Goal 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
Target 15.a: Mobilize and significantly increase financial resources from all sources to conserve and sustainably use biodiversity and ecosystems
Indicator 15.a.1: Official development assistance and public expenditure on conservation and sustainable use of biodiversity and ecosystems

Institutional information

Organization(s):

Organisation for Economic Co-operation and Development (OECD)

Concepts and definitions

Definition:

The indicator Official development assistance and public expenditure on conservation and sustainable use of biodiversity and ecosystems is defined as Gross disbursements of total ODA from all donors for biodiversity.

Rationale:

Total ODA flows to developing countries quantify the public effort that donors provide to developing countries for biodiversity.

Concepts:

ODA: The DAC defines ODA as "those flows to countries and territories on the DAC List of ODA Recipients and to multilateral institutions which are i) provided by official agencies, including state and local governments, or by their executive agencies; and ii) each transaction is administered with the promotion of the economic development and welfare of developing countries as its main objective; and is concessional in character and conveys a grant element of at least 25 per cent (calculated at a rate of discount of 10 per cent). (See http://www.oecd.org/dac/stats/officialdevelopmentassistancedefinitionandcoverage.htm)

ODA marked for biodiversity is captured through the CRS via a marker.

'All donors' refers to DAC donors, non-DAC donors and multilateral organisations.

Comments and limitations:

Data in the Creditor Reporting System are available from 1973. However, the data coverage is considered complete from 1995 for commitments at an activity level and 2002 for disbursements.

The biodiversity marker was introduced in 2002.

Methodology

Computation Method:

The sum of ODA flows from all donors to developing countries that have biodiversity as a principal or significant objective.

Disaggregation:

This indicator can be disaggregated by donor, recipient country, type of finance, type of aid, sector, etc.

Treatment of missing values:

- At country level

  None

- At regional and global levels

  None

Regional aggregates:

Global and regional figures are based on the sum of ODA flows for biodiversity.

Sources of discrepancies:

DAC statistics are standardized on a calendar year basis for all donors and may differ from fiscal year data available in budget documents for some countries.

Data Sources

Description:

The OECD/DAC has been collecting data on official and private resource flows from 1960 at an aggregate level and 1973 at an activity level through the Creditor Reporting System (CRS data are considered complete from 1995 for commitments at an activity level and 2002 for disbursements).

The biodiversity marker was introduced in 2002.

The data are reported by donors according to the same standards and methodologies (see here: http://www.oecd.org/dac/stats/methodology.htm).

Data are reported on an annual calendar year basis by statistical reporters in national administrations (aid agencies, Ministries of Foreign Affairs or Finance, etc.

Collection process:

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

Data Availability

On a donor basis for all DAC countries and many non-DAC providers (bilateral and multilateral) that report to the DAC on sector level data.

On a recipient basis for all developing countries eligible for ODA.

Calendar

Data collection:

Data are published on an annual basis in December for flows in the previous year. Detailed 2015 flows will be published in December 2016. (From NA to NA)

Data release:

December 2016.

Data providers

Data are reported on an annual calendar year basis by statistical reporters in national administrations (aid agencies, Ministries of Foreign Affairs or Finance, etc.

Data compilers

OECD

References

URL:

www.oecd.org/dac/stats

References:

See all links here: http://www.oecd.org/dac/stats/methodology.htm

Goal 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
Target 15.b: Mobilize significant resources from all sources and at all levels to finance sustainable forest management and provide adequate incentives to developing countries to advance such management, including for conservation and reforestation
Indicator 15.b.1: Official development assistance and public expenditure on conservation and sustainable use of biodiversity and ecosystems

Institutional information

Organization(s):

Organisation for Economic Co-operation and Development (OECD)

Concepts and definitions

Definition:

The indicator Official development assistance and public expenditure on conservation and sustainable use of biodiversity and ecosystems is defined as Gross disbursements of total ODA from all donors for biodiversity.

Rationale:

Total ODA flows to developing countries quantify the public effort that donors provide to developing countries for biodiversity.

Concepts:

ODA: The DAC defines ODA as "those flows to countries and territories on the DAC List of ODA Recipients and to multilateral institutions which are i) provided by official agencies, including state and local governments, or by their executive agencies; and ii) each transaction is administered with the promotion of the economic development and welfare of developing countries as its main objective; and is concessional in character and conveys a grant element of at least 25 per cent (calculated at a rate of discount of 10 per cent). (See http://www.oecd.org/dac/stats/officialdevelopmentassistancedefinitionandcoverage.htm)

ODA marked for biodiversity is captured through the CRS via a marker.

'All donors' refers to DAC donors, non-DAC donors and multilateral organisations.

Comments and limitations:

Data in the Creditor Reporting System are available from 1973. However, the data coverage is considered complete from 1995 for commitments at an activity level and 2002 for disbursements.

The biodiversity marker was introduced in 2002.

Methodology

Computation Method:

The sum of ODA flows from all donors to developing countries that have biodiversity as a principal or significant objective.

Disaggregation:

This indicator can be disaggregated by donor, recipient country, type of finance, type of aid, sector, etc.

Treatment of missing values:

- At country level

  None

- At regional and global levels

  None

Regional aggregates:

Global and regional figures are based on the sum of ODA flows for biodiversity.

Sources of discrepancies:

DAC statistics are standardized on a calendar year basis for all donors and may differ from fiscal year data available in budget documents for some countries.

Data Sources

Description:

The OECD/DAC has been collecting data on official and private resource flows from 1960 at an aggregate level and 1973 at an activity level through the Creditor Reporting System (CRS data are considered complete from 1995 for commitments at an activity level and 2002 for disbursements).

The biodiversity marker was introduced in 2002.

The data are reported by donors according to the same standards and methodologies (see here: http://www.oecd.org/dac/stats/methodology.htm).

Data are reported on an annual calendar year basis by statistical reporters in national administrations (aid agencies, Ministries of Foreign Affairs or Finance, etc.

Collection process:

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

Data Availability

On a donor basis for all DAC countries and many non-DAC providers (bilateral and multilateral) that report to the DAC on sector level data.

On a recipient basis for all developing countries eligible for ODA.

Calendar

Data collection:

Data are published on an annual basis in December for flows in the previous year. Detailed 2015 flows will be published in December 2016. (From NA to NA)

Data release:

December 2016.

Data providers

Data are reported on an annual calendar year basis by statistical reporters in national administrations (aid agencies, Ministries of Foreign Affairs or Finance, etc.

Data compilers

OECD

References

URL:

www.oecd.org/dac/stats

References:

See all links here: http://www.oecd.org/dac/stats/methodology.htm

Goal 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
Target 15.c: Enhance global support for efforts to combat poaching and trafficking of protected species, including by increasing the capacity of local communities to pursue sustainable livelihood opportunities
Indicator 15.c.1: Proportion of traded wildlife that was poached or illicitly trafficked

Institutional information

Organization(s):

United Nations Office on Drugs and Crime (UNODC)

Concepts and definitions

Definition:

The share of all trade in wildlife detected as being illegal

Rationale:

There are over 35,000 species under international protection, so it is impossible to monitor all poaching. Illegal trade, however, is an indirect indicator of poaching. Wildlife seizures represent concrete instances of illegal trade, but the share of overall wildlife crime they represent is unknown and variable. In addition, the number of species under international protection continues to grow. Legal international trade in protected species, by definition, is 100% captured in the CITES Trade Database, which now contains over 16 million records of trade in CITES-listed species. To ground the illegal trade data in a complete indicator, the ratio of aggregated seizures to total trade is estimated. An increase in the share of total wildlife trade that is illegal would be interpreted as a negative indicator, and a decrease as a positive one.

Because the illegal wildlife trade represents thousands of distinct products, a means of aggregation is necessary. The legal trade value does not represent the true black market value of the items seized, nor the true value of the legal shipments, because it is derived from a single market source (US LEMIS). It does, however, present a logical and consistent means of aggregating unlike products.

Concepts:

"All trade in wildlife" is the sum of the values of legal and illegal trade

"Legal trade" is the sum of the value of all shipments made in compliance with the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), using valid CITES permits and certificates.

"Illegal trade" is the sum of the value of all CITES/listed specimens seized.

Comments and limitations:

Seizures are an incomplete indicator of trafficking, and subject to considerable volatility. Universal coverage is not presently available, although 120 countries are represented in the present database. Since the indicator looks at the relationship between two values, changes in the relationship could be due to changes in either value.

Methodology

Computation Method:

The value of a species-product unit is derived from the weighted average of prices declared for legal imports of analogous species product units, as acquired from United States Law Enforcement Monitoring and Information System of the Fish and Wildlife Service.

The value of legal trade is the sum of all species-product units documented in CITES export permits as reported in the CITES Annual Reports times the species-product unit prices as specified above.

The value of illegal trade is the sum of all species-product units documented in the World WISE seizure database times the species-product unit prices as specified above.

The indicator is value of illegal trade/(value of legal trade + value of illegal trade)

Disaggregation:

Where source data are available, the data could be disaggregated to the national level. As a form of trade data, issues of gender, age, and disability status are not applicable.

Treatment of missing values:

- At country level

  Given the number of products and volatility of these markets, there is presently no mechanism for imputing missing data.

- At regional and global levels

  As above

Regional aggregates:

National data are added.

Sources of discrepancies:

The global figure is the aggregate of national figures provided by countries.

Data Sources

Description:

The legal trade data are reported annually by Parties to CITES and stored in the CITES Trade Database, managed by the UNEP World Conservation Monitoring Centre in Cambridge.

The detected illegal trade data have been gathered from a number of sources and combined in a UNODC database called "World WISE". This database will be filled, from 2017, with data from the new annual CITES Illegal Trade reporting requirement.

The US LEMIS price data for CITES-listed species are also provided to UNEP-WCMC within the U.S. annual report to CITES.

Collection process:

Some adjustment/validation is necessary between countries, but standardized codes for the legal wildlife trade have been developing since 1975. The basic fields necessary for the global indicator (species, product, and unit) are well established and present in every seizure. Some unit conversions (e.g. logs to MT to m3 for timber) are necessary for some products. For many commodities, for instance trade in live animals and trophies, it is possible to aggregate based on "whole individuals". To do regional or national breakdowns, however, data on the source of the shipment are necessary (as the impact of poaching pertains to the source country, not the seizure country), and these data are not available for every seizure.

Data Availability

60

Calendar

Data collection:

The first tranche of data from the Illicit Trade Report should be available in November 2017.

Data release:

To be determined

Data providers

The CITES Management Authority of each country

Data compilers

UNODC and UNEP-WCMC

References

URL:

www.unodc.org

References:

http://www.unodc.org/documents/data-and-analysis/wildlife/Methodological_Annex_final.pdf

http://trade.cites.org/cites_trade_guidelines/en-CITES_Trade_Database_Guide.pdf

Goal 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
Target 15.1: By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements
Indicator 15.1.1: Forest area as a proportion of total land area

Institutional information

Organization(s):

Food and Agriculture Organization of the United Nations (FAO)

Concepts and definitions

Definition:

Forest area as a proportion of total land area

Rationale:

Forests fulfil a number of functions that are vital for humanity, including the provision of goods (wood and non-wood forest products) and services such as habitat for biodiversity, carbon sequestration, coastal protection and soil and water conservation.

The indicator provides a measure of the relative extent of forest in a country. The availability of accurate data on a country's forest area is a key element for forest policy and planning within the context of sustainable development.

Changes in forest area reflect the demand for land for other uses and may help identify unsustainable practices in the forestry and agricultural sector.

Forest area as percentage of total land area may be used as a rough proxy for the extent to which the forests in a country are being conserved or restored, but it is only partly a measure for the extent to which they are sustainably managed.

The indicator was included among the indicators for the Millennium Development Goals (MDG) (indicator 7.1 “Proportion of land covered by forest”).

Concepts:

In order to provide a precise definition of the indicator, it is crucial to provide a definition of “Forest” and “Total Land Area”.

According to the FAO definitions, Forest is defined as: “land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds in situ. It does not include land that is predominantly under agricultural or urban land use”. More specifically:

- Forest is determined both by the presence of trees and the absence of other predominant land uses. The trees should be able to reach a minimum height of 5 meters.
- It includes areas with young trees that have not yet reached but which are expected to reach a canopy cover of at least 10 percent and tree height of 5 meters or more. It also includes areas that are temporarily unstocked due to clear-cutting as part of a forest management practice or natural disasters, and which are expected to be regenerated within 5 years. Local conditions may, in exceptional cases, justify that a longer time frame is used.
- It includes forest roads, firebreaks and other small open areas; forest in national parks, nature reserves and other protected areas such as those of specific environmental, scientific, historical, cultural or spiritual interest.
- It includes windbreaks, shelterbelts and corridors of trees with an area of more than 0.5 hectares and width of more than 20 meters.
- It includes abandoned shifting cultivation land with a regeneration of trees that have, or are expected to reach, a canopy cover of at least 10 percent and tree height of at least 5 meters.
- It includes areas with mangroves in tidal zones, regardless whether this area is classified as land area or not.
- It includes rubberwood, cork oak and Christmas tree plantations.
- It includes areas with bamboo and palms provided that land use, height and canopy cover criteria are met.
- It excludes tree stands in agricultural production systems, such as fruit tree plantations, oil palm plantations, olive orchards and agroforestry systems when crops are grown under tree cover. Note: Some agroforestry systems such as the “Taungya” system where crops are grown only during the first years of the forest rotation should be classified as forest.

Total land area is the total surface area of a country less the area covered by inland waters, like major rivers and lakes.

The indicator is expressed as percent.

Comments and limitations:

Assessment of forest area is carried out at infrequent intervals in many countries. Access to remote sensing imagery has improved in recent years, but remote sensing techniques have limitations. In particular there are limitations to assess land use (remote sensing primarily assesses land cover), and some slow changes such as forest regrowth cannot easily be observed with remote sensing techniques and require long time periods in order to detect. In addition, forest area with low canopy cover density (e.g. 10-30%) are difficult to detect with remote sensing techniques.

Methodology

Computation Method:

Forest area (reference year) / Land area (2015) * 100

This indicator can be aggregated to global or regional level by adding all country values globally or in a specific region

Disaggregation:

No further disaggregation of this indicator

Treatment of missing values:

- At country level

  For countries and territories where no information was provided to FAO for FRA 2015 (79 countries and territories representing 1.2 percent of the global forest area), a report was prepared by FAO using existing information from previous assessments and literature search.

- At regional and global levels

  See above

Regional aggregates:

Since information is available for all countries and territories, regional and global estimates are produced by summation.

Sources of discrepancies:

The national figures in the database are reported by the countries themselves following standardized format, definitions and reporting years, thus eliminating any discrepancies between global and national figures. The reporting format ensures that countries provide the full reference for original data sources as well as national definitions and terminology. Separate sections in the reporting format (country reports) deal with the analysis of data (including any assumptions made and the methods used for estimates and projections to the common reporting years); calibration of data to the official land area as held by FAO; and reclassification of data to the classes used in FAO's Global Forest Resources Assessments.

Methods and guidance available to countries for the compilation of the data at the national level:

All data are provided to FAO by countries in the form of a country report following a standard format, which includes the original data and reference sources and descriptions of how these have been used to estimate the forest area for different points in time.

Detailed methodology and guidance on how to prepare the country reports and to convert national data according to national categories and definitions to FAO's global categories and definitions is found in the document "Guide for country reporting for FRA 2015", http://www.fao.org/3/a-au190e.pdf.

Quality assurance:

Once received, the country reports undergo a rigorous review process to ensure correct use of definitions and methodology as well as internal consistency. A comparison is made with past assessments and other existing data sources. Regular contacts between national correspondents and FAO staff by e-mail and regional/sub-regional review workshops form part of this review process.

All country reports (including those prepared by FAO) are sent to the respective Head of Forestry for validation before finalization and publishing of data. The data are then aggregated at sub-regional, regional and global levels by the FRA team at FAO.

Data Sources

Description:

FAO has been collecting and analysing data on forest area since 1946. This is done at intervals of 5-10 years as part of the Global Forest Resources Assessment (FRA). FRA 2015 contains information for 234 countries and territories on more than 100 variables related to the extent of forests, their conditions, uses and values for three points in time: 1990, 2000, 2005, 2010 and 2015.

All data are provided to FAO by countries in the form of a country report following a standard format, which includes the original data and reference sources and descriptions of how these have been used to estimate the forest area for different points in time.

Officially nominated national correspondents and their teams prepare the country reports for the assessment. Some prepare more than one report as they also report on dependent territories. For the remaining countries and territories where no information is provided, a report is prepared by FAO using existing information and a literature search.

Once received, the country reports undergo a rigorous review process to ensure correct use of definitions and methodology as well as internal consistency. A comparison is made with past assessments and other existing data sources. Regular contacts between national correspondents and FAO staff by e-mail and regional/sub-regional review workshops form part of this review process. All country reports (including those prepared by FAO) are sent to the respective Head of Forestry for validation before finalization. The data are then aggregated at sub-regional, regional and global levels by the FRA team at FAO.

Collection process:

All data are provided to FAO by countries in the form of a country report following a standard format, which includes the original data and reference sources and descriptions of how these have been used to estimate the forest area for different points in time.

Officially nominated national correspondents and their teams prepare the country reports for the assessment. Some prepare more than one report as they also report on dependent territories. For the remaining countries and territories where no information is provided, a report is prepared by FAO using existing information and a literature search.

Once received, the country reports undergo a rigorous review process to ensure correct use of definitions and methodology as well as internal consistency. A comparison is made with past assessments and other existing data sources. Regular contacts between national correspondents and FAO staff by e-mail and regional/sub-regional review workshops form part of this review process. All country reports (including those prepared by FAO) are sent to the respective Head of Forestry for validation before finalization. The data are then aggregated at sub-regional, regional and global levels by the FRA team at FAO.

Data Availability

Description:

Data are available for all 234 countries and territories included in FRA 2015.

Time series:

1990, 2000, 2005, 2010, 2015

Calendar

Data collection:

Data collection process for FRA 2020 will be launched in 2017 and data collection will take place 2017-2019

Data release:
Data with updated time series and including year 2020 will be released late 2020. The possibilities of a more frequent reporting on forest area and other key indicators are currently being evaluated.

Data providers

Officially nominated national correspondents and their teams prepare the country reports for the assessment. Some prepare more than one report as they also report on dependent territories. For the remaining countries and territories where no information is provided, a report is prepared by FAO using existing information and a literature search.

Data compilers

FAO

References

URL:

http://www.fao.org/forest-resources-assessment/en/

References:

http://www.fao.org/forest-resources-assessment/current-assessment/en/

Related indicators

15.2.1:
Progress towards sustainable forest management

Goal 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
Target 15.1: By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements
Indicator 15.1.2: Proportion of important sites for terrestrial and freshwater biodiversity that are covered by protected areas, by ecosystem type

Institutional information

Organization(s):
UN Environment World Conservation Monitoring Centre (UNEP-WCMC)
BirdLife International (BLI)
International Union for Conservation of Nature (IUCN)

Concepts and definitions

Definition:
This indicator Proportion of important sites for terrestrial and freshwater biodiversity that are covered by protected areas shows temporal trends in the mean percentage of each important site for terrestrial and freshwater biodiversity (i.e., those that contribute significantly to the global persistence of biodiversity) that is covered by designated protected areas.

Rationale:
The safeguard of important sites is vital for stemming the decline in biodiversity and ensuring long term and sustainable use of terrestrial and freshwater natural resources. The establishment of protected areas is an important mechanism for achieving this aim, and this indicator serves as a means of measuring progress toward the conservation, restoration and sustainable use of terrestrial and freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements. Importantly, while it can be disaggregated to report on any given single ecosystem of interest (e.g., forests), it is not restricted to any single ecosystem type, and so faithfully reflects the intent of SDG target 15.1.

Levels of access to protected areas vary among the protected area management categories. Some areas, such as scientific reserves, are maintained in their natural state and closed to any other use. Others are used for recreation or tourism, or even open for the sustainable extraction of natural resources. In addition to protecting biodiversity, protected areas have high social and economic value: supporting local livelihoods; protecting watersheds from erosion; harbouring an untold wealth of genetic resources; supporting thriving recreation and tourism industries; providing for science, research and education; and forming a basis for cultural and other non-material values.

This indicator adds meaningful information to, complements and builds from traditionally reported simple statistics of terrestrial and freshwater area covered by protected areas, computed by dividing the total protected area within a country by the total territorial area of the country and multiplying by 100 (e.g., Chape et al. 2005). Such percentage area coverage statistics do not recognise the extreme variation of biodiversity importance over space (Rodrigues et al. 2004), and so risk generating perverse outcomes through the protection of areas which are large at the expense of those which require protection.

The indicator is used to track progress towards the 2011–2020 Strategic Plan for Biodiversity (CBD 2014, Tittensor et al. 2014), and was used as an indicator towards the Convention on Biological Diversity's 2010 Target (Butchart et al. 2010).

Concepts:
Protected areas, as defined by the International Union for Conservation of Nature (IUCN; Dudley 2008), are clearly defined geographical spaces, recognized, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values. Importantly, a variety of specific management objectives are recognised within this definition, spanning conservation, restoration, and sustainable use:

- Category Ia: Strict nature reserve
- Category Ib: Wilderness area
- Category II: National park
- Category III: Natural monument or feature
- Category IV: Habitat/species management area
- Category V: Protected landscape/seascape
- Category VI: Protected area with sustainable use of natural resources

The status "designated" is attributed to a protected area when the corresponding authority, according to national legislation or common practice (e.g., by means of an executive decree or the like), officially endorses a document of designation. The designation must be made for the purpose of biodiversity conservation, not de facto protection arising because of some other activity (e.g., military).

Sites contributing significantly to the global persistence of biodiversity are identified following globally standard criteria for the identification of Key Biodiversity Areas (IUCN 2016) applied at national levels. Two variants of these standard criteria have been applied in all countries to date. The first is for the identification of Important Bird & Biodiversity Areas, that is, sites contributing significantly to the global persistence of biodiversity, identified using data on birds, of which >12,000 sites in total have been identified from all of the world's countries (BirdLife International 2014). The second is for the identification of Alliance for Zero Extinction sites (Ricketts et al. 2005), that is, sites holding effectively the entire population of at least one species assessed as Critically Endangered or Endangered on The IUCN Red List of Threatened Species. In total, 587 Alliance for Zero Extinction sites have been identified for 920 species of mammals, birds, amphibians, reptiles, conifers, and reef-building corals. A global standard for the identification of Key Biodiversity Areas unifying these approaches along with other mechanisms for identification of important sites for other species and ecosystems was approved by IUCN (2016).

Comments and limitations:
Quality control criteria are applied to ensure consistency and comparability of the data in the World Database on Protected Areas. New data are validated at UNEP-WCMC through a number of tools and translated into the standard data structure of the World Database on Protected Areas. Discrepancies between the data in the World Database on Protected Areas and new data are minimised by provision of

a manual (UNEP-WCMC 2016) and resolved in communication with data providers. Similar processes apply for the incorporation of data into the World Database of Key Biodiversity Areas.

The indicator does not measure the effectiveness of protected areas in reducing biodiversity loss, which ultimately depends on a range of management and enforcement factors not covered by the indicator. A number of initiatives are underway to address this limitation. Most notably, numerous mechanisms have been developed for assessment of protected area management, which can be synthesised into an indicator (Leverington et al. 2010). This is used by the Biodiversity Indicators Partnership as a complementary indicator of progress towards Aichi Biodiversity Target 11 (http://www.bipindicators.net/pamanagement). However, there may be little relationship between these measures and protected area outcomes (Nolte & Agrawal 2013). More recently, approaches to "green listing" have started to be developed, to incorporate both management effectiveness and the outcomes of protected areas, and these are likely to become progressively important as they are tested and applied more broadly.

Data and knowledge gaps can arise due to difficulties in determining whether a site conforms to the IUCN definition of a protected area, and some protected areas are not assigned management categories. Moreover, "other effective area-based conservation measures", as specified by Aichi Biodiversity Target 11 of the Strategic Plan for Biodiversity 2011–2020, recognise that some sites beyond the formal protected area network, while not managed primarily for nature conservation, may nevertheless be managed in ways which are consistent with the persistence of the biodiversity for which they are important (Jonas et al. 2014). However, standard approaches to documentation of "other effective area-based conservation measures" are still under debate through the IUCN Task Force on Other Effective Areas Based Conservation Measures which will conclude with recommendations for a definition on OECMs. Once defined it is likely OEMCs will be documented in the World Database on Protected Areas.

Regarding important sites, the biggest limitation is that site identification to date has focused on specific subsets of biodiversity, for example birds (for Important Bird and Biodiversity Areas) and highly threatened species (for Alliance for Zero Extinction sites). While Important Bird and Biodiversity Areas have been documented to be good surrogates for biodiversity more generally (Brooks et al. 2001, Pain et al. 2005), the application of the unified standard for identification of Key Biodiversity Areas (IUCN 2016) sites across different levels of biodiversity (genes, species, ecosystems) and different taxonomic groups remains a high priority, building from efforts to date (Eken et al. 2004, Knight et al. 2007, Langhammer et al. 2007, Foster et al. 2012).

Key Biodiversity Area identification has been validated for a number of countries and regions where comprehensive biodiversity data allow formal calculation of the site importance (or "irreplaceability") using systematic conservation planning techniques (Di Marco et al. 2016, Montesino Pouzols et al. 2014).

Future developments of the indicator will include: a) expansion of the taxonomic coverage of terrestrial and freshwater Key Biodiversity Areas through application of the Key Biodiversity Areas standard (IUCN 2016) to a wide variety of terrestrial and freshwater vertebrates, invertebrates, plants and ecosystem type; b) improvements in the data on protected areas by continuing to increase the proportion of sites with documented dates of designation and with digitised boundary polygons (rather than coordinates); and c) exploring other methods for assessing and presenting temporal trends in protected area coverage.

Methodology

Computation Method:
This indicator is calculated from data derived from a spatial overlap between digital polygons for protected areas from the World Database on Protected Areas (IUCN & UNEP-WCMC 2017) and digital polygons for terrestrial and freshwater Key Biodiversity Areas (from the World Database of Key Biodiversity Areas, including Important Bird and Biodiversity Areas, Alliance for Zero Extinction sites, and other Key Biodiversity Areas; available through the Integrated Biodiversity Assessment Tool). The value of the indicator at a given point in time, based on data on the year of protected area establishment recorded in the World Database on Protected Areas, is computed as the mean percentage of each Key Biodiversity Area currently recognised that it covered by protected areas.

Year of protected area establishment is unknown for 12% of protected areas in the World Database on Protected Areas, generating uncertainty around changing protected area coverage over time. To reflect this uncertainty, a year was randomly assigned from another protected area within the same country, and then this procedure repeated 1,000 times, with the median plotted. In 2017 we slightly changed the methods described by Butchart et al. (2012, 2015) by randomly assigning a year to protected areas with no year of establishment before calculating trends in coverage. This is a computationally more efficient method and is likely to reflect more accurately changes in protected area coverage over time.

Previously the indicator was presented as the percentage of Key Biodiversity Areas completely covered by protected areas. However, it is now presented as the mean % of each Key Biodiversity Area that is covered by protected areas in order to better reflect trends in protected area coverage for countries or regions with few or no Key Biodiversity Areas that are completely covered.

Disaggregation:
Given that data for the global indicator are compiled at national levels, it is straightforward to disaggregate to national and regional levels (e.g., Han et al. 2014), or conversely to aggregate to the global level. Key Biodiversity Areas span all ecosystem types, including marine (Edgar et al. 2008), freshwater (Holland et al. 2012), and mountains (Rodríguez-Rodríguez et al. 2011, UNEP-WCMC 2002). The indicator can therefore be reported in combination across terrestrial and freshwater (and indeed marine) systems, or disaggregated among them. However, individual Key Biodiversity Areas can encompass terrestrial, freshwater, and marine systems simultaneously, and so determining the results is not simply additive. Finally, the indicator can be disaggregated according to different protected area management categories (categories I–VI) to reflect differing specific management objectives of protected areas.

In addition to the aggregation of the coverage of protected areas across important sites for terrestrial and freshwater biodiversity as an indicator towards SDG 15.1, other disaggregations of coverage of protected areas of particular relevance as indicators towards SDG targets (Brooks et al. 2016) include:

SDG 14.5.1 Coverage of protected areas in relation to marine areas.
SDG 15.4.1 Coverage by protected areas of important sites for mountain biodiversity.

Protected area coverage data can be combined with other data sources to yield further, complementary, indicators. For example, protected area overlay with ecoregional maps can be used to provide information on protected area coverage of different broad biogeographical regions. Protected area coverage of the distributions of different groups of species (e.g., mammals, birds, amphibians) can similarly provide indicators of trends in coverage of biodiversity at the species level. Protected area coverage can be combined with the Red List Index to generate indicators of the impacts of protected areas in reducing biodiversity loss (Butchart et al. 2012). Finally, indicators derived from protected area overlay can also inform sustainable urban development; for example, the overlay of protected areas onto urban maps could provide an indicator of public space as a proportion of overall city space.

Treatment of missing values:

- At country level

Data are available for protected areas and Key Biodiversity Areas in all of the world's countries, and so no imputation or estimation of national level data is necessary.

- At regional and global levels

Global indicators of protected area coverage of important sites for biodiversity are calculated as the mean percentage of each Key Biodiversity Area that is covered by protected areas. The data are generated from all countries, and so while there is uncertainty around the data, there are no missing values as such and so no need for imputation or estimation.

Regional aggregates:

UNEP-WCMC is the agency in charge of calculating and reporting global and regional figures for this indicator, working with BirdLife International and IUCN to combine data on protected areas with those for sites of importance for biodiversity. UNEP-WCMC aggregates the global and regional figures on protected areas from the national figures that are calculated from the World Database on Protected Areas and disseminated through Protected Planet. The World Database on Protected Areas and Protected Planet are jointly managed by UNEP-WCMC and IUCN and its World Commission on Protected Areas. The World Database on Protected Areas is held within a Geographic Information System that stores information about protected areas such as their name, size, type, date of establishment, geographic location (point) and/or boundary (polygon). Protected area coverage is calculated using all the protected areas recorded in World Database on Protected Areas whose location and extent is known. Protected areas without digital boundaries are excluded from the indicator.

Important Bird and Biodiversity Areas are sites of international significance for the conservation of biodiversity, identified using data for birds. Important Bird and Biodiversity Areas are identified using a standardised set of data-driven criteria and thresholds, relating to threatened, restricted-range, biome-restricted and congregatory species. Important Bird and Biodiversity Areas are delimited so that, as far as possible, they: (a) are different in character, habitat or ornithological importance from surrounding areas; (b) provide the requirements of the trigger species (i.e., those for which the site qualifies) while present, alone or in combination with networks of other sites; and (c) are or can be managed in some way.

Alliance for Zero Extinction sites meet three criteria: endangerment (supporting at least one Endangered or Critically Endangered species, as listed on The IUCN Red List of Threatened Species); irreplaceability (holding the sole or overwhelmingly significant (=95%) known population of the target species, for at least one life history segment); and discreteness (having a definable boundary within which the character of habitats, biological communities, and/or management issues have more in common with each other than they do with those in adjacent areas). Hence Alliance for Zero Extinction sites represent locations at which species extinctions are imminent unless appropriately safeguarded (i.e. protected or managed sustainably in ways consistent with the persistence of populations of target species).

The Important Bird and Biodiversity Area and Alliance for Zero Extinction site networks are, by definition, areas of particular importance for biodiversity as referred to in Aichi Biodiversity Target 11, and represent the only networks of such sites that have been identified systematically worldwide. Hence, they represent important areas to consider designating as formal protected areas.

Sources of discrepancies:
National processes provide the great bulk of the data that are subsequently aggregated into both the World Database on Protected Areas and the World Database of Key Biodiversity Areas, and so there are very few differences between national indicators and the global one. One minor source of difference is that the World Database on Protected Areas incorporates internationally-designated protected areas (e.g., World Heritage sites, Ramsar sites, etc), a few of which are not considered by their sovereign nations to be protected areas.

Note that because countries do not submit comprehensive data on degazetted protected areas to the WDPA, earlier values of the indictor may marginally underestimate coverage.

Methods and guidance available to countries for the compilation of the data at the national level:
The WDPA has its origins in a 1959 UN mandate when the United Nations Economic and Social Council called for a list of national parks and equivalent reserves Resolution 713 (XXVIII). More details are available here: https://www.protectedplanet.net/c/world-database-on-protected-areas. The UN List of Protected Areas has been published in 1961/62, 1966/71, 1972 (addendum to the 1966/71 edition), 1973, 1974, 1975, 1980, 1982, 1985, 1990, 1993, 1997, 2003 and 2014 which have resulted in a global network of national data providers for the WDPA. For example, in 2014 all Convention on Biological Diversity (CBD) National Focal points and all National Focal points for the CBD Protected Areas Programme of Work (PoWPA) to request data for the 2014 Un List of Protected Areas (https://www.protectedplanet.net/c/united-nations-list-of-protected-areas/united-nations-list-of-protected-areas-2014). Protected areas data is therefore compiled directly from government agencies, regional hubs and other authoritative sources in the absence of a government source. All records have a unique metadata identifier (MetadataID) which links the spatial database to the Source table where all sources are described. The data is collated and standardised following the WDPA Data Standards and validated with the source. The process of collation, validation and publication of data as well as protocols and the WDPA data standards are regularly updated in the WDPA User Manual (https://www.protectedplanet.net/c/wdpa-manual) made available through www.protectedplanet.net where all spatial data and the Source table are also published every month and can be downloaded. The process for compilation of data on sites contributing significantly to the global persistence of biodiversity (Key Biodiversity Areas) is documented online (http://www.keybiodiversityareas.org/home). Specifically, (http://www.keybiodiversityareas.org/what-are-kbas), the Key Biodiversity Area identification process is a highly inclusive, consultative and bottom-up exercise. Although anyone with appropriate scientific data may propose a site to qualify as a Key Biodiversity Area, wide consultation with stakeholders at the national level (both non-governmental and governmental organizations) is required during the proposal process. Key Biodiversity Area identification builds off the existing network of Key Biodiversity Areas, including those identified as Important Bird & Biodiversity Areas through the BirdLife Partnership of 120 national organisations (http://www.birdlife.org/worldwide/partnership/birdlife-partners), for the Alliance for Zero Extinction by 93 national and international organisations

(http://www.zeroextinction.org/partners.html), and as other Key Biodiversity Areas by civil society organisations supported by the Critical Ecosystem Partnership Fund in developing ecosystem profiles, named in each of the profiles listed here (http://www.cepf.net/resources/publications/Pages/ecosystem_profiles.aspx), with new data strengthening and expanding expand the network of these sites. Any site proposal undergoes independent scientific review. This is followed by the official site nomination with full documentation meeting the Documentation Standards for Key Biodiversity Areas. Sites confirmed by the Key Biodiversity Areas Secretariat to qualify as Key Biodiversity Areas then appear on the Key Biodiversity Areas website (http://www.keybiodiversityareas.org/home).

The WDPA User Manual (https://www.protectedplanet.net/c/wdpa-manual) published in English, Spanish, and French provides guidance to countries on how to submit protected areas data to the WDPA, what are the benefits of providing such data, which are the data standards and which quality checks are performed. We also provide a summary of our methods to calculate protected areas coverage to all WDPA users: https://www.protectedplanet.net/c/calculating-protected-area-coverage. The "Global Standard for the Identification of Key Biodiversity Areas" (https://portals.iucn.org/library/node/46259) comprises the standard recommendations available to countries in the identification of Key Biodiversity Areas, with further guidelines available on the Key Biodiversity Areas website (http://www.keybiodiversityareas.org/home). Specifically, (http://www.keybiodiversityareas.org/get-involved), the main steps of the Key Biodiversity Area identification process are the following:

i) submission of Expressions of Intent to identify a Key Biodiversity Area to Regional Focal Points;
ii) proposal Development process, in which proposers compile relevant data and documentation and consult national experts, including organizations that have already identified Key Biodiversity Areas in the country, either through national Key Biodiversity Area Coordination Groups or independently;
iii) review of proposed Key Biodiversity Areas by Independent Expert Reviewers, verifying the accuracy of information within their area of expertise; and
iv) a Site Nomination phase comprising the submission of all the relevant documentation for verification by the Key Biodiversity Areas Secretariat (see section 3.3 below).

Once a Key Biodiversity Area is identified, monitoring of its qualifying features and its conservation status is important. Proposers, reviewers and those undertaking monitoring can join the Key Biodiversity Areas Community to exchange their experiences, case studies and best practice examples.

Quality assurance

The process on how the data is collected, standardised and published is available in the WDPA User Manual at: https://www.protectedplanet.net/c/wdpa-manual which is available in English, French and Spanish. Specific guidance is provided at https://www.protectedplanet.net/c/world-database-on-protected-areas on, for example, predefined fields or look up tables in the WDPA: https://www.protectedplanet.net/c/wdpa-lookup-tables, how WDPA records are coded how international designations and regional designations data is collected, how regularly is the database updated, and how to perform protected areas coverage statistics. The process of identification of Key Biodiversity Areas is supported by the Key Biodiversity Areas Partnership (http://www.keybiodiversityareas.org/kba-partners). Among the roles of the partnership is establishment of the Key Biodiversity Areas Secretariat, which checks information submitted in the Site Nomination phase for the correct application of the Key Biodiversity Areas Standard ((https://portals.iucn.org/library/node/46259), and the adequacy of site documentation and then verifies the site, which is then published on the Key Biodiversity Areas Website (http://www.keybiodiversityareas.org/get-involved). In addition, the Chairs of the IUCN Species Survival Commission and World Commission on Protected Areas (both of whom are elected by the IUCN Membership of governments and non-governmental organisations), appoint the Chair of an independent Key Biodiversity Areas Standards and Appeals Committee, which ensures the correct application of the Global Standard for the identification of Key Biodiversity Areas. The R code for calculating protected area coverage of KBAs is documented as Dias, M. (2017) "R code for calculating protected area coverage of KBAs" (http://www.keybiodiversityareas.org/userfiles/files/R_code_for_calculating_protected_area_coverage_of_KBAs_March_2017.pdf).

In addition to dissemination via the Protected Planet website (https://www.protectedplanet.net/), the UN List process described in 3.1 the fact that protected areas data is collected from national agencies acknowledged in the WDPA metadata, and Key Biodiversity Areas website (http://www.keybiodiversityareas.org/home), Protected Planet and Key Biodiversity Areas data are disseminated through the Integrated Biodiversity Assessment Tool, available for research and conservation online (https://www.ibat-alliance.org/ibat-conservation/). This incorporates Country Profile documents for all of the world's countries, which includes documentation of the indicator of protected area coverage of Key Biodiversity Areas for the current year, starting from 2016. The first edition of each of these Country Profiles was sent for consultation to National Focal Points of the Convention on Biological Diversity (https://www.cbd.int/information/nfp.shtml), at the 13th meeting of the Conference of the Parties of the Convention on Biological Diversity; and this process will be repeated annually.

Data Sources

Description:
Protected area data are compiled by ministries of environment and other ministries responsible for the designation and maintenance of protected areas. Protected Areas data for sites designated under the Ramsar Convention and the UNESCO World Heritage Convention are collected through the relevant convention international secretariats. Protected area data are aggregated globally into the World Database on Protected Areas by the UN Environment World Conservation Monitoring Centre, according to the mandate for production of the United Nations List of Protected Areas (Deguignet et al. 2014). They are disseminated through Protected Planet, which is jointly managed by UNEP-WCMC and IUCN and its World Commission on Protected Areas (Juffe-Bignoli et al. 2014).

Key Biodiversity Areas are identified at national scales through multi-stakeholder processes, following standard criteria and thresholds. Key Biodiversity Areas data are aggregated into the World Database on Key Biodiversity Areas, managed by BirdLife International. Specifically, data on Important Bird and Biodiversity Areas are available online at BirdLife International (2016) and data on Alliance for Zero Extinction sites are available online at AZE (2010). Both datasets, along with Key Biodiversity Areas identified through other processes, are available through the World Database on Key Biodiversity Areas, and, along with the World Database on Protected Areas, are also disseminated through the Integrated Biodiversity Assessment Tool for Research and Conservation Planning.

Collection process:
See information under other sections.

Data Availability

Description:
This indicator has been classified by the IAEG-SDGs as Tier 1. Current data are available for all countries in the world, and these are updated on an ongoing basis.

Time series:
~150 years

Calendar

Data collection:
UNEP-WCMC produces the UN List of Protected Areas every 5–10 years, based on information provided by national ministries/agencies. In the intervening period between compilations of UN Lists, UNEP-WCMC works closely with national ministries/agencies and NGOs responsible for the designation and maintenance of protected areas, continually updating the WDPA as new data become available. The World Database of Key Biodiversity Areas is also updated on an ongoing basis, as new national data are submitted.

Data release:
The indicator of protected area coverage of important sites for biodiversity is anticipated to be released annually.

Data providers

Protected area data are compiled by ministries of environment and other ministries responsible for the designation and maintenance of protected areas. Key Biodiversity Areas are identified at national scales through multi-stakeholder processes, following standard criteria and thresholds.

Data compilers

Name:
UNEP-WCMC and IUCN

Description:
Protected area data are aggregated globally into the World Database on Protected Areas by the UN Environment World Conservation Monitoring Centre, according to the mandate for production of the United Nations List of Protected Areas (Deguignet et al. 2014). They are disseminated through Protected Planet, which is jointly managed by UNEP-WCMC and IUCN and its World Commission on Protected Areas (UNEP-WCMC 2016). Key Biodiversity Areas data are aggregated into the World Database on Key Biodiversity Areas, managed by BirdLife International (2017). Specifically, data on Important Bird and Biodiversity Areas are available online at BirdLife International (2016) and data on Alliance for Zero Extinction sites are available online at AZE (2010). Both datasets, along with the World Database on

Protected Areas, are also disseminated through the [Integrated Biodiversity Assessment Tool for Research and Conservation Planning].

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http://www.unep-wcmc.org/; http://www.birdlife.org/; http://www.iucn.org/

References:
These metadata are based on http://mdgs.un.org/unsd/mi/wiki/7-6-Proportion-of-terrestrial-and-marine-areas-protected.ashx, supplemented by http://www.bipindicators.net/paoverlays and the references listed below.

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Goal 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
Target 15.2: By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally
Indicator 15.2.1: Progress towards sustainable forest management

Institutional information

Organization(s):
Food and Agriculture Organisation of the United Nations (FAO)

Concepts and definitions

Definition:
"Sustainable forest management" (SFM) is a central concept for Goal 15 and target 15.1 as well as for target 15.2. It has been formally defined, by the UN General Assembly, as follows:

[a] dynamic and evolving concept [that] aims to maintain and enhance the economic, social and environmental values of all types of forests, for the benefit of present and future generations" (Resolution A/RES/62/98)

The indicator is composed of five sub-indicators that measure progress towards all dimensions of sustainable forest management. The environmental values of forests are covered by three sub-indicators focused on the extension of forest area, biomass within the forest area and protection and maintenance of biological diversity, and of natural and associated cultural resources. Social and economic values of forests are reconciled with environmental values through sustainable management plans. The sub-indicator provides further qualification to management of forest areas, by assessing areas which are independently verified for compliance with a set of national or international standards.

The sub-indicators are:

- Forest area net change rate
- Above-ground biomass stock in forest
- Proportion of forest area located within legally established protect areas
- Proportion of forest area under a long term forest management plan
- Forest area under an independently verified forest management certification scheme

A dashboard is used to assess progress related to the five sub-indicators. The adoption of the dashboard approach provides for clear view of areas where progress towards sustainable development goals has been achieved.

Rationale:

The definition of SFM by the UN General Assembly contains several key aspects, notably that sustainable forest management is a concept which varies over time and between countries, whose circumstances – ecological, social and economic – vary widely, but that it should always address a wide range of forest values, including economic, social and environmental values, and take intergenerational equity into account.

Clearly a simple measure of forest area, while essential, and used for target 15.1, is insufficient to monitor sustainable forest management as a whole. The significance of the five sub-indicators can be briefly explained as follows:

1. Trends in forest area are crucial for monitoring SFM. The first sub-indicator focuses on both the direction of change (whether there is a loss or gain in forest area) and how the change rate is changing over time; the latter is important in order to capture progress among countries that are losing forest area, but have managed to reduce the rate of annual forest area loss.
2. Changes in the above-ground biomass stock in forest indicate the balance between gains in biomass stock due to forest growth and losses due to wood removals, natural losses, fire, wind, pests and diseases. At country level and over a longer period, sustainable forest management would imply a stable or increasing biomass stock per hectare, while a long-term reduction of biomass stock per hectare would imply either unsustainable management of the forests and degradation or unexpected major losses due to fire, wind, pests or diseases.
3. The change in forest area within legally protected areas is a proxy for trends in forest biodiversity conservation and a clear indication of the political will to protect and conserve forest biodiversity. This indicator is related to the CBD Aichi Target 11 which calls for each country to conserve at least 17 per cent of terrestrial and inland water areas.
4. The fourth sub-indicator looks at the forest area that is under a long term forest management plan. The existence of a documented forest management plan is the basis for long term and sustainable management of the forest resources for a variety of management objectives such as for wood and non-wood forest products, protection of soil and water, biodiversity conservation, social and cultural use, and a combination of two or several of these. An increasing area under forest management plan is therefore an indicator of progress towards sustainable forest management.
5. The fifth sub-indicator is the forest area that is certified by an independently verified forest management certification scheme. Such certification schemes apply standards that generally are higher than those established by the countries' own normative frameworks, and compliance is verified by an independent and accredited certifier. An increase in certified forest area therefore provides an additional indication of progress towards sustainable forest management. It should however be noted that there are significant areas of sustainably managed forest which are not certified, either because their owners have chosen not to seek certification (which is voluntary and market-based) or because no credible or affordable certification scheme is in place for that area.

Concepts:
See Annex 1 with Terms and Definitions.

Comments and limitations:
The five sub-indicators chosen to illustrate progress towards sustainable forest management do not fully cover all aspects of sustainable forest management. In particular, social and economic aspects are poorly

reflected in the current set of sub-indicators. Furthermore, there are some data gaps, and the trends of some of the sub-indicators reflect different sets of countries. While the dashboard illustrates the progress on the individual sub-indicators, there is no weighting of the relative importance of the sub-indicators.

Methodology

Computation Method:
At national level, forest area, biomass stock, forest area within protected areas, forest area under management plan and forest area under an independently verified forest management certification scheme are reported directly to FAO for pre-established reference years. Based on the country reported data, FAO then makes country-level estimates of the forest area net change rate using the compound interest formula, and also the proportion of forest area within protected area and under management plan.

No dashboard traffic lights are made at country level.

Disaggregation:
No further disaggregation of this indicator.

Treatment of missing values:

- At country level
  For countries and territories where no information was provided to FAO for FRA 2015 (79 countries and territories representing 1.2 percent of the global forest area), a report was prepared by FAO using existing information from previous assessments and literature search.

- At regional and global levels
  See above.

Regional aggregates:
See Annex 2 – Methodology. It should be noted that for those sub-indicators where there are gaps in the data set, only the countries that reported a complete time series are included in the regional and global aggregates.   Annex 2 also shows how the dashboard traffic lights are applied at global and regional level.

Sources of discrepancies:
The national figures in the database are reported by the countries themselves following a standardized format, definitions and reporting years, thus eliminating any discrepancies between global and national figures. The reporting format ensures that countries provide the full reference for original data sources as well as national definitions and terminology. Separate sections in the reporting format (country reports) deal with the analysis of data (including any assumptions made and the methods used for estimates and projections to the common reporting years); calibration of data to the official land area as held by FAO; and reclassification of data to the classes used in FAO's Global Forest Resources Assessments.

Methods and guidance available to countries for the compilation of the data at the national level:
Data on all sub-indicators are provided to FAO by countries in the form of a country report following a standard format, which includes the original data and reference sources and descriptions of how these

have been used to estimate the forest area for different points in time. Data on forest certification is prefilled with information provided by the major certification schemes and countries review and amend this information as necessary.
Detailed methodology and guidance on how to prepare the country reports and to convert national data according to national categories and definitions to FAO's global categories and definitions is found in the document "Guide for country reporting for FRA 2015", http://www.fao.org/3/a-au190e.pdf.

Quality assurance
Once received, the country reports undergo a rigorous review process to ensure correct use of definitions and methodology as well as internal consistency. A comparison is made with past assessments and other existing data sources. Regular contacts between national correspondents and FAO staff by e-mail and regional/sub-regional review workshops form part of this review process.

All country reports (including those prepared by FAO) are sent to the respective Head of Forestry for validation before finalization and publishing of data. The data are then aggregated at sub-regional, regional and global levels by the FRA team at FAO.

Data Sources

Description:
Data on the sub-indicators are collected periodically (until now every 5 years) by FAO's Global Forest Resources Assessment (FRA) programme. All data are provided to FAO by countries in the form of a country report following a standard format, which includes the original data and reference sources and descriptions of how these have been used to estimate the forest area for different points in time.

Once received, the country reports undergo a rigorous review process to ensure correct use of definitions and methodology as well as internal consistency. A comparison is made with past assessments and other existing data sources. Regular contacts between national correspondents and FAO staff by e-mail and regional/sub-regional review workshops form part of this review process. All country reports (including those prepared by FAO) are sent to the respective Head of Forestry for validation before finalization. Data are then aggregated at sub-regional, regional and global levels by the FRA team at FAO.

Collection process:
Officially nominated national correspondents and their teams prepare the country reports for the assessment. Some prepare more than one report as they also report on dependent territories. For the remaining countries and territories where no information is provided, a report is prepared by FAO using existing information and a literature search.
Once received, the country reports undergo a rigorous review process to ensure correct use of definitions and methodology as well as internal consistency. A comparison is made with past assessments and other existing data sources. Regular contacts between national correspondents and FAO staff by e-mail and regional/sub-regional review workshops form part of this review process. All country reports (including those prepared by FAO) are sent to the respective Head of Forestry for validation before finalization. Data are then aggregated at sub-regional, regional and global levels by the FRA team at FAO.

In order to obtain internationally comparable data, countries are requested to provide national categories and definitions, and in case these are different than the FAO categories and definitions, countries are requested to perform a reclassification of national data to correspond to the FAO categories and definitions and to document this step in the country report. Countries are also requested to use interpolation or extrapolation of national data in order to provide estimates for the specific reporting years.

Data Availability

Description:

Breakdown of the number of countries covered by region and by sub-indicator is as follows:

Region	Total number of countries / territories	Number of countries reporting latest year: Forest area change rate	Number of countries reporting latest year: Biomass stock	Number of countries reporting latest year: Forest area within legally protected areas	Number of countries reporting latest year: Forest area under management plan	Number of countries reporting latest year: Forest area under an an independently verified forest management certification scheme	Number of countries reporting latest year (%): Forest area change rate	Number of countries reporting latest year (%): Biomass stock	Number of countries reporting latest year (%): Forest area within legally protected areas	Number of countries reporting latest year (%): Forest area under management plan	Number of countries reporting latest year (%): Forest area under an an independently verified forest management certification scheme
World	**234**	234	176	162	121	234	100%	75%	69%	52%	100%
Africa	**58**	58	52	48	40	58	100%	90%	83%	69%	100%
Northern Africa	**7**	7	7	5	5	7	100%	100%	71%	71%	100%
Sub-Saharan Africa	**51**	51	45	43	35	51	100%	88%	84%	69%	100%
Eastern Africa	**20**	20	16	18	10	20	100%	80%	90%	50%	100%
Middle Africa	**9**	9	9	7	7	9	100%	100%	78%	78%	100%
Southern Africa	**5**	5	5	5	4	5	100%	100%	100%	80%	100%
Western Africa	**17**	17	15	13	14	17	100%	88%	76%	82%	100%
Americas	**53**	53	29	35	17	53	100%	55%	66%	32%	100%
Latin America and the Caribbean	**48**	48	27	32	15	48	100%	56%	67%	31%	100%
Caribbean	**26**	26	9	11	5	26	100%	35%	42%	19%	100%
Latin America	**22**	22	18	21	10	22	100%	82%	95%	45%	100%
Northern America	**5**	5	2	3	2	5	100%	40%	60%	40%	100%
Asia	**48**	48	36	30	23	48	100%	75%	63%	48%	100%
Central Asia	**5**	5	5	3	3	5	100%	100%	60%	60%	100%
Eastern Asia	**5**	5	3	4	4	5	100%	60%	80%	80%	100%
Southern Asia	**9**	9	8	5	4	9	100%	89%	56%	44%	100%
South-Eastern Asia	**11**	11	9	9	4	11	100%	82%	82%	36%	100%
Western Asia	**18**	18	11	9	8	18	100%	61%	50%	44%	100%
Europe	**50**	50	44	38	34	50	100%	88%	76%	68%	100%
Eastern Europe	**10**	10	10	9	9	10	100%	100%	90%	90%	100%
Northern Europe	**15**	15	11	10	10	15	100%	73%	67%	67%	100%
Southern Europe	**16**	16	14	12	8	16	100%	88%	75%	50%	100%
Western Europe	**9**	9	9	7	7	9	100%	100%	78%	78%	100%
Oceania	**25**	25	15	11	7	25	100%	60%	44%	28%	100%
Australia and New Zealand	**3**	3	1	2	2	3	100%	33%	67%	67%	100%
Melanesia	**5**	5	3	3	2	5	100%	60%	60%	40%	100%
Micronesia	**7**	7	6	1	1	7	100%	86%	14%	14%	100%
Polynesia	**10**	10	5	5	2	10	100%	50%	50%	20%	100%

Time series:

1990, 2000, 2005, 2010, 2015

Calendar

Data collection:
Source collection is next planned for 2018.

Data release:
Expected dates of release of new data: 2018 or 2019

Data providers

NA

Data compilers

Food and Agriculture Organisation of the United Nations (FAO)

References

URL: http://www.fao.org/forest-resources-assessment/en/

Annex 1 – Terms and Definitions[1]

FOREST

Land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds *in situ*. It does not include land that is predominantly under agricultural or urban land use.

Explanatory notes

1. Forest is determined both by the presence of trees and the absence of other predominant land uses. The trees should be able to reach a minimum height of 5 meters.
2. Includes areas with young trees that have not yet reached but which are expected to reach a canopy cover of at least 10 percent and tree height of 5 meters or more. It also includes areas that are temporarily unstocked due to clear-cutting as part of a forest management practice or natural disasters, and which are expected to be regenerated within 5 years. Local conditions may, in exceptional cases, justify that a longer time frame is used.
3. Includes forest roads, firebreaks and other small open areas; forest in national parks, nature reserves and other protected areas such as those of specific environmental, scientific, historical, cultural or spiritual interest.
4. Includes windbreaks, shelterbelts and corridors of trees with an area of more than 0.5 hectares and width of more than 20 meters.
5. Includes abandoned shifting cultivation land with a regeneration of trees that have, or are expected to reach, a canopy cover of at least 10 percent and tree height of at least 5 meters.
6. Includes areas with mangroves in tidal zones, regardless whether this area is classified as land area or not.
7. Includes rubberwood, cork oak and Christmas tree plantations.
8. Includes areas with bamboo and palms provided that land use, height and canopy cover criteria are met.
9. Excludes tree stands in agricultural production systems, such as fruit tree plantations, oil palm plantations, olive orchards and agroforestry systems when crops are grown under tree cover. Note: Some agroforestry systems such as the "Taungya" system where crops are grown only during the first years of the forest rotation should be classified as forest.

ABOVE-GROUND BIOMASS

All living biomass above the soil including stem, stump, branches, bark, seeds, and foliage.

Explanatory note

[1] Global Forest Resources Assessment 2015 – Terms and Definitions. http://www.fao.org/docrep/017/ap862e/ap862e00.pdf

1. In cases where forest understorey is a relatively small component of the aboveground biomass carbon pool, it is acceptable to exclude it, provided this is done in a consistent manner throughout the inventory time series.

PROTECTED AREAS

Areas especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means.

FOREST AREA WITHIN PROTECTED AREAS

Forest area within formally established protected areas independently of the purpose for which the protected areas were established.

Explanatory notes

1. Includes IUCN Categories I – IV
2. Excludes IUCN Categories V-VI

FOREST AREA WITH MANAGEMENT PLAN

Forest area that has a long-term documented management plan, aiming at defined management goals, which is periodically revised.

Explanatory notes

1. A forest area with management plan may refer to forest management unit level or aggregated forest management unit level (forest blocks, farms, enterprises, watersheds, municipalities, or wider units).
2. A management plan must include adequate detail on operations planned for individual operational units (stands or compartments) but may also provide general strategies and activities planned to reach management goals.
3. Includes forest area in protected areas with management plan.

INDEPENDENTLY VERIFIED FOREST MANAGEMENT CERTIFICATION

Forest area certified under a forest management certification scheme with published standards and is independently verified by a third-party.

Annex 2 – Methodology

Sub-indicator 1 - Forest area annual net change rate

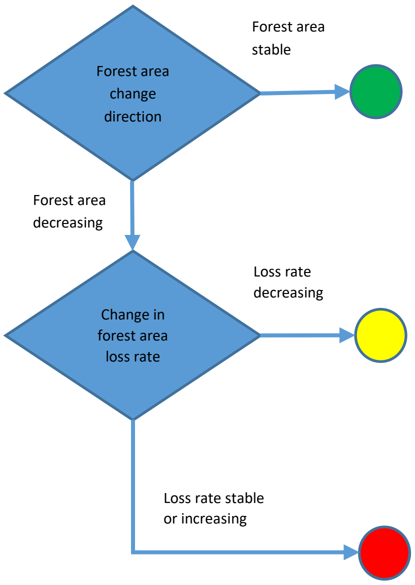
Unit: Percent

Reference period: Most recent period

Method of estimation: Compound interest formula

Translation to dashboard/traffic light:

The following flowchart explains the logic behind the translation of this indicator to a dashboard/traffic light:



The forest area change direction is determined by examining the value of the forest area change rate for the most recent period, a negative value indicate a loss of forest area, a zero value means that forest area is stable and a positive value means that forest area has increased. The change in forest area loss rate is based on a comparison of the current forest area net change rate with the baseline forest area net change rate for the period 2010-2015.

Comments:

This traffic light takes into consideration both the direction of forest area change (if forest area increases or decreases) as well as changes in the rate of forest area loss – the latter important in order to indicate progress among countries that are losing forest area but manage to reduce the loss rate.

For annual reporting, FAO can provide countries with imputed values based on previous trends that they can use in case they don't have new/updated information. The baseline should be updated every 5 years, so in 2020 a new baseline is calculated. Also, at country level, if a country gets new information and updates the historical time series, the baseline for the country will be recalculated, respecting the 2010-2015 period.

Sub-indicator 2 – Above-ground biomass stock in forest

Unit: tonnes/hectare

Reference year: Latest reporting year

Method of estimation: Biomass stock in forest (tonnes) / forest area (ha)

Translation to dashboard/traffic light:

The indicator value for the latest reporting year is compared with the indicator value for previous reporting year for assessment of continuity of progress since last report.

The ratio (r) between the current indicator value and the previously reported value is calculated; r>1 means an increase in stock per hectare, r<1 means a decrease while 1 indicates no change. A narrow interval for r has been established to indicate a stable condition, and traffic-light colors are assigned as follows:

$r \geq 1.01$ 

$0.99 < r < 1.01$ 

$r \leq 0.99$ 

Sub-indicator 3 – Proportion of forest area located within legally established protected areas.

Unit: Percent

Reference year: Latest reporting year

Method of estimation: Forest area within legally established protected areas / forest area 2015 * 100

Translation to dashboard/traffic light:

The indicator value for latest reporting year is compared the indicator value for previous reporting year for assessment of continuity of progress since last report.

The ratio (r) between the current indicator value and the previously reported value is calculated; r>1 means an increase in forest area within protected areas, r<1 means a decrease while 1 indicates no change. A narrow interval for r has been established to indicate a stable condition, and traffic-light colors are assigned as follows:

$r \geq 1.01$ 

$0.99 < r < 1.01$ 

$r \leq 0.99$ 

Comment:

Using forest area in 2015 as denominator for estimating this indicator ensures that the time series of percentages reflect real changes in the forest area within legally established protected areas and is not affected by changes (losses or gains) in total forest area.

Sub-indicator 4 – Proportion of forest area under a long-term forest management plan.

Unit: Percent

Reference year: Latest reporting year

Method of estimation: Forest area under a long term forest management plan / forest area 2015 * 100

Translation to dashboard/traffic light: The indicator value for latest reporting year is compared with the indicator value for previous reporting year for assessment of continuity of progress since last report.

The ratio (r) between the current indicator value and the previously reported value is calculated; r>1 means an increase in areas under forest management plan, r<1 means a decrease while 1 indicates no change. A narrow interval for r has been established to indicate a stable condition, and traffic-light colors are assigned as follows:

$r \geq 1.01$	
$0.99 < r < 1.01$	
$r \leq 0.99$	

Comment:

Using forest area in 2015 as denominator for estimating this indicator ensures that the time series of percentages reflect real changes in the forest area under forest management plan and is not affected by changes (losses or gains) in total forest area.

Sub-indicator 5 – Forest area under an independently verified forest management certification scheme.

Unit: Hectares

Reference year: Latest reporting year (as of June 30)

Method of estimation: Data is collected directly from the databases of each certification scheme and provided to countries for validation.

Translation to dashboard/traffic light: The indicator value for latest reporting year is compared with the indicator value for previous reporting year for assessment of continuity of progress since last report.

The ratio (r) between the current indicator value and the previously reported value is calculated; r>1 means an increase in areas under an independent forest management certification scheme, r<1 means a decrease while 1 indicates no change. A small interval for r has been established to indicate a stable condition, and traffic-light colors are assigned as follows:

$r \geq 1.01$

$0.99 < r < 1.01$

$r \leq 0.99$

Comments:

Using June 30 as the date for reporting, allows for the certification bodies to have their databases updated so they can provide information to FAO by end of the year, and then be included in the annual reporting to SDG in the beginning of the following year.

Goal 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
Target 15.3: By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world
Indicator 15.3.1: Proportion of land that is degraded over total land area

Institutional information

Organization(s):
United Nations Convention to Combat Desertification (UNCCD) and partners, including the Food and Agriculture Organization of the United Nations (FAO), United Nations Statistics Division (UNSD), United Nations Environment (UNEP), United Nations Framework Convention on Climate Change (UNFCCC) and Convention on Biological Diversity (CBD).

Concepts and definitions

Definitions:
Land degradation is defined as the reduction or loss of the biological or economic productivity and complexity of rain fed cropland, irrigated cropland, or range, pasture, forest and woodlands resulting from a combination of pressures, including land use and management practices. This definition was adopted by and is used by the 196 countries that are Party to the UNCCD.[1] (see also Figure 1)

Land Degradation Neutrality (LDN) is defined as a state whereby the amount and quality of land resources necessary to support ecosystem functions and services and enhance food security remain stable or increase within specified temporal and spatial scales and ecosystems (decision 3/COP12).[2]

Total land area is the total surface area of a country excluding the area covered by inland waters, like major rivers and lakes.[3]

The measurement unit for this indicator is the spatial extent (hectares or km2) expressed as the proportion (percentage or %) of land that is degraded over total land area.

SDG indicator 15.3.1 is a binary - degraded/not degraded - quantification based on the analysis of available data for three sub-indicators to be validated and reported by national authorities. The sub-indicators (Trends in Land Cover, Land Productivity and Carbon Stocks) were adopted by the UNCCD's governing body in 2013 as part of its monitoring and evaluation approach.[4]

[1] United Nations Convention to Combat Desertification. 1994. Article 1 of the Convention Text http://www2.unccd.int/sites/default/files/relevant-links/2017-01/UNCCD_Convention_ENG_0.pdf
[2] http://www2.unccd.int/sites/default/files/sessions/documents/ICCD_COP12_20_Add.1/20add1eng.pdf
[3] Food and Agriculture Organization of the United Nations
[4] By its decision 22/COP.11, the Conference of the Parties established a monitoring and evaluation approach consisting of: (a) indicators; (b) a conceptual framework that allows for the integration of indicators; and (c) indicators sourcing and management mechanisms at the national/local level.
http://www.unccd.int/en/programmes/Science/Monitoring-Assessment/Documents/Decision22-COP11.pdf

The method of computation for this indicator follows the "One Out, All Out" statistical principle and is based on the baseline assessment and evaluation of change in the sub-indicators to determine the extent of land that is degraded over total land area.

The One Out, All Out (1OAO)[5] principle is applied taking into account changes in the sub-indicators which are depicted as (i) positive or improving, (ii) negative or declining, or (iii) stable or unchanging. If one of the sub-indicators is negative (or stable when degraded in the baseline or previous monitoring year) for a particular land unit, then it would be considered as degraded subject to validation by national authorities.

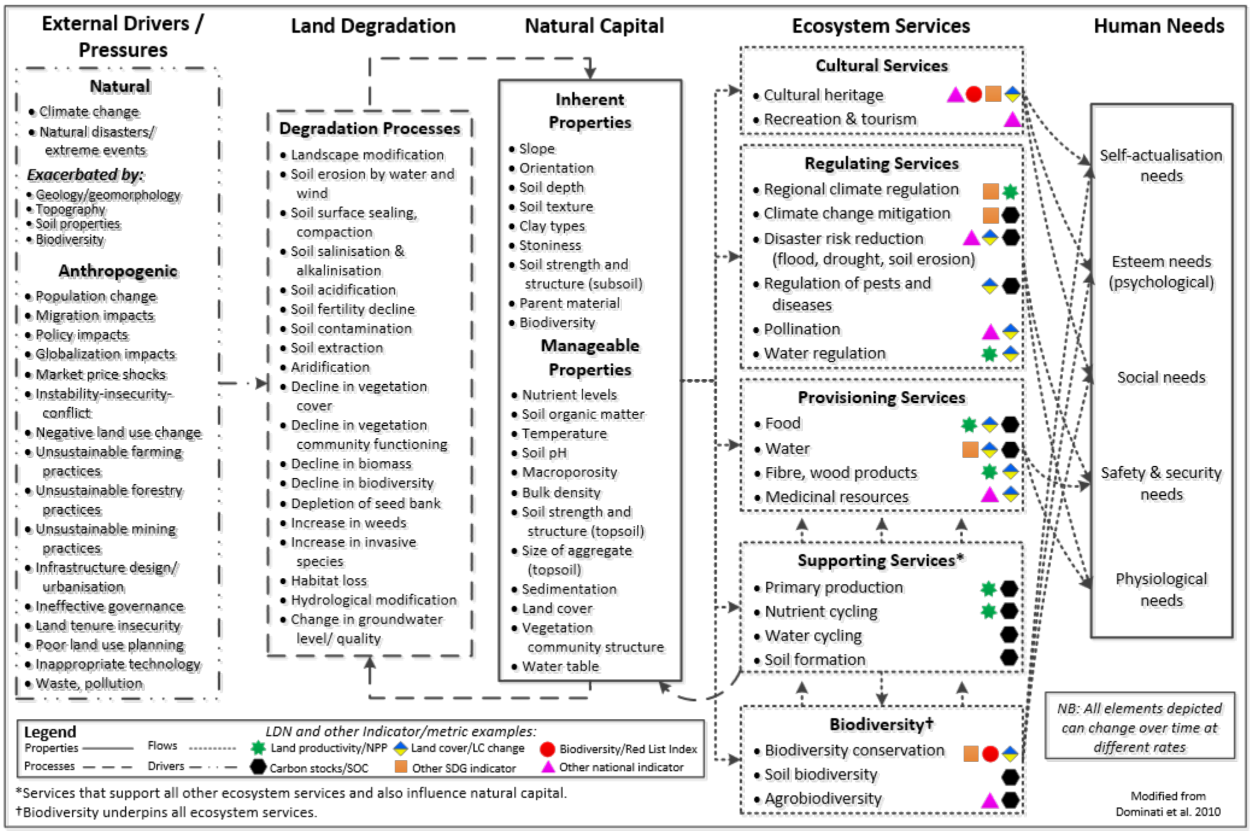
Concepts:
The assessment and quantification of land degradation is generally regarded as context-specific, making it difficult for a single indicator to fully capture the state or condition of the land. While necessary but not sufficient, the sub-indicators address changes in different yet highly relevant ways: for example, land cover or productivity trends can capture relatively fast changes while changes in carbon stocks reflect slower changes that suggest a trajectory or proximity to thresholds.[6]

As proxies to monitor the key factors and driving variables that reflect the capacity to deliver land-based ecosystem services, the sub-indicators are globally agreed upon in definition and methodology of calculation, and deemed both technically and economically feasible for systematic observation under both the Global Climate Observation System (GCOS) and the integrated measurement framework of the System of Environmental-Economic Accounting (SEEA). The ultimate determination of the extent of degraded land made by national authorities should be contextualized with other indicators, data and ground-based information.

An operational definition of land degradation along with a description of the linkages among the sub-indicators is given in Figure 1.

[5] https://circabc.europa.eu/sd/a/06480e87-27a6-41e6-b165-0581c2b046ad/Guidance%20No%2013%20-%20Classification%20of%20Ecological%20Status%20(WG%20A).pdf
[6] http://www2.unccd.int/sites/default/files/documents/2017-08/LDN_CF_report_web-english.pdf

Figure 1: Operational definition of land degradation and linkage with the sub-indicators.



Land cover refers to the observed physical cover of the Earth's surface which describes the distribution of vegetation types, water bodies and human-made infrastructure.[7] It also reflects the use of land resources (i.e., soil, water and biodiversity) for agriculture, forestry, human settlements and other purposes.[8] This sub-indicator serves two functions for SDG indicator 15.3.1: (1) changes in land cover may point to land degradation when there is a loss of ecosystem services that are considered desirable in a local or national context; and (2) a land cover classification system can be used to disaggregate the other two sub-indicators, thus increasing the indicator's policy relevance. This sub-indicator is also expected to be used for reporting on SDG indicators 6.6.1, 11.3.1 and 15.1.1.

There is an international standard for the sub-indicator on land cover[9] which includes the Land Cover Meta Language (LCML), a common reference structure (statistical standard) for the comparison and integration of data for any generic land cover classification system. LCML is also used for defining land cover and ecosystem functional units used in the SEEA, and closely linked to the Intergovernmental Panel on Climate Change (IPCC) classification on land cover/land use.

[7] Di Gregorio, A. 2005. Land cover classification system (LCCS): classification concepts and user manual. Food and Agriculture Organization of the United Nations, Rome.
[8] FAO-GTOS. 2009. Land Cover: Assessment of the status of the development of the standards for the Terrestrial Essential Climate Variables. Global Terrestrial Observing System, Rome.
[9] https://www.iso.org/standard/44342.html

Land productivity refers to the total above-ground net primary production (NPP) defined as the energy fixed by plants minus their respiration which translates into the rate of biomass accumulation that delivers a suite of ecosystem services.[10] This sub-indicator points to changes in the health and productive capacity of the land and reflects the net effects of changes in ecosystem functioning on plant and biomass growth, where declining trends are often a defining characteristic of land degradation.[11]

The international standard for calculating NPP ($gC/m^2/day$) from remotely-sensed, multi-temporal surface reflectance data, accounting for the global range of climate and vegetation types, was established in 1999 by the U.S. National Aeronautics and Space Administration (NASA) in anticipation of the launch of the Moderate Resolution Imaging Spectroradiometer (MODIS) sensor.[12] The Land Productivity Dynamics (LPD) methodology and dataset, developed by the Joint Research Centre of the European Commission[13] and used in the UNCCD pilot programme, employs this international standard to calculate NPP time series trends and change analyses.

Carbon stock is the quantity of carbon in a "pool": a reservoir which has the capacity to accumulate or release carbon and is comprised of above- and below-ground biomass, dead organic matter, and soil organic carbon.[14] In UNCCD decision 22/COP.11, *soil organic carbon (SOC) stock* was adopted as the metric to be used with the understanding that this metric will be replaced by *total terrestrial system carbon stocks*, once operational. SOC is an indicator of overall soil quality associated with nutrient cycling and its aggregate stability and structure with direct implications for water infiltration, soil biodiversity, vulnerability to erosion, and ultimately the productivity of vegetation, and in agricultural contexts, yields. SOC stocks reflect the balance between organic matter gains, dependent on plant productivity and management practices, and losses due to decomposition through the action of soil organisms and physical export through leaching and erosion.[15]

For carbon stocks, IPCC (2006) contains the most relevant definitions and standards, especially with regard to reference values applicable for Tier 2 and 3 GHG reporting.[16] In this regard, the technical soil infrastructure, data transfer and provision of national reporting data is also standards-based.[17]

Rationale:

In the last decade, there have been a number of global/regional targets and initiatives to halt and reverse land degradation and restore degraded land. Starting in 2010, these include the Aichi Biodiversity Targets, one of which aims to restore at least 15% of degraded ecosystems; the Bonn Challenge and its regional initiatives to restore more than 150 million hectares; and most recently the Sustainable Development Goals (SDGs), in particular SDG target 15.3.

[10] Millennium Ecosystem Assessment. 2005. Ecosystems and human wellbeing: a framework for assessment. Island Press, Washington, DC.
[11] Joint Research Centre of the European Commission. 2017. World Atlas of Desertification, 3rd edition. JRC, Ispra.
[12] Running et al. 1999. MODIS Daily Photosynthesis (PSN) and Annual Net Primary Production (NPP) Product (MOD17): Algorithm Theoretical Basis Document https://eospso.gsfc.nasa.gov/sites/default/files/atbd/atbd_mod16.pdf
[13] Ivits and Cherlet. 2013. Land-productivity dynamics towards integrated assessment of land degradation at global scales. European Commission JRC Technical Report. https://publications.europa.eu/en/publication-detail/-/publication/1e2aceac-b20b-45ab-88d9-b3d187ae6375/language-en/format-PDF/source-49343336
[14] IPCC. 2006. IPCC Guidelines for National Greenhouse Gas Inventories: Agriculture, Forestry and other Land Use. Prepared by the National Greenhouse Gas Inventories Programme: Eggleston H.S., Buendia L., Miwa K., Ngara T. and Tanabe K. (eds). IGES, Japan.
[15] Smith, P., Fang, C., Dawson, J. J., & Moncrieff, J. B. 2008. Impact of global warming on soil organic carbon. Advances in agronomy, 97: 1-43.
[16] IPCC. 2006. ibid
[17] https://www.iso.org/standard/44595.html

For each of the sub-indicators, countries can access a wide range of data sources, including Earth observation and geospatial information, while at the same time ensuring national ownership.[18] The use of the existing national reporting templates of the UNCCD,[19] which include the indicator and sub-indicators, provides a practical and harmonized approach to reporting on this indicator beginning in 2018 and every four years thereafter.[20] The quantitative assessments and corresponding mapping at the national level, as required by this indicator, would help countries to set policy and planning priorities among diverse land resource areas, in particular:

- to identify hotspots and plan actions of redress, including through the conservation, rehabilitation, restoration and sustainable management of land resources; and
- to address emerging pressures to help avoid future land degradation.

Comments and limitations:
SDG indicator 15.3.1 is a binary -- degraded/not degraded -- quantification based on the analysis of available data that is validated and reported by national authorities. Reporting on the sub-indicators should be based primarily, and to the largest extent possible, on comparable and standardized national official data sources. To a certain extent, national data on the three sub-indicators is and can be collected through existing sources (e.g., databases, maps, reports), including participatory inventories on land management systems as well as remote sensing data collected at the national level.

Regional and global datasets derived from Earth observation and geospatial information can play an important role in the absence of, to complement, or to enhance national official data sources. These datasets can help validate and improve national statistics for greater accuracy by ensuring that the data are spatially-explicit. Recognizing that the sub-indicators cannot fully capture the complexity of land degradation (i.e., its degree and drivers), countries are strongly encouraged to use other relevant national or sub-national indicators, data and information to strengthen their interpretation.

As regards slow changing variables, such as soil organic carbon stocks, reporting every four years may not be practical or offer reliable change detection for many countries. Nevertheless, this sub-indicator captures important data and information that will become more available in the future via improved measurements at the national level, such as those being facilitated by the FAO's Global Soil Partnership and others.

While access to remote sensing imagery has improved dramatically in recent years, there is still a need for essential historical time series that is currently only available at coarse to medium resolution. The expectation is that the availability of high-resolution, locally-calibrated datasets will increase rapidly in the near future. National capacities to process, interpret and validate geospatial data still need to be enhanced in many countries; good practice guidance for the monitoring and the reporting of the sub-indicators in other processes will assist in this regard.

Methodology

[18] United Nations General Assembly. 2015. Transforming our world: the 2030 Agenda for Sustainable Development. Resolution adopted by the General Assembly on 25 September 2015 (A/RES/70/1).
[19] http://www2.unccd.int/sites/default/files/relevant-links/2017-12/20171107_Template_Final_EN.pdf
[20] http://www2.unccd.int/sites/default/files/sessions/documents/2017-09/ICCD_CRIC%2816%29_L.3-1715758E.pdf

Computation Method:

By analysing changes in the sub-indicators in the context of local assessments of climate, soil, land use and any other factors influencing land conditions, national authorities can determine which land units are to be classified as degraded, sum the total, and report on the indicator. A conceptual framework, endorsed by the UNCCD's governing body in September 2017,[21] underpins a universal methodology for deriving the indicator. The methodology helps countries to select the most appropriate datasets for the sub-indicators and determine national methods for estimating the indicator. In order to assist countries with monitoring and reporting, Good Practice Guidance for SDG Indicator 15.3.1[22] has been developed by the UNCCD and its partners.

The indicator is derived from a binary classification of land condition (i.e., degraded or not degraded) based primarily, and to the largest extent possible, on comparable and standardized national official data sources. However, due to the nature of the indicator, Earth observation and geospatial information from regional and global data sources can play an important role in its derivation, subject to validation by national authorities.

Quantifying the indicator is based on the evaluation of changes in the sub-indicators in order to determine the extent of land that is degraded over total land area. The sub-indicators are few in number, complementary and non-additive components of land-based natural capital and sensitive to different degradation factors. As a result, the 1OAO principle is applied in the method of computation where changes in the sub-indicators are depicted as (i) positive or improving, (ii) negative or declining, or (iii) stable or unchanging. If one of the sub-indicators is negative (or stable when degraded in the baseline or previous monitoring year) for a particular land unit, then normally it would be considered as degraded subject to validation by national authorities.

The baseline year for the indicator is 2015 and its value (t_0) is derived from an initial quantification and assessment of time series data for the sub-indicators for each land unit during the period 2000-2015. Subsequent values for the indicator during each monitoring period (t_{1-n}) are derived from the quantification and assessment of changes in the sub-indicators as to whether there are has been positive, negative or no change for each land unit relative to the baseline value. Although the indicator will be reported as a single figure quantifying the area of land that is degraded as a proportion of land area, it can be spatially disaggregated by land cover class or other policy-relevant units.

As detailed in the Good Practice Guidance for SDG indicator 15.3.1, deriving the indicator for the baseline and subsequent monitoring years is done by summing all those areas where any changes in the sub-indicators are considered negative (or stable when degraded in the baseline or previous monitoring year) by national authorities. This involves the:

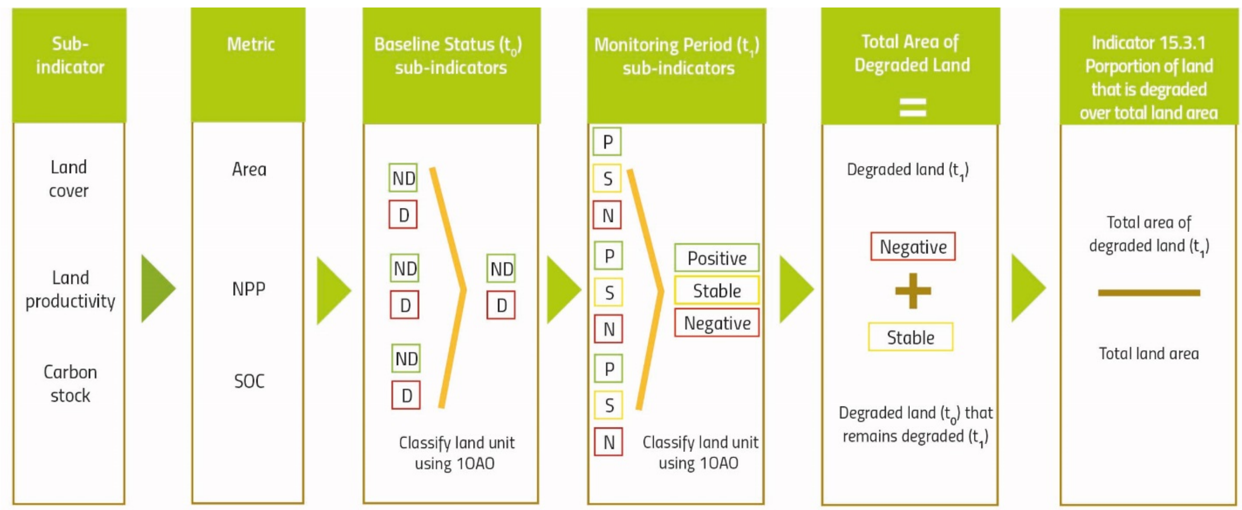
(1) assessment and evaluation of **land cover and land cover changes**;
(2) analysis of **land productivity** status and trends based on net primary production; and
(3) determination of **carbon stock** values and changes, with an initial assessment of soil organic carbon as the proxy.

[21] http://www2.unccd.int/sites/default/files/sessions/documents/2017-09/ICCD_COP%2813%29_CST_L.1-1715678E_0.pdf
[22] http://www2.unccd.int/sites/default/files/relevant-links/2017-10/Good%20Practice%20Guidance_SDG%20Indicator%2015.3.1_Version%201.0.pdf

It is good practice to assess change for interim and final reporting years in relation to the baseline year for each sub-indicator and then the indicator. This facilitates the spatial aggregation of the results from the sub-indicators for each land unit to determine the proportion of land that is degraded for the baseline and each monitoring year. Furthermore, it ensures that land classified as degraded will retain that status unless it has improved relative to the baseline or previous monitoring year.

Land degradation (or improvement) as compared to the baseline may be identified with reference to parameters describing the slope and confidence limits around the trends in the sub-indicators, or to the level or distribution of conditions in space and/or time as shown during the baseline period. The evaluation of changes in the sub-indicators may be determined using statistical significance tests or by interpretation of results in the context of local indicators, data and information. The method of computation for SDG indicator 15.3.1 is illustrated in Figure 2.

Figure 2: Steps to derive the indicator from the sub-indicators, where ND is not degraded and D is degraded.



The area degraded in the monitoring period t_n within land cover class *i* is estimated by summing all the area units within the land cover class determined to be degraded plus all area units that had previously been defined as degraded and that remain degraded:

$$A(Degraded)_{i,\text{n}} = \sum_{j=1}^{n} Arecent_{i,n} + Apersistent_{i,n} \quad (1)$$

Where:

$A(Degraded)_{i,n}$ is the total area degraded in the land cover class *i* in the year of monitoring *n* (ha);

$Arecent_{i,n}$ is the area defined as degraded in the current monitoring year following 1OAO assessment of the sub-indicators (ha);

$Apersistent_{i,n}$ is the area previously defined as degraded which remains degraded in the monitoring year following the 1OAO assessment of the sub-indicators (ha).

The proportion of land cover type *i* that is degraded is then given by:

$$P_{i,n} = \frac{A(degraded)_{i,\mathrm{n}}}{A(total)_{i,n}} \qquad (2)$$

Where

$P_{i,\mathrm{n}}$ is the proportion of degraded land in that land cover type *i* in the monitoring period *n*;

$A(Degraded)_{i,\mathrm{n}}$ is the total area degraded in the land cover type *i* in the year of monitoring *n* (ha);

$A(total)_{i,\mathrm{n}}$ is the total area of land cover type *i* within the national boundary (ha).

The total area of land that is degraded over total land area is the accumulation across the *m* land cover classes within the monitoring period *n* is given by:

$$A(Degraded)_{\mathrm{n}} = \sum_i^m A(Degraded)_{i,\mathrm{n}} \qquad (3)$$

Where

$A(Degraded)_{\mathrm{n}}$ is the total area degraded in the year of monitoring *n* (ha);

$A(Degraded)_{i,\mathrm{n}}$ is the total area degraded in the land cover type *i* in the year of monitoring *n*.

The total proportion of land that is degraded over total land area is given by:

$$P_{\mathrm{n}} = \frac{A(Degraded)_{\mathrm{n}}}{\sum_i^m \mathrm{A(Total)}} \qquad (4)$$

Where

P_{n} is the proportion of land that is degraded over total land area;

$A(Degraded)_{\mathrm{n}}$ is the total area degraded in the year of monitoring *n* (ha)*;*

$\mathrm{A(Total)}$ is the total area within the national boundary (ha).

The proportion is converted to a percentage value by multiplying by 100.

Disaggregation:
The indicator can be disaggregated by land cover class or other spatially explicit land unit.

Treatment of missing values:
At country level

For countries where no data or information is available, the UNCCD and its partners can provide default estimates from regional or global data sources that would then be validated by national authorities.

At regional and global levels

The land area of countries with missing values (i.e., there is no default data) would be excluded from regional and global aggregation.

Regional and global aggregates:
The indicator can be aggregated to the regional and global level by summing the spatial extent of land that is degraded over total land area for all countries reporting in a specific region or globally.

Sources of discrepancies:
Data reported by the countries themselves will follow a standardized format for UNCCD national reporting[23] that will include the indicator and sub-indicators as well as their data sources and explanatory notes. Differences between global and national figures may arise due to differences in spatial resolution of datasets, classification approaches (i.e. definition of land cover classes) and/or contextualization with other indicators, data and information.

The UNCCD reporting format helps to ensure that countries provide references for national data sources as well as associated definitions and terminology. In addition, the reporting format can accommodate more detailed analysis of the data, including any assumptions made and the methods used for estimating the indicator and sub-indicators.

Methods and guidance available to countries for the compilation of the data at the national level:
All data are provided to UNCCD by countries in the form of a national report following a standard reporting template,[24] which includes the quantitative data for the indicator and sub-indicators as well as a qualitative assessment of indicator trends. The reporting template ensures that countries provide the full reference for original data sources as well as national definitions and methodology.

Detailed guidance on how to prepare the country reports and how to compute the indicator and sub-indicators is contained in the UNCCD reporting manual and in the Good Practice Guidance for SDG indicator 15.3.1,[25] respectively.

Quality assurance
The UNCCD reporting templates has built-in quality check functionalities (e.g., range checks). Once received, national reports will undergo a review process by the UNCCD and its partners to ensure data integrity,

[23] http://www2.unccd.int/sites/default/files/relevant-links/2017-12/20171107_Template_Final_EN.pdf
[24] http://www2.unccd.int/sites/default/files/relevant-links/2017-12/20171107_Template_Final_EN.pdf
[25] http://www2.unccd.int/sites/default/files/relevant-links/2017-10/Good%20Practice%20Guidance_SDG%20Indicator%2015.3.1_Version%201.0.pdf

correctness and completeness, the correct use of definitions and methodology as well as internal consistency.

A help-desk system[26] has been set up as a single point of contact for countries to get answers to questions and gain assistance on reporting issues.

Data Sources

Description:
National data on the three sub-indicators is and can be collected through existing sources (e.g., databases, maps, reports), including participatory inventories on land management systems as well as remote sensing data collected at the national level. Datasets that complement and support existing national indicators, data and information are likely to come from multiple sources, including statistics and estimated data for administrative or national boundaries, ground measurements, Earth observation and geospatial information. A comprehensive inventory of all data sources available for each sub-indicator is contained in the Good Practice Guidance for SDG Indicator 15.3.1.

The most accessible and widely used regional and global data sources for each of the sub-indicators are briefly described here.

1) Land cover and land cover change data are available in the:

> **(1) ESA-CCI-LC,**[27] containing annual land cover area data for the period 1992-2015, produced by the Catholic University of Louvain Geomatics as part of the Climate Change Initiative of the European Space Agency (ESA); or
>
> **(2) SEEA-MODIS,**[28] containing annual land cover area data for the period 2001-2012, derived from the International Geosphere-Biosphere Programme (IGBP) type of the MODIS land cover dataset (MCD12Q1).

2) Land productivity data represented as vegetation indices (i.e., direct observations), and their derived products are considered the most independent and robust option for the analyses of land productivity, offering the longest consolidated time series and a broad range of operational data sets at different spatial scales. The most accurate and reliable datasets are available in the:

> **(1) MODIS data products,**[29] averaged at 1 km pixel resolution, integrated over each calendar year since 2000; and
>
> **(2) Copernicus Global Land Service products,**[30] averaged at 1 km pixel resolution and integrated over each calendar year since 1998.

[26] http://support.unccd.int/
[27] https://www.esa-landcover-cci.org/
[28] https://modis.gsfc.nasa.gov/data/dataprod/mod12.php
[29] https://modis.gsfc.nasa.gov/data/dataprod/mod13.php
[30] http://land.copernicus.eu/global/

3) Soil organic carbon stock data are available in the:

> **(1) Harmonized World Soil Database (HWSD), Version 1.2,**[31] the latest update being the current de facto standard soil grid with a spatial resolution of about 1 km;
>
> **(2) SoilGrids250m,**[32] a global 3D soil information system at 250m resolution containing spatial predictions for a selection of soil properties (at six standard depths) including SOC stock (t ha^{-1});
>
> **(3) Global SOC Map, Version 1.0,**[33] which consists of national SOC maps, developed as 1 km soil grids, covering a depth of 0-30 cm.

In the absence of, to enhance, or as a complement to national data sources, good practice suggests that the data and information derived from global and regional data sets should be interpreted and validated by national authorities. The most common validation approach involves the use of national, sub-national or site-based indicators, data and information to assess the accuracy of the sub-indicators derived from these regional and global data sources. This could include a mixed-methods approach which makes use of multiple sources of information or combines quantitative and qualitative data, including the ground-truthing of remotely sensed data using Google Earth images, field surveys or a combination of both.

Collection process:
Data on the indicator and sub-indicators will be provided by national authorities ("main reporting entity") to the UNCCD in their national reports following a standard format every four years beginning in 2018 or through other national data platforms and mechanisms endorsed by the UN Statistical Commission. This will include the original data and reference sources, and descriptions of how these have been used to derive the indicator and sub-indicators. Eligible (i.e. developing) countries will receive financial and technical assistance in preparing their national reports from the UNCCD and its partners.

Once received, national reports will undergo a review process by the UNCCD and its partners to ensure the correct use of definitions and methodology as well as internal consistency. A comparison can be made with past assessments and other existing data sources. Regular contacts between the main reporting entity and UNCCD secretariat via a help desk system, and through regional, sub-regional, and national workshops, will form part of this review process, enable data adjustments when needed, and contribute to building national capacities. The data will then be aggregated at sub-regional, regional and global levels by the UNCCD and its partners.

Data Availability

Description:
In many countries, national data for one or more of the sub-indicators are available. Regional and global data are available for all three sub-indicators and can be disaggregated at the national level for interpretation and validation by national authorities. Communication and coordination with national statistical systems, NSO

[31] http://www.fao.org/soils-portal/soil-survey/soil-maps-and-databases/harmonized-world-soil-database-v12/en/
[32] https://www.soilgrids.org/
[33] http://54.229.242.119/apps/GSOCmap.html

representatives and UNCCD national focal points in a transparent manner will include an assessment of data needs and capacity building for monitoring and reporting on the indicator when necessary.

Time series:
Annual since the year 2000.

Calendar

Data collection:
The data collection process for UNCCD reporting has begun with the first reporting period scheduled for 2018 and subsequent reporting every four years.

Data release:
Data from the 2018 reporting period will be released by February 2019 in national, sub-regional, regional and global formats.

Data providers

The ministries or agencies ("main reporting entity") that host the UNCCD National Focal Points, in conjunction with National Statistical Offices and specialized agencies, will prepare UNCCD national reports that include indicator 15.3.1 and the sub-indicators. Otherwise national data will be procured through national data platforms and mechanisms endorsed by the UN Statistical Commission.

Data compilers

UNCCD

References

All references for this indicator are provided in the footnotes

Related indicators

2.4.1; 6.6.1; 11.3.1; 15.1.1; 15.2.1

Goal 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
Target 15.4: By 2030, ensure the conservation of mountain ecosystems, including their biodiversity, in order to enhance their capacity to provide benefits that are essential for sustainable development
Indicator 15.4.1: Coverage by protected areas of important sites for mountain biodiversity

Institutional information

Organization(s):
UN Environment World Conservation Monitoring Centre (UNEP-WCMC)
BirdLife International (BLI)
International Union for Conservation of Nature (IUCN)

Concepts and definitions

Definition:
This indicator Coverage by protected areas of important sites for mountain biodiversity shows temporal trends in the mean percentage of each important site for mountain biodiversity (i.e., those that contribute significantly to the global persistence of biodiversity) that is covered by designated protected areas.

Rationale:
The safeguard of important sites is vital for stemming the decline in biodiversity and ensuring long term and sustainable use of mountain natural resources. The establishment of protected areas is an important mechanism for achieving this aim, and this indicator serves as a means of measuring progress toward the conservation, restoration and sustainable use of mountain ecosystems and their services, in line with obligations under international agreements. Importantly, while it can be disaggregated to report on any given single ecosystem of interest, it is not restricted to any single ecosystem type, and so faithfully reflects the intent of SDG target 15.1.

Levels of access to protected areas vary among the protected area management categories. Some areas, such as scientific reserves, are maintained in their natural state and closed to any other use. Others are used for recreation or tourism, or even open for the sustainable extraction of natural resources. In addition to protecting biodiversity, protected areas have high social and economic value: supporting local livelihoods; protecting watersheds from erosion; harbouring an untold wealth of genetic resources; supporting thriving recreation and tourism industries; providing for science, research and education; and forming a basis for cultural and other non-material values.

This indicator adds meaningful information to, complements and builds from traditionally reported simple statistics of mountain area covered by protected areas, computed by dividing the total protected area within a country by the total territorial area of the country and multiplying by 100 (e.g., Chape et al. 2005). Such percentage area coverage statistics do not recognise the extreme variation of biodiversity importance over space (Rodrigues et al. 2004), and so risk generating perverse outcomes through the protection of areas which are large at the expense of those which require protection.

The indicator is used to track progress towards the 2011–2020 Strategic Plan for Biodiversity (CBD 2014, Tittensor et al. 2014), and was used as an indicator towards the Convention on Biological Diversity's 2010 Target (Butchart et al. 2010).

Concepts:
Protected areas, as defined by the International Union for Conservation of Nature (IUCN; Dudley 2008), are clearly defined geographical spaces, recognized, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values. Importantly, a variety of specific management objectives are recognised within this definition, spanning conservation, restoration, and sustainable use:

- Category Ia: Strict nature reserve
- Category Ib: Wilderness area
- Category II: National park
- Category III: Natural monument or feature
- Category IV: Habitat/species management area
- Category V: Protected landscape/seascape
- Category VI: Protected area with sustainable use of natural resources

The status "designated" is attributed to a protected area when the corresponding authority, according to national legislation or common practice (e.g., by means of an executive decree or the like), officially endorses a document of designation. The designation must be made for the purpose of biodiversity conservation, not de facto protection arising because of some other activity (e.g., military).

Sites contributing significantly to the global persistence of biodiversity are identified following globally standard criteria for the identification of Key Biodiversity Areas (IUCN 2016) applied at national levels. Two variants of these standard criteria have been applied in all countries to date. The first is for the identification of Important Bird & Biodiversity Areas, that is, sites contributing significantly to the global persistence of biodiversity, identified using data on birds, of which >12,000 sites in total have been identified from all of the world's countries (BirdLife International 2014). The second is for the identification of Alliance for Zero Extinction sites (Ricketts et al. 2005), that is, sites holding effectively the entire population of at least one species assessed as Critically Endangered or Endangered on The IUCN Red List of Threatened Species. In total, 587 Alliance for Zero Extinction sites have been identified for 920 species of mammals, birds, amphibians, reptiles, conifers, and reef-building corals. A global standard for the identification of Key Biodiversity Areas unifying these approaches along with other mechanisms for identification of important sites for other species and ecosystems was approved by IUCN (2016).

Comments and limitations:
Quality control criteria are applied to ensure consistency and comparability of the data in the World Database on Protected Areas. New data are validated at UNEP-WCMC through a number of tools and translated into the standard data structure of the World Database on Protected Areas. Discrepancies between the data in the World Database on Protected Areas and new data are minimised by provision of a manual (UNEP-WCMC 2016) and resolved in communication with data providers. Similar processes apply for the incorporation of data into the World Database of Key Biodiversity Areas.

The indicator does not measure the effectiveness of protected areas in reducing biodiversity loss, which ultimately depends on a range of management and enforcement factors not covered by the indicator. A number of initiatives are underway to address this limitation. Most notably, numerous mechanisms have been developed for assessment of protected area management, which can be synthesised into an indicator (Leverington et al. 2010). This is used by the Biodiversity Indicators Partnership as a complementary indicator of progress towards Aichi Biodiversity Target 11 (http://www.bipindicators.net/pamanagement). However, there may be little relationship between these measures and protected area outcomes (Nolte & Agrawal 2013). More recently, approaches to "green listing" have started to be developed, to incorporate both management effectiveness and the outcomes of protected areas, and these are likely to become progressively important as they are tested and applied more broadly.

Data and knowledge gaps can arise due to difficulties in determining whether a site conforms to the IUCN definition of a protected area, and some protected areas are not assigned management categories. Moreover, "other effective area-based conservation measures", as specified by Aichi Biodiversity Target 11 of the Strategic Plan for Biodiversity 2011–2020, recognise that some sites beyond the formal protected area network, while not managed primarily for nature conservation, may nevertheless be managed in ways which are consistent with the persistence of the biodiversity for which they are important (Jonas et al. 2014). However, standard approaches to documentation of "other effective area-based conservation measures" are still under debate through the IUCN Task Force on Other Effective Areas Based Conservation Measures which will conclude with recommendations for a definition on OECMs. Once defined it is likely OEMCs will be documented in the World Database on Protected Areas.

Regarding important sites, the biggest limitation is that site identification to date has focused on specific subsets of biodiversity, for example birds (for Important Bird and Biodiversity Areas) and highly threatened species (for Alliance for Zero Extinction sites). While Important Bird and Biodiversity Areas have been documented to be good surrogates for biodiversity more generally (Brooks et al. 2001, Pain et al. 2005), the application of the unified standard for identification of Key Biodiversity Areas (IUCN 2016) sites across different levels of biodiversity (genes, species, ecosystems) and different taxonomic groups remains a high priority, building from efforts to date (Eken et al. 2004, Knight et al. 2007, Langhammer et al. 2007, Foster et al. 2012).

Key Biodiversity Area identification has been validated for a number of countries and regions where comprehensive biodiversity data allow formal calculation of the site importance (or "irreplaceability") using systematic conservation planning techniques (Di Marco et al. 2016, Montesino Pouzols et al. 2014).

Future developments of the indicator will include: a) expansion of the taxonomic coverage of mountain Key Biodiversity Areas through application of the Key Biodiversity Areas standard (IUCN 2016) to a wide variety of mountain vertebrates, invertebrates, plants and ecosystem type; b) improvements in the data on protected areas by continuing to increase the proportion of sites with documented dates of designation and with digitised boundary polygons (rather than coordinates); and c) exploring other methods for assessing and presenting temporal trends in protected area coverage.

Methodology

Computation Method:

This indicator is calculated from data derived from a spatial overlap between digital polygons for protected areas from the World Database on Protected Areas (IUCN & UNEP-WCMC 2017), Key Biodiversity Areas (from the World Database of Key Biodiversity Areas, including Important Bird and Biodiversity Areas, Alliance for Zero Extinction sites, and other Key Biodiversity Areas; available through the Integrated Biodiversity Assessment Tool), and mountains (UNEP-WCMC 2002). The value of the indicator at a given point in time, based on data on the year of protected area establishment recorded in the World Database on Protected Areas, is computed as the mean percentage of each Key Biodiversity Area currently recognised that is covered by protected areas.

Year of protected area establishment is unknown for 12% of protected areas in the World Database on Protected Areas, generating uncertainty around changing protected area coverage over time. To reflect this uncertainty, a year was randomly assigned from another protected area within the same country, and then this procedure repeated 1,000 times, with the median plotted. In 2017 we slightly changed the methods described by Butchart et al. (2012, 2015) by randomly assigning a year to protected areas with no year of establishment before calculating trends in coverage. This is a computationally more efficient method and is likely to reflect more accurately changes in protected area coverage over time.

Previously the indicator was presented as the percentage of Key Biodiversity Areas completely covered by protected areas. However, it is now presented as the mean % of each Key Biodiversity Area that is covered by protected areas in order to better reflect trends in protected area coverage for countries or regions with few or no Key Biodiversity Areas that are completely covered.

Disaggregation:
Given that data for the global indicator are compiled at national levels, it is straightforward to disaggregate to national and regional levels (e.g., Han et al. 2014), or conversely to aggregate to the global level. Key Biodiversity Areas span all ecosystem types, including mountains (Rodríguez-Rodríguez et al. 2011, UNEP-WCMC 2002). The indicator can therefore be reported in combination across terrestrial and freshwater systems, or disaggregated among them. However, individual Key Biodiversity Areas can encompass terrestrial and freshwater (and indeed marine) systems simultaneously, and so determining the results is not simply additive. Finally, the indicator can be disaggregated according to different protected area management categories (categories I–VI) to reflect differing specific management objectives of protected areas.

In addition to the aggregation of the coverage of protected areas across important sites for mountain biodiversity as an indicator towards SDG 15.4, other disaggregations of coverage of protected areas of particular relevance as indicators towards SDG targets (Brooks et al. 2016) include:

SDG 14.5.1 Coverage of protected areas in relation to marine areas.
SDG 15.1.2 Proportion of important sites for terrestrial and freshwater biodiversity that are covered by protected areas, by ecosystem type.

Protected area coverage data can be combined with other data sources to yield further, complementary, indicators. For example, protected area overlay with ecoregional maps can be used to provide information on protected area coverage of different broad biogeographical regions. Protected area coverage of the distributions of different groups of species (e.g., mammals, birds, amphibians) can similarly provide indicators of trends in coverage of biodiversity at the species level. Protected area coverage can be combined with the Red List Index to generate indicators of the impacts of protected areas in reducing biodiversity loss (Butchart et al. 2012). Finally, indicators derived from protected area overlay can also inform sustainable urban development; for example, the overlay of protected areas onto urban maps could provide an indicator of public space as a proportion of overall city space.

Treatment of missing values:

- At country level

Data are available for protected areas and Key Biodiversity Areas in all of the world's countries, and so no imputation or estimation of national level data is necessary.

- At regional and global levels

Global indicators of protected area coverage of important sites for biodiversity are calculated as the mean percentage of each Key Biodiversity Area that is covered by protected areas. The data are generated from all countries, and so while there is uncertainty around the data, there are no missing values as such and so no need for imputation or estimation.

Regional aggregates:

UNEP-WCMC is the agency in charge of calculating and reporting global and regional figures for this indicator, working with BirdLife International and IUCN to combine data on protected areas with those for sites of importance for biodiversity. UNEP-WCMC aggregates the global and regional figures on protected areas from the national figures that are calculated from the World Database on Protected Areas and disseminated through Protected Planet. The World Database on Protected Areas and Protected Planet are jointly managed by UNEP-WCMC and IUCN and its World Commission on Protected Areas. The World Database on Protected Areas is held within a Geographic Information System that stores information about protected areas such as their name, size, type, date of establishment, geographic location (point) and/or boundary (polygon). Protected area coverage is calculated using all the protected areas recorded in World Database on Protected Areas whose location and extent is known. Protected areas without digital boundaries are excluded from the indicator.

Important Bird and Biodiversity Areas are sites of international significance for the conservation of biodiversity, identified using data for birds. Important Bird and Biodiversity Areas are identified using a standardised set of data-driven criteria and thresholds, relating to threatened, restricted-range, biome-restricted and congregatory species. Important Bird and Biodiversity Areas are delimited so that, as far as possible, they: (a) are different in character, habitat or ornithological importance from surrounding areas; (b) provide the requirements of the trigger species (i.e., those for which the site qualifies) while present, alone or in combination with networks of other sites; and (c) are or can be managed in some way.

Alliance for Zero Extinction sites meet three criteria: endangerment (supporting at least one Endangered or Critically Endangered species, as listed on The IUCN Red List of Threatened Species); irreplaceability (holding the sole or overwhelmingly significant (=95%) known population of the target species, for at least one life history segment); and discreteness (having a definable boundary within which the character of habitats, biological communities, and/or management issues have more in common with each other than they do with those in adjacent areas). Hence Alliance for Zero Extinction sites represent locations at which species extinctions are imminent unless appropriately safeguarded (i.e. protected or managed sustainably in ways consistent with the persistence of populations of target species).

The Important Bird and Biodiversity Area and Alliance for Zero Extinction site networks are, by definition, areas of particular importance for biodiversity as referred to in Aichi Biodiversity Target 11, and represent the only networks of such sites that have been identified systematically worldwide. Hence, they represent important areas to consider designating as formal protected areas.

Sources of discrepancies:
National processes provide the great bulk of the data that are subsequently aggregated into both the World Database on Protected Areas and the World Database of Key Biodiversity Areas, and so there are very few differences between national indicators and the global one. One minor source of difference is that the World Database on Protected Areas incorporates internationally-designated protected areas (e.g., World Heritage sites, Ramsar sites, etc), a few of which are not considered by their sovereign nations to be protected areas.

Note that because countries do not submit comprehensive data on degazetted protected areas to the WDPA, earlier values of the indictor may marginally underestimate coverage.

Methods and guidance available to countries for the compilation of the data at the national level:
The WDPA has its origins in a 1959 UN mandate when the United Nations Economic and Social Council called for a list of national parks and equivalent reserves Resolution 713 (XXVIII). More details are available here: https://www.protectedplanet.net/c/world-database-on-protected-areas. The UN List of Protected Areas has been published in 1961/62, 1966/71, 1972 (addendum to the 1966/71 edition), 1973, 1974, 1975, 1980, 1982, 1985, 1990, 1993, 1997, 2003 and 2014 which have resulted in a global network of national data providers for the WDPA. For example, in 2014 all Convention on Biological Diversity (CBD) National Focal points and all National Focal points for the CBD Protected Areas Programme of Work (PoWPA) to request data for the 2014 Un List of Protected Areas (https://www.protectedplanet.net/c/united-nations-list-of-protected-areas/united-nations-list-of-protected-areas-2014). Protected areas data is therefore compiled directly from government agencies, regional hubs and other authoritative sources in the absence of a government source. All records have a unique metadata identifier (MetadataID) which links the spatial database to the Source table where all sources are described. The data is collated and standardised following the WDPA Data Standards and validated with the source. The process of collation, validation and publication of data as well as protocols and the WDPA data standards are regularly updated in the WDPA User Manual (https://www.protectedplanet.net/c/wdpa-manual) made available through www.protectedplanet.net where all spatial data and the Source table are also published every month and can be downloaded. The process for compilation of data on sites contributing significantly to the global persistence of biodiversity (Key Biodiversity Areas) is documented online (http://www.keybiodiversityareas.org/home). Specifically, (http://www.keybiodiversityareas.org/what-are-kbas), the Key Biodiversity Area identification process is a highly inclusive, consultative and bottom-up exercise. Although anyone with appropriate scientific data may propose a site to qualify as a Key Biodiversity Area, wide consultation with stakeholders at the national level (both non-governmental and governmental organizations) is required during the proposal process. Key Biodiversity Area identification builds off the existing network of Key Biodiversity Areas, including those identified as Important Bird & Biodiversity Areas through the BirdLife Partnership of 120 national organisations (http://www.birdlife.org/worldwide/partnership/birdlife-partners), for the Alliance for Zero Extinction by 93 national and international organisations (http://www.zeroextinction.org/partners.html), and as other Key Biodiversity Areas by civil society organisations supported by the Critical Ecosystem Partnership Fund in developing ecosystem profiles, named in each of the profiles listed here (http://www.cepf.net/resources/publications/Pages/ecosystem_profiles.aspx), with new data strengthening and expanding expand the network of these sites. Any site proposal undergoes

independent scientific review. This is followed by the official site nomination with full documentation meeting the Documentation Standards for Key Biodiversity Areas. Sites confirmed by the Key Biodiversity Areas Secretariat to qualify as Key Biodiversity Areas then appear on the Key Biodiversity Areas website (http://www.keybiodiversityareas.org/home).

The WDPA User Manual (https://www.protectedplanet.net/c/wdpa-manual) published in English, Spanish, and French provides guidance to countries on how to submit protected areas data to the WDPA, what are the benefits of providing such data, which are the data standards and which quality checks are performed. We also provide a summary of our methods to calculate protected areas coverage to all WDPA users: https://www.protectedplanet.net/c/calculating-protected-area-coverage. The "Global Standard for the Identification of Key Biodiversity Areas" (https://portals.iucn.org/library/node/46259) comprises the standard recommendations available to countries in the identification of Key Biodiversity Areas, with further guidelines available on the Key Biodiversity Areas website (http://www.keybiodiversityareas.org/home). Specifically, (http://www.keybiodiversityareas.org/get-involved), the main steps of the Key Biodiversity Area identification process are the following:

i) submission of Expressions of Intent to identify a Key Biodiversity Area to Regional Focal Points;
ii) proposal Development process, in which proposers compile relevant data and documentation and consult national experts, including organizations that have already identified Key Biodiversity Areas in the country, either through national Key Biodiversity Area Coordination Groups or independently;
iii) review of proposed Key Biodiversity Areas by Independent Expert Reviewers, verifying the accuracy of information within their area of expertise; and
iv) a Site Nomination phase comprising the submission of all the relevant documentation for verification by the Key Biodiversity Areas Secretariat (see section 3.3 below).

Once a Key Biodiversity Area is identified, monitoring of its qualifying features and its conservation status is important. Proposers, reviewers and those undertaking monitoring can join the Key Biodiversity Areas Community to exchange their experiences, case studies and best practice examples.

Quality assurance

The process on how the data is collected, standardised and published is available in the WDPA User Manual at: https://www.protectedplanet.net/c/wdpa-manual which is available in English, French and Spanish. Specific guidance is provided at https://www.protectedplanet.net/c/world-database-on-protected-areas on, for example, predefined fields or look up tables in the WDPA: https://www.protectedplanet.net/c/wdpa-lookup-tables, how WDPA records are coded how international designations and regional designations data is collected, how regularly is the database updated, and how to perform protected areas coverage statistics. The process of identification of Key Biodiversity Areas is supported by the Key Biodiversity Areas Partnership (http://www.keybiodiversityareas.org/kba-partners). Among the roles of the partnership is establishment of the Key Biodiversity Areas Secretariat, which checks information submitted in the Site Nomination phase for the correct application of the Key Biodiversity Areas Standard ((https://portals.iucn.org/library/node/46259), and the adequacy of site documentation and then verifies the site, which is then published on the Key Biodiversity Areas Website (http://www.keybiodiversityareas.org/get-involved). In addition, the Chairs of the IUCN Species Survival Commission and World Commission on Protected Areas (both of whom are elected by the IUCN Membership of governments and non-governmental organisations), appoint the Chair of an independent Key Biodiversity Areas Standards and Appeals Committee, which ensures the correct application of the Global Standard for the identification of Key Biodiversity Areas. The R code for calculating protected area coverage of KBAs is documented as Dias, M. (2017) "R code for calculating protected area coverage of KBAs" (http://www.keybiodiversityareas.org/userfiles/files/R_code_for_calculating_protected_area_coverage_of_KBAs_March_2017.pdf).

In addition to dissemination via the Protected Planet website (https://www.protectedplanet.net/), the UN List process described in 3.1 the fact that protected areas data is collected from national agencies acknowledged in the WDPA metadata, and Key Biodiversity Areas website (http://www.keybiodiversityareas.org/home), Protected Planet and Key Biodiversity Areas data are disseminated through the Integrated Biodiversity Assessment Tool, available for research and conservation online (https://www.ibat-alliance.org/ibat-conservation/). This incorporates Country Profile documents for all of the world's countries, which includes documentation of the indicator of protected area coverage of Key Biodiversity Areas for the current year, starting from 2016. The first edition of each of these Country Profiles was sent for consultation to National Focal Points of the Convention on Biological Diversity (https://www.cbd.int/information/nfp.shtml), at the 13th meeting of the Conference of the Parties of the Convention on Biological Diversity; and this process will be repeated annually.

Data Sources

Description:
Protected area data are compiled by ministries of environment and other ministries responsible for the designation and maintenance of protected areas. Protected Areas data for sites designated under the Ramsar Convention and the UNESCO World Heritage Convention are collected through the relevant convention international secretariats. Protected area data are aggregated globally into the World Database on Protected Areas by the UN Environment World Conservation Monitoring Centre, according to the mandate for production of the United Nations List of Protected Areas (Deguignet et al. 2014). They are disseminated through Protected Planet, which is jointly managed by UNEP-WCMC and IUCN and its World Commission on Protected Areas (UNEP-WCMC 2016).

Key Biodiversity Areas are identified at national scales through multi-stakeholder processes, following standard criteria and thresholds. Key Biodiversity Areas data are aggregated into the World Database on Key Biodiversity Areas, managed by BirdLife International. Specifically, data on Important Bird and Biodiversity Areas are available online BirdLife International (2016) and data on Alliance for Zero Extinction sites are available online at AZE (2010). Both datasets, along with Key Biodiversity Areas identified through other processes, are available through the World Database on Key Biodiversity Areas, and, along with the World Database on Protected Areas, are also disseminated through the Integrated Biodiversity Assessment Tool for Research and Conservation Planning.

Collection process:
See information under other sections.

Data Availability

Description:

This indicator has been classified by the IAEG-SDGs as Tier 1. Current data are available for all countries in the world, and these are updated on an ongoing basis.

Time series:
~150 years

Calendar

Data collection:
UNEP-WCMC produces the UN List of Protected Areas every 5–10 years, based on information provided by national ministries/agencies. In the intervening period between compilations of UN Lists, UNEP-WCMC works closely with national ministries/agencies and NGOs responsible for the designation and maintenance of protected areas, continually updating the
WDPA as new data become available. The World Database of Key Biodiversity Areas is also updated on an ongoing basis, as new national data are submitted.

Data release:
The indicator of protected area coverage of important sites for biodiversity is anticipated to be released annually.

Data providers

Protected area data are compiled by ministries of environment and other ministries responsible for the designation and maintenance of protected areas. Key Biodiversity Areas are identified at national scales through multi-stakeholder processes, following standard criteria and thresholds.

Data compilers

Name:
UNEP-WCMC and IUCN

Description:
Protected area data are aggregated globally into the World Database on Protected Areas by the UN Environment World Conservation Monitoring Centre, according to the mandate for production of the United Nations List of Protected Areas (Deguignet et al. 2014). They are disseminated through Protected Planet, which is jointly managed by UNEP-WCMC and IUCN and its World Commission on Protected Areas (UNEP-WCMC 2016). Key Biodiversity Areas data are aggregated into the World Database on Key Biodiversity Areas, managed by BirdLife International (2017). Specifically, data on Important Bird and Biodiversity Areas are available online at BirdLife International (2016) and data on Alliance for Zero Extinction sites are available online at AZE (2010). Both datasets, along with the World Database on Protected Areas, are also disseminated through the Integrated Biodiversity Assessment Tool for Research and Conservation Planning.

References

URL:
http://www.unep-wcmc.org/; http://www.birdlife.org/; http://www.iucn.org/

References:
These metadata are based on http://mdgs.un.org/unsd/mi/wiki/7-6-Proportion-of-terrestrial-and-marine-areas-protected.ashx, supplemented by http://www.bipindicators.net/paoverlays and the references listed below.

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Goal 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
Target 15.4: By 2030, ensure the conservation of mountain ecosystems, including their biodiversity, in order to enhance their capacity to provide benefits that are essential for sustainable development
Indicator 15.4.2: Mountain Green Cover Index

Institutional information

Organization(s):

Food and Agriculture Organization of the United Nations (FAO)

Concepts and definitions

Definition:

The Green Cover Index is meant to measure the changes of the green vegetation in mountain areas - i.e. forest, shrubs, trees, pasture land, crop land, etc. – in order to monitor progress on the mountain target.

The index, will provide information on the changes in the vegetation cover and, as such, will provide an indication of the status of the conservation of mountain environments.

Rationale:

The scientific mountain community recognizes that there is a direct correlation between the green coverage of mountain areas and their state of health, and as a consequence their capacity of fulfilling their ecosystem roles. Monitoring mountain vegetation changes over time provides an adequate measure of the status of conservation of mountain ecosystems. Monitoring the mountain “Green Cover Index” over time can provide information on the forest, woody and vegetal cover in general. For instance, its reduction will be generally linked to overgrazing, land clearing, urbanization, forest exploitation, timber extraction, fuelwood collection, fire. Its increase will be due to vegetation growth possibly linked to land restoration, reforestation or afforestation programmes.

Concepts:

Mountains are defined according to the UNEP-WCMC classification that identifies them according to altitude, slope and local elevation range as described by Kapos et al. 2000:

Class 1: elevation > 4,500 meters
Class 2: elevation 3,500–4,500 meters
Class 3: elevation 2,500–3,500 meters
Class 4: elevation 1,500–2,500 meters and slope > 2
Class 5: elevation 1,000–1,500 meters and slope > 5 or local elevation range (LER 7 kilometer radius) > 300 meters
Class 6: elevation 300–1,000 meters and local elevation range (7 kilometer radius) > 300 meters

Comments and limitations:

The indicator is based on Collect Earth, the most modern technology available. Its user friendliness and smooth learning curve make it a perfect tool for performing fast, accurate and cost-effective assessments. It is free, open source and highly customizable for the specific data collection needs and methodologies. It builds upon very high resolution multi-temporal images from Google Earth and Bing Maps and Landsat 7 and 8 datasets from Google Earth Engine. Data and images are stored and globally available for any year from 2000, making possible the monitoring of the change over time.

The indicator has a global accuracy of 99%, but at national level for small countries the degree of accuracy is lower. This will be improved over time as more countries expand the data collection within their territory.

Data on mountain coverage are provided by the 2015 FAO/MPS global map of mountains.

Methodology

Computation Method:

The indicator results from the juxtaposition of land cover data extracted from FAO Collect Earth tool and the global map of mountains produced by FAO/MPS in 2015 based on the UNEP-WMCM mountain classification.

Collect Earth (http://www.openforis.org/tools/collect-earth.html) is a free and open source tool that enables data collection through Google Earth for a wide variety of purposes, including:

- Support multi-phase National Forest Inventories
- Land Use, Land Use Change and Forestry (LULUCF) assessments
- Monitoring agricultural land and urban areas
- Validation of existing maps
- Collection of spatially explicit socio-economic data
- Quantifying deforestation, reforestation and desertification

Disaggregation:

The indicator is disaggregated by mountain elevation class.

Regional aggregates:

The estimate will generated through a probabilistic sampling approach. The sampling design has been developed in order to achieve an uncertainty on the forest and vegetation cover parameters of +-2% at global level and +-4 at regional level. Remote sensing data systematically collected from 2000 will be used to generate annual series from 2000 to 2015. The satellite data will be analysed using Collect Earth.

Collect Earth is a tool that enables data collection through augmented visual interpretation of high resolution imagery using Google Earth. In conjunction with Google Earth, Bing Maps and Google Earth

Engine, users can analyse high and very high resolution satellite imagery and historical trends in vegetation. It can be used to collect data at the local, regional and global level and has been successfully used by many country partners (Papua New Guinea, Tunisia, Uruguay, others).

Methods and guidance available to countries for the compilation of the data at the national level:

The indicator results from the juxtaposition of land cover data extracted from FAO Collect Earth tool (that was used to build the Global Forest Survey (GFS) Global Assessment map) and the global map of mountains produced by FAO/MPS in 2015 based on the UNEP-WMCM mountain classification.

Mountains are defined according to the UNEP-WCMC classification that identifies them according to altitude, slope and local elevation range as described by Kapos et al. 2000:
Class 1: elevation > 4,500 meters
Class 2: elevation 3,500–4,500 meters
Class 3: elevation 2,500–3,500 meters
Class 4: elevation 1,500–2,500 meters and slope > 2
Class 5: elevation 1,000–1,500 meters and slope > 5 or local elevation range (LER 7 kilometer radius) > 300 meters
Class 6: elevation 300–1,000 meters and local elevation range (7 kilometer radius) > 300 meters
http://www.fao.org/mountain-partnership/our-work/focusareas/foodsecurity/en/g

Collect Earth (http://www.openforis.org/tools/collect-earth.html) is a free and open source tool that enables data collection through Google Earth for a wide variety of purposes, including Land Use, Land Use Change and Forestry (LULUCF) assessments. The Global Forest Survey (GFS) Global Assessment built on the visual interpretation of satellite images in publicly available repositories, such as Google Earth Engine and Bing Maps, to provide a map of land cover/land use data.

Land cover data are classified according to the Intergovernmental Panel on Climate Change (IPCC) scheme, which defines six main classes: Forest land; Cropland; Grassland; Wetlands; Settlements; Other Land. Each plot is classified according to the dominant land cover.
(http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/4_Volume4/V4_03_Ch3_Representation.pdf)

The baseline statistics for the Mountain Green Cover Index are based on the GFS Global Assessment map released in January 2017. Green cover includes forest land, grassland/shrubland and cropland. The amounts of land in square kilometers covered by each of these three IPCC land cover/land use classes are aggregated to calculate the size of the total mountain area that they cover in each country. This figure is then expressed as a ratio of the total mountain area and converted to a percentage, providing the value of the Mountain Green Cover Index of each country. This percentage is the value displayed in the SDGs global database.

Quality assurance:

The GFS Global Assessment was carried out with standard protocols applied to the entire area of interest. Documents on the system tools and survey can be accessed at:

http://openforis.org/fileadmin/user_upload/Collect_Earth_Tutorials/Collect_Earth_User_Manual_20150618_highres_full.pdf

http://www.fao.org/in-action/global-forest-survey/en/

Data for all countries have been produced by FAO/MPS and are in the process of being distributed to governments for their validation.

Data Sources

Description:

The source of data is FAO Collect Earth.

Collection process:

The estimate will be generated through regional assessment carried out by circa 30 partners all around the world. The data will be collected in with the same methodology in order to guarantee data consistency. The methodology enables intensification of the sampling in order to obtain same level of uncertainties at regional and sub regional levels. The data collection will be also harmonized according to the Forest Resources Assessment definition schemes.

Data Availability

All

Calendar

Data collection:

By the end of 2016

Data release:

FAO Collect Earth is constantly updated; the mountain map doesn't need any update.

Data providers

As data are all already available, the analysis will be conducted by MPS/FAO and data will be validated by countries.

Data compilers

FAO

References

URL:

www.fao.org; www.mountainpartnership.org

References:

- http://www.mountainpartnership.org/
- http://www.mountainpartnership.org/our-work/focusareas/foodsecurity/en/ (GIS raster of mountains is available for download from the right-side bar)
- http://www.openforis.org/tools/collect-earth.html
- http://www.fao.org/3/a-i5175e.pdf
- http://www.fao.org/

Related indicators

6.6, 15.1

Goal 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
Target 15.5: Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species
Indicator 15.5.1: Red List Index

Institutional information

Organization(s):
International Union for Conservation of Nature (IUCN)
BirdLife International (BLI)

Concepts and definitions

Definition:
The Red List Index measures change in aggregate extinction risk across groups of species. It is based on genuine changes in the number of species in each category of extinction risk on The IUCN Red List of Threatened Species (IUCN 2015) is expressed as changes in an index ranging from 0 to 1.

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

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

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

The Red List Index is used as an indicator towards the 2011–2020 Strategic Plan for Biodiversity (CBD 2014, Tittensor et al. 2014), and was used as an indicator towards the Convention on Biological Diversity's 2010 Target (Butchart et al. 2010) and Millennium Development Goal 7. It can also be projected to assess future development scenarios (Visconti et al. 2015).

Concepts:
Threatened species are those listed on The IUCN Red List of Threatened Species in the categories Vulnerable, Endangered, or Critically Endangered (i.e., species that are facing a high, very high, or extremely high risk of extinction in the wild in the medium-term future). Changes over time in the proportion of species threatened with extinction are largely driven by improvements in knowledge and changing taxonomy. The indicator excludes such changes to yield a more informative indicator than the simple proportion of threatened species. It therefore measures change in aggregate extinction risk across groups of species over time, resulting from genuine improvements or deteriorations in the status of individual species. It can be calculated for any representative set of species that have been assessed for The IUCN Red List of Threatened Species at least twice (Butchart et al. 2004, 2005, 2007).

Comments and limitations:
There are four main sources of uncertainty associated with Red List Index values and trends.

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

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

c. Inconsistency between species assessments. These can be minimized by the requirement to provide supporting documentation detailing the best available data, with justifications, sources, and estimates of uncertainty and data quality, which are checked and standardized by IUCN through Red List Authorities, a Red List Technical Working Group and an independent Standards and Petitions Sub-committee. Further, detailed Guidelines on the Application of the Categories and Criteria are maintained (IUCN SPSC 2016), as is an online training course (in English, Spanish and French).

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

The main limitation of the Red List Index is related to the fact that the Red List Categories are relatively broad measures of status, and thus the Red List Index for any individual taxonomic group can practically be updated at intervals of at least four years. As the overall index is aggregated across multiple taxonomic groups, it can be updated typically annually. In addition, the Red List Index does not capture particularly well the deteriorating status of common species that remain abundant and widespread but are declining slowly.

Methodology

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

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

The formula requires that:

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

In many cases, species lists will change slightly from one assessment to the next (e.g., owing to taxonomic revisions). The conditions can therefore be met by retrospectively adjusting earlier Red List categorizations using current information and taxonomy. This is achieved by assuming that the current Red List Categories for the taxa have applied since the set of species was first assessed for the Red List, unless there is information to the contrary that genuine status changes have occurred. Such information is often contextual (e.g., relating to the known history of habitat loss within the range of the species). If there is insufficient information available for a newly added species, it is not incorporated into the Red List Index until it is assessed for a second time, at which point earlier assessments are retrospectively corrected by extrapolating recent trends in population, range, habitat and threats, supported by additional information. To avoid spurious results from biased selection of species, Red List Indices are typically calculated only for taxonomic groups in which all species worldwide have been assessed for the Red List, or for samples of species that have been systematically or randomly selected.

The methods and scientific basis for the Red List Index were described by Butchart et al. (2004, 2005, 2007, 2010).

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

i) Data Deficiency: Red List categories (from Least Concern to Extinct) are assigned to all Data Deficient species, with a probability proportional to the number of species in non-Data Deficient categories for that taxonomic group;

ii) Extrapolation uncertainty: although RLIs were extrapolated linearly based on the slope of the closest two assessed point, there is uncertainty about how accurate this slope may be. To incorporate this uncertainty, rather than extrapolating deterministically, the slope used for extrapolation is selected from a normal distribution with a probability equal to the slope of the closest two assessed points, and standard deviation equal to 60% of this slope (i.e., the CV is 60%);

iii) Temporal variability: the 'true' Red List Index likely changes from year to year, but because assessments are repeated only at multi-year intervals, the precise value for any particular year is uncertain.

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

Methods for generating national disaggregations of the Red List Index are described below.

Disaggregation:
The Red List Index can be downscaled to show national and regional Red List Indices, weighted by the fraction of each species' distribution occurring within the country or region, building on the method published by Rodrigues et al. (2014) PLoS ONE 9(11): e113934. These show an index of aggregate survival probability (the inverse of extinction risk) for all birds, mammals, amphibians, corals and cycads occurring within the country or region. The index shows how well species are conserved in a country or region to its potential contribution to global species conservation. The index is calculated as:

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

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

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

The taxonomic groups included are those in which all species have been assessed for the IUCN Red List more than once. Red List categories for years in which comprehensive assessments (i.e. those in which all species in the taxonomic group have been assessed) were carried out are determined following the approach of Butchart et al. 2007; PLoS ONE 2(1): e140, i.e. they match the current categories except for those taxa that have undergone genuine improvement or deterioration in extinction risk of sufficient magnitude to qualify for a higher or lower Red List category.

The indicator can also be disaggregated by ecosystems, habitats, and other political and geographic divisions (e.g., Han et al. 2014), by taxonomic subsets (e.g., Hoffmann et al. 2011), by suites of species relevant to particular international treaties or legislation (e.g., Croxall et al. 2012), by suites of species exposed to particular threatening processes (e.g., Butchart 2008), and by suites of species that deliver particular ecosystem services, or have particular biological or life-history traits (e.g., Regan et al. 2015). In each case, information can be obtained from The IUCN Red List of Threatened Species to determine which species are relevant to particular subsets (e.g. which occur in particular ecosystems, habitats, and geographic areas of interest).

Disaggregations of the Red List Index are also of particular relevance as indicators towards the following SDG targets (Brooks et al. 2015): SDG 2.4 Red List Index (species used for food and medicine); SDG 2.5 Red List Index (wild relatives and local breeds); SDG 12.2 Red List Index (impacts of utilisation) (Butchart 2008); SDG 12.4 Red List Index (impacts of pollution); SDG 13.1 Red List Index (impacts of climate change); SDG 14.1 Red List Index (impacts of pollution on marine species); SDG 14.2 Red List Index (marine species); SDG 14.3 Red List Index (reef-building coral species) (Carpenter et al. 2008); SDG 14.4 Red List Index (impacts of utilisation on marine species) – an ad hoc joint FAO-IUCN Technical Expert Group is currently working to develop agreed recommendations on the use and interpretation of this indicator; SDG 15.1 Red List Index (terrestrial & freshwater species); SDG 15.2 Red List Index (forest-specialist species); SDG 15.4 Red List Index (mountain species); SDG 15.7 Red List Index (impacts of utilisation) (Butchart 2008); and SDG 15.8 Red List Index (impacts of invasive alien species) (Butchart 2008, McGeoch et al. 2010).

Treatment of missing values:

- At country level

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

- At regional and global levels

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

Regional aggregates:
The Red List Categories and Criteria are applied for each species on The IUCN Red List of Threatened Species and are determined globally and provided principally by the Specialist Groups and stand-alone Red List Authorities of the IUCN Species Survival Commission, IUCN Secretariat-led initiatives, the BirdLife International partnership, and the other IUCN Red List partner organizations. The staff of the IUCN Global Species Programme compile, validate, and curate these data, and are responsible for publishing and communicating the results. Each individual species assessment is supported by the application of metadata and documentation standards (IUCN 2013), including classifications of, for example, threats and conservation actions (Salafsky et al. 2008).

Red List assessments are undertaken through either open workshops or through open-access web-based discussion fora. Assessments are reviewed by the appropriate Red List Authority (an individual or organization appointed by the IUCN Species Survival Commission to review assessments for specific species or groups of species) to ensure standardisation and consistency in the interpretation of information and application of the criteria. A Red List Technical Working Group and the IUCN Red List Unit work to ensure consistent categorization between species, groups and assessments. Finally, a Standards and Petitions Sub-committee monitors the process and resolves challenges and disputes over Red List assessments.

In addition, IUCN publishes guidelines on applying the IUCN Red List Categories and Criteria at regional or national scales (IUCN 2012b). Based on these, many countries have initiated programmes to assess the extinction risk of species occurring within their borders. These countries will be able to implement the Red List Index based on national extinction risk, once they have carried out at least two national Red Lists using the IUCN system in a consistent way (Bubb et al. 2009). An increasing number of countries have now completed national Red List Indices for a range of taxa (e.g., Gärdenfors 2010, Pihl & Flensted 2011).

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

Sources of discrepancies:
Some countries have assessed the national extinction risk of species occurring in the country, and have repeated such assessments, allowing a national Red List Index to be produced. This may differ from the indicator described here because (a) it considers national rather than global extinction risk, and (b) because it takes no account of the national responsibility for the conservation of each species, treating as equal both those species that occur nowhere outside the country (i.e. national endemics) and those with large ranges that occur in many other countries. Any such differences will be smaller for countries within which a high proportion of species are endemic (i.e., only found in that country), as in many island nations and mountainous countries, especially in the tropics. The differences will be larger for countries within which a high proportion of species have widespread distributions across many nations.

Methods and guidance available to countries for the compilation of the data at the national level:
See existing metadata for the Red List Index SDG indicator 15.5.1, especially the section on "Methodology". In sum: the data underlying the Red List Index are compiled under the authority of the IUCN Red List Committee, through application of the IUCN Red List Categories & Criteria (https://portals.iucn.org/library/node/10315). This includes submissions of endemics from national red list processes, where these have been conducted following the "Guidelines for application of IUCN Red List Criteria at Regional and National Levels" (https://portals.iucn.org/library/node/10336) and following the "Required and Recommended Supporting Information for IUCN Red List Assessments" (http://goo.gl/O52euG). Assessments may be submitted in all three IUCN languages (English, French and Spanish) and Portuguese. All assessments are peer reviewed through the relevant Red List Authority for the species or species group in question, as documented in the Red List Rules of Procedure (https://cmsdocs.s3.amazonaws.com/keydocuments/Rules_of_Procedure_for_IUCN_Red_List_Assessments_2017-2020.pdf); see in particular Annex 3, the "Details of the Steps Involved in the IUCN Red List Process" (https://cmsdocs.s3.amazonaws.com/keydocuments/Details_of_the_Steps_Involved_in_the_IUCN_Red_List_Process.pdf).

See existing metadata for the Red List Index SDG indicator 15.5.1, especially the section on "Methodology". In sum: the key document providing international recommendations and guidelines to countries and all involved in application of the IUCN Red List Categories & Criteria (https://portals.iucn.org/library/node/10315) is the "Guidelines for Using the IUCN Red List Categories and Criteria" (in English - http://cmsdocs.s3.amazonaws.com/RedListGuidelines.pdf and in French - http://cmsdocs.s3.amazonaws.com/keydocuments/RedListGuidelines_FR.pdf) accompanied by the "Required and Recommended Supporting Information for IUCN Red List Assessments". For countries (and regions), this is supplemented by the "Guidelines for application of IUCN Red List Criteria at Regional and National Levels" (https://portals.iucn.org/library/node/10336). To support the calculation of Red List Indices for any given country (or region), "R code to calculate and plot national RLIs weighted by the proportion of each species' distribution within a country or region" is posted online (https://cmsdocs.s3.amazonaws.com/keydocuments/R_code_for_calculating_RLIs_weighted_by_proportion_of_each_species'_range_within_a_country_or_region.pdf).

Quality assurance
See existing metadata for the Red List Index SDG indicator 15.5.1, especially the section on "Methodology", with full documentation in the Red List Rules of Procedure (https://cmsdocs.s3.amazonaws.com/keydocuments/Rules_of_Procedure_for_IUCN_Red_List_Assessments_2017-2020.pdf) in particular Annex 3, the "Details of the Steps Involved in the IUCN Red List Process" (https://cmsdocs.s3.amazonaws.com/keydocuments/Details_of_the_Steps_Involved_in_the_IUCN_Red_List_Process.pdf). In sum: all Red List assessments are peer reviewed through the relevant Red List Authority for the species or species group in question; and all Red List assessments undergo consistency checks (to ensure consistency with assessments submitted for other taxonomic groups, regions, processes, etc.) by the Red List Unit before publication on the Red List website (http://www.iucnredlist.org/). Finally, the Chair of the IUCN Species Survival Commission (elected each four years by the government and non-governmental Members of IUCN) appoints a Chair for a Standards and Petitions Sub-Committee (https://www.iucn.org/theme/species/about/species-survival-commission/ssc-leadership-and-steering-committee/sub-committees/standards-and-petitions-

subcommittee), which is responsible for ensuring the quality and standards of the IUCN Red List and for ruling on petitions against the listings of species on the IUCN Red List.

In addition to dissemination via the Red List website (http://www.iucnredlist.org/), Red List data are disseminated through the Integrated Biodiversity Assessment Tool, available for research and conservation online (https://www.ibat-alliance.org/ibat-conservation/). This incorporates Country Profile documents for all of the world's countries, which includes documentation of the Red List Index indicator for the current year, starting from 2016. The first edition of each of these Country Profiles was sent for consultation to National Focal Points of the Convention on Biological Diversity (https://www.cbd.int/information/nfp.shtml), at the 13th meeting of the Conference of the Parties of the Convention on Biological Diversity; and this process will be repeated annually.

Data Sources

Description:
National agencies producing relevant data include government, non-governmental organisations (NGOs), and academic institutions working jointly and separately. Data are gathered from published and unpublished sources, species experts, scientists, and conservationists through correspondence, workshops, and electronic fora. Data are submitted by national agencies to IUCN, or are gathered through initiatives of the Red List Partnership. From 2013–6, the Red List Partnership encompassed: BirdLife International; Botanic Gardens Conservation International; Conservation International; Microsoft; NatureServe; Royal Botanic Gardens, Kew; Sapienza University of Rome; Texas A&M University; Wildscreen; and Zoological Society of London.

Collection process:
See information under other categories.

Data Availability

Description:
The Red List Index has been classified by the IAEG-SDGs as Tier 1. Current data are available for all countries in the world, and these are updated on a regular basis (approximately once every four years).

Time series:
Since 1980 (approximately 35 years).

Calendar

Data collection:
The IUCN Red List of Threatened Species is updated annually. Red List Indices for any sets of species that have been comprehensively reassessed in that year are usually released alongside the update of the IUCN Red List. Data are stored and managed in the Species Information Service database, and are made freely available for non-commercial use through the IUCN Red List website. Re-assessments of extinction risk are required for every species assessed on The IUCN Red List of Threatened Species once every ten years,

and ideally undertaken once every four years. A Red List Strategic Plan details a calendar of upcoming re-assessments for each taxonomic group.

Data release:
New data typically become available for the Red List Index every year. For example, the first Red List Index for cycads was released in 2015, updates to the Red List Indices for birds and mammals will be released in 2016, and updates for conifers and sharks are anticipated in 2017.

Data providers

National agencies producing relevant data include government, non-governmental organisations (NGOs), and academic institutions working jointly and separately. Data are gathered from published and unpublished sources, species experts, scientists, and conservationists through correspondence, workshops, and electronic fora. Data are submitted by national agencies to IUCN, or are gathered through initiatives of the Red List Partnership.

Data compilers

Name:
IUCN

Description:
Compilation and reporting of the Red List Index at the global level is conducted by the International Union for Conservation of Nature (IUCN) and BirdLife International, on behalf of the Red List Partnership. Comprehensive syntheses of The IUCN Red List of Threatened Species have been published by, for example, Baillie et al. (2004) and Hoffmann et al. (2010).

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Goal 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
Target 15.6: Promote fair and equitable sharing of the benefits arising from the utilization of genetic resources and promote appropriate access to such resources, as internationally agreed
Indicator 15.6.1: Number of countries that have adopted legislative, administrative and policy frameworks to ensure fair and equitable sharing of benefits

Institutional information

Organization(s):
Secretariat of the Convention on Biological Diversity

Concepts and definitions

Definition:
The indicator is defined as the number of countries that have adopted legislative, administrative and policy frameworks to ensure fair and equitable sharing of benefits, since the adoption of the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity (2010).

The Protocol covers genetic resources and traditional knowledge associated with genetic resources, as well as the benefits arising from their utilization by setting out core obligations for its contracting Parties to take measures in relation to access, benefit-sharing and compliance.

The Protocol provides greater legal certainty and transparency for both providers and users of genetic resources and associated traditional knowledge. It helps to ensure benefit-sharing, in particular when genetic resources leave the country providing the genetic resources, and it establishes more predictable conditions for access to genetic resources and associated traditional knowledge.

By enhancing legal certainty and promoting benefit-sharing, the Nagoya Protocol encourages the advancement of research on genetic resources which could lead to new discoveries for the benefit of all. The Nagoya Protocol also creates incentives to conserve and sustainably use genetic resources, and thereby enhances the contribution of biodiversity to development and human well-being.
In addition, Parties to the Protocol are to encourage users and providers to direct benefits arising from the utilization of genetic resources towards the conservation of biological diversity and the sustainable use of its components.

Rationale:
The Nagoya Protocol, to be operational, requires that certain enabling conditions are met at the national level for its effective implementation. In particular, countries will need, depending on their specific circumstances, to revise legislative, administrative or policy measures already in place or develop new measures in order to meet the obligations set out under the Protocol.

In particular, the Nagoya Protocol provides that Parties are to take legislative, administrative or policy measures, as appropriate, to ensure the fair and equitable sharing of the benefits arising from the utilization of genetic resources, including for genetic resources that are held by indigenous communities, and benefits arising from the utilization of traditional knowledge associated with genetic resources.
The ABS Clearing-House is a platform for exchanging information on access and benefit-sharing established by Article 14 of the Protocol, The ABS Clearing-House is a key tool for facilitating the implementation of the Nagoya Protocol, by enhancing legal certainty and transparency on procedures for access, and for monitoring the utilization of genetic resources along the value chain. The Protocol requires Parties to make information on legislative, administrative and policy measures available to the ABS Clearing-House. Non-Parties are also encouraged to make this information available in the same manner. The goal is to allow users of genetic resources and associated traditional knowledge to easily find information on the ABS Clearing-House on how to access these resources and knowledge in an organized manner, and all in one convenient location.

Indicator 15.6.1 directly measures progress made by countries in establishing legislative, administrative or policy frameworks on access and benefit-sharing (ABS). By developing their ABS frameworks, countries are contributing to the achievement of SDG Target 15.6 and to the conservation and sustainable use of biological and genetic diversity. Progress in this indicator is assessed through measuring the increase in the number of countries that have adopted ABS legislative, administrative and policy measures and that have made available this information in the ABS Clearing-House.

Comments and limitations:
This indicator can be used to measure progress in adopting ABS legislative, administrative and policy frameworks over time.

This indicator does not assess the scope or effectiveness of ABS legislative, administrative and policy frameworks.

The notion of framework suggests that there is a complete set of rules established on access and benefit-sharing. However, it is difficult to have a predefined idea of what constitutes an ABS framework. In the context of this indicator, the publication by a country of one or more ABS legislative, administrative and policy measure in the ABS Clearing-House would be considered progress by that country on having an ABS legislative, administrative and policy framework.

Methodology

Computation Method:
Summation of information made available by each Party to the Convention on Biological Diversity related to:

- ABS legislative, administrative or policy measures made available to the ABS Clearing-House (y/n);

Disaggregation:
Data are provided by countries (or regional integration entities), and can be displayed by country, regional group, membership to a specific regional organization, and/or by their status as Parties or non-Parties to the Protocol.

Treatment of missing values:

- At country level
  NA

- At regional and global levels
  NA

Regional aggregates:
NA

Sources of discrepancies:
Reliability of the indicator is dependent on countries making information available to the ABS Clearing-House on ABS legislative, administrative or policy measures.

In addition to the information made available by countries to the ABS Clearing-House, the CBD Secretariat collects information from other sources: national biodiversity strategies and actions plans, national reports submitted under the CBD, the interim national reports on the implementation of the Nagoya Protocol (due in 2017) and official communications to the SCBD (responses to notifications, email communications, etc.). The information collected from these sources inform the Secretariat's inputs to other processes under the Protocol, in particular the consideration by the Conference of the Parties serving as the meeting of the Parties to the Protocol (COP-MOP) of national reports (Article 29) and assessment and review (Article 31). The resulting information on the number of countries with ABS legislative, administrative or and policy measures may differ from the number of countries that have made available this information in the ABS Clearing-House.

Methods and guidance available to countries for the compilation of the data at the national level:
Please see Work Plans and Methodological Development for Tier III SDG Indicators submitted on 31 October 2016.

Please refer to reporting requirements under the Nagoya Protocol and the International Treaty on PGRFA respectively.

Quality assurance
Please refer to reporting requirements under the Nagoya Protocol and the International Treaty on PGRFA respectively.

Capacity building activities and guidance provided to Parties to the respective instruments.

Data Sources

Description:
The Access and Benefit-sharing Clearing-House home page: http://absch.cbd.int.

Collection process:
NA

Data Availability

Description:
For 196 Parties to the Convention on Biological Diversity.

Availability of data is dependent on countries making the information on ABS legislative, administrative or and policy measures available to the ABS Clearing-House.

Calendar

Data collection:
Ongoing

Data release:
First data set can be made available by the SCBD in 2016

Data providers

Publishing authorities for the ABS Clearing-House as designated by the CBD national focal points or the ABS focal points.

Data compilers

CBD Secretariat

References

Text of the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity: https://www.cbd.int/abs/text/default.shtml

The Access and Benefit-sharing Clearing-House: http://absch.cbd.int

Related indicators

An indicator on numbers of permits and numbers of Material Transfer Agreements issued would provide complementary information.

Goal 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
Target 15.7: Take urgent action to end poaching and trafficking of protected species of flora and fauna and address both demand and supply of illegal wildlife products
Indicator 15.7.1: Proportion of traded wildlife that was poached or illicitly trafficked

Institutional information

Organization(s):

United Nations Office on Drugs and Crime (UNODC)

Concepts and definitions

Definition:

The share of all trade in wildlife detected as being illegal

Rationale:

There are over 35,000 species under international protection, so it is impossible to monitor all poaching. Illegal trade, however, is an indirect indicator of poaching. Wildlife seizures represent concrete instances of illegal trade, but the share of overall wildlife crime they represent is unknown and variable. In addition, the number of species under international protection continues to grow. Legal international trade in protected species, by definition, is 100% captured in the CITES Trade Database, which now contains over 16 million records of trade in CITES-listed species. To ground the illegal trade data in a complete indicator, the ratio of aggregated seizures to total trade is estimated. An increase in the share of total wildlife trade that is illegal would be interpreted as a negative indicator, and a decrease as a positive one.

Because the illegal wildlife trade represents thousands of distinct products, a means of aggregation is necessary. The legal trade value does not represent the true black market value of the items seized, nor the true value of the legal shipments, because it is derived from a single market source (US LEMIS). It does, however, present a logical and consistent means of aggregating unlike products.

Concepts:

“All trade in wildlife” is the sum of the values of legal and illegal trade

“Legal trade” is the sum of the value of all shipments made in compliance with the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), using valid CITES permits and certificates.

“Illegal trade” is the sum of the value of all CITES/listed specimens seized.

Comments and limitations:

Seizures are an incomplete indicator of trafficking, and subject to considerable volatility. Universal coverage is not presently available, although 120 countries are represented in the present database. Since the indicator looks at the relationship between two values, changes in the relationship could be due to changes in either value.

Methodology

Computation Method:

The value of a species-product unit is derived from the weighted average of prices declared for legal imports of analogous species product units, as acquired from United States Law Enforcement Monitoring and Information System of the Fish and Wildlife Service.

The value of legal trade is the sum of all species-product units documented in CITES export permits as reported in the CITES Annual Reports times the species-product unit prices as specified above.

The value of illegal trade is the sum of all species-product units documented in the World WISE seizure database times the species-product unit prices as specified above.

The indicator is value of illegal trade/(value of legal trade + value of illegal trade)

Disaggregation:

Where source data are available, the data could be disaggregated to the national level. As a form of trade data, issues of gender, age, and disability status are not applicable.

Treatment of missing values:

- At country level

  Given the number of products and volatility of these markets, there is presently no mechanism for imputing missing data.

- At regional and global levels

  As above

Regional aggregates:

National data are added.

Sources of discrepancies:

The global figure is the aggregate of national figures provided by countries.

Data Sources

Description:

The legal trade data are reported annually by Parties to CITES and stored in the CITES Trade Database, managed by the UNEP World Conservation Monitoring Centre in Cambridge.

The detected illegal trade data have been gathered from a number of sources and combined in a UNODC database called “World WISE”. This database will be filled, from 2017, with data from the new annual CITES Illegal Trade reporting requirement.

The US LEMIS price data for CITES-listed species are also provided to UNEP-WCMC within the U.S. annual report to CITES.

Collection process:

Some adjustment/validation is necessary between countries, but standardized codes for the legal wildlife trade have been developing since 1975. The basic fields necessary for the global indicator (species, product, and unit) are well established and present in every seizure. Some unit conversions (e.g. logs to MT to m3 for timber) are necessary for some products. For many commodities, for instance trade in live animals and trophies, it is possible to aggregate based on “whole individuals”. To do regional or national breakdowns, however, data on the source of the shipment are necessary (as the impact of poaching pertains to the source country, not the seizure country), and these data are not available for every seizure.

Data Availability

60

Calendar

Data collection:

The first tranche of data from the Illicit Trade Report should be available in November 2017.

Data release:

To be determined

Data providers

The CITES Management Authority of each country

Data compilers

UNODC and UNEP-WCMC

References

URL:

www.unodc.org

References:

http://www.unodc.org/documents/data-and-analysis/wildlife/Methodological_Annex_final.pdf

http://trade.cites.org/cites_trade_guidelines/en-CITES_Trade_Database_Guide.pdf

Goal 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
Target 15.8: By 2020, introduce measures to prevent the introduction and significantly reduce the impact of invasive alien species on land and water ecosystems and control or eradicate the priority species
Indicator 15.8.1: Proportion of countries adopting relevant national legislation and adequately resourcing the prevention or control of invasive alien species

Institutional information

Organization(s):

International Union for Conservation of Nature (IUCN)

Concepts and definitions

Definition:

The Proportion of countries adopting relevant national legislation and adequately resourcing the prevention or control of invasive alien species measures the adoption of national legislation relevant to the prevention or control of invasive alien species.

Rationale:

This indicator measures the management response globally, by tracking invasive alien species legislation for control and prevention at national and international levels. The more countries with invasive alien species and biosecurity related legislation, the greater the global commitment to controlling the threat to biodiversity from invasive alien species. The larger the number of invasive alien species -relevant international policies, and the greater the level of national commitment to these, the greater the global commitment to controlling invasive alien species. The more international agreements a country is party to the more strongly committed the country is to controlling invasive alien species.

The global trend in policy response has been positive for the few last decades and, since the publication of GBO3, the adoption of policies against invasive alien species has significantly increased. As reported in 2010, 55% of the 191 countries that are Party to the Convention on Biological Diversity have overarching national legislation to prevent, control and/or limit the spread and impact of invasive alien species, and most Convention on Biological Diversity Parties were signatory to at least one of ten other multilateral agreements that cover invasive alien species in some form. Among these countries, 8% are signatory to all 10 international agreements (McGeoch et al. 2010).

For example, the Council of Europe has been developing and adopting codes of conduct addressing some key pathways (e.g. horticulture, botanic gardens, zoos, hunting, or fishing) of invasive alien species. Moreover, once the European regulation on invasive alien species is fully adopted, it will have major implications for neighbouring countries, but also at a world scale, as the European institution is a major partner for global trade.

The projection of the current trend of adoption of national policies on invasive alien species projects a nonsignificant increase by 2020, with a slowing of the rate of increase in the proportion of countries adopting such legislation. The adoption of national and international policies on invasive alien species is a first step to combatting the spread of invasive alien species.

The indicator is maintained by the IUCN Species Survival Commission's Invasive Species Specialist Group.

This indicator is utilised for assessing progress towards Aichi Biodiversity Target 9 of the Strategic Plan for Biodiversity 2011-2020: "by 2020, invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment" (CBD 2014, Tittensor et al. 2014), and was used as an indicator towards the Convention on Biological Diversity's 2010 Target (Butchart et al. 2010).

Concepts:

An alien species is a species introduced by humans – either intentionally or accidentally – outside of its natural past or present distribution. However not all alien species have negative impacts, and it is estimated that between 5% and 20% of all alien species become problematic. It is these species that are termed 'invasive alien species'. Thus, an invasive alien species (IAS) is a species that is established outside of its natural past or present distribution, whose introduction and/or spread threaten biological diversity.

Comments and limitations:

The adoption of legislation does not necessarily indicate the existence of regulations or policy to implement the legislation or how successful such implementation has been on the ground. There still remains a need for further indicator refinement to make this link clearer.

Legislation does not necessarily capture all efforts against invasive alien species that are happening at the national level.

Methodology

Computation Method:

Data for this indicator were produced by identifying any national legislation relevant to controlling invasive alien species for each country (currently implemented for 191 Parties to the Convention on Biological Diversity). Legislation was considered relevant to the prevention of alien species introductions or to control of invasive alien species if it applied to multiple taxonomic groups and was not exclusively intended to protect agriculture. If two separate sets of legislation within a country covered plants and animals, the date of the more recent legislation was used. Invasive alien species -related legislation is implemented through national Ministries of the Environment and a variety of other ministries and agencies.

Disaggregation:

None implemented to date.

Treatment of missing values:

- At country level

  No imputation is conducted in producing the indicator.

- At regional and global levels

  No imputation is conducted in producing the indicator.

Regional aggregates:

National accession into relevant multinational environment-related agreements serves as the underlying data for this indicator.

Sources of discrepancies:

The indicator is derived from national accession into relevant multinational environment-related agreements, and so there are no differences between global and national figures.

Data Sources

Description:

Ten multinational environment-related agreements were used to quantify trends in the adoption of invasive alien species -related policy. National legislation related to the prevention, management and control of invasive alien species was recorded including year of enactment, type of legislation (prevention, management etc.) and the data analysed to calculate the indicator.

Collection process:

See other categories above.

Data Availability

Description:

191 countries

Time series:

Approximately 60 years

Calendar

Data collection:

This indicator was first calculated in 2010 and there has been no update since. Plans are to update this baseline, enhance it and make it available for global, regional and national use.

Data release:

It is anticipated that the indicator will be available annually.

Data providers

National accession into relevant multinational environment-related agreements serves as the underlying data for this indicator.

Data compilers

Name:

IUCN SSC

Description:

The indicator is maintained by the IUCN SSC Invasive Species Specialist Group (http://www.issg.org/).

Comment:
NA

References

URL:

http://www.iucn.org/

References:

These metadata are based on http://www.bipindicators.net/iaslegislationadoption, supplemented by the references listed below.

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

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

MCGEOCH, M.A., et al. (2010). Global indicators of alien species invasion: threats, biodiversity impacts and responses. Diversity and Distributions 16: 95-108.

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