: [UNBL trailer](#) | [UNBL brochure](#) | [UNBL user stories](#)

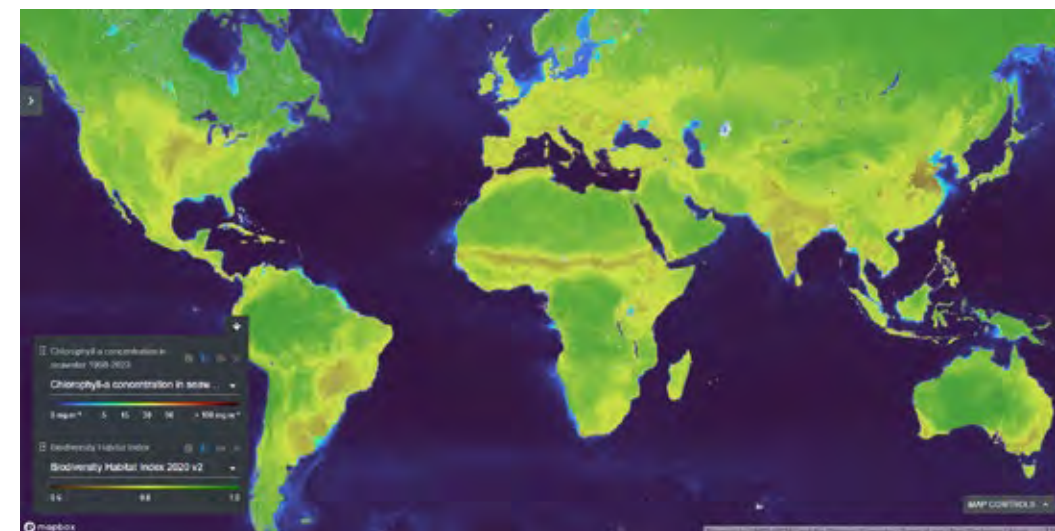


Figure 2. Explore spatial data on UNBL to support national planning, implementation, monitoring, and reporting for the Global Biodiversity Framework. This map includes data for calculation of headline indicators, including the Chlorophyll-a Concentration in Seawater (Sathyendranath et al. 2019), and component indicators, including the Biodiversity Habitat Index (Harwood et al. 2022). Map created using UN Biodiversity Lab on 2 April, 2024.

3.2

Global reference datasets available via UNBL to support national planning, implementation, monitoring, and reporting for the Global Biodiversity Framework

3.2.1

UNBL Data Collection on the Global Biodiversity Framework

The [Kunming-Montreal Global Biodiversity Framework Data Collection](#) on UNBL provides decision makers with a curated list of global spatial datasets that can be used for the calculation of headline, component, and complementary indicators under the Monitoring Framework. The global datasets provided here aim to support countries to fill spatial data gaps as an interim measure, where national data is not yet available.

The information made available is structured around the goals and targets of the Global Biodiversity Framework, including indicators that can be calculated using existing spatial data at the global level. The data listed for each indicator are the global reference dataset identified for calculation in the metadata associated with Decision 15/5. This collection can support countries with [Item 1, point c](#) “definition of data sources and calculation method” of a National Monitoring System Plan, as suggested by the UNEP-WCMC Guidance for Developing Plans for National Monitoring Systems in support of the Kunming-Montreal Global Biodiversity Framework (see [Box 2](#)).

The data selected for this collection include all data listed in [Annex 2](#) of this document for headline, component, and

complementary indicators. They are aligned with the indicators adopted in the Monitoring Framework under Decision 15/5 and the associated metadata available on the [Kunming-Montreal Global Biodiversity Framework Indicators Website](#) as of December 2023. The data collection includes a comprehensive list of available data for the headline and component indicators and a partial list of available data for the complementary indicators.

To explore the data collection, follow these steps:

1. Click on the ‘Discover’ tab on the [UNBL home page](#), select ‘Data Collections’, and then click on Kunming-Montreal Global Biodiversity Framework. Alternatively, navigate directly to the [Kunming-Montreal Global Biodiversity Framework Data Collection](#).
2. Browse the Global Biodiversity Framework goals and targets, select the goal or target of interest and view a description of the goal/target, indicators, and available global data layers that relate to each indicator.
3. Click ‘View data’ to view data layers that provide input to the monitoring of Kunming-Montreal Global Biodiversity Framework.

Note: UNBL also offers data collections that more broadly support planning around [Restoration \(Target 2\)](#), [Protection \(Target 3\)](#), and [Nature-based Solutions for Climate Change \(Target 8\)](#). We highlight them here as resources that may be useful to government policymakers and technical specialists for planning around the Kunming-Montreal Global Biodiversity

Framework, depending on national priorities and needs. It is recommended that countries validate the use of data before using them in the planning, implementation, and monitoring process. These data collections have not yet been reviewed for their alignment with Monitoring Framework indicators.

UNBL new feature alert: Curated Data Collection on the Kunming-Montreal Global Biodiversity Framework. Available April 2024.

3.2.2

UNBL data portfolio and the Global Biodiversity Framework data filtering system

In addition to the Kunming-Montreal Global Biodiversity Framework Data Collection, the UNBL public platform provides users with access to over 600 high quality global data layers, grouped into over 100 datasets, on biodiversity, ecosystem services, and human well-being. All data can either be viewed globally or for a specific country or area of interest, allowing users to activate multiple layers at the same time to compare or conduct a visual overlay analysis.

To enable government policymakers and technical specialists to search and select data that best meets their needs for the development of a national monitoring plan, UNBL also includes flexible thematic filters

and tags. The UNBL data team implements these data filters and tags systematically. In early 2024, UNBL will launch data filters for the Kunming-Montreal Global Biodiversity Framework to enable users to easily identify relevant data for planning, implementing, monitoring, and reporting for all goals, targets, headline indicators, and component indicators. These data filters can support countries with [Item 1, point c](#) “definition of data sources and calculation method” of a National Monitoring System Plan, as suggested by the UNEP-WCMC Guidance for Developing Plans for National Monitoring Systems in support of the Kunming-Montreal Global Biodiversity Framework (see [Box 2](#)).

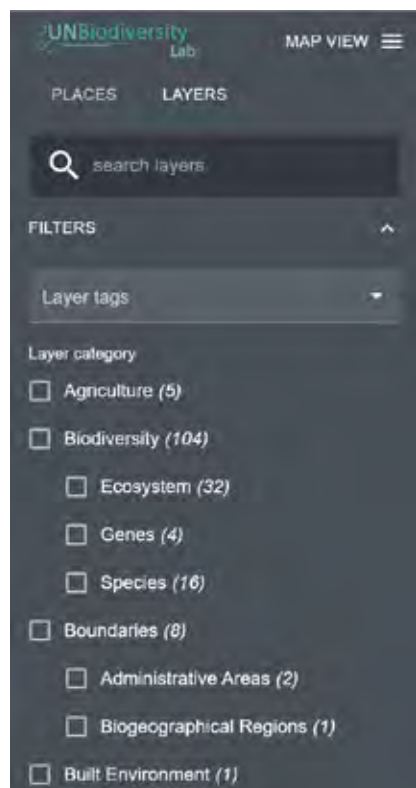
UNBL new feature alert: Data filters for Kunming-Montreal Global Biodiversity Framework goals, targets, headline indicators, and component indicators. Available early 2024.

To search and view relevant global datasets:

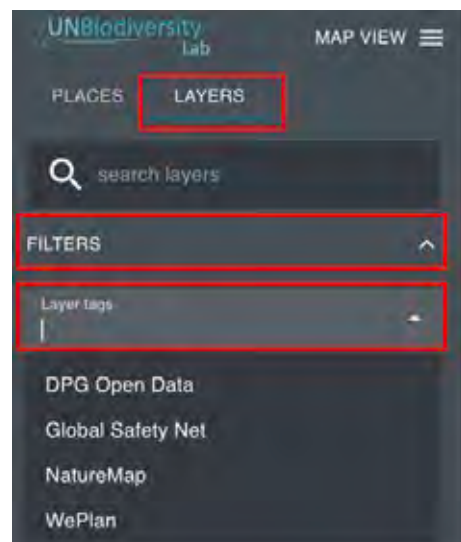
1. Click the 'LAUNCH MAP' tab or button on the UNBL home page.
2. Click the 'LAUNCH' button to load the UNBL public map platform.
3. You can stay on the global view, or navigate to your area of interest, if preferred (see [Section 3.2.3](#)).
4. Click the 'LAYERS' icon. To search for a layer, you can either:
 - a. Type the name of the layer you want to view into the search box, and select the desired result in the layer list.

OR

 - b. Click to expand the filters to view and select the layer categories of your interest. You then can select the desired layer from the search result list.



5. Click to expand the 'FILTERS'. Choosing a particular filter, for example 'Ecosystem Services', will consequently show only layers and layer categories associated with that theme. In 2024, Kunming-Montreal Global Biodiversity Framework Goals and Targets for which spatial data are relevant will be included here.
6. Click to expand the 'LAYER TAGS'. Choosing a particular tag, for example 'DPG (Digital Public Good) Open Data', will consequently show only layers and layer categories associated with that category.



7. Click the toggle to the left of the layer name to load this layer to the map.
8. Click the toggle again or click the X icon on the layer info to remove this layer.



3.2.3

How to find your country

UNBL can help government policymakers and technical specialists to navigate to their country to view any globally available data relevant for the development of a national monitoring plan.

To search for an area of interest, you can either:

1. Click on the 'PLACES' icon, type the name of the country, jurisdiction, or transboundary area you want to view

into the search box, and select the desired result in the search result list.

OR

2. Click on the 'PLACES' icon, click to expand the filters box, and select your filter of interest. You then can select the desired place from the search result list.

To further customize UNBL functionalities for your country and upload national data and/or connect to existing national repositories, please see [Section 3.3.1](#).



3.2.4

How to download data

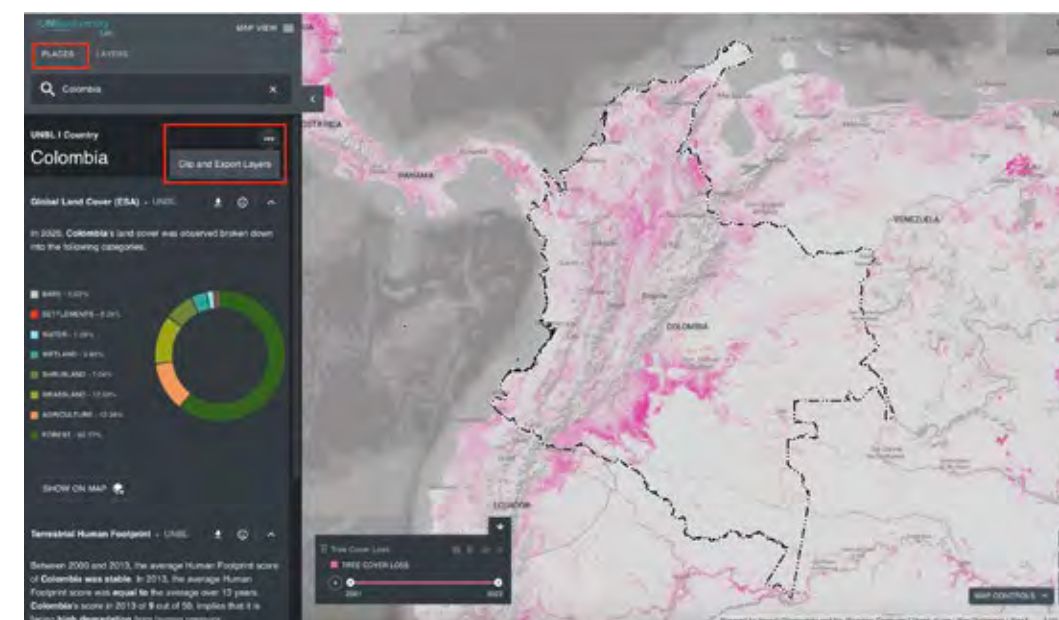
Clipping and downloading data to the range of your country

Registered users on UNBL are able to clip Kunming-Montreal Global Biodiversity Framework-related raster layers to an area of interest and download them for use in desktop GIS software. This function allows government policymakers and technical specialists to access the underlying data while avoiding the bandwidth and storage required to download and work with a global dataset.

To clip a Kunming-Montreal Global Biodiversity Framework-related layer to

your area of interest and download:

1. Register on the platform. Click here to view a demo: [EN](#) | [FR](#) | [SP](#).
2. Click the 'PLACES' icon and select your places of interest.
3. Click on the '...' icon on the right of the country's name, and click on 'Clip and Export Layers'.
4. Type the name or select the Global Biodiversity Framework-related data you want to download. If the data contains layers of multiple years, select the year you want to download.



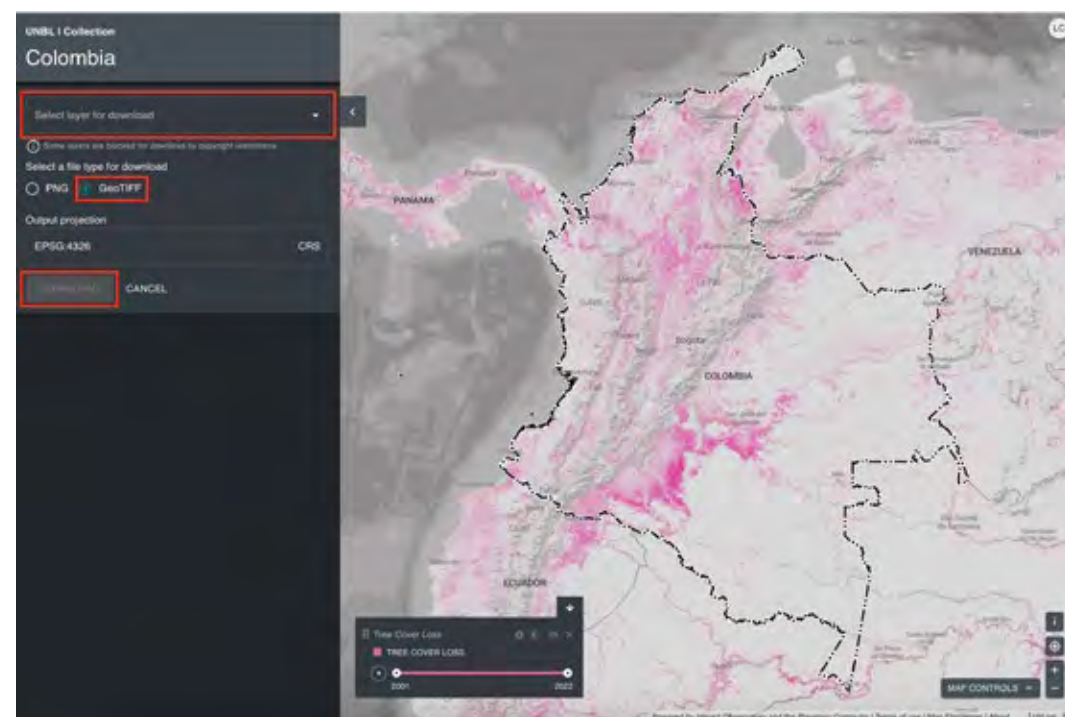
5. Click download.

- a. The selected data source will be clipped to the bounding box around the country.
- b. There is a small buffer added to the bounding box, which will slightly enlarge the area of the clipped raster. This helps to ensure that any incongruities between the national boundary used in UNBL and the official national boundary file you may wish to use do not result in

loss of data. This assumes that differences are potentially small. If this is not the case, please contact us at support@unbiodiversitylab.org for assistance.

- c. Note: this is the raw data and will not include styling information.

- 6. Access the downloaded .zip compressed file in your downloads folder once the download is complete.
- 7. The downloaded data can be opened in any GIS software for further analysis.

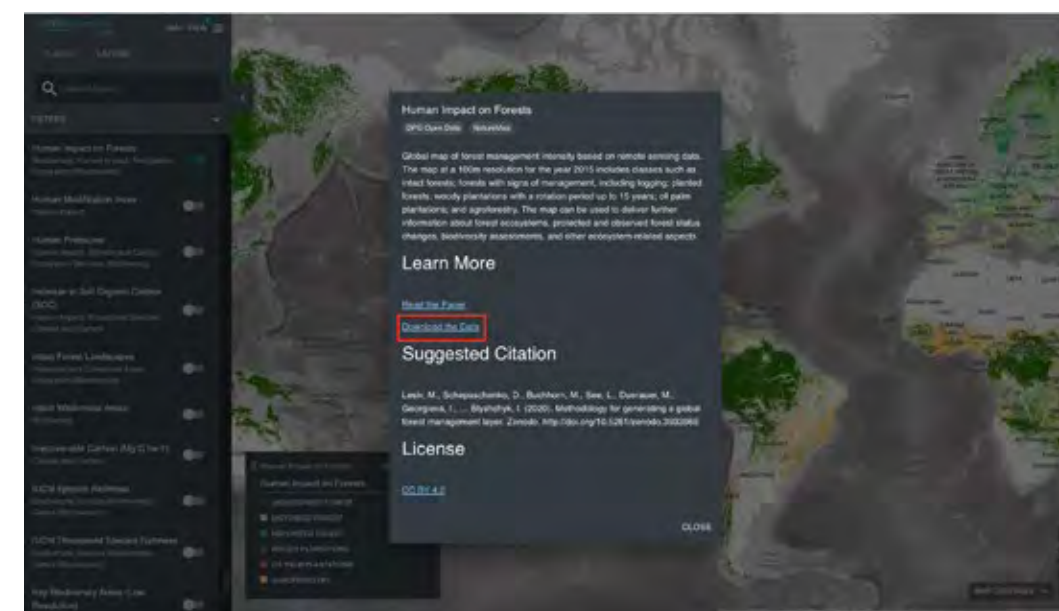


Downloading data on a global range

Should you wish to download and work with the global dataset for particular Kunming-Montreal Global Biodiversity Framework-related data, government policymakers and technical specialists will need to access the data from its original source.

To do this:

1. Select your layer of interest.
2. Click on the layer info icon.
3. Click on the link under 'LEARN MORE' to download the data from its original source.
4. If you encounter any issues in accessing the data, please contact support@unbiodiversitylab.org for further support.



3.3

UNBL workspaces as a common repository for national and global data as part of a monitoring system

3.3.1

What is a UNBL workspace?

UNBL workspaces provide a secure work area where national or subnational data can be added and shared with a set of specified users. They offer users with any level of GIS expertise the ability to collaborate on important work to use spatial data as part of the development of a national monitoring plan and/or system for the Global Biodiversity Framework. Government policymakers and technical specialists can use a UNBL workspace to:

- Invite a community of users relevant to the development of a national monitoring plan for the Kunming-Montreal Global Biodiversity Framework;
- Connect to existing national spatial data repositories, enabling all relevant data to be consolidated in one location and ensuring automatic updates from the original source;
- Upload national/subnational datasets and areas of interest to UN servers;
- Tag national data to clearly identify the goal, target, and indicator type that it will be used to calculate;
- Visualize national/subnational datasets alongside any of the global data layers available on UNBL;
- Calculate any UNBL metrics using the official national boundary layer or official sub-national boundary layers, including the forthcoming metrics for headline indicators;

- Connect to other key reporting tools, including [Target Tracker](#) (mechanism TBC).

When setting up the UNBL workspaces, government policymakers and technical specialists can assign roles to individuals or user groups to determine their level of access. These roles include:

- **Owners:** Nominated by the country to take control of the workspace. The owners will be responsible for inviting and granting access to other users, as well as adding other administrators.
- **Admins:** Can add and manage users, assign roles to users as editors and viewers, manage workspace assets via the admin tool, and view all workspace assets on the map view.
- **Editors:** Can manage workspace assets via the admin tool, and view all workspace assets on the map view. Editors should have experience using GIS software to enable them to upload and edit data layers.
- **Viewers:** Can view all workspace assets on the map view. Viewers cannot access the admin tool.

Where useful to national needs and context, a UNBL workspace could serve as a component of a national monitoring system for the Kunming-Montreal Global Biodiversity Framework. In particular, it

can support countries with [Box 2, item 1, point c](#) “definition of data sources and calculation method” of a National Monitoring System Action Plan, as suggested by the UNEP-WCMC Guidance for Developing Plans for National Monitoring Systems in Support of the Kunming-Montreal Global Biodiversity Framework (see [Box 2](#)). It can likewise

support the creation of a space for collaboration across different ministries involved in the monitoring system, related to [Item 3, point b](#)) definition of the “roles and resource requirements of the government agencies and non-government actors involved in the monitoring system”.

3.3.2

How to apply for a UNBL workspace

Parties to the CBD and any non-commercial users can freely apply for a UNBL workspace. To request a UNBL workspace please click on the UNBL

workspaces tab on our [support page](#) and fill out the form. Our [UNBL Workspace Guidance](#) provides further guidance on all features detailed above.

Box 7

View of Peru’s UNBL workspace, bringing together national and global data for visualization: Essential Life Support Areas map for Peru; national Degradation layer; and the global layer on Annual Tree Cover Loss.



3.4

Using UNBL to access and calculate headline indicators (forthcoming functionality)

In 2024-2025, UNBL will add the ability to view and calculate all spatializable headline indicators. This feature will enable countries to (1) view and download headline indicators calculated by global custodial institutions for a country using global reference data; and (2) calculate the indicator using existing national data and the official national boundary layer via UNBL workspaces. Where useful to national needs and context, this feature could serve as a component of a national monitoring system for the Global Biodiversity Framework. This ability

to view and calculate headline indicators can support countries with [Item 1, point c](#) “definition of data sources and calculation method” of a National Monitoring System Plan, as suggested by the UNEP-WCMC Guidance for Developing Plans for National Monitoring Systems in Support of the Kunming-Montreal Global Biodiversity Framework (see [Box 2](#)).

For a preview of how this will work, please see the steps below around existing dynamic metrics available on UNBL.

UNBL new feature alert: View & calculate headline Indicators for your country. Available 2024-2025.

3.4.1

How to calculate existing dynamic metrics for your country

To calculate dynamic metrics for your country:

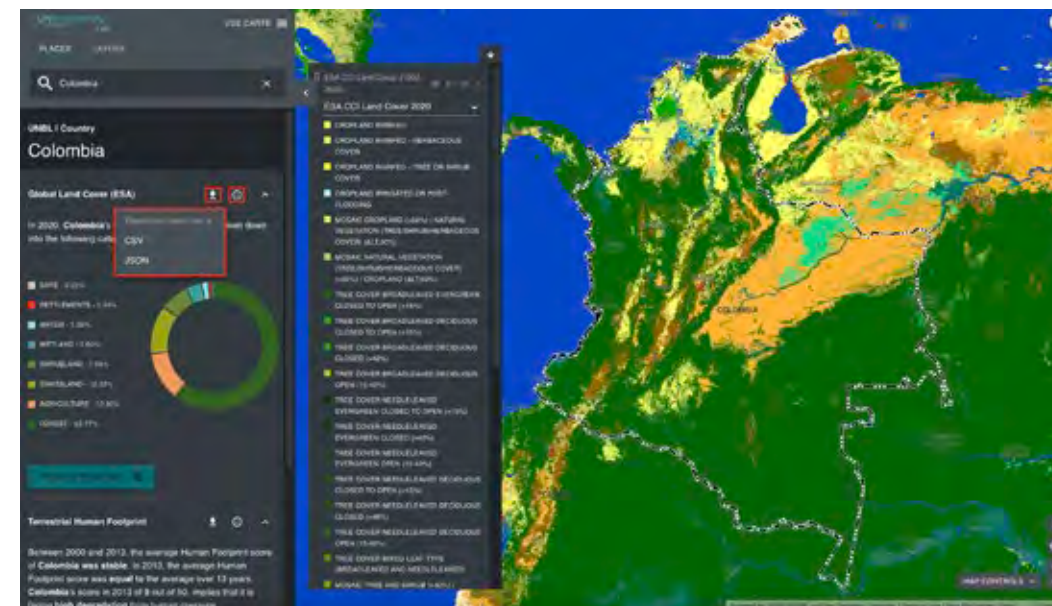
1. Review the metrics in the left panel.
2. Click on the ‘SHOW ON MAP’ icon

if you want to view this layer on the map. Click on the ‘REMOVE FROM MAP’ icon or the remove layer icon on the legend to clear the screen.



3. Click on the **i** icon to view layer info, the info pages provide a brief description of the data, related paper to read and source links.

4. To download summary data for the metric in .csv or .json format, click on the arrow icon **↓**. You can also download the data from source links on the layers’ info pages.



3.5

Using UNBL to connect to other key tools for the Monitoring Framework (forthcoming functionality)

To support streamlined and efficient monitoring and reporting for countries, UNBL will scope and create connections to other relevant platforms, including

the [Data Reporting Tool for Multilateral Environmental Agreements \(DaRT\)](#), [Target Tracker](#), and the [CBD Online Reporting Tool](#).

UNBL new feature alert: Connections to DaRT, Target Tracker, and CBD National Reporting Tool. Available 2024-2025.

3.6

Using UNBL to develop a customized spatial plan for action on Global Biodiversity Framework Targets and Indicators (forthcoming functionality)

The headline indicators and other indicators included within each national monitoring plan are intended to guide implementation of National Biodiversity Strategies and Action Plans, as well as to monitor progress towards national targets. In addition, Target 1 calls for an integrated spatial plan for action across all targets.

To support countries in this work, the UNBL partnership is building on extensive

work at the national level to map Essential Life Support Areas (ELSAs) (Box 7) to create a spatial prioritization tool. The ELSA Tool will enable countries to use UNBL to create a prioritized spatial plan to show where action to protect, manage, and restore nature can lead to the best outcomes across the goals, targets, and indicators of the Kunming-Montreal Global Biodiversity Framework, as well as other related policy commitments.

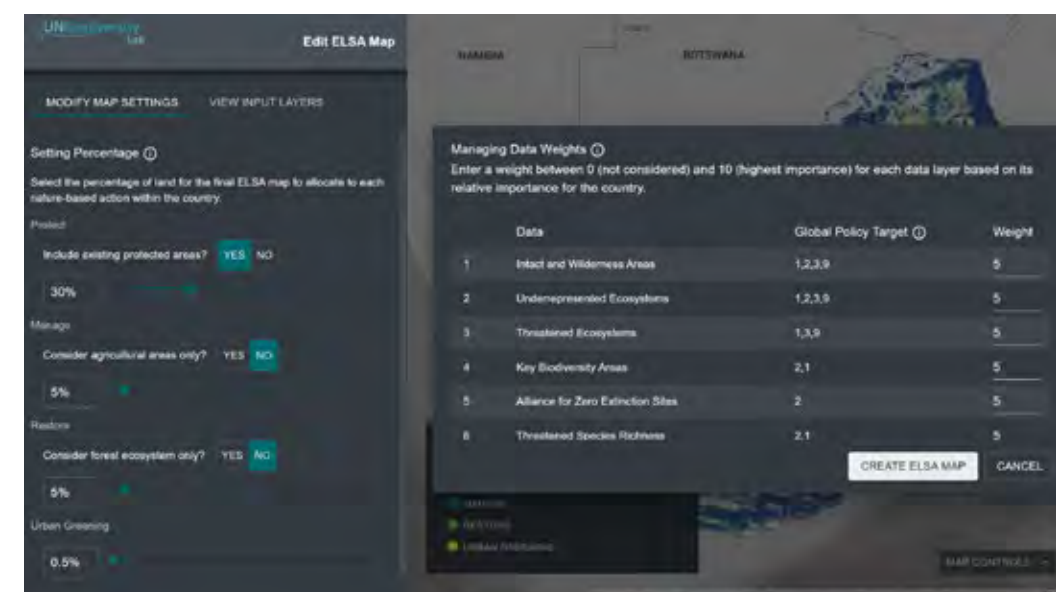
UNBL new feature alert: ELSA Tool to create a customized spatial plan for action to achieve the Global Biodiversity Framework. Available 2024-2025.

Box 8. Background on Mapping Hope: An approach to identifying ELSAs to mainstream biodiversity across sectors

UNDP has developed an approach to harness spatial data to create national 'Maps of Hope' that identify Essential Life Support Areas (ELSAs). These are places where action to protect, manage, and restore nature can sustain critical benefits to humanity, including food and water security, sustainable livelihoods, disaster risk reduction, and carbon sequestration. The result is a map that governments can use to harmonize nature and development policies and prioritize areas for protection, management, and restoration as they seek to implement the Kunming-Montreal Global Biodiversity Framework and related national priorities. UNDP has now developed customized ELSA maps for 12 countries based on their unique policy targets. More information about this methodology and case studies can be found in UNDP's [Integrated Spatial Planning Workbook](#) (UNDP, 2022).

To make the ELSA approach available via UNBL, UNDP worked with an [Expert Advisory Committee](#) that used systematic conservation planning approaches to develop a rapid ELSA analysis that can be applied and customized for any country in the world. The initial proof-of-concept applied this approach for Colombia, Costa Rica, and South Africa. Over the period 2024-2025, the UNBL partnership will work to strengthen the prioritization to reflect the final Global Biodiversity Framework goals, targets, and indicators and to make the tool available via UNBL's secure workspaces to any country in the world.

Learn More: [ELSA Trailer](#) | [ELSA Brochure](#) | [Maps of Hope Webpage](#)



4

Additional resources

- [UNBL website](#)
- UNBL Brochure: [English](#) | [French](#) | [Spanish](#) | [Portuguese](#) | [Russian](#)
- User Stories: [English](#) | [French](#) | [Spanish](#) | [Portuguese](#) | [Russian](#)
- UNBL trailer [English](#) | [French](#) | [Spanish](#)
- Micro-course ‘Using Spatial Data for Biodiversity’ hosted by Learning for Nature: [English](#) | [French](#) | [Spanish](#) | [Portuguese](#) | [Russian](#)
- UNBL Public platform guidance:
 - [Online user guide](#) | [FAQs](#)
 - Downloadable guidance: [English](#) | [French](#) | [Spanish](#) | [Portuguese](#) | [Russian](#)
- UNBL workspaces
- UNBL Workspace guidance:
 - [Online user guide](#) | [FAQs](#)
 - Downloadable guidance: [English](#) | [French](#) | [Spanish](#) | [Portuguese](#) | [Russian](#)
- Exploring UNBL data providers and use cases: [English](#) | [Spanish](#)



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Contact us

For any questions or inquiries on using UNBL to support the development of your country’s national monitoring plan, please contact Scott Atkinson (scott.atkinson@undp.org) and Di Zhang (di.zhang@undp.org).

Annex 1

List of headline and component indicators that require spatial data

These tables were produced through an analysis of Decision 15/5 and the associated indicator metadata available as of December 2023. The metadata for all indicators was provided to COP15 as a reference, has been updated through an expert process under the AHTEG on Indicators established by COP15, and is available on the [Kunming-Montreal Global Biodiversity Framework Indicators](#).

[Website](#). Indicators marked with * are those where methodology is still being developed. The use or non-use of spatial data for calculating these indicators may shift based on the final methodology. Please see [Table 1](#) for definitions of spatial, likely spatial, likely non-spatial, and non-spatial. Please see [Figure 1](#) for a summary view of this table.

Goal/Target	Headline Indicator	Spatial-S, Likely Spatial-LS, Likely Nonspatial-LN, Non-spatial-N	Component Indicator	Spatial-S, Likely Spatial-LS, Likely Nonspatial-LN, Non-spatial-N
A	A.1 Red List of Ecosystems	S	Ecosystem Intactness Index	S
	A.2 Extent of natural ecosystems	LS	Ecosystem Integrity Index	LS
	A.3 Red List Index	N	Species Habitat Index	S
	A.4 The proportion of populations within species with an effective population size > 500	N	Biodiversity Habitat Index	S
			Protected Connected (Protconn) index	S
			Protected Area Connectedness Index (PARC-Connectedness)	S
			Evolutionarily Distinct and Globally Endangered (EDGE)	S
			Living Planet Index	LS
		Change in the extent of water-related ecosystems over time	S	

Goal/Target	Headline Indicator	Spatial-S, Likely Spatial-LS, Likely Nonspatial-LN, Non-spatial-N	Component Indicator	Spatial-S, Likely Spatial-LS, Likely Nonspatial-LN, Non-spatial-N
B	B.1 Services provided by ecosystems*	LS	Red List Index (for utilized species)	N
			Living Planet Index (for used species)	S
C	C.1 Indicator on monetary benefits received*	LN		
	C.2 Indicator on non-monetary benefits*	LN		
D	D.1 International public funding, including official development assistance (ODA) for conservation and sustainable use of biodiversity and ecosystems	N		
	D.2 Domestic public funding on conservation and sustainable use of biodiversity and ecosystems	LN		
	D.3 Private funding (domestic and international) on conservation and sustainable use of biodiversity and ecosystems*	LN		
1	A.1 Red List of Ecosystems	S	Priority retention of intact / wilderness areas	LS
	A.2 Extent of natural ecosystems	LS		
	1.1 Per cent of land and seas covered by biodiversity-inclusive spatial plans*	LS		
2	2.2 Area under restoration	LS	Extent of natural ecosystems by type	LS
			Maintenance and restoration of connectivity of natural ecosystems	LS

Goal/Target	Headline Indicator	Spatial-S, Likely Spatial-LS, Likely Nonspatial-LN, Non-spatial-N	Component Indicator	Spatial-S, Likely Spatial-LS, Likely Nonspatial-LN, Non-spatial-N
3	3.1 Coverage of protected areas and OECMs	S	Protected area coverage of key biodiversity areas	S
			Protected Area Management Effectiveness (PAME)	N
			ProtConn	S
			Protected Area Connectedness Index (PARC-Connectedness)	S
			Red List of Ecosystems	S
			Connectivity Indicator	LS
			The number of protected areas that have completed a site-level assessment of governance and equity (SAGE)	LN
4	A.3 Red list Index	N	Living Planet Index	S
	A.4 The proportion of populations within species with an effective population size > 500	N	Number of plant and animal genetic resources secured in medium or long-term conservation facilities	N
			Trends in effective and sustainable management of human-wildlife conflict and coexistence	LN
			Green Status of Species Index	LS
		Conservation status of species listed in the CITES Appendices has stabilized or improved	LN	

Goal/Target	Headline Indicator	Spatial-S, Likely Spatial-LS, Likely Nonspatial-LN, Non-spatial-N	Component Indicator	Spatial-S, Likely Spatial-LS, Likely Nonspatial-LN, Non-spatial-N
5	5.1 Proportion of fish stocks within biologically sustainable levels	N	Red List Index for used species	N
			Living Planet Index for used species	S
			Sustainable use of wild species	LN
6	6.1 Rate of invasive alien species establishment	LN	Rate of invasive species impact and rate of impact	LS
			Rate of invasive alien species spread	LS
			Number of invasive alien species introduction events	LN
7	7.1 Index of coastal eutrophication potential	S	Fertilizer use	LN
	7.2 Pesticide environment concentration*	LS	Proportion of domestic and industrial wastewater flow safely treated	N
			Floating plastic debris density (by micro and macro plastics)	S
8			Red List Index (impact of pollution)	N
			Total climate regulation services provided by ecosystems and by ecosystem type (System of Environmental Economic Accounts)	LS
			Number of countries that adopt and implement national disaster risk reduction strategies in line with the Sendai Framework for Disaster Risk Reduction 2015–2030 which include biodiversity	LN

Goal/Target	Headline Indicator	Spatial-S, Likely Spatial-LS, Likely Nonspatial-LN, Non-spatial-N	Component Indicator	Spatial-S, Likely Spatial-LS, Likely Nonspatial-LN, Non-spatial-N
			National greenhouse inventories from land use and land-use change	LS
			BERI	S
9	9.1 Benefits from the sustainable use of wild species	LS	Number of people using wild resources for energy, food or culture (including firewood collection, hunting and fishing, gathering, medicinal use, craft making, etc.)	LN
	9.2 Percentage of the population in traditional occupations	LN	Red List Index (species used for food and medicine)	N
			Living Planet Index for used species	S
10	10.1 Proportion of agricultural area under productive and sustainable agriculture	S	Area of forest under sustainable management: total forest management certification by the Forest Stewardship Council and the Programme for the Endorsement of Forest Certification	LS
	10.2 Progress towards sustainable forest management	S	Average income of small-scale food producers, by sex and indigenous status	N
11	B.1 Services provided by ecosystems*	LS	Number of deaths, missing persons and directly affected persons, attributed to disasters per 100,000 population	N
			Mortality rate attributed to unsafe water, unsafe sanitation and lack of hygiene (exposure to unsafe Water, Sanitation and Hygiene for All (WASH) services	N

Goal/Target	Headline Indicator	Spatial-S, Likely Spatial-LS, Likely Nonspatial-LN, Non-spatial-N	Component Indicator	Spatial-S, Likely Spatial-LS, Likely Nonspatial-LN, Non-spatial-N
			Annual mean levels of fine particulate matter (e.g., PM2.5 and PM10) in cities	N
			Proportion of bodies of water with good ambient water quality	N
			Level of water stress	S
12	12.1 Average share of the built-up area of cities that is green/blue space for public use for all	S	Recreation and cultural ecosystem services provided	LS
13	C.1 Indicator on monetary benefits received	LN	Number of permits or their equivalents for genetic resources (including those related to traditional knowledge) by type of permit	N
	C.2 Indicator on non-monetary benefits	LN		
14	-		Number of countries with implementation of the System of Environmental-Economic Accounting	N
15	15.1 Number of companies reporting on disclosures of risks, dependencies and impacts on biodiversity	LN	Indicator based on the Task Force for Nature-related Financial Disclosures	LN
16	-		Food waste Index	N
			Material footprint per capita	N
			Global environmental impacts of consumption	LN
			Ecological footprint	N

Goal/Target	Headline Indicator	Spatial-S, Likely Spatial-LS, Likely Nonspatial-LN, Non-spatial-N	Component Indicator	Spatial-S, Likely Spatial-LS, Likely Nonspatial-LN, Non-spatial-N
18	18.1 Positive incentives in place to promote biodiversity conservation and sustainable use	N	Value of subsidies and other incentives harmful to biodiversity, that are redirected, repurposed or eliminated	LN
	18.2 Value of subsidies and other incentives harmful to biodiversity that have been eliminated, phased out or reformed	LN		
19	D.1 International public funding, including official development assistance (ODA) for conservation and sustainable use of biodiversity and ecosystems	N		
	D.2 Domestic public funding on conservation and sustainable use of biodiversity and ecosystems	LN		
	D.3 Private funding (domestic and international) on conservation and sustainable use of biodiversity and ecosystems*	LN		
21	21.1 Indicator on biodiversity information for the monitoring the Kunming-Montreal Global Biodiversity Framework	LS	Species Status Index	S

Goal/Target	Headline Indicator	Spatial-S, Likely Spatial-LS, Likely Nonspatial-LN, Non-spatial-N	Component Indicator	Spatial-S, Likely Spatial-LS, Likely Nonspatial-LN, Non-spatial-N
	-		Extent to which (a) global citizenship education and (b) education for sustainable development, including gender equality and human rights, are mainstreamed at all levels in: (i) national education policies, (ii) curricula, (iii) teacher education and (iv) student assessments	N
22	-		Proportion of total adult population with secure tenure rights to land, (a) with legally recognized documentation, and (b) who perceive their rights to land as secure, by sex and type of tenure	N
23	-		Proportion of seats held by women in (a) national parliaments and (b) local governments	N
			Indicator on national implementation of the Gender Plan of Action	LN
			Proportion of total adult population with secure tenure rights to land, (a) with legally recognized documentation; and (b) who perceive their rights to land as secure, by sex and type of tenure	N

Annex 2

List of Headline, Component and Complementary indicators that can be calculated using spatial data and associated global data

These tables were produced through an analysis of the Decision 15/5 and the associated indicator metadata available as of December 2023. The metadata for all indicators was provided to COP15 as a reference, has been updated through an expert process under the AHTEG on Indicators established by COP15, and is available on the [Kunming-Montreal Global Biodiversity Framework Indicators Website](#). This analysis was conducted comprehensively for the headline and component indicators and on an ad hoc basis for the complementary indicators. It will be updated based on the outcomes of the 26th meeting of the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA26) and the 16th

Conference of the Parties (COP16) of the Convention on Biological Diversity.

It should be noted that by highlighting these global reference datasets it is not implied that countries should be using these datasets for reporting but rather:

1. These are datasets that act as a data standard that countries can use to evaluate their own national datasets against.
2. In circumstances where no national data exists these global reference data can be used to enable reporting against the associated indicator.



Table 2. Headline Indicators – Global reference spatial data to inform calculation at the national level

This table contains all headline indicators that require spatial data for their calculation, as indicated by the indicator metadata associated with Decision 15/5.

Global Biodiversity Framework Goal/Target	Indicator & link to metadata for indicator calculation where available	Global data available	Global data description	Frequency of update for global data	Resolution of global data ^a	UNBL Mapview URL	Guiding questions to identify national data
<p>Goal A: The integrity, connectivity and resilience of all ecosystems are maintained, enhanced, or restored, substantially increasing the area of natural ecosystems by 2050;</p> <p>Human induced extinction of known threatened species is halted, and, by 2050, the extinction rate and risk of all species are reduced tenfold and the abundance of native wild species is increased to healthy and resilient levels;</p> <p>The genetic diversity within populations of wild and domesticated species is maintained, safeguarding their adaptive potential.</p>	<p>A.1 Red List of Ecosystems</p>	Red List of Ecosystems	<p>The Red List of Ecosystems framework assesses the relative risk of ecosystem collapse of an ecosystem type. The indicator ‘Red List Index of Ecosystems (RLIe)’ measures the average risk of ecosystem collapse of a group of ecosystems and allows for tracking change over time, based on genuine change in the risk category of each ecosystem.</p> <p>The RLIe can be calculated for any set of ecosystem types for which there are Red List of Ecosystems assessments. It can thus be calculated at the country level or at the global level, or for broad ecosystem groups (such as forests)</p>	5 years	N/A	Pending	<p>Does national data on classifications and the extent of ecosystem types exist?</p> <p>Has my country conducted Red List of Ecosystems assessments across all ecosystem types?</p>
	<p>A.2 Extent of natural ecosystems</p>	<p>Methodology for calculating the indicator is under development and review by the AHTEG on Indicators. Current metadata suggests the below data may be suitable for indicator calculation.</p> <p>IUCN Global Ecosystem Typology (GET) 2.0</p>	<p>Natural ecosystems are predominantly influenced by natural ecological processes characterized by a stable ecological state maintaining ecosystem integrity; ecosystem condition ranges within its natural variability. Examples (with reference to IUCN GET) are primary and old growth forests, natural grasslands and savannahs, natural rivers and wetlands. Natural ecosystems are defined based on the following IUCN GET biomes:Realms:</p> <p>Terrestrial - Biomes T1, T2, T3, T4, T5, T6.</p> <p>Freshwater - Biomes F1, F2.</p> <p>Marine - Biomes M1, M2, M3.</p> <p>Freshwater Terrestrial - Biome TF1.</p> <p>Freshwater Marine - Biome FM1.</p> <p>Marine Terrestrial - Biomes MT1, MT2.</p> <p>Marine Freshwater Terrestrial - Biome MFT1.</p> <p>Managed/Anthropogenic ecosystems are predominantly influenced by human activities where a stable natural ecological state is unobtainable and future socio-economic interventions are required to maintain a new stable state. Examples (with reference to IUCN GET) are urban green spaces and croplands, artificial water bodies and anthropogenic marine systems. Managed/anthropogenic ecosystems are defined based on the based on the following IUCN GET biomes: Realms:</p> <p>Terrestrial - Biomes T7.</p> <p>Freshwater - Biomes F3.</p> <p>Marine - Biomes M4.</p> <p>Marine Terrestrial - MT3</p>	N/A	30 arc-sec	Pending	<p>Does national data on classifications and the extent of terrestrial and/or marine ecosystem types exist?</p> <p>Does national data follow the IUCN GET methodology and typology?</p>
<p>Goal B: Biodiversity is sustainably used and managed and nature’s contributions to people, including ecosystem functions and services, are valued, maintained and enhanced, with those currently in decline being restored, supporting the achievement of sustainable development for the benefit of present and future generations by 2050.</p>	<p>B.1 Services provided by ecosystem</p>	<p>Methodology for calculating the indicator is under development and review by the AHTEG on Indicators. Current metadata indicates that this indicator will rely on spatial data for its calculation.</p>					<p>Pending methodology development.</p>

Global Biodiversity Framework Goal/Target	Indicator & link to metadata for indicator calculation where available	Global data available	Global data description	Frequency of update for global data	Resolution of global data ^a	UNBL Mapview URL	Guiding questions to identify national data
Target 1: Plan and Manage all Areas To Reduce Biodiversity Loss.	A.1 Red List of Ecosystems	Red List of Ecosystems	The Red List of Ecosystems framework assesses the relative risk of ecosystem collapse of an ecosystem type. The indicator 'Red List Index of Ecosystems (RLIe)' measures the average risk of ecosystem collapse of a group of ecosystems and allows for tracking change over time, based on genuine change in the risk category of each ecosystem. The RLIe can be calculated for any set of ecosystem types for which there are Red List of Ecosystems assessments. It can thus be calculated at the country level or at the global level, or for broad ecosystem groups (such as forests)	5 years	Unknown	Pending	Does national data on classifications and extent of ecosystem types exist? Has my country conducted Red List of Ecosystems assessments across all ecosystem types?
	A.2 Extent of natural ecosystems	Methodology for calculating the indicator is under development and review by the AHTEG on Indicators. Current metadata suggests the below data may be suitable for indicator calculation.					
		IUCN Global Ecosystem Typology (GET) 2.0	Natural ecosystems are predominantly influenced by natural ecological processes characterized by a stable ecological state maintaining ecosystem integrity; ecosystem condition ranges within its natural variability. Examples (with reference to IUCN GET) are primary and old growth forests, natural grasslands and savannahs, natural rivers and wetlands. Natural ecosystems are defined based on the following IUCN GET biomes:Realms: Terrestrial - Biomes T1, T2, T3, T4, T5, T6. Freshwater - Biomes F1, F2. Marine - Biomes M1, M2, M3. Freshwater Terrestrial - Biome TF1. Freshwater Marine - Biome FM1. Marine Terrestrial - Biomes MT1, MT2. Marine Freshwater Terrestrial - Biome MFT1. Managed/Anthropogenic ecosystems are predominantly influenced by human activities where a stable natural ecological state is unobtainable and future socio-economic interventions are required to maintain a new stable state. Examples (with reference to IUCN GET) are urban green spaces and croplands, artificial water bodies and anthropogenic marine systems. Managed/anthropogenic ecosystems are defined based on the based on the following IUCN GET biomes: Realms: Terrestrial - Biomes T7. Freshwater - Biomes F3. Marine - Biomes M4. Marine Terrestrial - MT3	N/A	30 arc-sec	Pending	Does national data on classifications and extent of terrestrial and/or marine ecosystem types exist?
	1.1 Per cent of land and seas covered by biodiversity-inclusive spatial plans*	Methodology for calculating the indicator is under development and review by the AHTEG on Indicators. Current metadata indicates that this indicator will rely on spatial data for its calculation.					

Global Biodiversity Framework Goal/Target	Indicator & link to metadata for indicator calculation where available	Global data available	Global data description	Frequency of update for global data	Resolution of global data ^a	UNBL Mapview URL	Guiding questions to identify national data
Target 2 : Restore 30% of all Degraded Ecosystems.	2.2 Area under restoration	FERM (Framework for Ecosystem Restoration Monitoring)	Currently, there is no mechanism for collecting area-based information on ecosystem restoration. FAO and key partners from the Monitoring Task Force of the UN Decade on Ecosystem Restoration have defined a draft methodology for data collection, compilation, and reporting. The proposed workflow consists of four main elements: data compilation, country validation, reporting and capacity development. The primary platforms and reporting mechanisms for collecting information on restoration areas identified by the Working Group, include the Framework for Ecosystem Restoration Monitoring (FERM), and others. Restoration initiatives, led by public entities, private sector, civil society and individuals can share area based data and additional parameters for reporting area under restoration through any of the key identified platforms. FAO will compile data from the key platforms and harmonize the data through the FERM registry.	N/A	N/A	Pending	Has your country submitted data to the FERM registry? Is there a national database on restoration projects in the country? Do NGO, community groups, or large private landowners, carry out restoration works that are, can, or should be included?
		IUCN Global Ecosystem Typology (GET) 2.0	Area under restoration by ecosystem describes the area where restoration is happening. It will be reported by ecosystem and country. A global ecosystem dataset is used as default data to make the map overlay that covers aquatic and terrestrial ecosystems. Available global ecosystem maps were evaluated and the outcome of the analysis found the most detailed and complete information is provided by the IUCN Global Ecosystem Typology 2.0 (Keith et al., 2022). The IUCN Global Ecosystem Typology 2.0 is the outcome of critical review and input by an extensive international network of ecosystem scientists, containing profiles for 25 biomes and 108 ecosystem functional groups (EFGs). Biomes will be used for disaggregation by ecosystems for reporting. Data type: tabular or spatially explicit.	N/A	30 arc-sec	Pending	Does national data on classifications and the extent of terrestrial and/or marine ecosystem types exist?
		World Database on Protected Areas	The primary platforms and reporting mechanisms for collecting information on restoration areas identified by the Working Group, include the World Database for Protected Areas (WDPA), Framework for Ecosystem Restoration Monitoring (FERM), etc.	Monthly	N/A	View map on UNBL	Is there national data on protected areas that includes areas not in the WDPA?
Target 3 : Conserve 30% of Land, Waters and Seas.	3.1 Coverage of protected areas and OECMs	World Database on Protected Areas	Coverage by ecosystem component: The indicator shows the total percentage coverage of terrestrial and marine areas by protected areas and OECMs at the global level.	Monthly	N/A	View map on UNBL	Is there national data on protected areas and OECMs that includes areas not already in the WDPA and WD-OECM?
		World Database of Other Effective Area-Based Conservation Measures (WD-OECM)	Coverage by ecosystem component: The indicator shows the total percentage coverage of terrestrial and marine areas by protected areas and OECMs at the global level.	Monthly	Unknown	View map on UNBL	
Target 6 : Reduce the Introduction of Invasive Alien Species by 50% and Minimize Their Impact.	6.1 Rate of invasive alien species establishment*	Methodology for calculating the indicator is under development and review by the AHTEG on Indicators. Current metadata indicates that this indicator will rely on spatial data for its calculation.					

Global Biodiversity Framework Goal/Target	Indicator & link to metadata for indicator calculation where available	Global data available	Global data description	Frequency of update for global data	Resolution of global data ^a	UNBL Mapview URL	Guiding questions to identify national data
Target 7: Reduce Pollution to Levels That Are Not Harmful to Biodiversity	7.1 Index of coastal eutrophication potential	Global Chlorophyll Statistics within territorial seas and EEZ.	The indicator aims to measure the contribution to coastal eutrophication from countries and the state of coastal eutrophication. Therefore, two levels of indicators are recommended: Level 1: Globally available data from earth observations and modeling Level 2: National data which will be collected from countries (through the relevant Regional Seas Programme, where applicable (i.e. for countries that are a member of a Regional Seas Programme)). Here we make available data for Level 1.	Unknown	Unknown	View map on UNBL	Is there national data on coastal eutrophication? If so, how often is it collected?
		Chlorophyll-a anomalies	Level 1: This sub-indicator evaluates the intra-annual changes in chlorophyll-a concentration anomalies in each Exclusive Economic Zone (EEZ) and territorial sea using the NOAA VIIRS chlorophyll-a ratio anomaly product produced daily for the globe at 2 km spatial resolution. The daily global VIIRS chlorophyll-a concentrations are produced from the NOAA Multi-Sensor Level 1 to Level 2 (MSL12) processing of the VIIRS sensor on the Suomi SNPP satellite.	Daily	2 km	View map on UNBL	
		Chlorophyll-a deviation	The indicator aims to measure the contribution to coastal eutrophication from countries and the state of coastal eutrophication. Therefore, two levels of indicators are recommended. This data is Level 1: Globally available data from earth observations and modeling. Chlorophyll-A deviation modeling.	Monthly	4km	View map on UNBL	
		Chlorophyll-a concentration in seawater	Level 1: The ESA Ocean Colour CCI (OC-CCI) project, led by the Plymouth Marine Laboratory (PML), has produced a consistent, merged chlorophyll-a product from SeaWiFS, MODIS, MERIS and VIIRS. For this indicator, Chlorophyll-a will be derived from the OC-CCI project and generated for each individual pixel within a country's territorial sea and EEZ.	Monthly	4 km	View map on UNBL	
	7.2 Pesticide environment concentration*	Risk of pesticide pollution at the global scale	The indicator is defined as the annual agricultural use of total pesticides in active ingredients for various categories of pesticides. This map shows the exposure of agricultural land to pesticide pollution. Value range is from 0 (lowest exposure) to 6.1 (highest exposure). Pixel values for non-agricultural land (-1) and water (-2) have been excluded from visualization.	Unknown	5 arc-min	View map on UNBL	
Target 9: Manage Wild Species Sustainably To Benefit People	9.1 Benefits from the sustainable use of wild species	Methodology for calculating the indicator is under development and review by the AHTEG on Indicators. Current metadata indicates that this indicator will rely on spatial data for its calculation.					

Global Biodiversity Framework Goal/Target	Indicator & link to metadata for indicator calculation where available	Global data available	Global data description	Frequency of update for global data	Resolution of global data ^a	UNBL Mapview URL	Guiding questions to identify national data
Target 10 : Enhance Biodiversity and Sustainability in Agriculture, Aquaculture, Fisheries, and Forestry	10.1 Proportion of agricultural area under productive and sustainable agriculture	Proportion of agricultural area under productive and sustainable agriculture	The indicator is defined by the formula: Area under productive and sustainable agriculture/ Agricultural land area. This implies the need to measure both the extent of land under productive and sustainable agriculture (the numerator), as well as the extent of agriculture land area (the denominator). The numerator captures the three dimensions of sustainable production: environmental, economic and social. It corresponds to the agricultural land area of the farms that satisfy the sustainability criteria of the 11 sub-indicators selected across all three dimensions. The denominator in turn is the sum of agricultural land area (as defined by FAO) utilized by agricultural holdings that are owned (excluding rented-out), rented-in, leased, sharecropped or borrowed. State or communal land used by farm holdings is not included.	Annual	Country-level stats	View map on UNBL	Is there national data on agriculture, aquaculture, fisheries and forestry?
	10.2 Progress towards sustainable forest management	Proportion of forest with a long-term management plan	Sustainable forest management (SFM) has been formally defined, by the UN General Assembly, as follows: dynamic and evolving concept that aims to maintain and enhance the economic, social and environmental values of all types of forests, for the benefit of present and future generations (Resolution A/RES/62/98) The indicator is composed of two sub-indicators that measure progress towards several dimensions of sustainable forest management.	Annual	Country-level stats	View map on UNBL	Is there national data on forest areas under sustainable forest management (SFM)?
		Forest area under an independently verified forest management certification scheme	Sustainable forest management (SFM) has been formally defined, by the UN General Assembly, as follows: dynamic and evolving concept that aims to maintain and enhance the economic, social and environmental values of all types of forests, for the benefit of present and future generations (Resolution A/RES/62/98) The indicator is composed of two sub-indicators that measure progress towards several dimensions of sustainable forest management.	Annual	N/A	View map on UNBL	
Target 11 : Restore, Maintain and Enhance Nature's Contributions to People.	B.1 Services provided by ecosystems*	Methodology for calculating the indicator is under development and review by the AHTEG on Indicators. Current metadata indicates that this indicator will rely on spatial data for its calculation.					
Target 12 : Enhance Green Spaces and Urban Planning for Human Well-Being and Biodiversity	12.1 Average share of the built-up area of cities that is green/blue space for public use for all	Average share of the built-up area of cities that is open space for public use for all, by sex, age and persons with disabilities	The following is the definition of the SDG 11.7.1 indicator and consequently there could be small variations in the definition for the "Average share of the built-up area of cities that is green/blue space for public use for all". Indicator 11.7.1 has several interesting concepts that required global consultations and consensus. These include; built-up areas, cities, open spaces for public use, etc. As a custodian agency, UN-Habitat has worked on these concepts along with several other partners.	Annual	City-level stats	View map on UNBL	Is there recent national validated land cover/land use data? Has there been a national assessment on greenspace and bluespace opportunities in built-up areas?
Target 21 : Ensure That Knowledge Is Available and Accessible To Guide Biodiversity Action.	21.1 Indicator on biodiversity information for the monitoring the Kunming-Montreal Global Biodiversity Framework	Methodology for calculating the indicator is under development and review by the AHTEG on Indicators. Current metadata indicates that this indicator will rely on spatial data for its calculation.					

^a N/A: not applicable. Refers to data that are points or polygons vector layers.

Unknown: Refers to data that are raster layers where the spatial resolution of the data is unknown.

Table 3. Component Indicators – Global reference spatial data to inform calculation at the national level

This table contains all component indicators that require spatial data for their calculation, as indicated by the indicator metadata associated with Decision 15/5.

Global Biodiversity Framework Goal/Target	Indicator & link to metadata for indicator calculation where available	Global data available	Global data description	Frequency of update for global data	Resolution of global data	UNBL Mapview URL	Guiding questions to identify national data
<p>Goal A: The integrity, connectivity and resilience of all ecosystems are maintained, enhanced, or restored, substantially increasing the area of natural ecosystems by 2050;</p> <p>Human induced extinction of known threatened species is halted, and, by 2050, the extinction rate and risk of all species are reduced tenfold and the abundance of native wild species is increased to healthy and resilient levels;</p> <p>The genetic diversity within populations of wild and domesticated species is maintained, safeguarding their adaptive potential.</p>	Ecosystem Intactness Index	Ecological Intactness Index	Human activities are altering natural areas worldwide. While our ability to map these activities at fine scales is improving, a simplistic binary characterization of habitat and non-habitat with a focus on change in habitat extent has dominated conservation assessments across different spatial scales. Here, the authors provide a Ecological Intactness Index metric that captures both habitat loss, quality and fragmentation effects which, when combined, are called intactness.	Annual	1km	View map on UNBL	<p>Is there technical capacity to recalculate the index with national data?</p> <p>If so, is there nationally validated data on:</p> <ul style="list-style-type: none"> • human footprint index • ecoregions
	Ecosystem Integrity Index	Methodology for calculating the indicator is under development. Current metadata indicates that this indicator will rely on spatial data for its calculation.					
	Species Habitat Index	Species Habitat Index	The Species Habitat Index (SHI) measures changes in ecosystem integrity through health of their component species populations and the associated processes and functions of ecological communities. The index captures alterations to the quality and connectivity of habitats at the level of single species and at fine spatial scale, addressing single square kilometer assemblages. When aggregated over a larger geographic unit (e.g., landscape, seascape, mountain region, ecological region, or country), SHI can provide a compound measure of an area’s ecological integrity and connectivity. When evaluated over species’ geographic ranges, the SHI also informs about trends in the health of species populations and potential changes in their genetic diversity	Annual	1 km ²	Pending	<p>Is there technical capacity to recalculate the index with national data?</p> <p>If so, is there nationally validated temporal data on: species habitat/ distribution range, connectivity, and habitat integrity?</p> <p>If these data exist, what is the spatial resolution of each?</p>
	Biodiversity Habitat Index	Biodiversity Habitat Index	The Biodiversity Habitat Index (BHI) estimates the level of species diversity expected to be retained within any given spatial reporting unit (e.g. a country, a biome, an ecosystem type, or the entire planet) as a function of the area, connectivity and integrity of natural ecosystems across that unit. Results for the indicator can be expressed as either: 1) the ‘effective proportion of habitat’ remaining within the unit – adjusting for the effects of the condition and functional connectivity of that habitat, and of spatial variation in the species composition of ecological communities (beta diversity); or 2) the proportion of species expected to persist (i.e. avoid extinction) over the long term, predicted as a simple species-area based function of the effective proportion of habitat remaining.	5 years	30 arc-sec	View map on UNBL	<ul style="list-style-type: none"> • Does your country have the technical capacity to replicate the methods to calculate this index? • Does your country have environmental data that is either nationally required and/or at a finer spatial resolution than WorldClim’s 30-arcsec data for: <ul style="list-style-type: none"> – Min Monthly Min Temperature – Max Monthly Max Temperature – Max Diurnal Temperature Range – Annual Precipitation – Actual Evaporation – Potential Evaporation – Min Monthly Water Deficit – Max Monthly Water Deficit – Soil pH – Soil Clay Proportion – Soil Silt Proportion – Soil Bulk Density – Soil Depth – Ruggedness Index – Topographic Wetness Index • Does your country have species occurrence records that are not in GBIF and would thus produce different outputs than the global index?

Global Biodiversity Framework Goal/Target	Indicator & link to metadata for indicator calculation where available	Global data available	Global data description	Frequency of update for global data	Resolution of global data	UNBL Mapview URL	Guiding questions to identify national data
	Protected Connected (Protconn) index	Protected Area Connectivity (ProtConn)	ProtConn, an indicator of the connectivity of Protected Areas (PAs) systems that improves the detail and comprehensiveness of previous related assessments mainly by depicting different categories of land through which movement between protected locations may occur, including the assessment of the contribution of transboundary PAs to connectivity.	2 years	10km	View map on UNBL	Methods to recompute the ProtConn index are complex; does your country: <ul style="list-style-type: none"> • have the capacity to recalculate the index? • have protected area data that has not been provided to the WDPA and would therefore produce different values than the global index?
	Protected Area Connectedness Index (PARC-Connectedness)	Protected Area Connectedness Index (PARC-Connectedness)	The Protected Area Representativeness and Connectedness (PARC) indices measure the extent to which terrestrial protected areas, and other effective area-based conservation measures (OECMs), are ecologically representative, and well-connected.	2 years	30 arc-sec	View map on UNBL	If working with global data, countries would simply extract the raw gridded PARC results (at 30-arcsecond grid resolution) for their country from the relevant globally-generated layers. If there is a desire to recalculate at the national level, the following questions are relevant. Is there technical capacity to recalculate the index with national data? If so, is there nationally validated data on: <ul style="list-style-type: none"> • protected areas and OECMs, and • spatial variation in species composition?
	Living Planet Index	Living Planet Index	The Living Planet Index is a multi-species indicator which tracks average changes in the relative abundance of species populations over time.	2 years	N/A	View map on UNBL	<ul style="list-style-type: none"> • Does your country have the technical capacity to replicate the methods to calculate this index? • The living planet index has created an R package (rlpi) to help with calculating the index using user collected/created data. • Do you have time series data on species population sizes in your country?
	Change in the extent of water-related ecosystems over time	Global Surface Water – Transitions 2000-2018 (SDG 6.6.1 INDICATOR)	This indicator tracks the extent to which different types of water-related ecosystems are changing in extent over time. The indicator is multifaceted capturing data on different types of freshwater ecosystems and to measure extent change the indicator considers spatial area changes, water quality and water quantity changes. The indicator uses satellite-based Earth observations to globally monitor different freshwater ecosystems types.	Annual	10m – 30m	View map on UNBL	Is there nationally validated temporal data on: <ul style="list-style-type: none"> • the extent of water related ecosystems, or • ecosystem types, or • land cover land use?
Goal B : Biodiversity is sustainably used and managed and nature's contributions to people, including ecosystem functions and services, are valued, maintained and enhanced, with those currently in decline being restored, supporting the achievement of sustainable development for the benefit of present and future generations by 2050.	Living Planet Index (for used species)	Living Planet Index (for used species)	The use of wildlife supports many people for their food, medicine, and livelihoods. Ensuring that this use is sustainable is central to conservation to ensure the persistence of species alongside continued utilization by people. Using more than 11,000 wildlife population trends from the Living Planet Index, the authors conducted a global analysis of local-scale data to better understand how wildlife populations respond to utilization.	2 years	N/A	View map on UNBL	<ul style="list-style-type: none"> • Does your country have the technical capacity to replicate the methods to calculate this index? • The living planet index has created an R package (rlpi) to help with calculating the index using user collected/created data. • Do you have time series data on utilized species population sizes in your country?

Global Biodiversity Framework Goal/Target	Indicator & link to metadata for indicator calculation where available	Global data available	Global data description	Frequency of update for global data	Resolution of global data	UNBL Mapview URL	Guiding questions to identify national data
Target 1 : Plan and Manage all Areas To Reduce Biodiversity Loss.	Priority retention of intact / wilderness areas	Methodology for calculating the indicator is under development. Current metadata indicates that this indicator will rely on spatial data for its calculation.					
Target 2 : Restore 30% of all Degraded Ecosystems.	Extent of natural ecosystems by type	Methodology for calculating the indicator is under development. Current metadata indicates that this indicator will rely on spatial data for its calculation.					
	Maintenance and restoration of connectivity of natural ecosystems	Methodology for calculating the indicator is under development. Current metadata indicates that this indicator will rely on spatial data for its calculation.					
Target 3 : Conserve 30% of Land, Waters and Seas.	Protected area coverage of key biodiversity areas	Key Biodiversity Areas	Key Biodiversity Areas (KBAs) are sites contributing significantly to the global persistence of biodiversity. KBAs are identified by applying the criteria and thresholds included in the “A Global Standard for the Identification of Key Biodiversity Areas” approved by the IUCN in April 2016. This standard applies to all taxa and all levels of biodiversity (genetic, species and ecosystems). There are 11 criteria grouped under five categories: Threatened biodiversity, Geographically restricted biodiversity, Ecological integrity, Biological processes and Irreplaceability through quantitative analysis.	Annual	Approximately 3km (coarse public overview layer on UNBL). Polygon/ Point data is available for country workspaces on UNBL; other uses require a data request from the KBA Partnership .	View map on UNBL	Are KBAs recognized in your country that have not been incorporated into the global KBA database? If so, does boundary data on them exist (or are the areas currently just identified as point locations)? Are there national assessments of Key Biodiversity Areas? Is there national data on protected areas and OECMs that includes areas not already in the WDPA and WD-OECM?
		World Database on Protected Areas	The WDPA (World Database on Protected Area) is the most comprehensive global database of marine and terrestrial protected areas, comprising both spatial data (i.e. boundaries and points) with associated attribute data (i.e. tabular information).	Annual	N/A	View map on UNBL	
	ProtConn	Protected Area Connectivity (ProtConn)	ProtConn, an indicator of the connectivity of Protected Areas (PAs) systems that improves the detail and comprehensiveness of previous related assessments mainly by depicting different categories of land through which movement between protected locations may occur, including the assessment of the contribution of transboundary PAs to connectivity.	2 years	10km	View map on UNBL	Methods to recompute the ProtConn index are complex; does your country: have the capacity to recalculate the index? have protected area data that has not been provided to the WDPA and would therefore produce different values than the global index?
	Protected Area Connectedness Index (PARC-Connectedness)	Protected Area Connectedness Index (PARC-Connectedness)	The Protected Area Representativeness and Connectedness (PARC) indices measure the extent to which terrestrial protected areas, and other effective area-based conservation measures (OECMs), are ecologically representative, and well-connected.	2 years	30 arc-sec	View map on UNBL	If working with the global data, countries could simply extract the raw gridded PARC results (at 30-arcsecond grid resolution) for their country from the relevant globally-generated layers. If there is a desire to recalculate at the national level, the following questions are relevant. Is there technical capacity to recalculate the index with national data? If so, is there nationally validated data on: protected areas and OECMs, and spatial variation in species composition?

Global Biodiversity Framework Goal/Target	Indicator & link to metadata for indicator calculation where available	Global data available	Global data description	Frequency of update for global data	Resolution of global data	UNBL Mapview URL	Guiding questions to identify national data
	Red List of Ecosystems	Red List of Ecosystems	The Red List of Ecosystems framework assesses the relative risk of ecosystem collapse of an ecosystem type. The indicator 'Red List Index of Ecosystems (RLIe)' measures the average risk of ecosystem collapse of a group of ecosystems and allows for tracking change over time, based on genuine change in the risk category of each ecosystem. The RLIe can be calculated for any set of ecosystem types for which there are Red List of Ecosystems assessments. It can thus be calculated at the country level or at the global level, or for broad ecosystem groups (such as forests)	5 years	Unknown	Pending	Does national data on classifications and extent of ecosystem types exist? Has my country conducted Red List of Ecosystems assessments across all ecosystem types?
	Connectivity Indicator	Methodology for calculating the indicator is under development. Current metadata indicates that this indicator will rely on spatial data for its calculation.					
	Species Protection Index	Species Protection Index	The Species Protection Index (SPI) captures how adequately Protected Areas or Other Effective Area-Based Conservation Measures, i.e. conservation areas, conserve habitat and support the health and survival of species and their populations.	Annual	Unknown	Pending	Map of Life has conducted an initial computation of global and national SPI values to assist biodiversity assessment and reporting. Is there technical capacity to recalculate the index with national data? If so, is there nationally validated data on: protected areas and OECMs that is not included in the WPDA and WD-OECM, and species habitat (suitable) range?
Target 4: Halt Species Extinction, Protect Genetic Diversity, and Manage Human-Wildlife Conflicts.	Living Planet Index	Living Planet Index	The Living Planet Index is a multi-species indicator which tracks average changes in the relative abundance of species populations over time.	2 years	N/A	View map on UNBL	Does your country have the technical capacity to replicate the methods to calculate this index? The living planet index has created an R package (rlpi) to help with calculating the index using user collected/created data. Do you have time series data on species population sizes in your country?
	Green Status of Species Index	Methodology for calculating the indicator is under development. Current metadata suggests the these data may be suitable for indicator calculation.					
Target 5: Ensure Sustainable, Safe and Legal Harvesting and Trade of Wild Species.	Living Planet Index for used species	Living Planet Index	The use of wildlife supports many people for their food, medicine, and livelihoods. Ensuring that this use is sustainable is central to conservation to ensure the persistence of species alongside continued utilization by people. Using more than 11,000 wildlife population trends from the Living Planet Index, the authors conducted a global analysis of local-scale data to better understand how wildlife populations respond to utilization.	2 years	N/A	View map on UNBL	Does your country have the technical capacity to replicate the methods to calculate this index? The living planet index has created an R package (rlpi) to help with calculating the index using user collected/created data. Do you have time series data on utilized species population sizes in your country?
Target 6: Reduce the Introduction of Invasive Alien Species by 50% and Minimize Their Impact.	Rate of invasive species impact and rate of impact	Methodology for calculating the indicator is under development. Current metadata indicates that this indicator will rely on spatial data for its calculation.					
	Rate of invasive alien species spread	Methodology for calculating the indicator is under development. Current metadata indicates that this indicator will rely on spatial data for its calculation.					

Global Biodiversity Framework Goal/Target	Indicator & link to metadata for indicator calculation where available	Global data available	Global data description	Frequency of update for global data	Resolution of global data	UNBL Mapview URL	Guiding questions to identify national data
Target 7: Reduce Pollution to Levels That Are Not Harmful to Biodiversity.	Floating plastic debris density (by micro and macro plastics)	Spatial distribution of micro-and macroplastics in large marine ecosystems	Plastic debris density includes potential measurement of plastics washed onto beaches or shorelines, floating on the water or in the water column, deposited on the seafloor/seabed, as well as ingested by biota; however, it is also important to note the importance of monitoring information on waste management and the sources of plastic pollution for understanding plastic pollution.	Annual	N/A	View map on UNBL	Is there a waste management department in the country? Are there national investigations and monitoring on micro-and macro-plastics in EEZ and inland sea?
Target 8: Minimize the Impacts of Climate Change on Biodiversity and Build Resilience.	Total climate regulation services provided by ecosystems and by ecosystem type (System of Environmental Economic Accounts)	Methodology for calculating the indicator is under development. Current metadata indicates that this indicator will rely on spatial data for its calculation.					
	National greenhouse inventories from land use and land-use change	Methodology for calculating the indicator is under development. Current metadata indicates that this indicator will rely on spatial data for its calculation.					
	Bioclimatic Ecosystem Resilience Index (BERI)	Bioclimatic Ecosystem Resilience Index (BERI)	The Bioclimatic Ecosystem Resilience Index (BERI) measures the capacity of landscapes to retain species diversity in the face of climate change, as a function of the area, connectivity and integrity of natural ecosystems across those landscapes. The indicator assesses the extent to which any given spatial configuration of natural habitat will promote or hinder climate-induced shifts in biological distributions. It does this by analyzing the functional connectivity of each grid-cell of natural habitat to areas of habitat in the surrounding landscape which are projected to support a similar assemblage of species under climate change to that currently associated with the cell of interest.	5 years	30 arc-sec	View map on UNBL	Does your country have the technical capacity to replicate the methods to calculate this index? Does your country have environmental data that is either nationally required and/or at a finer spatial resolution than WorldClim's 30-arcsec data for: Min Monthly Min Temperature Max Monthly Max Temperature Max Diurnal Temperature Range Annual Precipitation Actual Evaporation Potential Evaporation Min Monthly Water Deficit Max Monthly Water Deficit Soil pH Soil Clay Proportion Soil Silt Proportion Soil Bulk Density Soil Depth Ruggedness Index Topographic Wetness Index Does your country have species occurrence records that are not in GBIF and would thus produce different outputs than the global index?

Global Biodiversity Framework Goal/Target	Indicator & link to metadata for indicator calculation where available	Global data available	Global data description	Frequency of update for global data	Resolution of global data	UNBL Mapview URL	Guiding questions to identify national data
Target 9: Manage Wild Species Sustainably To Benefit People.	Living Planet Index for used species	Living Planet Index	The use of wildlife supports many people for their food, medicine, and livelihoods. Ensuring that this use is sustainable is central to conservation to ensure the persistence of species alongside continued utilization by people. Using more than 11,000 wildlife population trends from the Living Planet Index, the authors conducted a global analysis of local-scale data to better understand how wildlife populations respond to utilization.	2 years	N/A	View map on UNBL	Does your country have the technical capacity to replicate the methods to calculate this index? The living planet index has created an R package (rlpi) to help with calculating the index using user collected/created data. Do you have time series data on utilized species population sizes in your country?
Target 10: Enhance Biodiversity and Sustainability in Agriculture, Aquaculture, Fisheries, and Forestry.	Area of forest under sustainable management: total forest management certification by the Forest Stewardship Council and the Programme for the Endorsement of Forest Certification	Forest certified for sustainable use (FAO)	The area of forest, measured in hectares, which has been certified for sustainable use by and independently verified forest certification scheme, including the Forest Stewardship Council (FSC) and the Programme for the Endorsement of Forest Certification (PEFC).	Annual	Country-level stats	View map on UNBL	Does your country have forest under forest certification scheme, including the Forest Stewardship Council (FSC) and/or the Programme for the Endorsement of Forest Certification (PEFC)? If so, what's the area of forest under forest certification scheme?
Target 11: Restore, Maintain and Enhance Nature's Contributions to People.	Level of water stress	Level of water stress	Level of water stress (SDG 6.4.2) by major river basin - AQUASTAT (FAO). This map provides a global representation of the level of water stress spatially disaggregated by major river basin.	Annual	N/A	View map on UNBL	Does your national statistical body, environmental ministry, or local NGOs, collect data on water stress across your country?
Target 12: Enhance Green Spaces and Urban Planning for Human Well-Being and Biodiversity.	Recreation and cultural ecosystem services provided	Methodology for calculating the indicator is under development. Current metadata indicates that this indicator will rely on spatial data for its calculation.					
Target 21: Ensure That Knowledge Is Available and Accessible To Guide Biodiversity Action.	Species Status Index	Species Status Information Index (SSII)	For a given species, the Species Information Index (SII) captures how well existing data covers the species' expected range. At the species level, the SII can be computed across the entirety of the species' expected range, ignoring national boundaries, or separately within each nation where it is expected to occur.	Annual	Unknown	Pending	Does your country have species occurrence data that has not been uploaded to and mediated by the GBIF (Global Biodiversity Information Facility)? If so, does your country have the technical capacity to replicate the methods of the Map of Life to calculate this index?

Table 4. Complementary Indicators -- Global reference spatial data to inform calculation at the national level

Please note that this is not a comprehensive list of the complementary indicators that can be calculated using spatial data. Indicators are included here on an ad hoc basis where the UNBL team already had access to the data.

Global Biodiversity Framework Goal/Target	Indicator & link to metadata for indicator calculation where available	Global data available	Global data description	Frequency of update for global data	Resolution of global data	UNBL Mapview URL	Guiding questions to identify national data
<p>Goal A: The integrity, connectivity and resilience of all ecosystems are maintained, enhanced, or restored, substantially increasing the area of natural ecosystems by 2050; Human induced extinction of known threatened species is halted, and, by 2050, the extinction rate and risk of all species are reduced tenfold and the abundance of native wild species is increased to healthy and resilient levels; The genetic diversity within populations of wild and domesticated species is maintained, safeguarding their adaptive potential.</p>	Tree cover loss	Tree Cover Loss	This data is a collaboration between the GLAD (Global Land Analysis & Discovery) lab at the University of Maryland, Google, USGS, and NASA, measuring areas of tree cover loss across all global land (except Antarctica and other Arctic islands). The data were generated using multispectral satellite imagery from the Landsat 5 thematic mapper (TM), the Landsat 7 thematic mapper plus (ETM+), and the Landsat 8 Operational Land Imager (OLI) sensors. Over 1 million satellite images were processed and analyzed, including over 600,000 Landsat 7 images for the 2000-2012 interval, and more than 400,000 Landsat 5, 7, and 8 images for updates for the 2011-2022 interval. The clear land surface observations in the satellite images were assembled and a supervised learning algorithm was applied to identify per pixel tree cover loss.	Annual	30 m	View map on UNBL	<ul style="list-style-type: none"> Does your country produce annual forest cover data that includes the ability to measure loss of tree cover over time (e.g., does it include a temporal component)? Is the tree cover data that is available validated for national use?
	Global coral reef extent	Global Distribution of Warm-Water Coral Reefs	This dataset shows the global distribution of coral reefs in tropical and subtropical regions. It is the most comprehensive global dataset of warm-water coral reefs to date, acting as a foundation baseline map for future, more detailed, work. This dataset was compiled from a number of sources by UNEP World Conservation Monitoring Centre (UNEP-WCMC) and the WorldFish Centre, in collaboration with WRI (World Resources Institute) and TNC (The Nature Conservancy).	Unknown	Unknown	View map on UNBL	<ul style="list-style-type: none"> Does your country maintain national data on coral reef extent? If so, is this data historical? How often is it updated? When was it last updated?
	Global saltmarsh extent	Global Distribution of Saltmarshes	This dataset displays the extent of our knowledge regarding the distribution of saltmarshes globally, drawing from occurrence data (surveyed and/or remotely sensed). The dataset was developed to provide a baseline inventory of the extent of our knowledge regarding the global distribution of saltmarshes, which are ecosystems located in the intertidal zone of sheltered marine and estuarine coastlines. These ecosystems comprise brackish, shallow water with salt-tolerant plants such as herbs, grasses and shrubs, and are commonly found at temperate and high latitudes. Saltmarshes are of ecological importance as they underpin the estuarine food web. In particular, saltmarshes serve as nesting, nursery and feeding grounds for numerous species of birds, fish, molluscs and crustaceans, including commercially important fish species such as herring (<i>Clupea harengus</i>), and are also home to a number of Endangered and Critically Endangered species.	Unknown	N/A	View map on UNBL	<ul style="list-style-type: none"> Does your country maintain national data on saltmarsh extent? If so, is this data historical? How often is it updated? When was it last updated?
	Biodiversity Habitat Index	Biodiversity Habitat Index	The Biodiversity Habitat Index (BHI) estimates the level of species diversity expected to be retained within any given spatial reporting unit (e.g. a country, a biome, an ecosystem type, or the entire planet) as a function of the area, connectivity and integrity of natural ecosystems across that unit. Results for the indicator can be expressed as either: 1) the 'effective proportion of habitat' remaining within the unit – adjusting for the effects of the condition and functional connectivity of that habitat, and of spatial variation in the species composition of ecological communities (beta diversity); or 2) the proportion of species expected to persist (i.e. avoid extinction) over the long term, predicted as a simple species-area based function of the effective proportion of habitat remaining.	5 years	30 arc-sec	View map on UNBL	<ul style="list-style-type: none"> Does your country have the technical capacity to replicate the methods to calculate this index? Does your country have environmental data that is either nationally required and/or at a finer spatial resolution than WorldClim's 30-arcsec data for: <ul style="list-style-type: none"> Min Monthly Min Temperature Max Monthly Max Temperature Max Diurnal Temperature Range Annual Precipitation Actual Evaporation Potential Evaporation Min Monthly Water Deficit Max Monthly Water Deficit Soil pH Soil Clay Proportion Soil Silt Proportion Soil Bulk Density Soil Depth Ruggedness Index Topographic Wetness Index Does your country have species occurrence records that are not in GBIF and would thus produce different outputs than the global index?

Global Biodiversity Framework Goal/Target	Indicator & link to metadata for indicator calculation where available	Global data available	Global data description	Frequency of update for global data	Resolution of global data	UNBL Mapview URL	Guiding questions to identify national data
	Bioclimatic Ecosystem Resilience Index (BERI)	Bioclimatic Ecosystem Resilience Index (BERI)	The Bioclimatic Ecosystem Resilience Index (BERI) measures the capacity of landscapes to retain species diversity in the face of climate change, as a function of the area, connectivity and integrity of natural ecosystems across those landscapes. The indicator assesses the extent to which any given spatial configuration of natural habitat will promote or hinder climate-induced shifts in biological distributions. It does this by analyzing the functional connectivity of each grid-cell of natural habitat to areas of habitat in the surrounding landscape which are projected to support a similar assemblage of species under climate change to that currently associated with the cell of interest.	5 years	30 arc-sec	View map on UNBL	<ul style="list-style-type: none"> • Does your country have the technical capacity to replicate the methods to calculate this index? • Does your country have environmental data that is either nationally required and/or at a finer spatial resolution than WorldClim's 30-arcsec data for: <ul style="list-style-type: none"> – Min Monthly Min Temperature – Max Monthly Max Temperature – Max Diurnal Temperature Range – Annual Precipitation – Actual Evaporation – Potential Evaporation – Min Monthly Water Deficit – Max Monthly Water Deficit – Soil pH – Soil Clay Proportion – Soil Silt Proportion – Soil Bulk Density – Soil Depth – Ruggedness Index – Topographic Wetness Index • Does your country have species occurrence records that are not in GBIF and would thus produce different outputs than the global index?
Goal B : Biodiversity is sustainably used and managed and nature's contributions to people, including ecosystem functions and services, are valued, maintained and enhanced, with those currently in decline being restored, supporting the achievement of sustainable development for the benefit of present and future generations by 2050.	Number of mixed sites (having both natural and cultural Outstanding Universal Values), cultural landscapes (recognized as combined works of nature and people) and natural sites with cultural values including those supporting local and indigenous knowledge and practices inscribed on the UNESCO World Heritage List and UNESCO World Network of Biosphere Reserves	UNESCO World Heritage Sites	World Heritage sites are unique and diverse. Heritage is our legacy from the past, what we live with today, and what we pass on to future generations. Our cultural and natural heritage are both irreplaceable sources of life and inspiration.	Unknown	N/A	View map on UNBL	Not applicable
		UNESCO MAB Biosphere Reserves	The UNESCO World Network of Biosphere Reserves Programme strives to: Identify and assess the changes in the biosphere resulting from human and natural activities and the effects of these changes on humans and the environment, in particular in the context of climate change; Study and compare the dynamic interrelationships between natural/near-natural ecosystems and socio-economic processes, in particular in the context of accelerated loss of biological and cultural diversity with unexpected consequences that impact the ability of ecosystems to continue to provide services critical for human well-being; Ensure basic human welfare and a livable environment in the context of rapid urbanization and energy consumption as drivers of environmental change; Promote the exchange and transfer of knowledge on environmental problems and solutions, and to foster environmental education for sustainable development.	Unknown	N/A	View map on UNBL	Not applicable

Global Biodiversity Framework Goal/Target	Indicator & link to metadata for indicator calculation where available	Global data available	Global data description	Frequency of update for global data	Resolution of global data	UNBL Mapview URL	Guiding questions to identify national data
<p>Target 2: Ensure that by 2030 at least 30 percent of areas of degraded terrestrial, inland water, and coastal and marine ecosystems are under effective restoration, in order to enhance biodiversity and ecosystem functions and services, ecological integrity and connectivity.</p>	<p>Bioclimatic Ecosystem Resilience Index (BERI)</p>	<p>Bioclimatic Ecosystem Resilience Index (BERI)</p>	<p>The Bioclimatic Ecosystem Resilience Index (BERI) measures the capacity of landscapes to retain species diversity in the face of climate change, as a function of the area, connectivity and integrity of natural ecosystems across those landscapes. The indicator assesses the extent to which any given spatial configuration of natural habitat will promote or hinder climate-induced shifts in biological distributions. It does this by analyzing the functional connectivity of each grid-cell of natural habitat to areas of habitat in the surrounding landscape which are projected to support a similar assemblage of species under climate change to that currently associated with the cell of interest.</p>	<p>5 years</p>	<p>30 arc-sec</p>	<p>View map on UNBL</p>	<ul style="list-style-type: none"> • Does your country have the technical capacity to replicate the methods to calculate this index? • Does your country have environmental data that is either nationally required and/or at a finer spatial resolution than WorldClim’s 30-arcsec data for: <ul style="list-style-type: none"> – Min Monthly Min Temperature – Max Monthly Max Temperature – Max Diurnal Temperature Range – Annual Precipitation – Actual Evaporation – Potential Evaporation – Min Monthly Water Deficit – Max Monthly Water Deficit – Soil pH – Soil Clay Proportion – Soil Silt Proportion – Soil Bulk Density – Soil Depth – Ruggedness Index – Topographic Wetness Index • Does your country have species occurrence records that are not in GBIF and would thus produce different outputs than the global index?
	<p>Biodiversity Habitat Index</p>	<p>Biodiversity Habitat Index</p>	<p>The Biodiversity Habitat Index (BHI) estimates the level of species diversity expected to be retained within any given spatial reporting unit (e.g. a country, a biome, an ecosystem type, or the entire planet) as a function of the area, connectivity and integrity of natural ecosystems across that unit. Results for the indicator can be expressed as either: 1) the ‘effective proportion of habitat’ remaining within the unit – adjusting for the effects of the condition and functional connectivity of that habitat, and of spatial variation in the species composition of ecological communities (beta diversity); or 2) the proportion of species expected to persist (i.e. avoid extinction) over the long term, predicted as a simple species-area based function of the effective proportion of habitat remaining.</p>	<p>5 years</p>	<p>30 arc-sec</p>	<p>View map on UNBL</p>	<ul style="list-style-type: none"> • Does your country have the technical capacity to replicate the methods to calculate this index? • Does your country have environmental data that is either nationally required and/or at a finer spatial resolution than WorldClim’s 30-arcsec data for: <ul style="list-style-type: none"> – Min Monthly Min Temperature – Max Monthly Max Temperature – Max Diurnal Temperature Range – Annual Precipitation – Actual Evaporation – Potential Evaporation – Min Monthly Water Deficit – Max Monthly Water Deficit – Soil pH – Soil Clay Proportion – Soil Silt Proportion – Soil Bulk Density – Soil Depth – Ruggedness Index – Topographic Wetness Index • Does your country have species occurrence records that are not in GBIF and would thus produce different outputs than the global index?

Global Biodiversity Framework Goal/Target	Indicator & link to metadata for indicator calculation where available	Global data available	Global data description	Frequency of update for global data	Resolution of global data	UNBL Mapview URL	Guiding questions to identify national data
<p>Target 3: Ensure and enable that by 2030 at least 30 percent of terrestrial, inland water, and of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem functions and services, are effectively conserved and managed through ecologically representative, well-connected and equitably governed systems of protected areas and other effective area-based conservation measures, recognizing indigenous and traditional territories, where applicable, and integrated into wider landscapes, seascapes and the ocean, while ensuring that any sustainable use, where appropriate in such areas, is fully consistent with conservation outcomes, recognizing and respecting the rights of indigenous peoples and local communities, including over their traditional territories.</p>	<p>Number of hectares of UNESCO designated sites (natural and mixed World Heritage sites and Biosphere Reserves)</p>	UNESCO World Heritage Sites	World Heritage sites are unique and diverse. Heritage is our legacy from the past, what we live with today, and what we pass on to future generations. Our cultural and natural heritage are both irreplaceable sources of life and inspiration.	Unknown	N/A	View map on UNBL	Not applicable
		UNESCO MAB Biosphere Reserves	The UNESCO World Network of Biosphere Reserves Programme strives to: Identify and assess the changes in the biosphere resulting from human and natural activities and the effects of these changes on humans and the environment, in particular in the context of climate change; Study and compare the dynamic interrelationships between natural/near-natural ecosystems and socio-economic processes, in particular in the context of accelerated loss of biological and cultural diversity with unexpected consequences that impact the ability of ecosystems to continue to provide services critical for human well-being; Ensure basic human welfare and a livable environment in the context of rapid urbanization and energy consumption as drivers of environmental change; Promote the exchange and transfer of knowledge on environmental problems and solutions, and to foster environmental education for sustainable development.	Unknown	N/A	View map on UNBL	Not applicable

Annex 3

Indicator Specification Template

This template is recreated with permission from the companion *Guidance for Developing Plans for National Monitoring Systems in Support of the Kunming-Montreal Global Biodiversity Framework*. It is available in Microsoft Word format [here](#).

1. Indicator name
2. Target measured by the indicator
3. How the indicator relates to the NBSAP target (e.g. which components or elements it helps to measure or understand, and its suitability for this purpose)
4. The responsible agency and person for the production and communication of the indicator
5. Development status of the indicator (e.g. proposed, in draft form, fully specified and adopted, actively being calculated and available)
6. Definition of the indicator
7. Units of the indicator (e.g. km ² , ha yr ⁻¹ (hectares per year), number of individuals, % change)
8. Forms of presentation (graph types, maps, narrative text, etc. – give examples where possible)
9. Calculation procedure (method)
10. Frequency of production of the indicator
11. Where and how the indicator results are published (are they freely available or on request, and in a machine readable, non-proprietary file format such as: .csv, .txt, geospatial formats, etc.)
12. Reports that use the indicator and their frequency
The responsible agency and person for producing the reports
13. Where data is available from for calculating the indicator (e.g. a database)
Responsible agency and person for the data source
Time period for which data is available
Level of coverage by the data for the subject of interest (e.g. geographical area, relevant populations)

14. How observations and measurements (primary data) are produced for the indicator
Primary providers or source of observations and measurements for the indicator
15. How to interpret the indicator results (e.g. how effectively it helps to measure the target; limitations of the data; its suitability for aggregation; meaning of upward or downward trends; threshold values)
16. Limits to the indicator's usefulness and accuracy (e.g. slow change in response to changes in the subject of interest; poor quality data; limited scope for updating)
17. Closely related indicators (including in national and international processes)
18. Costs and funding to produce and maintain the indicator
Annual staff and office costs (current and future years) + source of funding + any funding gaps
Annual costs to collect data (current and future years) + source of funding + any funding gaps
Annual computing and other infrastructure costs (current and future years) + source of funding + any funding gaps
Annual costs to produce information products (indicators, reports, etc.) (current and future years) + source of funding + any funding gaps
Actions to address any funding requirements
19. Capacity development needs
Personnel or staff positions to be filled
Technical skills to be developed
Computing and other infrastructure needs to be developed
Actions to address capacity development needs
20. Further information sources and details

