Indicator metadata form

1. Indicator name

Insert full indicator name

Red List Index of Ecosystems

2. Date of metadata update

Insert date of metadata update

October 2022

3. Goals and Targets addressed

Please provide details about the proposed goals and targets of the first draft post-2020 global biodiversity framework for which the indicator will measure progress in the first draft of the post-2020 global biodiversity framework

3a. Goal

If relevant, Provide the corresponding draft goal name, draft goal number, or N/A

Goal A

3b. Target

Provide the corresponding draft target name, draft target number, or N/A

Target 2,3 & 7

4. Rationale

Description of the purpose and rational behind the indicator, noting its relevance to the corresponding draft goal or target

Ecosystems are vital to sustaining biodiversity and human wellbeing, yet are threatened by ongoing loss and degradation world-wide (Nicholson et al. 2021). The Red List Index of Ecosystems (RLIE) summarises global or national trends in risk status for terrestrial, marine and freshwater ecosystems, integrating data on ecosystem area and integrity. It was designed to complement the widely used indicator of species extinction risk, the Red List Index of species survival based on the *IUCN Red List of Threatened Species* (Butchart et al. 2007), by focusing on a different level of biodiversity, deepening understanding of biodiversity loss and priorities for action to reverse it.

The RLIE measures trends in the risk of ecosystem collapse for sets of ecosystems, using data from the *IUCN Red List of Ecosystems* criteria and categories. It is based on the proportion of ecosystems in each Red List risk category. A downward trend in the RLIE over time means that ecosystems face a higher risk of collapse, due to loss in ecosystem area and/or integrity. Conversely, an increase in the RLIE indicates improvements in collapse risk due to increases in area or integrity of ecosystems, and would indicate that Goal A of the post-2020 global biodiversity framework is on track. Reducing ecosystem collapse risk includes preventing ecosystems from collapsing, becoming threatened, or becoming more threatened. Measuring collapse risk provides an important benchmark for change in ecosystem area and integrity.

The Red List of Ecosystems was adopted by IUCN in 2014 as the global standard for ecosystem risk assessment for terrestrial, freshwater and marine ecosystems. It assesses the relative risk of ecosystem collapse by measuring change in ecosystem area and integrity. Its five criteria place ecosystems in familiar Red List risk categories (e.g., Endangered, Vulnerable), with Collapsed replacing the Extinct category used for species. Red List of Ecosystems assessments can be done for selected ecosystems or for all ecosystem types in an area, and can be applied at a range of spatial scales, from local to national to global. Ecosystem assessments identify which ecosystems are most at risk, and the drivers of ecosystem loss and degradation.

5. Definitions, concepts and classifications

5a. Definition:

Precise definition of the indicator, including references to standards and classifications. The indicator definition should be unambiguous and in expressed in universally applicable terms. It must clearly express the unit of measurement (proportion, dollars, number of people, etc.).

Indicator definition: The Red List Index of Ecosystems (RLIE) measures the average risk of ecosystem collapse of a group of ecosystems and how those change over time based on genuine change in the risk category of each ecosystem.

Unit of measure: The RLIE is measured on a scale of 0-1, where 0 means that all ecosystems are listed as Collapsed, and 1 means that all ecosystems are listed as Least Concern. A value between 0 and 1 means that the ecosystems have a range of risk categories. As the indicator is an arithmetic mean, the higher the average risk of collapse among the set of ecosystems, the lower the indicator value.

Risk categories: The risk of collapse is based on the risk categories each ecosystem is assigned after assessment under the *IUCN Red List of Ecosystems* protocols (Keith et al. 2013). The risk categories include, in order of increasing risk of collapse: Least Concern, Near Threatened, Vulnerable, Endangered, Critically Endangered, and Collapsed.

The definitions of *ecosystem* and *ecosystem collapse* are consistent with the *IUCN Red List of Ecosystems* categories and criteria (Keith et al., 2013; Bland et al; 2017). Ecosystems are defined based on the geographic distribution, native ecological community, the environmental conditions that support them, and the processes and interactions among components. Ecosystems can be described, classified, and identified using the IUCN Global Ecosystem Typology (Keith et al. 2020). The risk of ecosystem collapse is the likelihood that an ecosystem will collapse over a specified timeframe. Ecosystem collapse is the endpoint of ecosystem decline, when an ecosystem loses its defining features (i.e., species, assemblages, structure, and functions) and is replaced by a different, often depauperate, ecosystem type. Collapse can be irreversible, but some ecosystems may recover over long timeframes or with restoration (Keith et al. 2013).

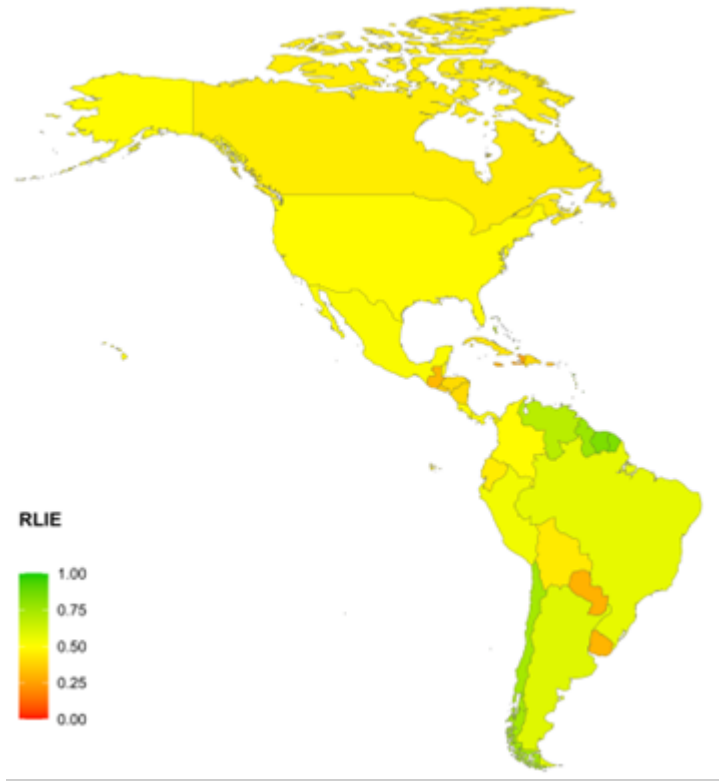
5b. Method of computation

The Red List Index of Ecosystems (RLIE) measures trends in ecosystem collapse risk based on the proportion of ecosystems in each risk category (for details see Rowland et al. 2020a). The RLIE is calculated for the overall risk category (which is defined based on the IUCN Red List of Ecosystems protocols) and separately for each *IUCN Red List of Ecosystems* criterion. The RLIE is the mean of ordinal ranks assigned to each risk category and is defined as:

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

where $Wc_{(i,t)}$ is the risk category rank for ecosystem *i* in year *t* (Collapsed=5, Critically Endangered=4, Endangered=3, Vulnerable=2, Near Threatened=1, Least Concern=0; following Butchart et al. 2007), W_{CO} is the maximum category rank (Collapsed=5), and *n* is the total number of ecosystems excluding Data Deficient or Not Evaluated ecosystems. The RLIE ranges from 0 (all ecosystems Collapsed) to 1 (all Least Concern).

The RLIE can be reported at national or global levels, and disaggregated by ecosystem type, using the *IUCN Global Ecosystem Typology*. It can be presented in multiple ways, including as a snapshot of risk (Figure 1) or time-series, where available (Figure 2).



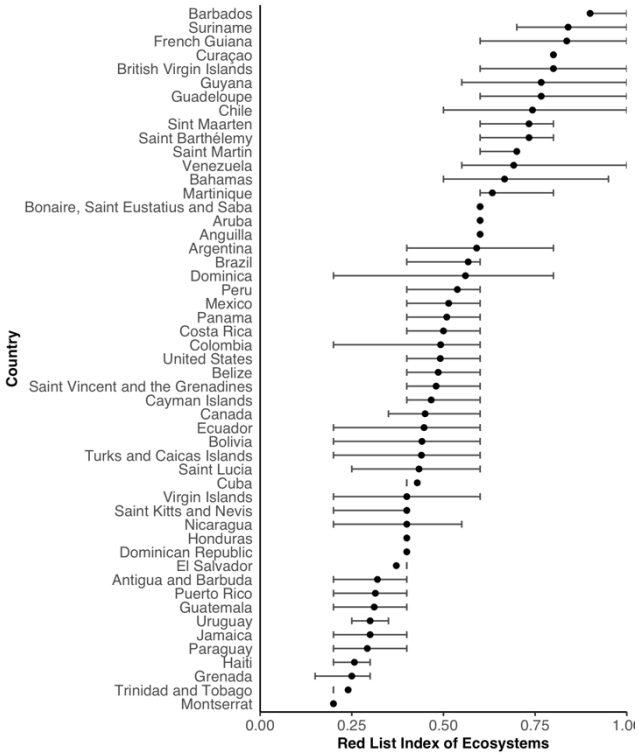


Figure 1. *The Red List Index of ecosystems (RLIE) as a snapshot of risk by country, for the forests of the Americas, presented by plotting graphically (left) or mapping national RLIE values (right).*

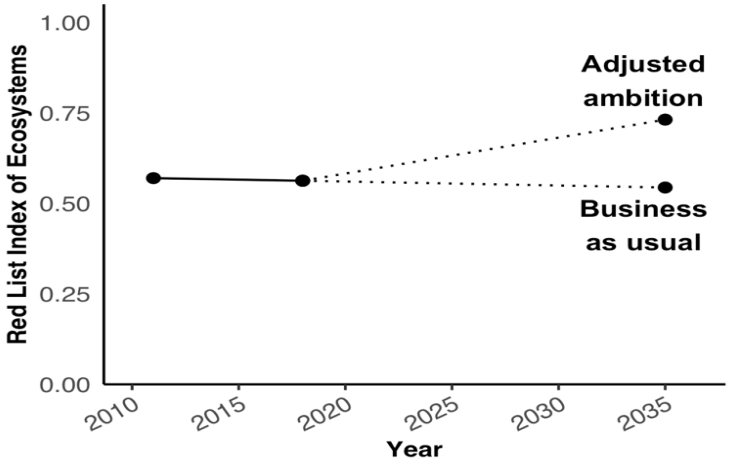
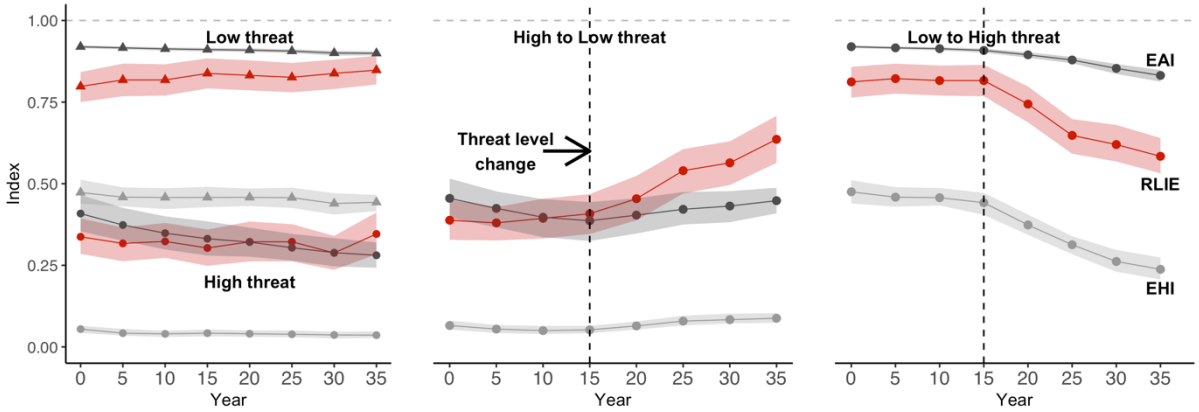


Figure 2. *The Red List Index of ecosystems (RLIE) can be presented as a time-series. Here, it differentiates between an 'adjusted ambition' for improving ecosystem collapse status nationally and 'business as usual' policy pathways in Norway for a selected set of ecosystems; Norway has undertaken two Red List of Ecosystem assessments (2011, 2018) and projected the impact of policy pathways on ecosystem risk status (presented in Kyrkjeeide et al. 2021).*

A key question for indicators is how sensitive they are to biodiversity change. Analyses from Norway found that the RLIE could provide time-series to compare alternative policy scenarios (Kyrkjeeide et al. 2021). The RLIE has been tested for sensitivity and responsiveness using an ecosystem simulation model of a coral reef (Rowland et al. 2020b), showing that the RLIE (red in Figure 3):

- Clearly differentiates between low and high threat levels
- Responds quickly (within 5 years) to both increases in threats (e.g., climate change) and decreases (e.g., effective conservation policy)
- Detects change in area and integrity

Figure 3. *Tests of the Red List Index of ecosystems (RLIE) show it differentiates between low and high threat scenarios, detects changes in threats, and responds to change in area (Ecosystem Area Index, black) and integrity (Ecosystem Health Index, grey).*



5c. Data collection method

Description of all methods used for data collection. This description should include, when applicable, the questions used to collect the data, the type of interview, the dates/duration of fieldwork, the sample size and the response rate. Hyperlinks to methodologies are acceptable

The RLIE is calculated using data from *IUCN Red List of Ecosystems* risk assessments, specifically the overall risk status. Ecosystems are assessed using five quantitative criteria: change in ecosystem area over a specified timeframe (criterion A), restricted ecosystem distribution (criterion B), change in environmental conditions (criterion C) and biotic processes and interactions (criterion D) over a specified timeframe, and a quantitative analysis of the probability of ecosystem collapse in the future (criterion E). The timeframes include: since ~1750, over the past 50 years, the next 50 years, and any 50-year period including the past, present and future. Thus, the RLIE takes into account trends

through time. Data used to complete *IUCN Red List of Ecosystems* assessments can be derived from a range of sources.

IUCN Red List of Ecosystems assessments can be undertaken at a range of scales. The most common format is within national assessments, based on national or local data; currently approximately 60 countries have Red List of Ecosystems assessments for all terrestrial ecosystems. Global, regional and local assessments are also available for some ecosystem types or regions (e.g., forests, mangroves) for a further 20 countries.

5d. Accessibility of methodology

Note whether the methodology for the indicator and the underlying data are published in a peer reviewed location that can be accessed, and the methodology can be repeated by other scientists or agencies with the same overall result obtained. For "global indicators" please note whether a methodology is available for use at national or regional scales

The RLIE can be calculated for any set of ecosystems for which there are *IUCN Red List of Ecosystems* assessments. The method was published in an open-access peer-reviewed paper (Rowland et al. 2020a). Scripts to calculate the indicator using the program *RStudio* are publicly available via the Red List of Ecosystems GitHub site (https://github.com/red-list-ecosystem/rle_indices). The script provides the code to calculate the indicator and includes examples of the indicator outputs using sample data from the continental assessment of 136 temperate and tropical forests across 51 countries/territories in the Caribbean and Americas (Ferrer-Paris et al. 2019). The sample data are provided to demonstrate the structure of the data required to calculate the indicator.

5e. Data sources

Description of all actual and recommended sources of data.

The Red List Index of Ecosystems is based on data from the *IUCN Red List of Ecosystems* risk assessment protocols. Specifically, the indicator uses the assigned risk categories for a set of ecosystems to calculate the indicator for a given year. Where reassessments of ecosystems have occurred, the indicator can show change in the mean collapse risk over time, where there are genuine improvements or deterioration in the risk status of the ecosystem. *IUCN Red List of Ecosystems* assessments are based on five quantitative criteria that examine the ecosystem distribution, changes in environmental conditions and biota, and the probability that the ecosystem will collapse in the future using a simulation model. The criteria can be assessed using a range of data sources, including scientific literature, reports, experts, historical accounts, maps, or satellite imagery.

IUCN Red List of Ecosystems assessments are currently published as peer-reviewed publications or reports. A publicly available centralised database of assessments is housing an increasing number of assessments (https://assessments.iucnrle.org). This database will become a key source of data to calculate the RLIE at global scales. In the short-term, the RLIE can be estimated at national levels either by countries or other data holders/providers, or using an inventory of assessments curated via the *IUCN Red List of Ecosystems* website: https://iucnrle.org/

5f. Availability and release calendar

Please note whether the indicator is available now or in development. If in development, please state the year it will be available. Additionally, state how often the indicator will be updated with additional data. (e.g. annually, every five years etc). For existing indicators, please note whether data/indicator are freely available/available on request. Please provide a link for the relevant website where the indicator is accessible.

Over 4000 ecosystems have been assessed using the Red List of Ecosystems protocol (Figure 4). The majority of these assessments were undertaken as part of national assessments. National Red List of Ecosystems assessments are available for approximately 60 countries, which can form the basis for RLIE indicator values at natIN ional levels, along with subsets of ecosystems for another 20 countries (e.g., forests across the Americas). Some countries have already undertaken repeat assessments (e.g., South Africa, Norway, and Finland) providing RLIE time-series. Some national assessments have been undertaken by governments, others in partnership with NGOs, while others were done independently of government processes or support.

A complete globally Index is expected to be available by 2025, with anticipated updates every 5 years. At a national level, the release will vary by country.

A growing subset of *IUCN Red List of Ecosystems* assessments are available via a centralised database hosted on the *IUCN Red List of Ecosystems* website (https://assessments.iucnrle.org). Countries can use available code or seek assistance to calculate RLIE values from their National Red List assessments. For countries where Red List assessments are not available, global terrestrial assessments are anticipated to be available for most ecosystem types by 2025.

5g. Time series

Date range for which indicator is available, e.g. 1993 – 2021 and date of next update.

Figure 4. *Availability of systematic Red List of Ecosystems assessments (November 2022). Systematic assessments include national or regional assessments of all ecosystems or a subset of ecosystems (e.g., all forests). Freshwater ecosystems have also been assessed in Mayotte, Madagascar, South Africa, Brazil, Ethiopia, Malawi, Botswana, Uganda, Ghana, Rwanda, Taiwan, and across Europe.*

Currently, a single time point is available based on several continental assessments and national assessments (see coverage in Figure 4). Some countries have already undertaken repeat assessments (e.g., South Africa, Norway and Finland) providing RLIE time-series. The IUCN has committed to support its ongoing development and application, with a goal of assessing all terrestrial ecosystems globally by 2025.

5h. Data providers

Identification of data provider(s), where relevant noting any national data providers. Specify the organisation(s) responsible for producing the data. For BIP partners only: if needed, please provide updated partner logos

UCN Red List of Ecosystems assessments can be done at a range of scales and institutions, most commonly national or global. Data to conduct *Red List of Ecosystems assessment* and thus generate risk categories are gathered from a range of sources, including scientific literature, reports, experts, historical accounts, maps, and satellite imagery. Assessment teams can include government, non-governmental organisations (NGOs), and/or academic institutions.

Currently a subset of the approx. 4000 ecosystem assessments are in the Red list of Ecosystems database, which can be found via the website: https://iucnrle.org/ This includes global/region, national and subnational assessments. The data available via the database will grow as more existing assessments are entered, and more assessments are completed.

National: Systematic assessments of all ecosystems or a subset of ecosystems within a country can be done for individual countries (see Figure 4). These assessments are typically conducted by governments, often in association with NGOs and/or academic institutions. These assessments may be available in the Red List of Ecosystems Database, national databases, reports and/or in the scientific literature.

Other: Strategic assessments of one of a few ecosystems may be done by individual researchers or research teams (e.g., mountain ash forests in Australia, Burns et al. 2015; fridge mangroves in the Phillipines, Marshall et al. 2018). These are typically then entered into the Red List of Ecosystems Database. They may contribute to global trends via RLIE, but usually systematic assessments at global or national scales will underpin the RLIE indicator.

5i. Data compilers

Organisation(s) responsible for compilation of this indicator. For BIP partners only: if needed, please provide updated partner logos

Data to calculate the indicator are currently compiled independently by the assessors for available national or global assessments. In the near future, a global level indicator will be coordinated by the IUCN.

5j. Gaps in data coverage

Please note any gaps in the data coverage for this indicator (e.g. taxonomic, thematic, or geographic data gaps)

The Red List Index of Ecosystems (RLIE) was calculated in 2018 for the continental-scale *IUCN Red List of Ecosystems* assessments of 136 temperate and tropical forest across 51 countries and territories across the Caribbean and North, Central and South America. This accounts for almost 10% of the Earth's landmass. These indicator values provide baseline data-points. The current goal is for all terrestrial ecosystems to be assessed by 2025. To date, over 4000 ecosystem units in 100

countries have been completed. Systematic assessments are complete or underway in 21 countries and two continental regions (the Americas and Europe), for which the indicator can already be calculated for.

Typically, *IUCN Red List of Ecosystems* assessments are done for all ecosystems within a jurisdiction. This can result in some poorly known ecosystems to be listed Data Deficient, or Not Evaluated if there are insufficient resources to evaluate all criteria or ecosystems. Due to differences in data availability for spatial, environmental and biological variables, many assessments only assess criteria relating to distribution (Criteria A and B) (Rowland et al. 2018).

5k. Treatment of missing values

Description of the methodology employed for producing estimates for the indicator when country data are not available, including any mathematical formulas and description of additional variables used as input into the estimation process.

Global/International context only: Description of how missing values for individual countries or areas are imputed or otherwise estimated by international agencies to derive regional or global aggregates of the indicator

The Red List Index of Ecosystems is currently only calculated for a single timepoint for countries and ecosystem types for which data are available. Missing data may stem from incomplete assessments, or coarse scale assessments that exclude finer scale variation in ecosystems (e.g., ecological communities)

6. Scale

6a. Scale of use

Indicate if indicator data is applicable at the global, national, regional scale. Specify whether global or regional scale indicators can be disaggregated for national use, and/or whether national data can be collated to form global indicator. Additionally, please mention any plans to nationalise the indicator.

Scale of application (please check all relevant boxes): Global: ☐ Regional: ☐ National☐

Scale of data disaggregation/aggregation:

Global/ regional scale indicator can be disaggregated to national level: ☐

National data is collated to form global indicator: ☐

Please add additional information as required: (free text) The indicator can be used at national, regional, and global levels, depending on data availability. The indicator is currently available for several continental assessments and national assessments (including Colombia, South Africa, and forests of the Americas and Caribbean).

6b. National/regional indicator production

For global indicators, please note whether a national/regional methodology available for use and provide links to any online documentation. Please also specify if underlying data can be accessed and used by countries to produce national indicators.

The Red List Index of Ecosystems can be calculated at the national level if there are *IUCN Red List of Ecosystems* assessments (for methodology see: Keith et al. 2013; Rodríguez et al. 2015; Bland et al. 2017) conducted at the national scale. The code for calculating the indicator is freely available on GitHub (https://github.com/red-list-ecosystem/rle_indices).

6c. Sources of differences between global and national figures

Explanation on the differences between country produced and internationally estimated data on the indicator, highlighting and summarising the main sources of differences.

The procedure for calculating the indicator is the same across national to global scales. The indicator values for a given ecosystem type may vary between national and global levels if there are differences in the collapse risk of the ecosystem at the different scales. The differences between a global and national indicator score may be smaller where the country has a high proportion of endemic ecosystems. However, the Red List of Ecosystem's criteria include a measure of risk based on the current size and distribution of the ecosystems (criterion B). The indicator values are likely to be lower for countries with small, or narrowly distributed ecosystems that are more widely distributed on a global scale.

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

6d.1 Description of the methodology

Include any mathematical formulas, used for the calculation of the regional/global aggregates from the country values. Description of the weighting structure used for aggregating country indicator values to regional and global levels.

The methods of calculating the Red List Index of Ecosystems are the same across national, regional and global scales. At present, indicators at these difference scales are calculated based on assessments at the corresponding scales; country values are not yet aggregated to calculate regional or global assessments.

Where ecosystems extend beyond national boundaries, there is the possibility of aggregating data using the IUCN Global Ecosystem Typology, though this has not yet been done.

6d.2 Additional methodological details

Description of how the data from countries or areas is assembled by custodian international agencies to provide regional and global aggregates. This is distinct from the method of computation section), which looks at how the indicator is compiled at a national level.

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

Include: (i) the official counterpart at the country level; (ii) description of any validation and consultation process; (iii) description of any adjustments with respect to use of standard classifications and harmonization of breakdowns for age group and other dimensions, or adjustments made for compliance with specific international or national definitions.

7. Other MEAs, processes and organisations

7a. Other MEA and processes

Please note where the indicator is already in use (e.g. by the CBD, other MEAs (such as CITES, CMS, Ramsar, UNCCD),SDGs, the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services – IPBES, and the name of the IPBES assessment it is included in).

N/A

7b. Biodiversity Indicator Partnership

Is the indicator include in those approved and promoted by the Biodiversity Indicators Partnership?

Yes: ☐ No: ☐

https://www.bipindicators.net/indicators/red-list-index-of-ecosystems

8. Disaggregation

Specification of the dimensions and levels used for disaggregation of the indicator (e.g., species, taxa, ecosystem, geographic location, income, sex, age group, disability status, etc.)

The RLIE can be calculated for any number of relevant groupings, such as by region, country, biome, ecosystem type, ecosystem functional group (following the IUCN Global Ecosystem Typology, Keith et al. 2020) for a single ecosystem, protection status etc. Because the RLIE is derived from data from the IUCN Red List of Ecosystems criteria, the RLIE value per criterion can also be calculated, showing the key drivers of risk status, such as loss of area versus ecosystem degradation. For example, see Figure 2 for disaggregating by country.

9. Related goals, targets and indicators

Description of linkages to other indicators proposed in the first draft monitoring framework

In addition to underpinning the RLIE, the *IUCN Red List of Ecosystems* also provides data for two other indicators, which have been proposed as complementary or component indicators:

1. Ecosystem Area Index (EAI), which aggregates RLE data on change in ecosystem area through time, and can be disaggregated in a range of ways (similar to RLIE), such as by country or biome (e.g. using the Global Ecosystem Typology)

2. Ecosystem Health Index (EHI), which summarises data on changes in ecosystem integrity or condition through time, based on ecosystem-specific indicators quantified in Red List of Ecosystems assessments. The EHI can also be disaggregated by country or biome.

The Red List Index of Ecosystems can be used to measure progress towards several additional goals and targets in the first draft of the post-2020 global biodiversity framework, including:

Draft Target 1. Ensure that all land and sea areas globally are under integrated biodiversity-inclusive spatial planning addressing land- and sea-use change, retaining existing intact and wilderness areas.

Draft Target 2. Ensure that at least 20 per cent of degraded freshwater, marine and terrestrial ecosystems are under restoration, ensuring connectivity among them and focusing on priority ecosystems.

Draft Target 3. Ensure that at least 30 per cent globally of land areas and of sea areas, especially areas of particular importance for biodiversity and its contributions to people, are conserved through effectively and equitably managed, ecologically representative and well-connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes.

Draft Target 7, Reduce pollution from all sources to levels that are not harmful to biodiversity and ecosystem functions and human health, including by reducing nutrients lost to the environment by at least half, and pesticides by at least two thirds and eliminating the discharge of plastic waste. One proposed indicator is RLIE for ecosystems affected by pollution.

Draft Target 20. Ensure that relevant knowledge, including the traditional knowledge, innovations and practices of indigenous and local communities with their free, prior, and informed consent, guides decision making for the effective management of biodiversity, enabling monitoring, and by promoting awareness, education and research.

Proportion of ecosystems assessed through the IUCN Red List of Ecosystems.

Number of assessments on the IUCN Red List of Ecosystems

10. Data reporter

10a. Organisation

Organisation of the contact person(s) for the data or metadata

International Union for Conservation of Nature (IUCN) CEM

Deakin University

10b. Contact person(s)

Person(s) and email addresses to be contacted with any questions regarding the data or metadata.

Emily Nicholson (e.nicholson@deakin.edu.au)

11. References

Links to other literature helpful in understanding, interpreting and using the indicator. A maximum of ten.

Websites:

https://github.com/red-list-ecosystem/rle_indices

https://assessments.iucnrle.org/

Literature:

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

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

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

Ferrer-Paris JR, Zager I, Keith DA, Oliveira-Miranda MA, Rodríguez JP, Josse C, González-Gil M, Miller RM, Zambrana-Torrelio C, Barrow E. 2019, March 1. An ecosystem risk assessment of

temperate and tropical forests of the Americas with an outlook on future conservation strategies. Wiley-Blackwell.

Keith DA et al. 2013. Scientific Foundations for an IUCN Red List of Ecosystems. PLoS ONE **8**:e62111. Available from Keith_et_al_2013_Scientific_foundations_for_an_IUCN_Red_List_of_ecosystems.pdf.

Keith DA et al. 2020. IUCN Global Ecosystem Typology 2.0 Descriptive profiles for biomes and ecosystem functional groups. Available from https://twitter.com/IUCN/.

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

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

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

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

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

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

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

12. Graphs and diagrams

Provide updated images of any graphs and diagrams, with captions

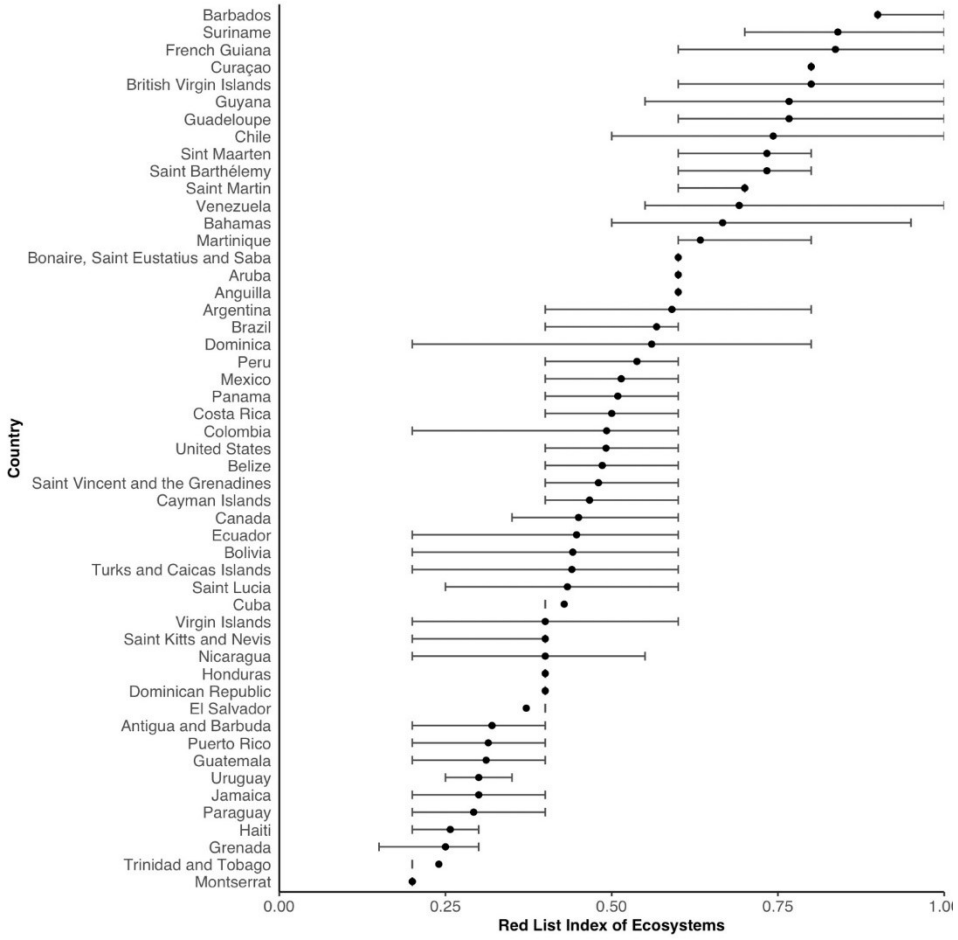


Figure 1. The Red List Index of Ecosystems (RLIE) for the tropical and temperate forests for 51 countries and territories within North, Central and South America and the Caribbean in 2018. Index values range from 1 (all ecosystems are “Least Concern”) to 0 (all ecosystems are “Collapsed”).The average risk of ecosystem collapse increases as the index value decreases. The intervals were calculated using the 25th and 75th percentiles to represent the middle 50% of the data for each country. Adapted from Rowland et al. (2020).

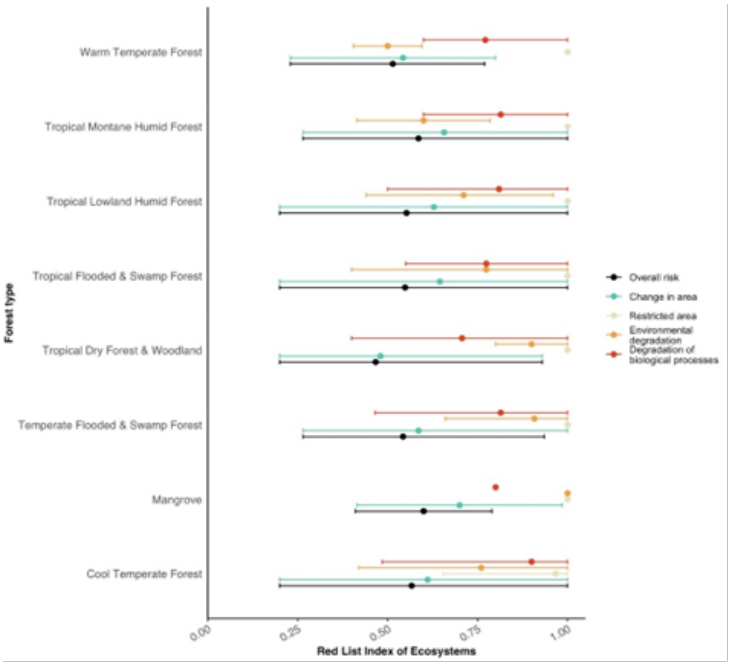


Figure 2. The Red List Index of Ecosystems (RLIE) for the overall risk category and for each Red List criteria for tropical and temperate forest types across North, Central and South America and the Caribbean in 2018. The risk categories capture change in area (criterion A), restricted area (criterion B), environmental degradation (criterion C) and degradation of biological processes (criterion D). The average risk of ecosystem collapse increases as the index value decreases. Index values range from 1 (all ecosystems are "Least Concern") to 0 (all ecosystems are "Collapsed").The average risk of ecosystem collapse increases as the index value decreases. The intervals were calculated using the 25th and 75th percentiles to represent the middle 50% of the data for each forest type. Adapted from Rowland et al. (2020).

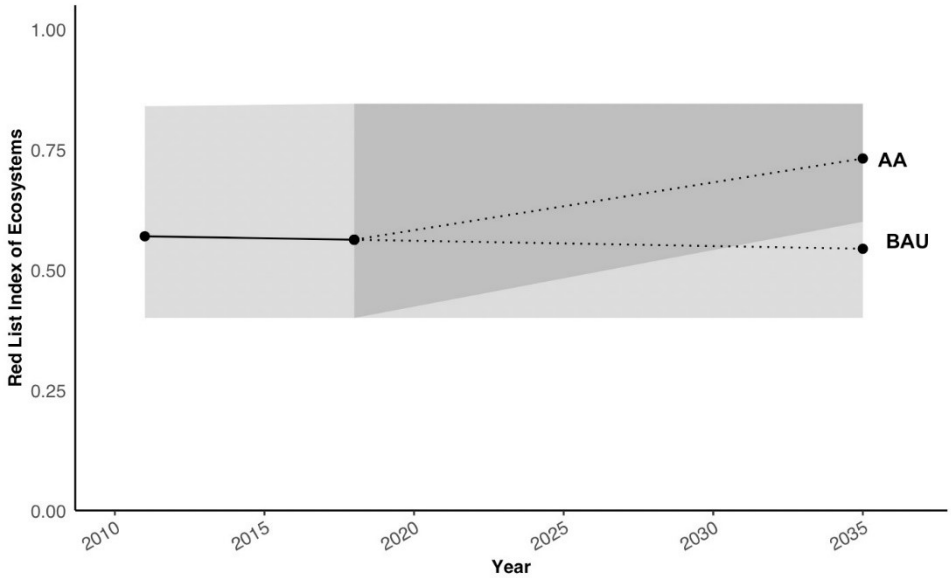


Figure 3. The Red List Index of Ecosystems (RLIE) for the habitats in Norway in 2011, 2018 and the future goal in 2035. AA is the "adjusted ambition" and BAU is "business as usual" presented in Kyrkjeeide et al. 2021, which represents the future scenario where the revised goal for ecosystem collapse risk is met. The intervals were calculated using the 25th and 75th percentiles to represent the middle 50% of the data at each timepoint. The darker grey intervals represent where the intervals for the AA and BAU scenarios overlap.