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Agenda Item 4: Specific Issues

Mediterranean Sustainability Dashboard: Methodological Factsheets. Draft Version

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Mediterranean Sustainability Dashboard:
Methodological Factsheets
Draft Version

Various frameworks are used by Plan Bleu for designing the methodological factsheets of the 26 indicators of the Mediterranean Sustainability Dashboard, as agreed at COP 20 (Decision IG.23/4).

For the indicators corresponding or linked to the SDG ones, Plan Bleu is using the Metadata Factsheets as available online at the following link: https://unstats.un.org/sdgs/metadata

The SDG Indicators are classified into three tiers based on their level of methodological development and the availability of data at the global level, as follows:

- Tier 1: Indicator is conceptually clear, has an internationally established methodology and standards are available, and data are regularly produced by countries for at least 50 per cent of countries and of the population in every region where the indicator is relevant.
- Tier 2: Indicator is conceptually clear, has an internationally established methodology and standards are available, but data are not regularly produced by countries.
- Tier 3: No internationally established methodology or standards are yet available for the indicator, but methodology/standards are being (or will be) developed or tested.

Plan Bleu is using its own approach for the Tier 3 indicators because there is not any internationally established methodology or standards yet available.

For the indicators recommended by the Mediterranean Strategy for Sustainable Development (MSSD) 2016-2025, the framework is not yet defined; the methodological information is extracted from relevant guidelines, reports, or websites.

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N°	MSSD OBJECTIVE	INDICATOR	NEW INDICATOR (Plan Bleu's proposal)
1	General indicators	Ecological footprint	
2	General indicators	Human Development Index	
3	General indicators	Gross Domestic Product	SDG Indicator 8.1.1 Annual growth rate of real GDP per capita
4	General indicators	Youth literacy rate	
5	General indicators	Girl/Boy primary and secondary school registration ratio	
6	1 - Sea and coast	Number of ratifications and level of compliance as reported by Barcelona Convention Contracting Parties	
7	1 - Sea and coast	Percentage of protected coastal and marine areas under national jurisdiction	SDG Indicator 14.5.1 Coverage of protected areas in relation to marine areas
8	2 - Rural & Resources	Water efficiency index	SDG Indicator 6.4.1. Change in water-use efficiency over time
9	2 - Rural & Resources	Number of countries participating in the Green list initiative	
10	2 - Rural & Resources	Official development assistance and public expenditure on conservation and sustainable use of biodiversity and ecosystems (SDG 15.a.1)	
11	2 - Rural & Resources	Global Food Security Index	
12	2 - Rural & Resources	Water demand by sector	SDG Indicator 6.4.2 Level of water stress: freshwater withdrawal as a proportion of available freshwater resources
13	2 - Rural & Resources	Share of population with access to an improved water source	SDG Indicator 6.1.1 Proportion of population using safely managed drinking water service
14	2 - Rural & Resources	Share of population with access to an improved sanitation system	SDG Indicator 6.2.1 Proportion of population using (a) safely managed sanitation services
15	2 - Rural & Resources	Proportion of agriculture quality products and Share of the agricultural land area used by organic farming	SDG Indicator 2.4.1 Proportion of agricultural area under productive and sustainable agriculture
16	2 - Rural & Resources		SDG Indicator 15.5.1 Red List Index (IUCN).
17	3 - Cities	People living in informal settlements (%)	SDG Indicator 11.1.1: Proportion of urban population living in slums, informal settlements, or inadequate housing
18	3 - Cities	Status of UNESCO world heritage sites	
19	3 - Cities	Waste generated and treated by type of waste and treatment type	SDG Indicator 12.5.1 on recycling rates
20	4 - Climate change	Green House Gas emissions	

21	4 - Climate change	Energy use efficiency, Renewable energy rate	SDG Indicator 7.3.1 Energy intensity measured in terms of primary energy and GDP and SDG indicator 7.2.1 Renewable energy share in the total final energy consumption
22	5 – Green/blue economy	Material intensity of the economy.	SDG 12.2.2 Domestic material consumption, domestic material consumption per capita, and domestic material consumption per GDP
23	6 - Governance	National Sustainable Development Strategies	SDG 17.14.1 Number of countries with mechanisms in place to enhance policy coherence of sustainable development
24	6 - Governance	Proportion of bank credit allocated to the private sector *(removed)*	
25	6 - Governance	Public and private expenses for research and development in percentage of GDP *(removed)*	
26	6 - Governance	Number of countries adopting the Aarhus Convention	SDG Indicator 16.10.2 Number of countries that adopt and implement constitutional, statutory and/or policy guarantees for public access to information

MSSD 1: Ecological footprint

Ecological Footprint accounting quantifies the supply and demand of Earth's biocapacity.

he National Footprint Accounts (NFA) are the most widely used Ecological Footprint (EF) dataset, and provide results for most countries and the world from 1961 to 2014, based primarily on publicly available UN datasets.

Ecological Footprint is a measure of how much area of biologically productive land and water an individual, population or activity requires to produce all the resources it consumes and to absorb the waste it generates, using prevailing technology and resource management practices. The Ecological Footprint is usually measured in global hectares. Because trade is global, an individual or country's Footprint includes land or sea from all over the world. Without further specification, Ecological Footprint generally refers to the Ecological Footprint of consumption. Ecological Footprint is often referred to in short form as Footprint. "Ecological Footprint" and "Footprint" are proper nouns and thus should always be capitalized.

Ecological Footprint of consumption from the Footprints of production, imports, and exports:

$$EF_C = EF_P + EF_I - EF_E$$

Where:

EF_C = Footprint of consumption associated with a product or waste

EF_P = Footprint of production associated with product or waste

EF_I = Footprint of imports associated with product or waste

EF_E = Footprint of exports associated with product or waste

The Footprint of consumption of individual products or wastes are summed to obtain an aggregate Footprint of consumption for a given land use category.

biological capacity or biocapacity is the capacity of ecosystems to regenerate what people demand from those surfaces. Life, including human life, competes for space. The biocapacity of a particular surface represents its ability to renew what people demand. Biocapacity is therefore the ecosystems' capacity to produce biological materials used by people and to absorb waste material generated by humans, under current management schemes and extraction technologies. Biocapacity can change from year to year due to climate, management, and also what portions are considered useful inputs to the human economy. In the National Footprint Accounts, the biocapacity of an area is calculated by multiplying the actual physical area by the yield factor and the appropriate equivalence factor. Biocapacity is usually expressed in global hectares.
Biocapacity for Single Land Use Type

$$BC = A * YF * IYF * EQF$$

Where:

BC = biocapacity of a given land use type, gha

A = Area of a given land use type within a country, nha

YF = Yield factor of a given land use type within a country, wha/nha

IYF = Intertemporal Yield factor of a given land use type for that year, no units

EQF = Equivalence factor for given land use type, gha/wha

ecological deficit / reserve OR biocapacity deficit / reserve
The difference between the biocapacity and Ecological Footprint of a region or country. An ecological deficit occurs when the Footprint of a population exceeds the biocapacity of the area available to that population. Conversely, an ecological reserve exists when the biocapacity of a region exceeds its population's Footprint. If there is a regional or national ecological deficit, it means that the region is importing biocapacity through trade or liquidating regional ecological assets, or emitting wastes into a global commons such as the atmosphere. In contrast to the national scale, the global ecological deficit cannot be compensated for through trade, and is therefore equal to overshoot by definition.

References

http://www.footprintnetwork.org/
http://data.footprintnetwork.org/
https://www.footprintnetwork.org/resources/glossary/
https://www.footprintnetwork.org/content/uploads/2018/05/2018-National-Footprint-Accounts-Guidebook.pdf

MSSD 2: Human Development Index (HDI)

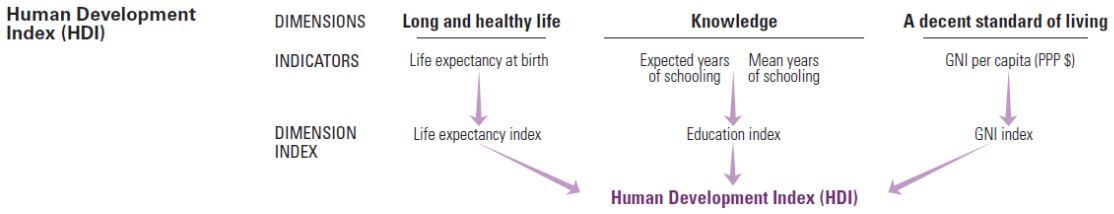
The HDI was created to emphasize that people and their capabilities should be the ultimate criteria for assessing the development of a country, not economic growth alone. The HDI can also be used to question national policy choices, asking how two countries with the same level of GNI per capita can end up with different human development outcomes. These contrasts can stimulate debate about government policy priorities.

The Human Development Index (HDI) is a summary measure of average achievement in key dimensions of human development: a long and healthy life, being knowledgeable and have a decent standard of living. The HDI is the geometric mean of normalized indices for each of the three dimensions.

The health dimension is assessed by life expectancy at birth, the education dimension is measured by mean of years of schooling for adults aged 25 years and more and expected years of schooling for children of school entering age. The standard of living dimension is measured by gross national income per capita. The HDI uses the logarithm of income, to reflect the diminishing importance of income with increasing GNI. The scores for the three HDI dimension indices are then aggregated into a composite index using geometric mean.

The HDI simplifies and captures only part of what human development entails. It does not reflect on inequalities, poverty, human security, empowerment, etc. The HDRO offers the other composite indices as broader proxy on some of the key issues of human development, inequality, gender disparity and poverty.

A fuller picture of a country's level of human development requires analysis of other indicators and information presented in the statistical annex of the HDR report.



References:

http://www.hdr.undp.org/en
http://hdr.undp.org/sites/default/files/hdr2018_technical_notes.pdf
http://hdr.undp.org/en/2018-update/download

MSSD 3: SDG Indicator 8.1.1: Annual growth rate of real GDP per capita

Goal 8: Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all

Target 8.1: Sustain per capita economic growth in accordance with national circumstances and, in particular, at least 7 per cent gross domestic product growth per annum in the least developed countries

Institutional information

Organization(s):
United Nations Statistics Division (UNSD)

Concepts and definitions

Definition:
Annual growth rate of real Gross Domestic Product (GDP) per capita is calculated as the percentage change in the real GDP per capita between two consecutive years. Real GDP per capita is calculated by dividing GDP at constant prices by the population of a country or area. The data for real GDP are measured in constant US dollars to facilitate the calculation of regional and global aggregates.

Rationale:
Real Gross Domestic Product (GDP) per capita is a proxy for the average standard of living of residents in a country or area.
A positive percentage change in annual real GDP per capita can be interpreted as an increase in the average standard of living of the residents in a country or area

Concepts:
GDP measures the monetary value of final goods and services produced in an economic territory/country in a given period of time (say a quarter or a year). It is calculated without making deductions for depreciation of produced assets or for depletion and degradation of natural resources. GDP can be measured using the expenditure approach as the sum of expenditure on final consumption plus gross capital formation plus exports less imports, the production approach as the value of output less intermediate consumption plus any taxes less subsidies on products not already included in the value of output, or the income approach as compensation of employees plus gross operating surplus plus gross mixed incomes plus taxes less subsidies on both production and imports

Comments and limitations:
Although countries or areas calculate GDP using the common principles and recommendations in the United Nations System of National Accounts (SNA), there are still problems in international comparability of GDP estimates. These include:

a. Different versions of the SNA (for example, 1968, 1993 or 2008) countries or areas use in calculating their GDP estimates
b. Different degree of coverage of informal and non-observed economic activities in the GDP estimates

Further, as a necessary condition to being a key economic performance indicator of sustainable development, one of the often-cited limitations of GDP is that it does not account for the social and environmental costs of production. It is designed as a measure of the level of overall well-being. For example, growth in real GDP per capita reveals nothing concerning energy and material interactions with the environment.

Methodology

Computation Method:
The annual growth rate of real Gross Domestic Product (GDP) per capita is calculated as follows:

a. Convert annual real GDP in domestic currency at 2010 prices for a country or area to US dollars at 2010 prices using the 2010 exchange rates.
b. Divide the result by the population of the country or area to obtain annual real GDP per capita in constant US dollars at 2010 prices.
c. Calculate the annual growth rate of real GDP per capita in year t+ 1 using the following formula: [(G(t+1) – G(t))/G(t)] x 100, where G(t+1) is real GDP per capita in 2010 US dollars in year t+1 and G(t) is real GDP per capita in 2010 US dollars in yeart.

Disaggregation:
It is possible to disaggregate the country data by region, if countries can make available the underlying regional data which are consistent with the national accounts data to perform the disaggregation.

Treatment of missing values:

- At country level
  When a full set of official annual GDP data is not available, estimation procedures are employed to obtain estimates for the entire time series. When full data are not available, a hierarchy of other data sources is used to gather information on the national accounts of a country or area. The data gathered are then either used directly or estimation procedures are applied to obtain the annual GDP data.

  If official data are not available, the selection of data sources is based on following hierarchy:
  a. Official publications and websites of national statistical offices, central banks or relevant government ministries;
  b. Official statistics disseminated by Eurostat, European Central Bank and the Organization for Economic Cooperation and Development (OECD) for their members;
  c. Information provided by Permanent Missions to the United Nations;
  d. Economic surveys and estimates prepared by United Nations' Regional Economic Commissions (i.e. UNECE, ECLAC, ESCAP, UNECA and ESCWA);
  e. Publications of international organizations with a strong focus on statistical data collection (including regional development banks). The most common sources used for their respective countries are listed below: Asia: Asian Development Bank, ASEAN, Arab Monetary Fund, Secretariat of the Pacific Community (SPC) Africa: African Development Bank, Afristat, Banque des Etats de l'Afrique Centrale (BEAC), Union Economique Monetaire Ouest Africain (UEMOA) Americas: CARICOM, Caribbean Development Bank, Eastern Caribbean Central Bank (ECCB) Other: OECD for non-member countries Statistical Committee of the

Commonwealth of Independent States.

f. Estimates and indicators from other international organizations. The most common sources used are: the International Monetary Fund (IMF) and the World Bank;
g. Publications or websites of specialized groups, the most common sources used are: the Gulf Cooperation Council, the Asia-Pacific Economic Cooperation (APEC), the Committee of Central Bank Governors in SADC; the Islamic Development Bank, and the Statistical Training Centre for Islamic Countries;
h. Economic data from commercial providers and other sources, the most common sources used are: the Economic Intelligence Unit and the United States Central Intelligence Agency;
i. Information from neighbouring countries where no alternative source is available (Switzerland for Liechtenstein; France for Monaco; Italy for San Marino; Spain for Andorra; and some Pacific Islands for other Pacific Islands);

The estimation methods involved in preparing the GDP estimates using sources other than official data include trend extrapolation, using appropriate indices for inflating or deflating relevant data series, and share distribution of GDP. A hierarchical assessment is followed to determine which method should be used. Effort is made to keep data estimation methods consistent from year to year.

Regional and global aggregates:

For each year, the real GDP and population estimates for each country or area are summed up to derive the regional and global aggregates. The regional and global aggregates are then divided by the corresponding population to derive the regional and global real GDP per capita estimates. These estimates are then used to calculate the annual growth rates in regional and global real GDP per capita using the formula as described above.

Sources of discrepancies:

The differences with country data include the following:

a. Official country data are typically available in domestic currency only. The data estimates for this indicator are in US dollars.
b. Countries or areas may not have a full set of official GDP data. The GDP data estimated by UNSD include imputations using various estimation procedures as described above to obtain estimates for the entire time series.
c. Official country data are often reported as multiple sets of time series versions, with each version representing a unique methodology used to compile the national accounts data (for example, a difference between two time series versions could reflect a change in currency, a switch from 1968 SNA to 1993 SNA, a change in the office responsible for compiling national accounts, etc.). These time series versions may not be comparable, especially when a country has shifted from the 1968 SNA to 1993 SNA or 2008 SNA. When a single time series version does not exist for the entire period (1970 to t-1), UNSD uses estimation procedures to backcast the most recently reported time series version. Backcasting is only performed when time series overlap for at least one year. The overlapping year is used to create a ratio; this ratio is then applied backwards to the previous time series version. If there is a change of fiscal year between two official data time series, the older series are converted to the fiscal year type of the most recent time series prior to backcasting. UNSD uses the same backcasting methods when official country constant price time series versions include multiple base years or when constant

price time series versions are reported as constant prices of the previous year (CPPY). CPPY data are backcasted by using the officially reported current price data and the officially reported constant price data. The data are backcasted into a single series with a fixed base year.

d. The population estimates from the United Nations Population Division may be different from country-produce estimates as the former include analysis carried out to take into account deficiencies such as incompleteness of coverage, lack of timeliness and errors in the reporting or coding of the basic information and to establish past population trends by resolving the inconsistencies affecting the basic data.Methods and guidance available to countries for the compilation of the data at the national level:

- GDP: National Accounts Statistics: Main Aggregates and Detailed Tables, 2016 See https://unstats.un.org/unsd/nationalaccount/pubsDB.asp?pType=3

- Population: United Nations Demographic Yearbook See: https://unstats.un.org/unsd/demographic/products/dyb/dybsets/2016.pdf

- GDP: 2008 SNA See https://unstats.un.org/unsd/nationalaccount/docs/SNA2008.pdf

- Population: Principles and Recommendations for Population and Housing Censuses See https://unstats.un.org/unsd/publication/seriesM/Series_M67rev3en.pdf

Quality assurance

Data are validated in accordance with the international statistical

standards. Discrepancies are resolved through written communication

with countries.

Data Sources

Description:

The underlying annual GDP estimates in domestic currency are collected from countries or areas annually through a national accounts questionnaire (NAQ), while the underlying population estimates are obtained from the UN Population Division on https://esa.un.org/unpd/wpp/Download/Standard/Population/

Collection process:

Each year, the national accounts section of the UNSD sends a pre-filled NAQ to countries or areas to collect the latest data on official annual national accounts in domestic currency. In order to lighten the reporting burden of countries to different international and regional organizations the UNSD receives data from the Organisation for Economic Co-operation and Development (OECD), the United Nations Economic Commission for Europe (ECE) and the Caribbean Community (CARICOM) on behalf of their constituents.

The official national accounts data in domestic currency are then validated to check for errors. The validation procedure involves ensuring that aggregates are equal to the sum of their components and that data series which are provided in multiple tables are represented consistently. After that, the current and constant price GDP series are converted into US dollars by applying the corresponding

market exchange rates as reported by the International Monetary Fund (IMF). When these conversion rates are not available other IMF rates are used (official rates or principal rates).

For countries whose exchange rates are not reported by the IMF, the annual average of United Nations operational rates of exchange (UNOPs) is applied. The UNOPs are conversion rates that are applied in official transactions of the United Nations with these countries. These exchange rates are based on official, commercial and/or tourist rates of exchange.

In cases where a country experiences considerable distortion in the conversion rates, the UNSD uses price-adjusted rates of exchange (PARE) as an alternative to the exchange rates reported by the IMF or UN operational rates of exchange. The conversion based on PARE corrects the distorting effects of uneven price changes that are not well reflected in the other conversion rates. Consequently, unrealistic levels in GDP and other national accounts aggregates expressed in US Dollars may have been adjusted for certain time periods to improve the economic analysis at national, regional and local levels.

The estimates derived for each year are compared to previous years to ensure that estimates are prepared consistently from year to year. Additionally, the growth rate from year to year is analysed to identify anomalies in the data.

The constant-price GDP series for each country is then divided by its population to obtain its real GDP per capita.

More information on the methodology to estimate the data is available on http://unstats.un.org/unsd/snaama/methodology.pdf.

Data Availability

Description:
National statistics offices, central banks or national agencies responsible for compiling official national accounts estimates for a country or area

Time series:
Annual data from 1970 to 2016 are available.

Calendar

Data collection:
The exercise to collect official annual national accounts estimates from countries or areas using the national accounts questionnaire starts in February of each year for the data available up to the end of the previous year.

Data release:
December of each year

Data providers

National statistics offices, central banks or national agencies responsible for compiling official national accounts estimates for a country or area

Data compilers

United Nations Statistics Division (UNSD)

References

URL:

http://unstats.un.org/unsd/snaama/introduction.asp

References:

http://unstats.un.org/unsd/nationalaccount/sna.asp
http://unstats.un.org/unsd/nationalaccount/data.as
p
http://unstats.un.org/unsd/snaama/introduction.as
p http://data.un.org/Explorer.aspx?d=SNAAMA
https://esa.un.org/unpd/wpp/

Related indicators

Any economic statistics related SDG indicator

MSSD 4: Youth literacy rate

Definition
Percentage of people aged 15 to 24 years who can both read and write with understanding a short simple statement on their everyday life. Generally, 'literacy' also encompasses 'numeracy', the ability to make simple arithmetic calculations.

Calculation method
Divide the number of people aged 15 to 24 years who are literate by the total population in the same age group and multiply the result by 100.

Data required
Population and number of literates (or illiterates) aged 15 to 24 years old.

Data source
National population census; household and/or labour force surveys.

Interpretation
A high literacy rate among the 15 to 24 years old suggests a high level of participation and retention in primary education, and its effectiveness in imparting the basic skills of reading and writing. Because persons belonging to this age group are entering adult life, monitoring their literacy levels is important with respect to national human resources policies, as well as for tracking and forecasting progress in adult literacy.

Limitations
Some countries apply definitions and criteria for literacy which are different from the international standards defined above, or equate persons with no schooling to illiterates, or change definitions between censuses. Practices for identifying literates and illiterates during actual census enumeration may also vary. Errors in literacy self-declaration can affect the reliability of the statistics.

Purpose
Reflects the outcomes of the primary education system over the previous 10 years, and is often seen as a proxy measure of social progress and economic achievement.

Quality standards
Rate cannot exceed 100%. It is useful to align measurements of literacy with the standard international definition given above and to administer literacy tests on a sample basis to verify and improve the quality of the statistics.

Types of disaggregation
By sex

MSSD 5: Ratios of girls to boys in primary, secondary and tertiary education

Definition
The ratio of girls to boys in primary, secondary or tertiary education, or Gender Parity Index, is the ratio between the Gross Enrolment Ratio (GER) of girls and that of boys, for each level of education.

Concepts
Primary education, according to the International Standard Classification of Education (ISCED97), normally consists of programmes designed on a unit or project basis to give pupils a sound basic education in reading, writing and mathematics along with an elementary understanding of other subjects such as history, geography, natural science, social science, art and music.

Secondary education is divided by ISCED97 into lower secondary education and upper secondary education. Lower secondary education is generally designed to continue the basic programmes of the primary level but with more subject-focused teaching, requiring more specialized teachers for each subject area. In upper secondary education, instruction is generally organized even more along subject lines and teachers typically need an even higher or more subject-specific qualification.

Tertiary education is defined by ISCED97 as programmes with an educational content more advanced than what is offered at the secondary level. The first stage is composed of largely theoretically based programmes intended to provide sufficient qualifications for gaining entry into advanced research programmes and professions with high skill requirements; and programmes that are generally more practical, technical and/or occupationally specific. The second stage of tertiary education comprises programmes devoted to advanced study and original research, which lead to the award of an advanced research qualification.

The Gender Parity Index (GPI) is another term used to describe the ratio of girls to boys in primary, secondary or tertiary education. The GPI is calculated based on the Gross Enrolment Ratio for a given level of education.

The Gross Enrolment Ratio (GER) is the total enrolment in a specific level of education, regardless of age, expressed as a percentage of the eligible official school-age population corresponding to the same level of education in a given school year.

Method of computation
The GPI is calculated by dividing the female GER by the male GER for a given level of education. To calculate the GER it is first necessary to determine the official school age population for each level of education. Then, the number of students enrolled in each level of education is divided by the official school age population for that level of education, and the result is multiplied by 100. GERs for boys and girls are calculated separately. This method requires information on the structure of education (that is, the theoretical entrance ages and durations of primary, lower secondary and upper secondary education), enrolments in each level of education and the populations of the age groups corresponding to the given levels of education. The age group for tertiary education usually corresponds to a five- year duration following the theoretical completion age of upper secondary education. Separate figures for boys and girls are required.

RATIONALE AND INTERPRETATION
Gender parity in access to and participation in schooling is the first step toward gender equality in education. Eliminating gender disparity at all levels of education improves women's health and well-being, position in family and society, economic opportunities and returns, and political participation. A mother's level of education has also proved to have a strong positive effect on her children's education and family health. Women's education is also an important determinant of economic development. This indicator of equality of educational opportunities is a measure of both fairness and efficiency.

A GPI of 1 indicates parity between the sexes. A GPI lower than 1 indicates a disparity in favour of boys, that is, a disadvantage for girls; whereas a GPI greater than 1 indicates a disparity in favour of girls, that is, a disadvantage for boys.

SOURCES AND DATA COLLECTION

Data on school enrolment are usually recorded by the ministry of education or derived from surveys and censuses. If administrative data are not available, household survey data may be used, although household surveys usually measure self-reported attendance rather than enrolment as reported by schools. Also, household survey data may not be comparable between surveys. A serious problem with household survey data is also the inaccurate recording of pupils' ages, depending on the time of the year that the survey is conducted. Later in the school year, some younger children may appear to be of primary school age when in fact they are not. It can also happen that older children appear to be of secondary school age when in fact they were of primary age at the start of the school year.

Among international surveys, Multiple Indicator Cluster Surveys (MICS) and Demographic and Health Surveys (DHS) and sometimes also Living Standards Measurement Studies and Core Welfare Indicators Questionnaire Surveys in Africa provide school attendance data.

Data should be organized according to the levels of education defined in ISCED97 to ensure international comparability of resulting indicators.

Population estimates used in the denominator of the Gross Enrolment Ratio can be obtained from population censuses and vital statistics registration. The use of different population estimates in the denominator is often at the origin of differences between national and international data for this indicator, as international population estimates generally differ from those available at the national level.

DISAGGREGATION

Rural and urban differences are important for the analysis of gender differences in school enrolment, because of significant differences in school facilities, available resources, demand on children's time for work, and drop-out patterns that affect girls and boys differently. It is also important to consider disaggregation by geographical areas and social or ethnic groups since gender differences may be more pronounced in some groups. Disaggregation should focus on identifying marginalized populations, particularly those living in remote areas or belonging to minorities.

Most countries collect data disaggregated by sex, age, region, type of school, etc. Some countries however proceed with systematic data collection only for total enrolment, and disaggregations at the national level are extrapolated from data collected from a sample of schools. These breakdowns allow policy makers to target the population sub-groups where gender differences are more pronounced. Although administrative data cannot generally distinguish between urban and rural enrolment, household surveys may allow disaggregating data for urban and rural areas.

COMMENTS AND LIMITATIONS

Caution should be exercised in interpreting trends towards gender parity. For example, the indicator cannot help determine whether improvements in the ratio reflect increases in girls' school participation (desirable) or decreases in boys' participation (undesirable). Also, it also does not reveal whether those enrolled in school complete the relevant education cycles or, whether the overall level of participation in education is low or high.

Finally, the difference between the value of the GPI and the value 1—representing perfect parity—does not mean the same thing for girls and boys. For example, a GPI of 0.5—0.5 units away from parity—indicates that the value of the female component of the indicator (that is, the female GER) is half the value of the male component (that is, the male GER). By contrast, a GPI of 1.5—also 0.5 units away from parity—indicates that the value of the male component of the indicator is two-thirds of the value of the female component (not half). Consequently, a disadvantage for boys in terms of gender parity appears more drastic than a disadvantage for girls.

It is therefore important to supplement the analysis of trends in GPIs with analysis of trends in the GER of men and women.

Special attention should be paid to interpreting data related to tertiary education where a ratio in favour of girls may reflect the fact that a higher number of men than women study abroad or join the labour market early.

GENDER EQUALITY ISSUES

In situations of limited resources, families make difficult choices about sending their children to school. They may perceive the value of education differently for boys and girls. Girls are more likely than boys to suffer from limited access to education, especially in rural areas. But where basic education is widely accepted and overall enrolment is high, girls tend to equal or outnumber boys at primary and secondary levels. The pattern is similar in higher education, but with larger differences between the two sexes.

DATA FOR GLOBAL AND REGIONAL MONITORING

For global and regional monitoring, the United Nations Educational, Social and Cultural Organization Institute for Statistics (UIS) produces time series data based on enrolment data reported by education ministries or national statistical offices, through questionnaires sent annually to countries, and population estimates produced by the Population Division of the United Nations Department of Economic and Social Affairs (UNPD). Population estimates are revised and submitted to international agencies every two years by the United Nations Population Division based on recent country population censuses or updated information on births, deaths and migration. Consequently, UIS updates its time series in order to make trends comparable for UPE monitoring.

The Gender Parity Index is calculated for each level of education. To ensure international comparability, the official school age populations for each level of education are those defined in ISCED97. (on ISCED, see DATA FOR GLOBAL AND REGIONAL MONITORING for Indicator 2.1)

Country figures may differ from international figures because of differences between nationally defined school age populations and levels, and those defined in ISCED97 or differences in coverage (that is, the extent to which different types of education—for instance, private or special education—or different types of programmes—for instance, adult education or early childhood care and education—are included in national figures). There might also be differences between national population data and population estimates prepared by the UNPD, which are used by UIS as denominator for the indicator.

Regional and global averages are calculated on the basis of the data published by the UIS and using the best possible non-publishable estimates where no publishable data exist. Averages are produced using the appropriate school-age populations as weights. At the tertiary level, this is the five-year age group immediately following the theoretical end of secondary education as defined by ISCED97.

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MSSD 7: SDG Indicator 14.5.1: Coverage of protected areas in relation to marine areas

Goal 14: Conserve and sustainably use the oceans, seas and marine resources for sustainable development
Target 14.5: By 2020, conserve at least 10 per cent of coastal and marine areas, consistent with national and international law and based on the best available scientific information

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:
The indicator Coverage of protected areas in relation to marine areas shows temporal trends in the mean percentage of each important site for marine 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 marine 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 marine 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.

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; maintaining fisheries; 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 marine 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 marine Key Biodiversity Areas through application of the Key Biodiversity Areas standard (IUCN 2016) to a wide variety of marine 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 marine 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 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 through the marine environment (Edgar et al. 2008) and beyond. The indicator can therefore be reported in combination across marine systems along with terrestrial or freshwater systems, or disaggregated among them. However, individual Key Biodiversity Areas can encompass marine, terrestrial, and freshwater 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 marine biodiversity as an indicator towards SDG 14.5, other disaggregations of coverage of protected areas of particular relevance as indicators towards SDG targets (Brooks et al. 2016) include:

SDG 15.1.2 Proportion of important sites for terrestrial and freshwater biodiversity that are covered by protected areas, by ecosystem type.
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 eco-regional 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) 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 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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URL:
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MSSD 8: SDG Indicator 6.4.1: Change in water-use efficiency over time

Goal 6: Ensure availability and sustainable management of water and sanitation for all
Target 6.4: By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity

Institutional information

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

Concepts and definitions

Definition:
The change in water use efficiency over time (CWUE). The change in the ratio of the value added to the volume of water use, over time.

Water Use Efficiency (WUE) is defined as the volume of water used divided by the value added of a given major sector[1]. Following ISIC 4 coding, sectors are defined as:

1. agriculture; forestry; fishing (ISIC A), hereinafter "agriculture";
2. mining and quarrying; manufacturing; electricity, gas, steam and air conditioning supply; constructions (ISIC B, C, D and F), hereinafter "MIMEC";
3. all the service sectors (ISIC E and ISIC G-T), hereinafter "services".

The unit of the indicator is expressed in Value/Volume, commonly USD/m^3.

Rationale:
The rationale behind this indicator consists in providing information on the efficiency of the economic and social usage of water resources, i.e. value added generated by the use of water in the main sectors of the economy, and distribution network losses.

The distribution efficiency of water systems is implicit within the calculations and could be made explicit if needed and where data are available.

This indicator addresses specifically the target component "substantially increase water-use efficiency across all sectors", by measuring the output per unit of water from productive uses of water as well as losses in municipal water use. It does not aim at giving an exhaustive picture of the water utilization in a country. Other indicators, specifically those for Targets 1.1, 1.2, 2.1, 2.2, 5.4, 5.a, 6.1, 6.2, 6.3, 6.5 will complement the information provided by this indicator. In particular, the indicator needs to be combined with the water stress indicator 6.4.2 to provide adequate follow-up of the target 6.4.

[1] In order to maintain consistency with the terminology used in SEEA-Water, the terms water use and water abstraction are utilized in this text. In particular, "water abstraction" must be considered synonym of "water withdrawal, as expressed in both AQUASTAT and the statement of the SDG target 6.4.

Together, the three sectoral efficiencies provide a measure of overall water efficiency in a country. The indicator provides incentives to improve water use efficiency through all sectors, highlighting those sectors where water use efficiency is lagging behind.
The interpretation of the indicator would be enhanced by the utilization of supplementary indicators to be used at country level. Particularly important in this sense would be the indicator on efficiency of water for energy and the indicator on the efficiency of the municipality distribution networks.

Concepts:

- Water use: water that is received by an industry or households from another industry or is directly abstracted. [SEEA-Water (ST/ESA/STAT/SER.F/100), par. 2.21]
- Water abstraction: water removed from the environment by the economy. [SEEA-Water (ST/ESA/STAT/SER.F/100), par. 2.9]
- Water use for irrigation (km³/year)
    - Annual quantity of water used for irrigation purposes. It includes water from renewable freshwater resources, as well as water from over-abstraction of renewable groundwater or abstraction of fossil groundwater, direct use of agricultural drainage water, (treated) wastewater, and desalinated water. [AQUASTAT Glossary]
- Water use for livestock (watering and cleaning) (km³/year)
    - Annual quantity of water used for livestock purposes. It includes water from renewable freshwater resources, as well as water from over-abstraction of renewable groundwater or abstraction of fossil groundwater, direct use of agricultural drainage water, (treated) wastewater, and desalinated water. It includes livestock watering, sanitation, cleaning of stables, etc. If connected to the public water supply network, water used for livestock is included in the services water use. [AQUASTAT Glossary]
- Water use for aquaculture (km³/year)
    - Annual quantity of water used for aquaculture. It includes water from renewable freshwater resources, as well as water from over-abstraction of renewable groundwater or abstraction of fossil groundwater, direct use of agricultural drainage water, (treated) wastewater, and desalinated water. Aquaculture is the farming of aquatic organisms in inland and coastal areas, involving intervention in the rearing process to enhance production and the individual or corporate ownership of the stock being cultivated. [AQUASTAT Glossary]
- Water use for the MIMEC sectors (km³/year)
    - Annual quantity of water used for the MIMEC sector. It includes water from renewable freshwater resources, as well as over-abstraction of renewable groundwater or abstraction of fossil groundwater and use of desalinated water or direct use of (treated) wastewater. This sector refers to self-supplied industries not connected to the public distribution network. [AQUASTAT Glossary. To be noted that in AQUASTAT, the sectors included in the MIMEC group are referred to as “industry”][2]
- Water use for the services sectors (km³/year)
    - Annual quantity of water used primarily for the direct use by the population. It includes water from renewable freshwater resources, as well as over-abstraction of renewable groundwater or abstraction of fossil groundwater and the use of desalinated water or direct use of treated wastewater. It is usually computed as the total water used by the public distribution network. It can include that part of the industries, which is connected

[2] In AQUASTAT, as well as in the World Bank databank and in other national and international datasets, the MIMEC sector is referred to as “Industry”. Also, SEEA-Water uses the term “industrial use” of water.

to the municipal network. [AQUASTAT Glossary. To be noted that in AQUASTAT, the sectors included in “services” are referred to as “municipal”]

- Value added (gross)
    - Value added is the net output of a sector after adding up all outputs and subtracting intermediate inputs. It is calculated without making deductions for depreciation of fabricated assets or depletion and degradation of natural resources. The industrial origin of value added is determined by the International Standard Industrial Classification (ISIC), revision 4. [WB Databank, metadata glossary, modified]
- Arable land
    - Arable land is the land under temporary agricultural crops (multiple-cropped areas are counted only once), temporary meadows for mowing or pasture, land under market and kitchen gardens and land temporarily fallow (less than five years). The abandoned land resulting from shifting cultivation is not included in this category. Data for “Arable land” are not meant to indicate the amount of land that is potentially cultivable. [FAOSTAT]
- Permanent crops
    - Permanent crops are the land cultivated with long-term crops which do not have to be replanted for several years (such as cocoa and coffee); land under trees and shrubs producing flowers, such as roses and jasmine; and nurseries (except those for forest trees, which should be classified under "forest"). Permanent meadows and pastures are excluded from land under permanent crops. [FAOSTAT]
- Proportion of irrigated land on the total cultivated land
    - Part of cultivated land that is equipped for irrigation, expressed in percentage

Comments and limitations:

The corrective coefficient Cr for the agricultural sector is needed in order to focus the indicator on the irrigated production. This is done for two main reasons:

- To ensure that only runoff water and groundwater (so-called blue water) are considered in computing the indicator;
- To eliminate a potential bias of the indicators, which otherwise would tend to decrease if rainfed cropland is converted to irrigated.

Methodology

Computation Method:

Water use efficiency is computed as the sum of the three sectors listed above, weighted according to the proportion of water used by each sector over the total use. In formula:

$$WUE = A_{we} \times P_A + M_{we} \times P_M + S_{we} \times P_S$$

Where:

WUE = Water use efficiency
A_{we} = Irrigated agriculture water use efficiency [USD/m^3]
M_{we} = MIMEC water use efficiency [USD/m^3]
S_{we} = Services water use efficiency [USD/m^3]
P_A = Proportion of water used by the agricultural sector over the total use
P_M = Proportion of water used by the MIMEC sector over the total use
P_S = Proportion of water used by the service sector over the total use

The computing of each sector is described below.
Water use efficiency in irrigated agriculture is calculated as the agricultural value added per agricultural water use, expressed in USD/m^3.
In formula:

$$A_{we} = \frac{GVA_a \times (1 - C_r)}{V_a}$$

Where:

A_{we} = Irrigated agriculture water use efficiency [USD/m^3]
GVA_a = Gross value added by agriculture (excluding river and marine fisheries and forestry) [USD]
C_r = Proportion of agricultural GVA produced by rainfed agriculture
V_a = Volume of water used by the agricultural sector (including irrigation, livestock and aquaculture) [m^3]

The volume of water used by the agricultural sectors (V) is collected at country level through national records and reported in questionnaires, in units of m^3/year (see example in AQUASTAT http://www.fao.org/nr/water/aquastat/sets/aq-5yr-quest_eng.xls). Agricultural value added in national currency is obtained from national statistics, converted to USD and deflated to the baseline year.

C_r can be calculated from the proportion of irrigated land on the total Arable land and Permanent crops (hereinafter "cultivated land", as follows:

$$C_r = \frac{1}{1 + \frac{A_i}{(1 - A_i) * 0.375}}$$

Where:

A_i = proportion of irrigated land on the total cultivated land, in decimals
0.375 = generic default ratio between rainfed and irrigated yields

More detailed estimations are however possible and encouraged at country level.

Water efficiency of the MIMEC sectors (including power production): MIMEC value added per unit of water used for the MIMEC sector, expressed in USD/m^3.

In formula:

$$M_{we} = \frac{GVA_m}{V_m}$$

Where:

M_{we} = Industrial water use efficiency [USD/m^3]
GVA_m = Gross value added by MIMEC (including energy) [USD]
V_m = Volume of water used by MIMEC (including energy) [m^3]

MIMEC water use (V_m) is collected at country level through national records and reported in

questionnaires, in units of m^3/year (see example in AQUASTAT http://www.fao.org/nr/water/aquastat/sets/aq-5yr-quest_eng.xls). MIMEC value added is obtained from national statistics, deflated to the baseline year.

Services water supply efficiency is calculated as the service sector value added (ISIC 36-39 and ISIC 45-98) divided by water used for distribution by the water collection, treatment and supply industry (ISIC 36), expressed in USD/m^3.

In formula:

$$S_{we} = \frac{GVA_s}{V_s}$$

Where:

S_{we} = *Services water use efficiency [USD/m^3]*
GVA_s = Gross value added by services [USD]
V_s = Volume of water used by the service sector [m^3]

Data on volumes of used and distributed water are collected at country level from the municipal supply utilities records and reported in questionnaires, in units of km^3/year or million m^3/year (see example in AQUASTAT http://www.fao.org/nr/water/aquastat/sets/aq-5yr-quest_eng.xls). Services value added is obtained from national statistics, deflated to the baseline year.

Change in water use efficiency (CWUE) is computed as the ratio of water use efficiency (WUE) in time t minus water use efficiency in time t-1, divided by water use efficiency in time t-1 and multiplied by 100:

$$CWUE = \frac{WUE_t - WUE_{t-1}}{WUE_{t-1}} * 100$$

It must be noted that computing the indicator in an aggregated manner, i.e. total GDP over total water use, would lead to an overestimation of the indicator. That is due to the fact that, for the agricultural sector, only the value produced under irrigation has to be counted in calculating the indicator. Hence, the sum of the value added of the various sectors used in these formulas is not equivalent to the total GDP of the country.

Disaggregation:
The indicator covers all the economic sectors according to the ISIC classification, providing the means for more detailed analysis of the water use efficiency for national planning and decision-making.

Although the subdivision into three major aggregated economic sectors as defined in chapter 3 is sufficient for the purpose of compiling the indicator, wherever possible it is advisable to further disaggregate the indicator, according to the following criteria:

- Economically, a more refined subdivision of the economic sector can be done using ISIC Rev.4 by the following groups:
  - Agriculture, Forestry and Fisheries (ISIC A);
  - Mining and Quarrying (ISIC B);
  - Manufacturing (ISIC C);
  - Electricity, Gas, Steam and Air Conditioning Supply (ISIC D);
  - Water Supply, Sewerage, Waste Management and Remediation Activities (ISIC E), by
  - Water Collection, Treatment and Supply (ISIC 36)
    - Sewerage (ISIC 37)
    - Construction (ISIC F)
  - Other industries (sum of remaining industries)
- Geographically, computing the indicator by river basin, watershed or administrative units within a country.

These levels of disaggregation, or a combination of those, will give further insight on the dynamics of water use efficiency, providing information for remedial policies and actions.

Treatment of missing values:

- At country level
  If scattered data (over time) are available, a methodology will be developed with regards to inter- and extrapolation.

- At regional and global levels
  If country data are missing, the value of the indicator will be considered in the average of the others in the same region.

Regional aggregates:
The aggregation for global and regional estimations is done by summing up the values of the various parameters constituting the elements of the formula, i.e. value added by sector and water use by sector. The aggregated indicator is then calculated by applying the formula with those aggregated data, as if it were a single country.

An Excel sheet with the calculations is being prepared, and will be shared with the IAEG if required.

Sources of discrepancies:
Regional differences, in particular in relation to irrigated agriculture and different climatic conditions (including variability), are to be considered in the interpretation of this indicator, especially in countries with large amounts of available water resources. Also for this reason, coupling this indicator with water stress (6.4.2) is important for the interpretation of the data.

Obtaining internationally comparable data for global monitoring
Data for this indicator are collected through a questionnaire/calculation sheet that allows countries to identify the needed parameters, and provide some preliminary control checks.
The data so collected are then reviewed by FAO experts, also through the GEMI team if needed. The finding of the review is then shared with the country, in order to ensure consistency and harmonization of methods, definitions and results.

FAO has prepared a Step-by-step methodological paper, in order to provide a technical guide for the country teams. Moreover, an e-learning tool, in the form of a course on-line, is being prepared and will be ready early in 2018. Finally, an overall manual is being drafted.

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

- NA

Quality assurance

- NA

Data Sources

The data needed for the compilation of the indicator are administrative data collected at country level by the relevant institutions, either technical (for water and irrigation) or economic (for value added). Those data are then compiled by FAO, World Bank, UNSD and other international institutions, harmonized and published in sectoral databases such FAO's AQUASTAT, WB's Databank and

UNSD's UNdata.

Examples of the questionnaires that can be used include: AQUASTAT
http://www.fao.org/nr/water/aquastat/sets/index.stm#main
http://www.fao.org/nr/water/aquastat/sets/aq-5yr-guide_eng.pdf

SEEA Water
SEEA-Water:
https://seea.un.org/sites/seea.un.org/files/seeawaterwebversion_final_en.pdf SEEA
Central Framework: https://seea.un.org/sites/seea.un.org/files/seea_cf_final_en.pdf

SEEA Technical Note on water (draft)
https://seea.un.org/sites/seea.un.org/files/technical_note_water_26_05_2016.pdf

IRWS
https://seea.un.org/sites/seea.un.org/files/irws_en.pdf

UNSD/UNEP Questionnaire on Environment Statistics – Water Section
http://unstats.un.org/unsd/environment/questionnaire.htm
http://unstats.un.org/unsd/environment/qindicators.htm

OECD and Eurostat Joint Questionnaire on Inland Waters
http://ec.europa.eu/eurostat/web/environment/water

Source for GDP
UNSD: http://unstats.un.org/unsd/snaama/selbasicFast.asp

Data Availability

Presently, the data needed for the indicator are collected by AQASTAT and the other databases for 168 countries worldwide.

Breakdown of the number of countries covered by region is as follows:

World	168
Africa	51
Northern Africa	6
Sub-Saharan Africa	45
Eastern Africa	16
Middle Africa	8
Southern Africa	5
Western Africa	16
Americas	30
Latin America and the Caribbean	28
Caribbean	8
Latin America	20

Northern America	2
Asia	46
Central Asia	5
Eastern Asia	5
Southern Asia	8
South-Eastern Asia	10
Western Asia	18
Europe	37
Eastern Europe	10
Northern Europe	10
Southern Europe	10
Western Europe	7
Oceania	4
Australia and New Zealand	2
Melanesia	2
Micronesia	0
Polynesia	0

Calendar

Data collection:
The source collection is on-going in the context of the Integrated Monitoring Initiative (GEMI)

Data release:
November 2018

Data providers

Data collection is done with different modalities in different countries. Technical and economic institutions provide their relevant data, sometimes through the National Statistical Office (NSO), particularly for the economic data.

Although data collection and its modality remains ultimately a responsibility of each country, FAO is working to promote a more regular involvement of NSOs, in order to ensure strongest consistency and robustness of the data provided.

The list of National Focal Points for those countries involved through the GEMI project is in annex.

Data compilers

FAO (through AQUASTAT), on behalf of UN-Water. The monitoring of this indicator will be integrated into the GEMI initiative, which together with JMP and GLAAS, under the UN-Water umbrella, will provide a coherent framework for global monitoring of SDG 6.

References

- AQUASTAT main page: http://www.fao.org/nr/water/aquastat/main/index.stm
- AQUASTAT glossary: http://www.fao.org/nr/water/aquastat/data/glossary/search.html
- AQUASTAT Main country database: http://www.fao.org/nr/water/aquastat/data/query/index.html?lang=en
- AQUASTAT Water use: http://www.fao.org/nr/water/aquastat/water_use/index.stm
- AQUASTAT Water resources: http://www.fao.org/nr/water/aquastat/water_res/index.stm
- AQUASTAT publications dealing with concepts, methodologies, definitions, terminologies, metadata, etc.: http://www.fao.org/nr/water/aquastat/catalogues/index.stm
- AQUASTAT Quality Control: http://www.fao.org/nr/water/aquastat/sets/index.stm#main
- AQUASTAT Guidelines: http://www.fao.org/nr/water/aquastat/sets/aq-5yr-guide_eng.pdf
- FAOSTAT production database: http://faostat3.fao.org/download/Q/*/E
- UNSD/UNEP Questionnaire on Environment Statistics – Water Section http://unstats.un.org/unsd/environment/questionnaire.htm http://unstats.un.org/unsd/environment/qindicators.htm
- Framework for the Development of Environment Statistics (FDES 2013) (Chapter 3): http://unstats.un.org/unsd/environment/FDES/FDES-2015-supporting-tools/FDES.pdf
- International Recommendations for Water Statistics (IRWS) (2012): http://unstats.un.org/unsd/envaccounting/irws/
- OECD/Eurostat Questionnaire on Environment Statistics – Water Section: http://ec.europa.eu/eurostat/web/environment/water
- OECD National Accounts data files: http://www.oecd-ilibrary.org/economics/data/oecd-national- accounts-statistics_na-data-en
- SEEA-Water: https://seea.un.org/sites/seea.un.org/files/seeawaterwebversion_final_en.pdf
- SEEA Central Framework: https://seea.un.org/sites/seea.un.org/files/seea_cf_final_en.pdf
- UNSD National Accounts Main Aggregates Database: http://unstats.un.org/unsd/snaama/selbasicFast.asp
- World Bank Databank (World Economic Indicators) http://databank.worldbank.org/data/home.aspx
- ISIC rev. 4: https://unstats.un.org/unsd/cr/registry/regcst.asp?Cl=27

Related indicators

This indicator needs to be combined with the water stress indicator 6.4.2 to provide adequate follow-up of the target 6.4.

Other indicators, specifically those for Targets 1.1, 1.2, 2.1, 2.2, 5.4, 5.a, 6.1, 6.2, 6.3, 6.5 will complement the information provided by this indicator.

MSSD 9: Number of countries participating in the Green list initiative

The IUCN Green List is one of the flagship initiatives included in the MSSD to measure the effectiveness of the protected areas management in the Mediterranean region, in line with Objective 2 of the strategy. Moreover, IUCN-Med also presented the progress made in promoting the Green List standard in the Mediterranean, which was followed by a general discussion with members of the MCSD for their comments.

The pilot phase of the IUCN Green List Programme began in the Mediterranean in 2013, to test the standard in 3 countries. 24 of the tested sites obtained a GLPCA award at the World Parks Congress held in Sydney in 2014, 8 of them are located in France, Italy and Spain. Currently, IUCN-Med is supporting France, Italy and Spain involvement in a LIFE project assessing the feasibility of Green List standard against Natura 2000 network. Furthermore, the IUCN-Med team continues working with Mediterranean countries to promote the standard in the region and is working closely with national authorities of Algeria, Lebanon and Jordan, for this.

The IUCN Green List of Protected and Conserved Areas is a global initiative to encourage, achieve and promote effective, equitable and successful protected and conserved areas. To be added to the Green List, protected and conserved areas have to show that they meet the indicators of the GLPCA Standard by means of an independent evaluation.

This meeting was organised by the UN Environment/ Coordinating Unit for the Mediterranean Action Plan Secretariat to the Barcelona Convention and its Protocols. The MCSD, as an advisory body to the Barcelona Convention and a forum for debate, can provide substantial contribution on these issues, in view also of its COP 20 that will be held in Tirana, Albania, 25-26 October 2017.

Sites on the IUCN Green List are certified as being effectively managed and fairly governed, with long-term positive impact on people and nature. Every five years, they are evaluated against a set of demanding criteria defined by the IUCN Green List Standard. These criteria include the quality of protection of natural values and the effectiveness of actions against threats.

Global Standard

At the heart of the IUCN Green List Programme is a globally applicable Standard. It provides an international benchmark for quality that motivates improved performance and achievement of conservation objectives. By committing to meet the IUCN Green List of Protected and Conserved Areas global Standard, site managers seek to demonstrate and maintain performance and deliver real nature conservation results.

The IUCN Green List Standard

The objective of the Standard is to "encourage protected and conserved areas to measure, improve and maintain their performance through globally consistent criteria that benchmark good governance, sound design and planning, effective management, and successful conservation outcomes."

The IUCN Green List Standard is organised into four components of successful nature conservation in protected and conserved areas.

The baseline components concern:
- Good Governance
- Sound Design and Planning
- Effective Management

Together, these support the component on Successful Conservation Outcomes attesting to the successful achievement of an area's goals and objectives. Each component has a set of criteria and each criterion has a set of indicators to measure achievement

References:

https://www.iucn.org/news/mediterranean/201707/progress-iucn-green-list-protected-areas-mediterranean-region
https://www.iucn.org/theme/protected-areas/our-work/iucn-green-list-protected-and-conserved-areas/global-standard
https://www.iucn.org/news/protected-areas/201711/iucn-prepares-new-wave-%E2%80%98green-list%E2%80%99-conservation-success

MSSD 10: SDG Indicator 15.a.1: Official development assistance and public expenditure on conservation and sustainable use of biodiversity and ecosystems

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

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

MSSD 11: Global Food Security Index

Definitions
Food security is defined as the state in which people at all times have physical, social and economic access to sufficient and nutritious food that meets their dietary needs for a healthy and active life.

Using this definition adapted from the 1996 World Food Summit, the Global Food Security Index considers the core issues of affordability, availability, and quality across a set of 113 countries. The index is a dynamic quantitative and qualitative scoring model, constructed from 28 unique indicators, that measures these drivers of food security across both developing and developed countries. The overall goal of the study is to assess which countries are most and least vulnerable to food insecurity through the categories of Affordability, Availability, and Quality and Safety. The index also looks at the impact that Natural Resources & Resilience have on food security.

While food security research is the subject of many organisations worldwide, this effort is distinct for a number of reasons. This index is the first to examine food security comprehensively across the three internationally established dimensions. Moreover, the study looks beyond hunger to the underlying factors affecting food insecurity. Lastly, we have created a number of unique qualitative indicators, many of which relate to government policy, to capture drivers of food security which are not currently measured in any international dataset

Affordability
Measures the ability of consumers to purchase food, their vulnerability to price shocks and the presence of programmes and policies to support customers when shocks occur.

Availability
Measures the sufficiency of the national food supply, the risk of supply disruption, national capacity to disseminate food and research efforts to expand agricultural output.

Quality & safety
Measures the variety and nutritional quality of average diets, as well as the safety of food.

Natural Resources and adjustment
Assesses a country's exposure to the impacts of climate change; its susceptibility to natural resource risks; and how the country is adapting to these risks.

References
https://foodsecurityindex.eiu.com/
https://foodsecurityindex.eiu.com/Home/Methodology
https://foodsecurityindex.eiu.com/Resources
https://foodsecurityindex.eiu.com/Downloads

MSSD 12: SDG Indicator 6.4.2: Level of water stress: freshwater withdrawal as a proportion of available freshwater resources

Goal 6: Ensure availability and sustainable management of water and sanitation for all
Target 6.4: By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity

Institutional information

Organization(s):

Food and Agriculture Organization of the United Nations (FAO)

Concepts and definitions

Definition:

The level of water stress: freshwater withdrawal as a proportion of available freshwater resources is the ratio between total freshwater withdrawn by all major sectors and total renewable freshwater resources, after taking into account environmental water requirements. Main sectors, as defined by ISIC standards, include agriculture; forestry and fishing; manufacturing; electricity industry; and services. This indicator is also known as water withdrawal intensity.

Rationale:

The purpose of this indicator is to show the degree to which water resources are being exploited to meet the country's water demand. It measures a country's pressure on its water resources and therefore the challenge on the sustainability of its water use. It tracks progress in regard to “withdrawals and supply of freshwater to address water scarcity”, i.e. the environmental component of target 6.4.

The indicator shows to what extent water resources are already used, and signals the importance of effective supply and demand management policies. It indicates the likelihood of increasing competition and conflict between different water uses and users in a situation of increasing water scarcity. Increased water stress, shown by an increase in the value of the indicator, has potentially negative effects on the sustainability of the natural resources and on economic development. On the other hand, low values of the indicator indicate that water does not represent a particular challenge for economic development and sustainability.

Concepts:

This indicator provides an estimate of pressure by all sectors on the country’s renewable freshwater resources. A low level of water stress indicates a situation where the combined withdrawal by all sectors is marginal in relation to the resources, and has therefore little potential impact on the sustainability of the resources or on the potential competition between users. A high level of water stress indicates a

situation where the combined withdrawal by all sectors represents a substantial share of the total renewable freshwater resources, with potentially larger impacts on the sustainability of the resources and potential situations of conflicts and competition between users.

Total renewable freshwater resources (TRWR) are expressed as the sum of internal and external renewable water resources. The terms “water resources” and “water withdrawal” are understood here as freshwater resources and freshwater withdrawal.

Internal renewable water resources are defined as the long-term average annual flow of rivers and recharge of groundwater for a given country generated from endogenous precipitation.
.
External renewable water resources refer to the flows of water entering the country, taking into consideration the quantity of flows reserved to upstream and downstream countries through agreements or treaties.

Total freshwater withdrawal (TWW) is the volume of freshwater extracted from its source (rivers, lakes, aquifers) for agriculture, industries and municipalities. It is estimated at the country level for the following three main sectors: agriculture, municipalities (including domestic water withdrawal) and industries. Freshwater withdrawal includes primary freshwater (not withdrawn before), secondary freshwater (previously withdrawn and returned to rivers and groundwater, such as discharged wastewater and agricultural drainage water) and fossil groundwater. It does not include non-conventional water, i.e. direct use of treated wastewater, direct use of agricultural drainage water and desalinated water. TWW is in general calculated as being the sum of total water withdrawal by sector minus direct use of wastewater, direct use of agricultural drainage water and use of desalinated water.

Environmental water requirements (Env.) are the quantities of water required to sustain freshwater and estuarine ecosystems. Water quality and also the resulting ecosystem services are excluded from this formulation which is confined to water volumes. This does not imply that quality and the support to societies which are dependent on environmental flows are not important and should not be taken care of. Methods of computation of Env. are extremely variable and range from global estimates to comprehensive assessments for river reaches. For the purpose of the SDG indicator, water volumes can be expressed in the same units as the TWW, and then as percentages of the available water resources.

Comments and limitations:

Water withdrawal as a percentage of water resources is a good indicator of pressure on limited water resources, one of the most important natural resources. However, it only partially addresses the issues related to sustainable water management.

Supplementary indicators that capture the multiple dimensions of water management would combine data on water demand management, behavioural changes with regard to water use and the availability of appropriate infrastructure, and measure progress in increasing the efficiency and sustainability of water use, in particular in relation to population and economic growth. They would also recognize the different climatic environments that affect water use in countries, in particular in agriculture, which is the main user of water. Sustainability assessment is also linked to the critical thresholds fixed for this indicator and there is no universal consensus on such threshold.

Trends in water withdrawal show relatively slow patterns of change. Usually, three-five years are a

minimum frequency to be able to detect significant changes, as it is unlikely that the indicator would show meaningful variations from one year to the other.

Estimation of water withdrawal by sector is the main limitation to the computation of the indicator. Few countries actually publish water use data on a regular basis by sector.

Renewable water resources include all surface water and groundwater resources that are available on a yearly basis without consideration of the capacity to harvest and use this resource. Exploitable water resources, which refer to the volume of surface water or groundwater that is available with an occurrence of 90% of the time, are considerably less than renewable water resources, but no universal method exists to assess such exploitable water resources.

There is no universally agreed method for the computation of incoming freshwater flows originating outside of a country's borders. Nor is there any standard method to account for return flows, the part of the water withdrawn from its source and which flows back to the river system after use. In countries where return flow represents a substantial part of water withdrawal, the indicator tends to underestimate available water and therefore overestimate the level of water stress.

Other limitations that affect the interpretation of the water stressindicator include:
• difficulty to obtain accurate, complete and up-to-date data;
• potentially large variation of sub-national data;
• lack of account of seasonal variations in water resources;
• lack of consideration to the distribution among water uses;
• lack of consideration of water quality and its suitability for use; and
• the indicator can be higher than 100 per cent when water withdrawal includes secondary freshwater (water withdrawn previously and returned to the system), non-renewable water (fossil groundwater), when annual groundwater withdrawal is higher than annual replenishment (over-abstraction) or when water withdrawal includes part or all of the water set aside for environmental water requirements.
Some of these issues can be solved through disaggregation of the index at the level of hydrological units and by distinguishing between different use sectors. However, due to the complexity of water flows, both within a country and between countries, care should be taken not to double-count.

Methodology

Computation Method:

Method of computation: The indicator is computed as the total freshwater withdrawn (TWW) divided by the difference between the total renewable freshwater resources (TRWR) and the environmental water requirements (Env.), multiplied by 100. All variables are expressed in km^3/year (10^9 m^3/year).

Stress (%) = TWW / (TRWR - Env.) 100

It is proposed to classify the level of water stress in three main categories (levels): low, high and very high. The thresholds for the indicator could be country specific, to reflect differences in climate and

national water management objectives. Alternatively, uniform thresholds could be proposed using existing literature and taking into account environmental water requirements.

Disaggregation:

To compute this indicator sectoral data are needed. The indicator can be disaggregated to show the respective contribution of different sectors to the country's water stress, and therefore the relative importance of actions needed to contain water demand in the different sectors (agriculture, municipalities and industry).

At national level, water resources and withdrawal are estimated or measured at the level of appropriate hydrological units (river basins, aquifers). It is therefore possible to obtain a geographical distribution of water stress by hydrological unit, thus allowing for more targeted response in terms of water demand management.

Treatment of missing values:

- At country level

  If scattered data are available, a methodology will be developed with regards to inter- and extrapolation

- At regional and global levels

  For the MDGs, latest values were used to obtain regional or global aggregates, even if not available for the same year. It is expected that through the baseline that will be produced for the SDG monitoring, data for more or less the same range of years become available.

Regional aggregates:

Regional and global estimates will be done by summing up the national figures on renewable freshwater resources and total freshwater withdrawal, considering only the internal renewable water resources of each country in order to avoid double counting.

Sources of discrepancies:

Differences might occur due to the following, amongst others: For national estimates incoming water is counted as being part of the country's available water resources, while global estimates can only be done by adding up the internal renewable water resources (water generated within the country) of all countries in order to avoid double counting.

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

This indicator provides an estimate of pressure by all sectors on the country's renewable freshwater resources. A low level of water stress indicates a situation where the combined withdrawal by all sectors is marginal in relation to the resources, and has therefore little potential impact on the sustainability of the resources or on the potential competition between users. A high level of water stress indicates a situation where the combined withdrawal by all sectors represents a substantial share of the total

renewable freshwater resources, with potentially larger impacts on the sustainability of the resources and potential situations of conflicts and competition between users.
The indicator is computed based on three components:

Total renewable freshwater resources
(TRWR) Total freshwater withdrawal (TWW)
Environmental flow requirements (EFR)

$$Water\ Stress\ (\%) = \frac{TWW}{TRWR - EFR.} * 100$$

Several documents exist that can be used to support countries in the computation of this indicator. Among them:

Understanding AQUASTAT - FAO's global water information system
This information note covers a twenty year history of the collection and analysis of water-related data and its dissemination as an international public good, freely available to all. The process of collecting and checking the data has resulted in the establishment of a unique network of collaborators who provide data, use data from other countries for comparative purposes, and exchange views and experiences on how best to measure and account for water-related use. Users range from international private companies to non-governmental organizations, and virtually all significant reports related to water depend on the data provided by AQUASTAT.
http://www.fao.org/3/a-bc817e.pdf

Renewable Water Resources Assessment - 2015 AQUASTAT methodology review
http://www.fao.org/3/a-bc818e.pdf

Global database on municipal wastewater production, collection, treatment, discharge and direct use in agriculture
This paper describes the rationale and method to setup and feed the AQUASTAT database on municipal wastewater production, collection, treatment, discharge or direct use in agriculture. The best available sources of information have been reviewed, including peer-reviewed papers, proceedings of workshops, conferences and expert meetings, global or regional databases, as well as country briefs, national reports and direct communications by country government officials and experts
http://www.fao.org/3/a-bc823e.pdf

Cooling water for energy generation and its impact on national-level water statistics
This technical note, describing the issue of cooling water for energy generation and its impact on national-level water statistics, has two purposes: 1) to act as a general informational resource and 2) to encourage governmental agencies responsible for water usage to gather and report information disaggregated by sub-sector (keeping thermoelectric withdrawals separate from industrial and hydroelectric withdrawals), and to determine the point at which lower water withdrawal designs are more favourable, even if the required capital cost is higher.
http://www.fao.org/3/a-bc822e.pdf

Municipal and industrial water withdrawal modelling for the years 2000 and 2005 using statistical methods
This document describes the efforts to generate models that estimate the municipal and industrial water withdrawals for the years 2000 and 2005.
http://www.fao.org/3/a-bc821e.pdf

Disambiguation of water statistics
The nomenclature surrounding water information is often confusing and gives rise to different interpretations and thus confusion. When discussing the way in which renewable water resources are utilized, the terms water use, usage, withdrawal, consumption, abstraction, extraction, utilization, supply

and demand are often used without clearly stating what is meant.
http://www.fao.org/3/a-bc816e.pdf

Country survey on water use for agriculture and rural development Questionnaire for water survey

These Guidelines and Questionnaire have been prepared for the updating of the data and country profiles in AQUASTAT.
http://www.fao.org/nr/water/aquastat/sets/aq-5yr-quest_eng.xls
http://www.fao.org/nr/water/aquastat/sets/aq-5yr-guide_eng.pdf

International Recommendations for Water Statistics

The International Recommendations for Water Statistics (IRWS) were developed to help strengthen national information systems for water in support of design and evaluation of Integrated Water Resources Management (IWRM) policies.
https://unstats.un.org/UNSD/envaccounting/irws/

UNSD/UNEP Questionnaire on Environment Statistics – Water Section

http://unstats.un.org/unsd/environment/questionnaire.htm
http://unstats.un.org/unsd/environment/qindicators.htm

UNSD 'National Accounts Main Aggregates Database'

http://unstats.un.org/unsd/snaama/selbasicFast.asp

Quality assurance:

Every data in AQUASTAT goes through a thorough validation process:
Before uploading, data is compared to other variables to ensure it is logically correct (in other words: 1+2=3) and whether the reference used is not leading back to AQUASTAT itself. In other words, AQUASTAT frequently finds data for 2014, which is really AQUASTAT data for 2000 with the year changed (most probably when the data was harvested).

During uploading into the Main Database, another validation process takes place, using a set of about 300 validation rules. Of these, about 100 rules are obligatory rules, which means that if the data-point doesn't obey this rule, the validation process cannot go on. For example, the cultivated area of a country cannot be larger than the total area of the country. The other set of about 200 validation rules are warning signs for the person doing the validation. For example, in general the area equipped for irrigation using surface irrigation technology is at least half of the total area equipped for irrigation. However, in some countries the localized irrigation area or the sprinkler irrigation area might be larger than the surface irrigation area. If this is the case, then a warning pops up during validation for the analyst to check whether for this country it is possible. Also during the validation process each new data-point is compared to other data already available for this variable in other years or in the same year. If it is impossible to harmonize or reconcile the different data, then one or the other data-point has to be deleted from the database.
http://www.fao.org/nr/water/aquastat/sets/WhyDBisEmpty_eng.pdf
http://www.fao.org/nr/water/aquastat/About_us/index3.stm

Beyond the usual AQUASTAT validation described above, in the compilation of the indicator countries will be encouraged and supported in setting up their own quality control system, ensuring that all data used in the computation are checked, and that consistency is kept over the years to ensure comparability and robust identification of trends.

The indicator requires data from different sectors of expertise. Internationally, they are available of different datasets from various institutions, such as FAO, UNSD and IWMI. Each of these institutions has its own established mechanism to consult and validate the data with the countries.

For the data deriving from FAOSTAT and AQUASTAT, data are collected in countries through surveys consisting of data collection and country description by means of a detailed questionnaires were the source reference and comments are associated with each value, through national resource persons. Critical analysis of information and data processing is done by FAO staff. Data are then organized in standard data tables, and feedback and approval is sought from national institutions before publication and dissemination.

However, for the SDG process a specific mechanism will be put in place, consisting in the identification in each country, by the national government, of a national focal point and a technical team, in charge of the collection and computation of the indicator, in close consultation with FAO. This system has been successfully tested during the initial phase of the GEMI project, carried out by FAO and other seven UN agencies, coordinated by UN-Water.

For those countries that could initially have difficulties in compiling and computing the indicator, FAO will provide support and ultimately will be able to produce the indicator starting from internationally available data. However, no data will be made public without the prior approval by the relevant national authorities.

Data Sources

Description:

Data for this indicator are usually collected by national ministries and institutions having water-related issues in their mandate, such as ministries of water resources, agriculture, or environment. Data are mainly published within national water resources and irrigation master plans, national statistical yearbooks and other reports (such as those from projects, international surveys or results and publications from national and international research centres).

The data for the indicator are collected through questionnaires to be answered by the relevant institutions in each country. Examples of the questionnaires that can be used can be found at:

AQUASTAT
www.fao.org/nr/water/aquastat/sets/aq-5yr-quest_eng.xls

UNSD/UNEP
http://unstats.un.org/unsd/environment/Questionnaires/q2013Water_English.xls

OECD/Eurostat
http://ec.europa.eu/eurostat/ramon/coded_files/OECD_ESTAT_JQ_Manual_version_2_21.pdf

Collection process:

i. Official counterparts at country level are the line ministry for water resources and the national statistics office
ii. Countries are expected to put in place a process of Quality Control (QC), Quality Assurance (QA) and data verification. The process should be carried out internally for the QC part, ensuring that all the planned steps are properly carried out at each round of data collection. The QA should be carried out by independent experts, either national or international, to

assess the consistence and robustness of the data produced. Finally, where possible the resulting data should be verified by comparison with similar data from other sources.

iii. As the data will be collected through different questionnaires, harmonization will be needed among the eventual differences in definitions and aggregations.

Data Availability

Description:

Countries (2010 to present):
Asia and Pacific 2
Africa 6
Latin America and the Caribbean 16
Europe, North America, Australia, New Zealand and Japan 24

Countries (2000-2009):
Asia and Pacific 42
Africa 49
Latin America and the Caribbean 27
Europe, North America, Australia, New Zealand and Japan 47

Time series:

1961-2015 (Discontinuous, depending on country)

Calendar

Data collection:

2016-2018

Data release:

New data for the indicator are planned to be produced for most countries between 2017 and 2018.

Data providers

Description:

National Statistical Offices Line ministry National consultants The institutions responsible for data collection at national level vary according to countries. However, in general data for this indicator are provided by the Ministry of Agriculture, Ministry of Water and Ministry of Environment, and sometimes channeled through the National statistical Office.

Data compilers

Food and Agriculture Organization of the United Nations (FAO) through AQUASTAT, its global water information system (http://www.fao.org/nr/aquastat).

References

URL:

www.fao.org/nr/aquastat

References:

Food and Agricultural Organization of the United Nations (FAO). AQUASTAT, FAO's Global Water Information System. Rome. Website http://www.fao.org/nr/aquastat.

The following resources of specific interest to this indicator are available on this site:

- AQUASTAT glossary (http://www.fao.org/nr/water/aquastat/data/glossary/search.html).
- AQUASTAT Main country database (http://www.fao.org/nr/water/aquastat/data/query/index.html?lang=en)
- AQUASTAT Water use (http://www.fao.org/nr/water/aquastat/water_use/index.stm).
- AQUASTAT Water resources (http://www.fao.org/nr/water/aquastat/water_res/index.stm).
- AQUASTAT publications dealing with concepts, methodologies, definitions, terminologies, metadata, etc. (http://www.fao.org/nr/water/aquastat/catalogues/index.stm)
- For surface water, environmental water requirement databases include:
- http://waterdata.iwmi.org/apps/flow_management_classes/
- http://www.iwmi.cgiar.org/resources/models-and-software/environmental-flow-calculators/
- http://waterdata.iwmi.org/Applications/Global_Assessment_Environmental_Water_Requirements_Scarcity/

UNSD/UNEP Questionnaire on Environment Statistics – Water Sectionhttp://unstats.un.org/unsd/environment/qindicators.htm

- Framework for the Development of Environment Statistics (FDES 2013) (Chapter 3) http://unstats.un.org/unsd/environment/FDES/FDES-2015-supporting-tools/FDES.pdf
- OECD/Eurostat Questionnaire on Environment Statistics – Water Section
- International Recommendations for Water Statistics (IRWS) (2012) http://unstats.un.org/unsd/envaccounting/irws/

Related indicators

6.4.1: Change in water-use efficiency over time
6.1.1: Proportion of population using safely managed drinking water services
6.3.1: Proportion of wastewater safely treated
6.6.1: Change in the extent of water-related ecosystems over time
6.5.1: Degree of integrated water resources management implementation (0-100)
2.4.1: Proportion of agricultural area under productive and sustainable agriculture
15.3.1: Proportion of land that is degraded over total land area
1.5.1: Number of deaths, missing persons and persons affected by disaster per 100,000 people [a]
11.5.1: Number of deaths, missing persons and persons affected by disaster per 100,000 people [a]

MSSD 13: SDG Indicator 6.1.1: Proportion of population using safely managed drinking water services

Goal 6: Ensure availability and sustainable management of water and sanitation for all
Target 6.1: By 2030, achieve universal and equitable access to safe and affordable drinking water for all

Institutional information

Organization(s):

World Health Organization (WHO) United

Nations Children's Fund (UNICEF)

Concepts and definitions

Definition:

Proportion of population using safely managed drinking water services is currently being measured by the proportion of population using an improved basic drinking water source which is located on premises, available when needed and free of faecal (and priority chemical) contamination. 'Improved' drinking water sources include: piped water into dwelling, yard or plot; public taps or standpipes; boreholes or tubewells; protected dug wells; protected springs; packaged water; delivered water and rainwater.

Rationale:

MDG target 7C called for 'sustainable access' to 'safe drinking water'. At the start of the MDG period, there was a complete lack of nationally representative data about drinking water safety in developing countries, and such data were not collected through household surveys or censuses. The JMP developed the concept of 'improved' water sources, which was used as a proxy for 'safe water', as such sources are likely to be protected against faecal contamination, and this metric has been used since 2000 to track progress towards the MDG target. International consultations since 2011 have established consensus on the need to build on and address the shortcomings of this indicator; specifically, to address normative criteria of the human right to water including accessibility, availability and quality.

The above consultation concluded that JMP should go beyond the basic level of access and address safe management of drinking water services, including dimensions of accessibility, availability and quality. The proposed indicator of 'safely managed drinking water services' is designed to address this.

Concepts:

Improved drinking water sources include the following: piped water into dwelling, yard or plot; public taps or standpipes; boreholes or tubewells; protected dug wells; protected springs; packaged water; delivered water and rainwater.

A water source is considered to be 'located on premises' if the point of collection is within the dwelling, yard, or plot.
'Available when needed': households are able to access sufficient quantities of water when needed.

'Free from faecal and priority chemical contamination': water complies with relevant national or local standards. In the absence of such standards, reference is made to the WHO Guidelines for Drinking Water Quality (http://www.who.int/water_sanitation_health/dwq/guidelines/en/).
E. coli or thermotolerant coliforms are the preferred indicator for microbiological quality, and arsenic and fluoride are the priority chemicals for global reporting.

Comments and limitations:

Data on availability and safety of drinking water is increasingly available through a combination of household surveys and administrative sources including regulators, but definitions have yet to be standardized. Data on faecal and chemical contamination, drawn from household surveys and regulatory databases, will not cover all countries immediately. However, sufficient data were available to make global and regional estimates of safely managed drinking water services for four out of eight SDG regions in 2017.

Methodology

Computation Method:

Household surveys and censuses currently provide information on types of basic drinking water sources listed above, and also indicate if sources are on premises. These data sources often have information on the availability of water and increasingly on the quality of water at the household level, through direct testing of drinking water for faecal or chemical contamination. These data will be combined with data on availability and compliance with drinking water quality standards (faecal and chemical) from administrative reporting or regulatory bodies.

The WHO/UNICEF Joint Monitoring Programme for Water Supply, Sanitation and Hygiene (JMP) estimates access to basic services for each country, separately in urban and rural areas, by fitting a regression line to a series of data points from household surveys and censuses. This approach was used to report on use of 'improved water' sources for MDG monitoring. The JMP is evaluating the use of alternative statistical estimation methods as more data become available.

The JMP 2017 update and SDG baselines report describes in more detail how data on availability and quality from different sources, can be combined with data on use of different types of supplies, as recorded in the current JMP database to compute the safely managed drinking water services indicator. https://washdata.org/report/jmp-2017-report-final.

Disaggregation:

Disaggregation by place of residence (urban/rural) and socioeconomic status (wealth, affordability) is possible for all countries. Disaggregation by other stratifiers of inequality (subnational, gender, disadvantaged groups, etc.) will be made where data permit. Drinking water services will be disaggregated by service level (including no services, basic, and safely managed services) following the

JMP drinking water ladder.

Treatment of missing values:

- At country level
  The JMP method uses a simple regression model to generate time series estimates for all years including for years without data points. The JMP then shares all its estimates using its country consultation mechanism to get consensus from countries before publishing its estimates.

- At regional and global levels
  The JMP does not publish estimates for countries for which national data are not available. Regional and global estimates are made for basic services as long as data are available for 50% of the population with the region, weighting by the latest UN Population Division population estimates. Regional and global estimates for safely managed services used a lower threshold of 30% for the JMP 2017 update and SDG baselines report.

Regional aggregates:

For more details on JMP rules and methods, please consult the website: www.washdata.org.

Sources of discrepancies:

JMP estimates are based on national sources of data approved as official statistics. Differences between global and national figures arise due to differences in indicator definitions and methods used in calculating national coverage estimates. In some cases national estimates are based on the most recent data point rather than from regression on all data points as done by the JMP. In some cases national estimates draw on administrative sector data rather than the nationally representative surveys and censuses used by the JMP.

Data Sources

Description:

Access to water and sanitation are considered core socio-economic and health indicators, and key determinants of child survival, maternal, and children's health, family wellbeing, and economic productivity. Drinking water and sanitation facilities are also used in constructing wealth quintiles used by many integrated household surveys to analyse inequalities between rich and poor. Access to drinking water and sanitation is therefore a core indicator for most household surveys. Currently the JMP database holds over 1,700 censuses and surveys. In high-income countries where household surveys or censuses do not always collect information on basic access, data are drawn from administrative records.

Data on availability and quality of drinking water, and regulation by appropriate authorities will be collected by the JMP through consultation with the government departments responsible for drinking water supply and regulation. The JMP routinely conducts country consultations with national authorities before publishing country estimates. Data on availability and quality of water supplies are currently available from household surveys or administrative sources including regulators for over 70 high-income countries, and at least 30-40 low- and middle-income countries. Thus, data are currently available from

ca. 100 countries, covering the majority of the global population. This number will rise as regulation becomes more widespread in low- and middle-income countries.

The population data used by the JMP, including the proportion of the population living in urban and rural areas, are those routinely updated by the UN Population Division.

Collection process:

WHO is required by World Health Assembly resolution to consult on all WHO statistics, and seek feedback from countries on data about countries and territories. Before publishing, all JMP estimates undergo rigorous country consultations facilitated by WHO and UNICEF country offices. Often these consultations give rise to in-country visits, and meetings about data on drinking water, sanitation and hygiene services and the monitoring systems that collect these data. JMP has been engaged with more than fifty countries over the last 10 years in explaining JMP estimates, and reasons for discrepancies if any.

Data Availability

Description:

In the JMP 2017 report estimates for basic drinking water services were available for nearly all countries and estimates for safely managed drinking water services were made for 96 countries at national level. Sufficient data were available to estimate safely managed drinking water services at the regional level for the following four SDG regions: Sub-Saharan Africa, Central Asia and Southern Asia, Latin America and the Caribbean, Northern America and Europe.

Time series:

Time series data are available for the basic drinking water level of service over the period 2000-2015. These serve as the foundation for the safely managed drinking water service indicator. Some elements of safe management (e.g. water quality) were not collected during the MDG period and trend analysis will only be possible several years into the SDGs. (From 2000 to 2015).

Calendar

Data collection:

The current biennial data collection cycle begins in October during an even year and estimates are published during the following year.

Data release:

The baseline SDG report was published in July 2017 and feed into the SG's 2017 SDG Progress Report. The estimates will be updated in 2019.

Data providers

National statistics offices, Ministries of water, sanitation, health, environment. Regulators of water and sanitation services.

Data compilers

Name:

WHO/UNICEF

Description:

WHO/UNICEF Joint Monitoring Programme for Water Supply, Sanitation and Hygiene

References

URL:
www.washdata.org

References:

JMP website: www.washdata.org.

JMP 2017 update and SDG baselines
https://washdata.org/report/jmp-2017-report-final

Safely managed drinking water thematic report
https://washdata.org/report/jmp-2017-tr-smdw

WHO Guidelines for Drinking Water Quality:
http://www.who.int/water_sanitation_health/dwq/guidelines/en/

Related indicators

All targets under Goal 6, as well as targets 1.2, 1.4, 2.2, 3.2, 3.8, 3.9, 4a, 5.4 and 11.1

MSSD 14: SDG Indicator 6.2.1: Proportion of population using safely managed sanitation services, including a hand- washing facility with soap and water

Goal 6: Ensure availability and sustainable management of water and sanitation for all
Target 6.2: By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations

Institutional information

Organization(s):

World Health Organization (WHO) United

Nations Children's Fund (UNICEF)

Concepts and definitions

Definition:

The Proportion of population using safely managed sanitation services, including a hand-washing facility with soap and water is currently being measured by the proportion of the population using a basic sanitation facility which is not shared with other households and where excreta is safely disposed in situ or treated off-site. 'Improved' sanitation facilities include: flush or pour flush toilets to sewer systems, septic tanks or pit latrines, ventilated improved pit latrines, pit latrines with a slab, and composting toilets.

Population with a basic handwashing facility: a device to contain, transport or regulate the flow of water to facilitate handwashing with soap and water in the household.

Rationale:

MDG target 7C called for 'sustainable access' to 'basic sanitation'. The JMP developed the metric of use of 'improved' sanitation facilities, which are likely to hygienically separate human excreta from human contact, and has used this indicator to track progress towards the MDG target since 2000. International consultations since 2011 have established consensus on the need to build on and address the shortcomings of this indicator; specifically, to address normative criteria of the human right to water including accessibility, acceptability, and safety. Furthermore, the safe management of faecal wastes should be considered, as discharges of untreated wastewater into the environment create public health hazards.

The above consultation concluded that post-2015 targets, which apply to all countries, should go beyond the basic level of access and address indicators of safe management of sanitation services, including dimensions of accessibility, acceptability and safety. The Expert Working Group called for analysis of faecal waste management along the sanitation chain, including containment, emptying of latrines and septic

tanks, and safe on-site disposal or the transport and treatment of wastes at a designated treatment site. Classification of treatment will be based on categories defined by SEEA and the International Recommendations for Water Statistics and following a laddered approach (primary, secondary and tertiary treatment).

Handwashing with soap is widely agreed to be the top hygiene priority for improving health outcomes. In 2008 and 2009, the JMP supported a review of indicators of handwashing practice, and determined that the most practical approach leading to reliable measurement of handwashing in national household surveys was observation of the place where household members wash their hands and noting the presence of water and soap (or local alternative) at that location. This provides a measure of whether households have the necessary tools for handwashing and is a proxy for their behaviour. Observation by survey enumerators represents a more reliable, valid and efficient indicator for measuring handwashing behaviour than asking individuals to report their own behaviour.

Concepts:

Improved sanitation facilities include the following: flush or pour flush toilets to sewer systems, septic tanks or pit latrines, ventilated improved pit latrines, pit latrines with a slab, and composting toilets.

Safely disposed in situ; when pit latrines and septic tanks are not emptied, the excreta may still remain isolated from human contact and can be considered safely managed. For example, with the new SDG indicator, households that use twin pit latrines or safely abandon full pit latrines and dig new facilities, a common practice in rural areas, would be counted as using safely managed sanitation services.

Treated offsite; not all excreta from toilet facilities conveyed in sewers (as wastewater) or emptied from pit latrines and septic tanks (as faecal sludge) reaches a treatment site. For instance, a portion may leak from the sewer itself or, due to broken pumping installations, be discharged directly to the environment. Similarly, a portion of the faecal sludge emptied from containers may be discharged into open drains, to open ground or water bodies, rather than being transported to a treatment plant. And finally, even once the excreta reaches a treatment plant a portion may remain untreated, due to dysfunctional treatment equipment or inadequate treatment capacity, and be discharged to the environment. For the purposes of SDG monitoring, adequacy of treatment will initially be assessed based on the reported level of treatment.

A handwashing facility with soap and water: a handwashing facility is a device to contain, transport or regulate the flow of water to facilitate handwashing. This indicator is a proxy of actual handwashing practice, which has been found to be more accurate than other proxies such as self-reports of handwashing practices.

Comments and limitations:

A framework for measuring faecal waste flows and safety factors has been developed and piloted in 12 countries (World Bank Water and Sanitation Program, 2014), and is being adopted and scaled up within the sanitation sector. This framework has served as the basis for indicators 6.2.1 and 6.3.1. Data on safe disposal and treatment are not available for all countries. However, sufficient data were available to make global and regional estimates of safely managed sanitation services in 2017.

Presence of a handwashing station with soap and water does not guarantee that household members

consistently wash hands at key times, but has been accepted as the most suitable proxy. Data were available for 70 countries in 2017.

Methodology

Computation Method:

Method of computation: Household surveys and censuses provide data on use of types of basic sanitation facilities listed above, as well as the presence of handwashing materials in the home.

The percentage of the population using safely managed sanitation services is calculated by combining data on the proportion of the population using different types of basic sanitation facilities with estimates of the proportion of faecal waste which is safely disposed in situ or treated off-site.

The JMP estimates use of basic sanitation facilities for each country, separately in urban and rural areas, by fitting a regression model to a series of data points from household surveys and censuses. This approach was used to report on use of 'improved sanitation' facilities for MDG monitoring. The JMP is evaluating the use of alternative statistical estimation methods as more data become available.

The JMP 2017 update and SDG baselines report describes in more detail how estimates of the proportion of household wastewater that is safely disposed of in situ or treated off-site have been combined with data on use of different types of sanitation facilities, as recorded in the JMP global database.

Disaggregation:

Disaggregation by place of residence (urban/rural) and socioeconomic status (wealth, affordability) is possible for all countries. Disaggregation by other stratifies of inequality (subnational, gender, disadvantaged groups, etc.) will be made where data permit. Sanitation services will be disaggregated by service level (including no services, basic, and safely managed services) following the JMP sanitation ladder.

Treatment of missing values:

- At country level
  The JMP method uses a simple regression model to generate time series estimates for all years including for years without data points. The JMP then shares all its estimates using its country consultation mechanism to get consensus from countries before publishing its estimates.

- At regional and global levels
  The JMP does not publish estimates for countries for which national data are not available. Regional and global estimates are made for basic services as long as data are available for 50% of the population with the region, weighting by the latest UNPD population estimates. Regional and global estimates for safely managed services used a lower threshold of 30% for the JMP 2017 update and SDG baselines report.

Regional aggregates:

For more details on JMP rules and methods, please consult the website: www.washdata.org.

Sources of discrepancies:

JMP estimates are based on national sources of data approved as official statistics. Differences between global and national figures arise due to differences in indicator definitions and methods used in calculating national coverage estimates. In some cases national estimates are based on the most recent data point rather than from regression on all data points as done by the JMP. In some cases national estimates draw on administrative sector data rather than the nationally representative surveys and censuses used by the JMP.

Data Sources

Description:

Access to water and sanitation are considered core socio-economic and health indicators, and key determinants of child survival, maternal, and children's health, family wellbeing, and economic productivity. Drinking water and sanitation facilities are also used in constructing wealth quintiles used by many integrated household surveys to analyse inequalities between rich and poor. Access to sanitation is therefore a core indicator for most household surveys. Currently the JMP database holds over 1,700 surveys and censuses. In high-income countries where household surveys or censuses do not always collect information on basic access, data are drawn from administrative records.

Estimates of excreta management will be collected from countries and used to adjust the data on use of basic sanitation facilities as needed. Administrative, population and environmental data can also be combined to estimate safe disposal or transport of excreta, when no country data are available. Data on disposal or treatment of excreta are limited but estimates for safe management of faecal wastes can be calculated based on faecal waste flows associated with the use of different types of basic sanitation facility.

Since the handwashing with soap survey questions were standardized in 2009, over 70 DHS and MICS surveys have included the module. JMP published handwashing estimates for 12 countries in its 2014 update, for 54 countries in its 2015 update, and for 70 countries in its 2017 update.

The population data used by JMP, including the proportion of the population living in urban and rural areas, are those established by the UN Population Division.

Collection process:

WHO is required by World Health Assembly resolution to consult on all WHO statistics, and seek feedback from countries on data about countries and territories. Before publishing, all JMP estimates undergo rigorous country consultations facilitated by WHO and UNICEF country offices. Often these consultations give rise to in-country visits, and meetings about data on drinking water, sanitation and hygiene services and the monitoring systems that collect these data. The JMP has been engaged with more than fifty countries over the last 10 years in explaining JMP estimates, and reasons for discrepancies if any.

Data Availability

Description:

In the JMP 2017 report estimates for basic sanitation services were available for nearly all countries and estimates for safely managed sanitation services were made for 96 countries at national level. Sufficient data were available to estimate safely managed drinking water services at the regional level for the following five SDG regions: Australia and New Zealand, Eastern Asia and South-eastern Asia, Latin America and the Caribbean, Northern America and Europe, Western Asia and Northern Africa

Data on basic handwashing facilities were available for 70 countries and regional estimates were possible for Sub-Saharan Africa and Western Asia and Northern Africa.

Time series:

Time series data are available for the basic sanitation level of service over the period 2000-2015. These serve as the foundation for the safely managed sanitation service indicator. Some elements of safe management (e.g. wastewater treatment) were not collected during the MDG period and trend analysis will only be possible several years into the SDGs. (From 2000 to 2015)

Calendar

Data collection:

The current biennial data collection cycle begins in October during an even year and estimates are published during the following year.

Data release:

The baseline SDG report was published in July 2017 and feed into the SG's 2017 SDG Progress Report. . The estimates will be updated in 2019.

Data providers

National statistics offices, Ministries of water, sanitation, health, environment. Regulators of water and sanitation services.

Data compilers

Name:

WHO/UNICEF

Description:

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References

URL:

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References:

JMP website: www.washdata.org.

JMP 2017 update and SDG baselines
https://washdata.org/report/jmp-2017-report-final

Ram, P., Practical Guidance for Measuring Handwashing Behaviour: 2013 update, World Bank Water Supply and Sanitation Programme, 2013.

http://www.wsp.org/sites/wsp.org/files/publications/WSP-Practical-Guidance-Measuring-Handwashing-Behavior-2013-Update.pdf"

Related indicators

All targets under Goal 6, as well as targets 1.2, 1.4, 2.2, 3.2, 3.8, 3.9, 4a, 5.4 and 11.1

MSSD 15: SDG Indicator 2.4.1: Proportion of agricultural area under productive and sustainable agriculture

Goal 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture
Target 2.4: By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality

Institutional information

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

Concepts and definitions

Definition:
The indicator is defined by the formula:

$$SDG2.4.1 = Area\ under\ productive\ and\ sustainable\ agriculture\ /\ Agricultural\ land\ area^{3}$$

This implies the need to measure both the extent of land under productive and sustainable agriculture (the numerator), as well as the extent of land area under agriculture (the denominator).

The *numerator* captures the three dimensions of sustainable production: environmental, economic and social. It corresponds to agricultural area of the farms that satisfy sub-indicators selected across all three dimensions.

The *denominator* is agricultural land area managed by agricultural holdings, defined as the sum of agricultural area utilized by agricultural holdings that are owned (excluding rented-out), rented-in, leased, sharecropped or borrowed. State or communal land used by farm holdings is not included. Please see the methodological document prepared by FAO for a more detailed explanation.

Indicator 2.4.1 focuses on agricultural land, and therefore primarily on land that is used to grow crops and raise livestock. This choice of scope is fully consistent with the intended use of a country's agricultural area as the denominator of the aggregate indicator.

Included within the scope:

- Both intensive and extensive production systems (including intensive livestock production).
- Subsistence agriculture.
- State and common land when used exclusively and managed by the holding.
- Food and non-food crops and livestock products (example crops such as tobacco, cotton, and livestock raised for non-food products like sheep for wool).

[3] State or communal land used by farm holdings is not included, see discussion in section "Spatial scope: the denominator" in this detailed methodological document prepared by FAO.

Crops grown for fodder or for energy purposes.

- Agro-forestry (trees on the farm).
- Aquaculture, to the extent that it takes place within the agricultural area. For example, rice-fish farming and similar systems.

Excluded from the scope:

- State and common land not used exclusively by the agriculture holding.
- Nomadic pastoralism.
- Production from gardens and backyards. Production from hobby farms.
- Holdings focusing exclusively on aquaculture.
- Forest and other wooded lands, when not part of an agricultural holding.
- Food harvested from the wild.

Rationale:

At the heart of the concept of sustainability is the notion of balance over the long term among a full range of aspects concerning human activity on Earth. Thus, while there are 17 distinct SDG goals, they are, at the same time, seen as providing coverage for an integrated challenge. Meeting this challenge will require taking a systems-based perspective on how the different aspects combine.

Most commonly, sustainability is considered in the context of three dimensions – economic, environmental and social – but other dimensions may be considered such as resilience and governance. Depending on the location and circumstance, any one of the dimensions may be in or out of balance such that a situation or activity is considered unsustainable.

While the issue of sustainability is not new, discussion of the concept at the international level was especially renewed at the 1992 Rio Summit on Sustainable Development, which came in the wake of the release of the 1987 Brundtland Commission report. The discussion of sustainable development in international and national policy circles at that time was wide ranging and many sectors took it upon themselves to considerably extend discussion of sustainability at a sector level. Agriculture was no exception.

The approaches to framing and defining sustainable agriculture vary in terms of their coverage of the three primary dimensions of sustainability, i.e. economic, environmental and social, and in terms of the scale that which they assess sustainability, i.e. from field and farm scales, to national and global scales. Some approaches consider different features of sustainability, for example whether current practices are economically feasible, environmentally sound and socially desirable. Many approaches to considering sustainable agriculture focus on particular practices such as organic, regenerative or low-input agriculture and can equate these with sustainable agriculture.

The conclusion from a literature review associated with the methodological development of this indicator is that the multi-dimensional approach developed by FAO in 1988 is a meaningful framing of the concept. Thus, sustainable agriculture can be considered as:

“The management and conservation of the natural resource base, and the orientation of technological and institutional change in such a manner as to ensure the attainment and continued satisfaction of human needs for present and future generation. Such development (in agriculture, forestry and

fishing, etc.) conserves land, water, plant and animal genetic resources, environmentally non-degrading, technically appropriate, economically viable and socially acceptable." (FAO, 1988)

More recently, in 2014, FAO built on these broad principles embodied in this definition of sustainable agriculture, to describe a vision for sustainable food and agriculture. Recognizing the current "unprecedented confluence of pressures" including poverty and hunger, inadequate diets, land and water scarcity, loss of biodiversity and the effects of climate change, the FAO described a vision based on five principles applicable across five sectors: crops, livestock, forestry, aquaculture and fisheries. The five principles (FAO, 2014) are:

- Improving efficiency in the use of resources is crucial to sustainable agriculture.
- Sustainability requires direct action to conserve, protect and enhance natural resources
- Agriculture that fails to protect and improve rural livelihoods, equity and social well-being is unsustainable
- Enhanced resilience of people, communities and ecosystems is key to sustainable agriculture
- Sustainable food and agriculture requires responsible and effective governance mechanisms.

These serve as the framework for SDG indicator 2.4.1.

Concepts:

The literature review (Hayati, 2017) identified a large number of potential sustainability themes across the three dimensions of sustainability and, for each theme, usually a large number of possible sub-indicators. The key considerations in the selection of themes are relevance and measurability. In terms of relevance, the relationship between the associated sub-indicator and sustainable agriculture outcomes at farm level should be strong. Following this approach, only sub-indicators that are responsive to farm level policies aimed at improving sustainable agriculture are considered. In terms of measurability, only a "core" set of themes and sub-indicators for which measurement and reporting is expected in the majority of countries are selected.

A key aspect of all approaches to measuring sustainable agriculture is the recognition that sustainability is a multi-dimensional concept, and that these multiple dimensions need to be reflected in the construction of the indicator. This implies that SDG indicator 2.4.1 must be based on a set of sub-indicators that cover these three dimensions.

Through a consultative process that has lasted over two years, 11 themes and sub-indicators have been identified, which make up SDG 2.4.1.

No.	Theme	Sub-indicators
1	Land productivity	Farm output value per hectare
2	Profitability	Net farm income
3	Resilience	Risk mitigation mechanisms
4	Soil health	Prevalence of soil degradation
5	Water use	Variation in water availability
6	Fertilizer pollution risk	Management of fertilizers
7	Pesticide risk	Management of pesticides

8	Biodiversity	Use of biodiversity-supportive practices
9	Decent employment	Wage rate in agriculture
10	Food security	Food insecurity experience scale (FIES)
11	Land tenure	Secure tenure rights to land

Please see the annex for a detailed description of the sub-indicators.

Comments and limitations:

An earlier version of the methodology suggested a combination of different data collection instruments to monitor the various sub-indicators. In the consultations undertaken, however, several countries did highlight the difficulties in combining data from different sources and requested that this be avoided to the extent possible. Other, relatively data rich, countries, instead, insisted on the need to allow for the use of existing data sources. This revised methodology addresses both concerns: it offers the farm survey as a single data collection instrument for all sub-indicators, but it also offers the possibility of using a combination of different data sources as an alternative option as long as certain criteria are satisfied.

The decision to use the farm survey as a unique data collection instrument is in line with countries' efforts, supported by FAO, to develop farm surveys as the most appropriate tool for generating agricultural statistics. It also benefits from the FAO work in developing the Agricultural Integrated Survey (AGRIS) programme, which has been recently finalized as is part of a new data initiative called 50 X 2030 (http://www.data4sdgs.org/news/how-agriculture-sector-leading-way-investment-data).

The decision to focus on farm survey has implications on the type of information that it is possible to capture in order to cover the different dimensions of sustainability. While farm surveys are well suited to measure the economic dimension of sustainability, they may not be the ideal tool for measuring environmental and social sustainability in terms of impact/outcomes.

Typically, environmental impacts of agriculture are measured through monitoring systems like remote sensing, soil and water sampling, or other tools associated with a specific area, rather than with a single agricultural holding. For several environmental themes, it is unlikely that farmers would be able to assess the environmental impact of their farming practices on issues like fertilizer pollution or pesticide impact. Using a farm survey instrument, instead of environmental monitoring systems, therefore implies moving from measuring outcome/impact to assessing farmers' behaviour. Whenever possible, however, the revised methodology continues to focus on measuring outcomes.

The sub-themes under the social dimension are usually best captured through household surveys. While in the majority of cases agricultural holdings are closely associated with a given household, this is not always the case, and therefore capturing the social dimension of sustainability through a farm survey could pose certain challenges.

Methodology

Computation Method:

Steps to calculate SDG 2.4.1 include:

1. Determining the **scope** of the indicator: The choice made for indicator 2.4.1 is to focus on crops and livestock production thus excluding forestry, fisheries and aquaculture.
2. Determining the **dimensions** to be covered: The choice made for indicator 2.4.1 is to include environmental, economic and social dimensions in the sustainability assessment.
3. Choosing the **scale** for the sustainability assessment: The choice made for indicator 2.4.1 is farm level with aggregation to higher levels.
4. Selecting the data collection **instrument(s)**.
5. Selecting the themes within each dimension, and choosing a **sub-indicator** for each theme.
6. Assessing **sustainability performance at farm level for each sub-indicator**: Specific sustainability **criteria** are applied in order to assess the sustainability level of the farm for each theme according to the respective sub-indicators.
7. Deciding the **periodicity** of monitoring the indicator.
8. **Modality of reporting the indicator**. The set of sub-indicators are presented in the form of a **dashboard**. The dashboard described above offers a response in terms of measuring sustainability at farm level and aggregating it at national level.

The revised methodology proposes to focus on a dashboard presenting the different sub-indicators separately. The dashboard is chosen for reporting the indicator, as sustainability is about finding an acceptable balance between its three dimensions. It offers several advantages, including the possibility of combining data from different sources and clarity about the main unsustainability issues: countries can easily visualize their performance in terms of the different sustainability dimensions and themes, and understand where policy efforts can be focused.

Computation of results and construction of the dashboard is performed for each sub-indicator separately: for each sub-indicator, aggregation at national level is done by summing the agricultural land area of all agricultural holdings by sustainability category, following a 'traffic light' approach (red, yellow or green), and reported as percentage of the total agricultural land area of the country (minus the common land).

Several countries have suggested using existing data sources or alternative data sources like remote sensing and GIS on the grounds that these instruments can be more cost-effective and sometimes provide more reliable results than farm surveys.

The use of such instruments is allowed, considering that several aspects need to be carefully taken into account prior to using alternative data sources. First of all, it should be demonstrated that the alternative source gives results of at least same quality as the surveys and ensure international comparability. In order to produce consistent and reliable data as per recommended periodicity, it is advised that the use of alternative data sources may be considered when the available datasets fulfill the following criteria:

- Can be reflected in or attributed to agricultural land area in the country, considering different farm typologies and agricultural regions;
- Can be associated with the country's agricultural productions systems, particularly crops, livestock and the combinations in between;
- Capture the same aspect/phenomenon as the proposed farm survey with at least a documented same quality, considering scientific standards;
- Are representative of the situation at the national level (with respect to agricultural land area) taking into account main agricultural region types;
- Are compliant with international/national standards and classifications systems in order to ensure the indicator to be internationally comparable;

- Data are available at the same level of territorial disaggregation as the farm survey.
- The ways and means to adjust for under-coverage and non-coverage (when needed) should be clearly devised and described;
- Data collection year and periodicity are homogenous across the sub-indicators.

Finally, using different data sources implies that mechanisms should be put in place at the country level to coordinate regularly the flow of required information generated by various institutions.

Disaggregation:

Indicator 2.4.1 is expected to be collected through farm surveys and the result expressed as a national value. However, the methodology is scale independent and can be adopted at any geographical level. In addition the indicator can be disaggregated according to type of farming system (crop, livestock or mixed) and other characteristics of the farm e.g. size, or gender of the farm holder.

Treatment of missing values:

Partial non-response at individual level (farm holding) will be imputed using appropriate statistical techniques, such as nearest-neighbor algorithms. The decision on whether to impute or not and the choice of the method is a function of the nature of the variable to impute and the amount and type of data available for the imputation, such as the availability of auxiliary data coming from different sources (e.g. surveys, administrative information). To the extent possible, raw survey results will also be adjusted to minimize the biases associated with total non-response.

It is important to clearly distinguish missing data from non-applicable events. As specified above and in the sub-indicator methodology sheets, some sub-indicators can be recorded as 'not applicable' for a given farm. In this case, the farm will be considered sustainable from the perspective of the given sub-indicators.

Regional aggregates:

These data will be disseminated through FAOSTAT, the largest database of food and agricultural statistics. Therefore the method of calculation will follow the international standard established by the database. In the case of this indicator, regional and global aggregates will be computed by weighting the national indicators according to the country's agricultural area.

Sources of discrepancies:

Given that this is a Tier III indicator, no data currently exists for this indicator. Therefore there are no discrepancies between national and sub-national data.

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

The methodology note provides a detailed description for the computation of the indicator on the basis of the farm survey.

Ideally, to obtain the proportion of agriculture area that is sustainable, the assessment of sustainability

should be made across all sub-indicators for each farm that is part of the sample. The farm would then be assigned a sustainability level that is the most constraining across all sub-indicators, and the results would then be aggregated at the national level. However, this implies that a single data collection instrument (the farm survey) is used to collect information on all sub-indicators for a given agricultural area representative of the country's agricultural area. If different sources are used to collect information on the different sub-indicators, it is impossible to assess sustainability at the level of the farm holding.

In order to allow for the possibility to use alternative data sources, Indicator 2.4.1 is derived from the dashboard at country level, and is associated with the result of the sub-indicator that is most limiting sustainability performances. This is to check amongst all sub-indicators one that has achieved the least 'desirable + acceptable' sustainability level (or the highest level of unsustainability) at the country level

Respecting the 'traffic light' approach, the following values can then be calculated:

$$SDG241_d = \min_{n:1-11}(SI_{d\,n})$$

where:

$SDG241_d$ = proportion of agricultural land area that have achieved the 'desirable' level (estimated by excess, see note below)
$SI_{d\,n}$ = proportion of sub-indicator n that is classified as 'desirable'
min refers to the minimum level of $SI_{d\,n}$ at national level across all 11 sub-indicators
$SDG241_d$ is the proportion of agricultural area for which all sub-indicators are green.

$$SDG241_{a+d} = \min_{n:1-11}(SI_d + SI_a)_n$$

where:

$SDG241_{a+d}$ = proportion of agricultural land area that have achieved at least the 'acceptable' level (estimated by excess, see note below)
$SI_{d\,n}$ = proportion of sub-indicator n that is classified as 'desirable'
$SI_{a\,n}$ = proportion of sub-indicator n that is classified as 'acceptable'
min refers to the minimum level of ($SI_{d\,n}$ + $SI_{a\,n}$) at national level across all 11 sub-indicators
$SDG241_{a+d}$ is the proportion of agricultural area for which all indicators are either green or yellow, an acceptable situation, but that could be improved.

$$SDG241_u = 1 - SDG241_{a+d} = \max_{n:1-11}(SI_{u\,n})$$

where:

$SDG241_u$ = proportion estimated by default of agricultural area that is 'unsustainable' (see note below)
$SI_{u\,n}$ = proportion of sub-indicator n that is classified as 'unsustainable'
max refers to the highest value of $SI_{u\,n}$ across all 11 sub-indicators at national level
$SDG241_u$ = is the proportion of agricultural area for which at least one sub-indicator is unsustainable, and is therefore classified as unsustainable.
The performances of countries over time can be measured by the change in the value of $SDG241_d$ and $SDG241_{a+d}$. An increase over time indicates improvement, while decrease indicates degradation.
Note: It should be noted that the choice of using the results of the dashboard at national level to compute Indicator 2.4.1. rather than compiling results at farm level and aggregating them further at national level will systematically over-estimate the proportion of agricultural area under sustainable and productive agriculture. The reason is that the probability is high that different holdings will perform badly (red) in terms of different sub-indicators. The total area considered 'unsustainable' will therefore likely be higher in reality than by looking at the limiting factor aggregated at national level through the dashboard. This shortcoming is compensated by the higher level of flexibility offered by the method described above.

The performances of countries over time can be measured by the change in the value of $SDG241_d$ and $SDG241_{a+d}$. An increase over time indicates improvement, while decrease indicates degradation.
Note: It should be noted that the choice of using the results of the dashboard at national level to compute Indicator 2.4.1 rather than compiling results at farm level and aggregating them further at national level will systematically over-estimate the proportion of agricultural area under sustainable and productive agriculture. The reason is that the probability is high that different holdings will perform badly (red) in terms of different sub-indicators. The total area assessed as 'unsustainable' will therefore likely be higher than by looking at the limiting factor aggregated at national level through the dashboard. This shortcoming is compensated by the higher level of flexibility offered by the method described above.

Quality assurance

FAO will work closely with countries for quality assurance. Not only will data collection for SDG 2.4.1 respect international standards, it will also adhere to FAO's data quality assurance "Statistics Quality Assurance Framework" (http://www.fao.org/statistics/standards/en/).

Data Sources

Description:

Different data are collected through different instruments. Often, environmental data are collected through environmental monitoring systems, including remote sensing. Yet many countries do not have the capacity or resources to do so, and therefore these data are sparse or non-existent. In order to propose a manageable and cost-effective solution, a requirement stressed by several countries during the consultations, the methodology offers a single data collection instrument for all sub-indicators: the farm survey.

Several countries have suggested using existing data sources or alternative data sources on the grounds that these instruments can be more cost-effective and sometimes provide more reliable results than farm surveys. These instruments include remote sensing, GIS, models, agricultural surveys, household surveys,

administrative data or environmental monitoring systems. The methodology considers the possibility to use such instruments, subject to a series of criteria to ensure data quality and international comparability. Other data sources may also be used to complement and/or validate farm surveyresults.

The methodology note also recommends that countries complement the farm survey with a monitoring system that can measure the impact of agriculture on the environment (soil, water, fertilizer and pesticide pollution, biodiversity) and on health (pesticides residues in food and human bodies). This will provide additional information and help crosscheck the robustness of SDG indicator 2.4.1 with regard to the environmental dimension of sustainability.

Collection process:
A questionnaire module has been designed, which contains the core set of questions necessary to obtain the data for SDG 2.4.1. If farm surveys already exist within a country, these questions can be integrated into existing instruments in order to minimize the burden to national statistical offices in data collection.

All data collection activities will be done through the national statistical office or the office designated to collect data for this indicator. FAO, together with the Global Strategy, has created all capacity development material necessary for this indicator, including a methodological guide, an enumerator manual, and a calculation document. An e-learning module is in preparation and will be finalised as soon as the indicator is approved by the IAG-SDG. Regional training workshops are also foreseen for end 2018 and 2019.

Data Availability

Description:

Many sub-indicators for this indicator are already being collected in countries, either as part of existing farm surveys or through other data sources such as environmental monitoring systems, administrative data or household surveys. Yet they are not collected in with a common set of criteria that guarantee the same quality or adherence to international comparability.

SDG indicator 2.4.1 brings together 11 sub-indicators and, through a farm survey, guarantees comparability and a minimum set of standards for data quality.

Time series:

SDG Indicator 2.4.1 measures progress towards more sustainable and productive agriculture. For many sub-indicators, it is likely that changes will be relatively limited from a year to another. Furthermore, the 3-year periodicity will enable countries to have three data points on the indicator before 2030. It is therefore recommended that the survey be conducted every three years.

Calendar

Data collection:

Data collection will depend on currently existing data collection cycles for farm surveys within countries. FAO intends to integrate the questionnaire module associated with this indicator in AGRIS, and in future agricultural censuses.

Data release:

Although new data may not be available annually for each country, all new information is expected to be released annually through FAOSTAT.

Data providers

National Statistical Offices or designated offices within countries will be responsible for collecting data for this indicator.

Data compilers

National Statistical Offices or designated offices within countries will be responsible for collecting data for this indicator. They will in turn report to FAO who will provide capacity development, conduct quality control and disseminate the information through FAOSTAT. FAO will in turn report to the international statistical community.

References

- FAO. 1988. Report of the FAO Council, 94th Session, 1988. Rome.
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- FAO, 2018. Land Use Classification. In: SEEA Agriculture, Forestry and Fisheries, Annex I, pg. 120, 130-135. FAO and UNSD, Rome, Italy.
- FAO. 2018. Report of the 26th Committee on Agriculture, 1-5 October 2018.
- Global Strategy for Improving Agricultural and Rural Statistics. 2017. Handbook on the Agricultural Integrated Survey.
- Hayati, D. 2017. Literature Review: A Literature Review on Frameworks and Methods for Measuring and Monitoring Sustainable Agriculture. Technical Report n.22. Global Strategy Technical Report: Rome.

Related indicators

Direct links to:

2.1.2 Prevalence of moderate or severe food insecurity in the population, based on the Food Insecurity Experience Scale (FIES)

5.a.1 (a) Percentage of people with ownership or secure rights over agricultural land (out of total

agricultural population), by sex; and (b) share of women among owners or rights-bearers of agricultural land, by type of tenure

Indirect link to:
Indicator 2.3.2: Average income of small-scale food producers, by sex and indigenous statusAnnex: description of the sub-indicators

1. Farm output value per hectare

Dimension: Economic

Theme: Land Productivity

Land productivity is a measure of agricultural value of outputs obtained on a given area of land. Maintaining or improving the output over time relative to the area of land used is an important aspect in sustainability for a range of reasons. At farm level, the land productivity reflects technology and production processes for given agro-ecological conditions. In a broader sense, an increase in the level of land productivity enables higher production while reducing pressure on increasingly scarce land resources, commonly linked to deforestation and associated losses of ecosystem services and biodiversity.

Coverage: All farm types (except those that purchase more than 50% of the feed for their livestock)

Description:

The sub-indicator is described as farm output value per hectare (crops and livestock).

Information on farm outputs and agricultural area should be standard information available from farm surveys thus providing a good basis for assessment at farm level.

- Farm output: The volume of agricultural output at farm level generally takes into account production of multiple outputs, e.g. crop types and crop and livestock combinations, etc. Since the volume of agricultural outputs is not measured in commensurate units (e.g. not all outputs are measured in tonnes, and tonnes of different output represent different products), it is necessary to establish an appropriate means of aggregation, in this case using a monetary unit. A simple way to enable aggregation is to reflect the multiple outputs produced by a single farm in terms of values (i.e. quantity multiplied by prices).
- Farm agricultural land area: defined as the area of land used for agriculture within the farm[4].

Sustainability criteria:

Distance from the 90th percentile of the national distribution[5]:

- Green (desirable): Sub-indicator value is ≥ 2/3 of the corresponding 90th percentile
- Yellow (acceptable): Sub-indicator value is ≥ 1/3 and < 2/3 of the corresponding 90th percentile
- Red (unsustainable): Sub-indicator value is < 1/3 of the corresponding 90th percentile

[4] According to the SEEA-AFF classification and the classification of the World Agricultural Census 2020

[5] The percentile is calculated by major production system (crops, livestock, crops/livestock) and by major agricultural areas of the country and farm productivity is compared with similar farms in same agricultural area. Reference period: calendar year

Data items

1.1. Quantities and farm gate prices of the 5 main crops or livestock products and by-products produced by the farm
1.2. Quantities and farm gate prices of other agricultural products (agro-forestry or aquaculture products) produced by the farm
1.3. Agricultural area of the holding
1.4. Distribution of sources of animal feed used on the agricultural holding (same as 8.2)

◯ 1 percentage produced on the agricultural holding

◯ 2 percentage purchased from outside the holding

2. Net Farm Income

Dimension: Economic

Theme: Profitability

An important part of sustainability in agriculture is the economic viability of the farm, driven to a large extent by its profitability. Profitability is measured using the net income that the farmer is able to gain from farming operations. Availability and use of information on farm economic performance, measured using profitability, will support better decision making both at micro and macro-economic level. Since performance measures drive behaviour, better information on performance can alter behaviour and decision-making by government and producers both in large-scale commercial farming and medium and small-scale subsistence agriculture.

Coverage: All farms types

Description:

The sub-indicator measures if the farm is consistently profitable over a 3-year period. The focus of this sub-indicator is on income from farming operations as distinct from the total income of the farming household, which may include other sources of income such as, for example, employment in local businesses by other family members, tourism activity, etc.

Formula[6]:

$$NFI = CR + Y_k - OE - Dep + \Delta In$$

where:

- NFI = Total Net Farm Income
- CR = Total farm cash receipts including direct program payments
- Y_k = Income in kind
- OE = Total operating expenses after rebates (including costs of labour)
- Dep = Depreciation
- Δ Inv = Value of inventory change.

Estimating profitability at a farm level will generally require compilation of basic farm financial records, i.e. daily, weekly, monthly or seasonal transactions in an organized way. In general, large commercial farms maintain detailed financial records however, in case of medium farms and small subsistence agriculture, record keeping is seldom practiced and in most of the countries it doesn't exist at all.

[6] See Statistics Canada at: http://www.statcan.gc.ca/pub/21-010-x/21-010-x2014001-eng.pdf

In case when detailed data are not available at farm level, then estimates will be calculated based on farmer declaration of outputs and inputs quantity and value. In these cases, depreciation, variation of stocks and taxes may be neglected. This is described below as simplified option (1).

A second simplified option (short questionnaire) is also offered, based on farmer's declaration of the agricultural holding's profitability over the last three calendar years. It is recommended to use this simplified option only when other options are not feasible.

Sustainability criteria:

For a farm to be profitable the net farm income should be above zero.

- Green (desirable): above zero for past 3 consecutive years
- Yellow (acceptable): above zero for at least 1 of the past 3 consecutive years
- Red (unsustainable): below zero for all of the past consecutive years

Data items

Reference period: last three calendar years

Detailed option

Data from farm financial records, i.e. daily, weekly, monthly or seasonal transactions in an organized way (in general, large commercial farms maintain detailed financial records on the basis of which the NFI can be calculated as per above equation).

Simplified option (1)

To be used when the detailed data are not available at farm level (better adapted to smallholders and household sector). Variables to be calculated are Farm Cash Receipts; Income in kind; Direct program payments; and Operating Expenses.

1.1 Output quantity (crops and livestock products and by-products marketed or self-consumed)
1.2 Farm gate prices of above outputs
1.3 Inputs quantity and prices
1.4 Income from other on-farm activities
1.5 Operating expenses

Simplified option (2)

1.1 Respondent's declaration on agricultural holding profitability over the last 3 calendar years

3. Risk mitigation mechanisms

Dimension: Economic

Theme: Resilience

Resilience encompass absorptive, anticipatory and adaptive capacities and refers to the properties of a system that allows farms to deal with shocks and stresses, to persist and to continue to be well-functioning (in the sense of providing stability, predictable rules, security and other benefits to its members).

Coverage: All farms types

Description:

This sub-indicator measures the incidence of the following mitigation mechanisms:

- Access to or availed credit[7].
- Access to or availed insurance.
- On farm diversification (share of a single agricultural commodity not greater than 66% in the total value of production of the holding).

Access to credit and/or insurance is defined here as when a given service is available and the holder has enough means to obtain the service (required documents, collateral, positive credit history, etc.). Broadly, access to one or more the above 3 factors will allow the farm to prevent, resist, adapt and recover from external shocks such as, floods, droughts, market failure (e.g. price shock), climate shock and pest/animal diseases.

Sustainability criteria:

A farm holding is considered resilient if it has availed or has the means to access the risk mitigation mechanisms as follows:

- Green (desirable): Access to or availed at least two of the above-listed mitigation mechanisms.
- Yellow (acceptable): Access to or availed at least one of the above-listed mitigation mechanisms.
- Red (unsustainable): No access to the listed mitigation mechanisms.

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Data items

Reference period: last calendar year

3.1. Agricultural holding access to credit, insurance or other financial instruments:

- Credit (formal, informal)
- Insurance

3.2 List of other on-farm activities apart from crops and livestock

3.3 Value of production for the listed on-farm commodities

4. Prevalence of soil degradation

Dimension: Environmental

Theme: Soil health

Many of the processes affecting soil health are driven by agricultural practices. FAO and the Intergovernmental Technical Panel on Soils (ITPS) have identified 10 main threats to soil functions: soil erosion; soil organic carbon losses; nutrient imbalance; acidification; contamination; waterlogging; compaction; soil sealing; salinization and loss of soil biodiversity.

Coverage: All farms types

Description:

[7] Include cash loans and in-kind loans (e.g., seeds provided by another farmer and repaid with a share of the harvest, seeds, etc.) only for agriculture related investments.

The sub-indicator measures the extent to which agriculture activities affects soil health and therefore represents a sustainability issue. A review of the 10 threats to soil shows that all except one (soil sealing, which is the loss of natural soil to construction/urbanisation) are potentially and primarily affected by inappropriate agricultural practices. Ideally, therefore, all soils under agricultural land area in a country should be the subject of periodic monitoring in order to assess the impact of agriculture on soils. This requires detailed surveys and sampling campaigns, associated with laboratory testing. In order to propose a manageable solution while capturing the main trends in the country in terms of soil health, the farm survey focuses on the four threats that combine the characteristics more widespread (for national monitoring, countries may choose to add any of the other areas indicated above, depending on relevance), and easier to assess through farm surveys:

1. Soil erosion
2. Reduction in soil fertility
3. Salinization of irrigated land
4. Waterlogging

The farm survey captures farmer's knowledge about the situation of the agricultural holding in terms of soil degradation. Experience has shown that farmers are very much aware of the state of their soils, health and degradation level. Farmers may also be offered the opportunity to mention other threats than the above four.
Other data sources on soil health may either complement the information collected through the farm survey and offer opportunities for cross-checking farmers' responses; or be used as alternative sources of data. Prior to the farm survey, a desk study could collect all available information on soil health, including using national official statistics or statistics available from international agencies such as FAO. This typically includes maps, models, results from soil sampling, laboratory analysis and field surveys, and all existing report on soil and land degradation at national level. On the basis of this information, maps or tables (by administrative boundaries or other divisions of the country) can be established, showing the threats to soils according to the above 4 categories of threats.

Sustainability criteria:

Proportion of agricultural area of the farm affected by soil degradation.

- Green (desirable): The combined area affected by any of the four selected threats to soil health is negligible (less than 10% of the total agriculture area of the farm).
- Yellow (acceptable): The combined area affected by any of the four selected threats to soil health is between 10% and 50% of the total agriculture area of the farm.
- Red (unsustainable): The combined area affected by any of the four selected threats to soil health is above 50% of the total agriculture area of the farm.

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Data items

Reference period: last three calendar years

4.1 List of soil degradation threats experienced on the holding

- Soil erosion (loss of topsoil through wind or water erosion)
- Reduction in soil fertility[8]
- Salinization of irrigated land
- Waterlogging

[8] Reduction in soil fertility will be experienced by farmers as progressive reduction in yield and will be the result of a negative nutrient balance by which the amount of nutrient application (including through mineral and organic fertilizers, legumes, or green manure) is lower than the amount that is lost and exported by crops.

- Other
- None of the above

4.2 Total area of the holding affected by threats related to soil degradation

5. Variation in water availability

Dimension: Environmental

Theme: Water use

Agriculture, more specifically irrigated agriculture, is by far the main economic sector using freshwater resources. In many places, water withdrawal from rivers and groundwater aquifers is beyond what can be considered environmentally sustainable. This affects both rivers and underground aquifers. Sustainable agriculture therefore requires that that level of use of freshwater for irrigation remains within acceptable boundaries. While there is no internationally agreed standards of water use sustainability, signals associated with unsustainable use of water typically include progressive reduction in the level of groundwater, drying out of springs and rivers, increased conflicts among water users.

Coverage: All farm types

Description:

The sub-indicator captures the extent to which agriculture contributes to unsustainable patterns of water use. Ideally, the level of sustainability in water use is measured at the scale of the river basin or groundwater aquifer, as it is the combined effect of all users sharing the same resource that impact water sustainability. The farm survey captures farmers' awareness and behaviour in relation with water scarcity, and associates them with three levels of sustainability. These awareness and behaviour are expressed in terms of:

- whether the farmer uses water to irrigate crops on at least 10% of the agriculture area of the farm and why, if the answer is negative (does not need, cannot afford);
- whether the farmer is aware about issues of water availability in the area of the farm and notices a reduction in water availability over time;
- whether there are organizations (water users organisations, others) in charge of allocating water among users and the extent to which these organisations are working effectively.

Other data sources may either complement the farm survey on water use and offer opportunities for cross-checking farmers' responses; or be used as alternative sources of data. Prior to the farm survey, a desk study should collect all available information on water balance, including national official statistics or statistics available from international agencies such as FAO. Information on water resources and use is usually collected by the entities in charge of water management or monitoring and are organised by hydrological entity (river basin or groundwater aquifer). They typically include hydrological records (river flow, groundwater levels), models and maps showing the extent of water use by hydrological entity.

Sustainability criteria:

Farm sustainability in relation with water use will be assessed as follows:

- Green (desirable): does not use water for irrigating crops on more than 10% of the agriculture area of the farm, or water availability remains stable over the years
- Yellow (acceptable): uses water to irrigate crops on at least 10% of the agriculture area of the farm, does not know whether water availability remains stable over the years, or experiences reduction on water availability over the years, but there is an organisation that effectively allocates water among users.

- Red (unsustainable): in all other cases.

Data items

Reference period: last three calendar years

5.1 Irrigated agricultural area of the holding

5.2 Reduction in water availability experienced on the holding

5.3 Existence of organizations dealing with water allocation

6. Management of fertilizers

Dimension: Environmental

Theme: Fertilizer pollution risk

Agriculture can affect the quality of the environment through excessive use or inadequate management of fertilizers. Sustainable agriculture implies that the level of chemicals in soil and water bodies remains within acceptable thresholds. Integrated plant nutrient management considers all sources of nutrients (mineral and organic) and their management in order to obtain best nutrient balance. Measuring soil and water quality captures the extent and causes of pollution, but establishing monitoring systems of soil and water is costly and not always feasible in countries.

Note: the management of plant nutrients addresses two sustainability issues: avoiding pollution, and maintaining a good level of soil fertility. This sub-indicator addresses the first issue, while the second one is addressed under sub-indicator 4 'Soil health'.

Coverage: All farm types

Description:

The proposed approach is based on questions to farmers about their use of fertilizer, in particular mineral or synthetic fertilizers, their awareness about the environmental risks associated with fertilizer and manure applications, and their behaviour in terms of plant nutrient management[9]. Management measures considered to help reducing risk is as follows:

1. Follow protocols as per extension service or retail outlet recommendations or local regulations, not exceeding recommended doses
2. Use organic source of nutrients (including manure or composting residues) alone, or in combination with synthetic or mineral fertilizers
3. Use legumes as a cover crop, or component of a multi/crop or pasture system to reduce fertilizer inputs
4. Distribute synthetic or mineral fertilizer application over the growing period
5. Consider soil type and climate[10] in deciding fertilizer application doses and frequencies
6. Use soil sampling at least every 5 years to perform nutrient budget calculations
7. Perform site-specific nutrient management or precision farming[11]
8. Use buffer strips along water courses.

[9] In order to keep the questionnaire manageable, the module does not consider different type of crop or practice. The method therefore assumes that if a farmer reports best practices, these practices are applied over the entire farm. It may therefore over-estimate the area under good practices.

[10] Soil type, combined with climate, and in particular the frequency and intensity of rainfall events, are important elements to consider in deciding fertilizer application doses and frequencies.

[11] Precision farming is a farming management concept based on observing, measuring and responding to inter and intra-field variability in crops.

Sustainability criteria:

Farm sustainability in relation with fertilizer pollution risk will be assessed as follows:

- Green (desirable): The farm does not use fertilizers[12] or uses fertilizers and takes specific measures to mitigate environmental risks (at least four from the list above)
- Yellow (acceptable): the farm uses fertilizers and takes at least two measures from the above list to mitigate environmental risks
- Red (unsustainable): farmer uses fertilizer and does not take any of the above specific measures to mitigate environmental risks associated with their use.

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Data items

Reference period: last calendar year

6.2 Use of synthetic or mineral fertilizer or animal manure/slurry by the agricultural holding (Y/N)

6.3 Specific measures taken to mitigate the environmental risks associated with the excessive use or misuse use of fertilizers as per list below:

◯ 1 Follow protocols as per extension service or retail outlet recommendations or local regulations, not exceeding recommended doses
◯ 2 Use organic source of nutrients (including manure or composting residues) alone, or in combination with synthetic or mineral fertilizers
◯ 3 Use legumes as a cover crop, or component of a multi/crop or pasture system to reduce fertilizer inputs
◯ 4 Distribute synthetic or mineral fertilizer application over the growing period
◯ 5 Consider soil type and climate in deciding fertilizer application doses and frequencies
◯ 6 Use soil sampling at least every 5 years to perform nutrient budget calculations
◯ 7 Perform site-specific nutrient management or precision farming
◯ 8 Use buffer strips along water courses.

7. Management of pesticides

Dimension: Environmental

Theme: Pesticide risk

Pesticides are important inputs in modern agriculture (crop and livestock), but if not well managed

they can cause harm to people's health or to the environment. Practices associated with integrated pest management (IPM[13]) exist that contribute to minimise risks associated with the use of pesticides and limit their impact on human health and on the environment. The International Code of Conduct on Pesticide Management defines best practice in pesticide management.

Coverage: All farm types

Description:

The proposed sub-indicator is based on information on the use of pesticides on the farms, the type of pesticide used and the type of measure(s) taken to mitigate the associated risks[14]. It considers the possibility that the holding uses pesticides in the framework of an Integrated Pest Management (IPM) program, or

[12] Fertilizers to be considered include mineral and synthetic fertilizers as well as animal manure.
[13] Integrated Pest Management (IPM) is an ecosystem approach to crop production and protection that combines different management strategies and practices to grow healthy crops and minimize the use of pesticides (FAO).
[14] In order to keep the questionnaire manageable, the module does not consider different types of crop or livestock. The method therefore assumes that if a farmer reports best practices, these practices are applied over the entire farm. It may therefore over-estimate the area under good practices.

adopts specific measures to help reducing risks associated with pesticide use. List of possible measures:

Health

1. Adherence to label recommendations for pesticide use (including use of protection equipment)
2. Safe disposal of waste (cartons, bottles and bags)

Environment

1. Adherence to label recommendations for pesticide application
2. Adopt any of the above good practices: adjust planting time, apply crop spacing, crop rotation, mixed cropping or inter-cropping
3. Perform biological pest control or use biopesticides
4. Adopt pasture rotation to suppress livestock pest population
5. Use of pest resistant/tolerant cultivars, disease resistant/tolerant livestock breed and standard/certified seed and planting material
6. Systematic removal of plant parts attacked by pests
7. Maintenance and cleansing of spray equipment after use

Sustainability criteria:

Farm sustainability in relation with pesticides will be assessed as follows:

- Green (desirable): The farm does not use pesticides or uses only moderately or slightly hazardous[15] pesticides (WHO Class II or III). In this case, it adheres either to an IPM programme or to both health-related measures and at least three of the environment-related measures
- Yellow (acceptable): farmer uses only moderately or slightly hazardous pesticides (WHO Class II or III) and takes some measures to mitigate environmental and health risks (at least two from each of the lists above)
- Red (unsustainable): farmer uses highly or extremely hazardous pesticides (WHO Class Ia or Ib), illegal pesticides, or uses moderately or slightly hazardous pesticides without taking specific measures to mitigate environmental or health risks associated with their use (fewer than two from each of the lists above).

Data items

Reference period: last calendar year

7.2 Use of pesticides for crop or livestock by the agricultural holding (Y/N)

7.3 Use of highly or extremely hazardous pesticides by the agricultural holding (Y/N)

7.4 Adherence to an Integrated Pest Management Programme (Y/N)

7.5 Measures taken to protect people from health-related risks associated with pesticides:

1. Adherence to label recommendations for pesticide use, including use of personal protection equipment (Y/N)
2. Safe disposal of waste (cartons, bottles and bags) (Y/N)

7.6 Measures taken to avoid environment-related risks associated with pesticides:

3. Adherence to label recommendations for pesticide application (Y/N)

[15] WHO Class II or III pesticides as defined by WHO classification (http://www.who.int/ipcs/publications/pesticides_hazard_2009.pdf), or equivalent national classification.

4. Adjustment of planting time (Y/N)
5. Application of crop spacing (Y/N)
6. Application of crop rotation (Y/N)
7. Application of mixed cropping (Y/N)
8. Application of inter-cropping (Y/N)
9. Perform biological pest control (Y/N)
10. Use of biopesticides (Y/N)
11. Adopting pasture rotation to suppress livestock pest population (Y/N)
12. Use of pest resistant/tolerant cultivars (Y/N)
13. Use of disease resistant/tolerant livestock breed (Y/N)
14. Use of standard/certified seed and planting material (Y/N)
15. Systematic removal of plant parts attacked by pests (Y/N)
16. Maintenance and cleansing of spray equipment after use (Y/N)

8. Use of biodiversity-supportive practices

Dimension: Environmental

Theme: Biodiversity

The Convention on Biological Diversity (CBD) stresses the close relationship between agriculture activities and biodiversity, considering three levels of biodiversity: genetic level diversity; agrobiodiversity at production system level; and ecosystem level (wild) biodiversity. The way agriculture is practiced influences all three levels. Attempts to develop indicators of biodiversity for agriculture systematically consider a large number of sub-indicator, with no universally agreed sustainability criteria. Considering these constraints, and the importance of addressing biodiversity in the construction of Indicator 2.4.1, it is proposed to develop a sub-indicator that captures the efforts towards more biodiversity-friendly agriculture, by identifying a limited list of practices that are conducive to biodiversity conservation.

Coverage: All farm types

Description:

This sub-indicator measures the level of adoption of biodiversity-supportive practices by the farm at ecosystem, species and genetic levels. This indicator addresses both crops and livestock. The practices are broken down as follows:

1. Leaves at least 10% of the holding area for natural or diverse vegetation. This can include natural pasture/grassland[16], maintaining wildflower strips, stone and wood heaps, trees or hedgerows, natural ponds or wetlands.
2. Does not use synthetic pesticides, does not purchase more than 50% of the feed for livestock and does not use antimicrobials as growth promoters.
3. At least two of the following contribute to the farm production, each of them representing at least 10% of the value of the holding's production: 1) crop/pasture[17]; 2) trees or tree products (including permanent crops like orchards or vineyards); 3) livestock or animal products; 4) fish.
4. Practices crop or crop/pasture rotation involving at least 3 crops or crops and pastures on at least 80% of the farm area (excluding permanent pastures) over a period of 3 years.
5. The area under a single continuous commodity is not larger than 2 hectares (excluding pasture), and areas larger than 2 hectares under a single commodity use at least two different varieties.

[16] Natural pastures or grassland implies no use of mineral or chemical fertilizer and no pesticides

[17] A value needs to be applied for pasture even if it is used for animal production on the farm

6. At least 50% of each animal species' population consists of locally adapted breeds[18] or breeds at risk of extinction[19].

Sustainability criteria:

Level of adoption of biodiversity-supportive practices:

- Green (desirable): The agricultural holding meets at least four of the above criteria
- Yellow (acceptable): The agricultural holding meets two or three of the above criteria
- Red (unsustainable): The agricultural holding meets less than two of the above criteria

Data items

Reference period: last calendar year

8.1 Percentage of the holding area covered by natural or diverse vegetation (not cultivated), including natural pasture or grasslands; wildflower strips; stone or wood heaps; trees or hedgerows; natural ponds or wetlands

8.2a Use of pesticides by the agricultural holding (Y/N) (covered by sub-indicator 7)

8.2b Distribution of sources of animal feed used on the agricultural holding

◯ 1 percentage produced on the agricultural holding

◯ 2 percentage purchased from outside the holding

8.2 c Use of antimicrobials as growth promoter for livestock (Y/N)

8.3 Production on the holding (covered by sub-indicator 1)

◯ 1 Crops or pasture
◯ 2 Trees and tree products
◯ 3 Livestock and animal products
◯ 4 Fish

8.4 Percentage of the agricultural area on which crop rotation or crop/pasture rotation involving at least three crops is practiced over a 3 year period

8.5 Area of the agricultural holding covered by the (up to 5) main crops listed for sub-indicator 1 (excluding pasture)

8.6 Number of varieties used for each of the (up to 5) main crops cultivated on the holding

8.7 List of different breeds and cross-breed and percentage of animals they represent for each animal species

9. Wage rate in agriculture

Dimension: Social

Theme: Decent employment

The theme provide information on the remuneration of employees working for the farm and belonging to

[18] Locally adapted breeds: "which have been in the country for a sufficient time to be genetically adapted to one or more of traditional production systems or environments in the country." 15 FAO. 2000. Guidelines for the development of country reports (available at http://www.fao.org/docrep/meeting/021/am228e.pdf).

[19] The enumerator will be provided with a national list of breeds at risk of extinction based on DAD-IS (http://www.fao.org/dad-is/en/).

the elementary occupation group, as defined by the International Standard Classification of Occupation (ISCO-08 - code 92). It informs about economic risks faced by unskilled workers in terms of remuneration received, the later benchmarked against the minimum wage set at national level in the agricultural sector. This sub-indicator allows distinguishing between holdings that pay a fair remuneration to all employees under the elementary occupation group, and agricultural holdings paying a remuneration to their employees belonging to the elementary occupation group that is below the minimum wage standard. In the latter case, agricultural holdings are deemed to be non-sustainable since the remuneration paid is not sufficient to ensure a decent living standard.

Coverage: Not applicable to farms that employ only family labour.

Description:

The sub-indicator measures the farm unskilled labour daily wage rate in Local Currency Units (LCU).

$$Daily\ wage\ rate\ of\ unskilled\ hired\ labor = \frac{Total\ annual\ compensation}{Total\ annual\ hours\ worked} * 8\ hour$$

Where compensation = both monetary and in kind payments expressed in LCU

Sustainability criteria:

Unskilled labour wage rate in relation to national or agriculture sector minimum wage rate. In case there is no national or agriculture sector minimum wage rate, the national poverty line is used instead:

- Green (desirable): if the farm doesn't hire any labour or if the holding has fair labour certification[20] or if the wage rate paid to unskilled labour is above the minimum national wage rate or minimum agricultural sector wage rate (if available).
- Yellow (acceptable): if the wage rate paid to unskilled labour is equals to the minimum national wage rate or minimum agricultural sector wage rate (if available).
- Red (unsustainable): if the wage rate paid to unskilled labour is below the minimum national wage rate or minimum agricultural sector wage rate (if available).

Data items

Reference period: last calendar year

9.1 Unskilled workers hired on the agricultural holding (Y/N)

9.2 Average pay in-cash and/or in-kind for a hired unskilled worker per day (of 8 hours)

9.3 Minimum agricultural sector wage rate (if available) or minimum national wage rate

10. Food Insecurity Experience Scale (FIES)

Dimension: Social

Theme: Food security

FIES is a metric of severity of food insecurity at the household level that relies on people's direct yes/no responses to eight simple questions regarding their access to adequate food. It is a statistical measurement scale similar to other widely-accepted statistical scales designed to measure unobservable traits such as aptitude/intelligence, personality, and a broad range of social, psychological and health-related conditions.

Coverage: Only household farms

Description:

The Food Insecurity Experience Scale (FIES) produces a measure of the severity of food insecurity experienced by individuals or households, based on direct interviews.

[20] Recognized nationally

The FIES questions refer to the experiences of the individual respondent or of the respondent's household as a whole. The questions focus on self-reported food-related behaviors and experiences associated with increasing difficulties in accessing food due to resource constraints.

The FIES is derived from two widely-used experience-based food security scales: the U.S. Household Food Security Survey Module and the Latin American and Caribbean Food Security Scale (Spanish acronym ELCSA). It consists of a set of eight short yes/no questions asked directly to people. The questions focus on self-reported, food-related behaviours and experiences associated with increasing difficulties in accessing food due to resource constraints. The FIES is based on a well- grounded construct of the experience of food insecurity composed of three domains: uncertainty/anxiety, changes in food quality, and changes in food quantity.

This sub-indicator is SDG indicator 2.1.2, contextualised for a farm survey.

Sustainability criteria: Level on FIES scale

- Green (desirable): Mild food insecurity[21]
- Yellow (acceptable): Moderate food insecurity
- Red (unsustainable): Severe food insecurity

Data items

Reference period: last calendar year

10.1 The respondent's recollection that he/she (or any other adult in the household) would be worried about not having enough food to eat due to lack of money or other resources

10.2 The respondent's recollection that he/she (or any adult in the household) was unable to eat healthy and nutritious food because of lack of money or other resources

10.3 The respondent's recollection that he/she (or any adult in the household) only ate a few kinds of food due to lack of money or other resources

10.4 The respondent's recollection that he/she (or any adult in the household) had to skip a meal because there was no enough money or other resources for food

10.5 The respondent's recollection that he/she (or any adult in the household) ate less than he/she thought he should due to lack of money or other resources

10.6 The respondent's recollection that he/she (or any adult in the household) ran out of food because of a lack of money or other resources

10.7 The respondent's recollection that he/she (or any adult in the household) was hungry but not eating due to lack of money or other resources for food

10.8 The respondent's recollection that he/she (or any adult in the household) did not eat for a whole day because of a lack of money or other resources

11. Secure tenure rights to land

Dimension: Social

Theme: Land tenure

The sub-indicator allows assessing sustainability in terms of rights over use of agricultural land areas. Since agricultural land is a key input for agricultural production, having secure rights over land ensures that the agricultural holding controls such a key asset and does not risk losing the land used by the holding for

[21] Computation of food insecurity level is described in details in e-learning course on SDG 2.1.2: http://www.fao.org/elearning/#/elc/en/course/SDG212

farming.

Evidence shows that farmers tend to be less productive if they have limited access to and control of economic resources and services, particularly land. Long-lasting inequalities of economic and financial resources have positioned certain farmers at a disadvantage relative to others in their ability to participate in, contribute to and benefit from broader processes of development.

As such, adequate distribution of economic resources, particularly land, help ensure equitable economic growth, contributes to economic efficiency and has a positive impact on key development outcomes, including poverty reduction, food security and the welfare of households.

This sub-indicator is SDG indicator 5.a.1., contextualised for a farm survey.

Coverage: All farms types

Description:

The sub-indicator measures the ownership or secure rights over use of agricultural land areas using the following criteria:

- Formal document issued by the Land Registry/Cadastral Agency
- Name of the holder listed as owner/use right holder on legally recognized documents
- Rights to sell any of the parcel of the holding
- Rights to bequeath any of the parcel of the holding

Sustainability criteria:

Level of security of access to land.

- Green (desirable): has a formal document with the name of the holder/holding on it, or has the right to sell any of the parcel of the holding, or has the right to bequeath any of the parcel of the holding
- Yellow (acceptable): has a formal document even if the name of the holder/holding is not on it
- Red (unsustainable): no positive responses to any of the 4 questions above

Data items

Reference period: last calendar year

11.1 Type of formal document for any of the agricultural land of the holder/holding that it holds (alternatively 'possess, use, occupy) issued by the Land Registry/Cadastral Agency

◯ 1 Title deed
◯ 2 Certificate of customary tenure
◯ 3 Certificate of occupancy
◯ 4 Registered will or registered certificate of hereditary acquisitions
◯ 5 Registered certificate of perpetual / long term lease
◯ 6 Registered rental contract
◯ 7 Other

11.2 Name of any member of the holding listed as an owner or use right holder on any of the legally recognized documents

11.3 The right of the holder/holding to sell any of the parcel of the holding

11.4 The right of the holder/holding to bequeath any of the parcel of the holding

MSSD 16: SDG Indicator 15.5.1: Red List Index

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

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.

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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URL:

http://www.iucn.org/; http://www.birdlife.org/

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MSSD 17: SDG Indicator 11.1.1: Proportion of urban population living in slums, informal settlements or inadequate housing

Goal 11: Make cities and human settlements inclusive, safe, resilient and sustainable
Target 11.1: By 2030, ensure access for all to adequate, safe and affordable housing and basic services and upgrade slums

Institutional information

Organization(s):
United Nations Human Settlements Programme (UN-Habitat)

Concepts and definitions

The nature of the housing sector with its institutions, laws and regulations, is one that touches every single aspect of the economy of a country and has interface with practically every social development sector. People living in adequate homes have better health, higher chances to improve their human capital and seize the opportunities available in urban contexts. At the same time, a housing sector that performs well acts as a 'development multiplier' benefiting complementary industries, contributing to economic development, employment generation, service provision and overall poverty reduction. Broadly, for every job in the house-building sector, an additional 1.5 to 2 jobs are generally created in the construction materials and other input industries. The contributions of housing to urban prosperity are also evident. The UN-Habitat City Prosperity Initiative reveals indicates that inadequate housing has negative effects on several other dimensions of urban prosperity. Urban contexts with housing conditions below average experience poorer equity and inclusion, reduced urban safety and livelihood opportunities, and have neglected connectivity and provision of public space.

Inadequate housing thus remains very much a global urban sustainability challenge but also development opportunity. At the same time, the thematic area of 'adequate housing' and especially the term 'slums' - are often highly politicized. More nuanced definitions of these terms would enable and support a more robust and measured debate, greater engagement by all key stakeholders and the development of specific recommendations for application within each context and place.

In order to develop a more nuanced definition, there are a number of interrelated terms that must be grappled with when considering an indicator for the SDG Target 11.1. They include inadequate housing and housing affordability, informal settlements and slums.

Housing affordability

One of the most daunting challenges of urbanization globally has been the provision of adequate housing that people can afford. Findings from the UN Global Sample of Cities[1] show that people across all types of urban centres are not able to afford home ownership or even the cost of rental housing. In low-income

[1] UN-Habitat (2016). Fundaments of Urbanization. Evidence Base for Policy Making. Nairobi: UN-Habitat

countries for example, households need to save the equivalent of nearly eight times their annual household income in order to be able to afford the price of a standard house in their town or city. If they rent, households have to commit more than 25 per cent of their monthly income to rent payments.[2]

The affordability issue is affecting the developing and developed worlds alike. In Latin America, high house price-to-income ratio and inaccessible housing finance compel households to resort to informal solutions without the benefits of planning and safety regulations. In many parts of Sub-Saharan Africa, less than 10 per cent of households are able to afford a mortgage for even the cheapest newly built house. In fact, African households face 55 per cent higher housing costs relative to their per capita GDP than in other regions.[3] In many European countries, families, especially the youth, are severely cost burdened and have much less to spend on other necessities such as food, health, transport and clothing. In extreme circumstances, households are forced to leave their accommodation because of the inability to pay. The current migration crisis has worsened housing conditions in the region, a trend that seems set to continue in the next few years.

Inadequate housing, informal settlements and slums

Today, an estimated 1.6 billion people live in inadequate housing globally, of which 1 billion live in slums and informal settlements[4]. This means that about one in four people in cities live in conditions that harm their health, safety, prosperity and opportunities. Lack of access to basic services is a common constraint in informal settlements and slums: worldwide 2.4 billion people live without improved sanitation and 2 billion are affected by water stress. In spite of a decrease from 39 to 30 per cent of urban population living in slums between 2000 and 2014, absolute numbers continue to grow: currently, one quarter of the world's urban population is estimated to live in slums, 881 million urban residents as opposed to 792 million in 2000. Young women- and children-headed households are often the most vulnerable to inadequate housing conditions. Homelessness is also a growing challenge and it is estimated that more than 100 million people worldwide are homeless.[5]

Slums represent one of the most extreme forms of deprivation and exclusion and remain a critical factor for the persistence of poverty and exclusion in the world – indeed a challenge for sustainable and inclusive urbanization. Research shows that other forms of urban poverty in the form of informal settlements increasingly become a worldwide phenomenon found also in the developed world.

At the same time, not all people who live in inadequate housing live in slums but are nonetheless living in very substandard conditions in the urban contexts in which they are situated. The nature of these unsatisfactory living conditions must be captured and better represented in the global, country and city-level data to ensure a more robust picture of inadequate housing is documented. In light of this, the following definitions are proposed.

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[2] Ibid

[3] World Bank, 2017. Africa's Cities: Opening Doors to the World.

[4] UN-Habitat (2016). World Cities Report. UN-Habitat (2005). Financing Shelter.

[5] UN-HABITAT (2005). Financing Urban Shelter: Global Report on Human Settlements 2005. Nairobi: UN-Habitat

Definition and concept:
As per the 2030 Agenda, to guide the development of the appropriate policies and programmes for ensuring access for all to adequate housing and the upgrading of slums, it is necessary to identify and quantify the proportion of the population that live in **slums**, **informal settlements** and those living in **inadequate housing**.

a. Slums – An expert group meeting was convened in 2002 by UN-Habitat, the United Nations Statistics Division and the Cities Alliance to agree on an operational definition for slums to be used for measuring the indicator of MDG 7 Target 7.D. The agreed definition classified a *'slum household'* as one in which the inhabitants suffer one or more of the following *'household deprivations'*:

1. Lack of access to improved water source,
2. Lack of access to improved sanitation facilities,
3. Lack of sufficient living area,
4. Lack of housing durability and,
5. Lack of security of tenure. By extension, the term *'slum dweller'* refers to a person living in a household that lacks any of the above attributes.[6]

These five components –all derived from the adequate housing's definition have been used ever since for reporting and tracking of the MDGs, as the primary or secondary data measured to determine the number of slum dwellers living in developing countries. They were also the basis to establish the successful achievement of MDG Target 7.D. For each component, the experts agreed with the following sub-definitions:[7]

1) Access to improved water – A household is considered to have access to improved drinking water if it has sufficient amount of water (20 litres/person/day) for family use, at an affordable price (less than 10% of the total household income) and available to household members without being subject to extreme effort (less than one hour a day for the minimum sufficient quantity), especially to women and children. An improved drinking water source is a facility that is protected from outside contamination, in particular from faecal matters' contamination. Improved drinking water sources include: piped water into dwelling, plot or yard; public tap/stand pipe serving no more than 5 households; protected spring; rainwater collection; bottled water (if secondary source is also improved); bore hole/tube well; and, protected dug well.

2) Access to improved sanitation – A household is considered to have access to improved sanitation if an excreta disposal system, either in the form of a private toilet or a public toilet shared with a reasonable number of people, is available to household members. Such improved sanitation facilities, therefore, hygienically separates human waste from human contact. Improved facilities include: flush/pour-flush toilets or latrines connected to a sewer, septic tank or pit; ventilated improved pit latrine; pit latrine with a slab or platform, which covers the pit entirely; and, composting toilets/latrines.

[6] UN-Habitat (2003), Slums of the World: The face of urban poverty in the new millennium; <mirror.unhabitat.org/pmss/getElectronicVersion.aspx?nr=1124&alt=1>
[7] United Nations (2007), Indicators of Sustainable Development: Guidelines and Methodologies. Third Edition, United Nations, New York; < https://sustainabledevelopment.un.org/index.php?page=view&type=400&nr=107&>; UN-Habitat (2003), Slums of the World: The face of urban poverty in the new millennium.

3) Sufficient living area /overcrowding– A dwelling unit provides sufficient living area for the household members if not more than three people share the same habitable room.[22] Additional indicators of overcrowding have been proposed: area-level indicators such as average in-house living area per person or the number of households per area. Additionally, housing-unit level indicators such as the number of persons per bed or the number of children under five per room may also be viable. However, the number of persons per room has been shown to correlate with adverse health risks and is more commonly collected through household survey.[23] UN-Habitat believes that the definition as it stands does not reflect the practical experience of overcrowding and as noted below, is proposing an alternative.

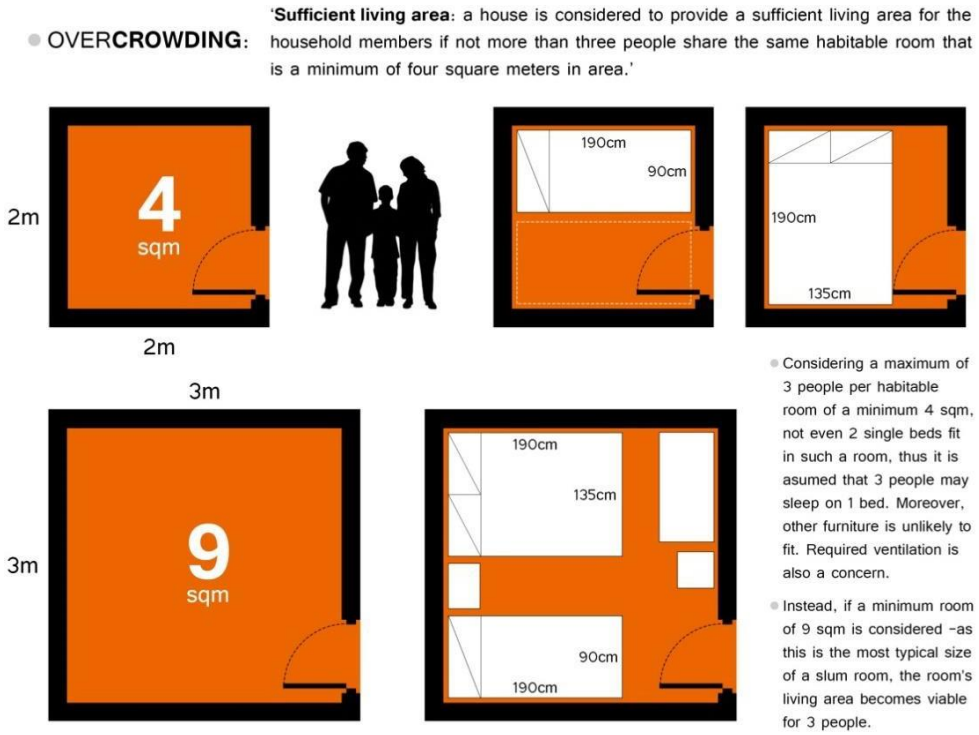

Figure 1- Example of Overcrowding

4) Structural quality/durability of dwellings – A house is considered as 'durable' if it is built on a non-hazardous location and has a permanent and adequate structure able to protect its inhabitants from the extremes of climatic conditions such as rain, heat, cold, and humidity. The following criteria are used to determine the structural quality/durability of dwellings: permanency of structure (permanent building material for the walls, roof and floor; compliance with building codes; the dwelling is not in a dilapidated state; the dwelling is not in need of major repair); and location of house (hazardous location; the dwelling is not located on or near toxic waste; the dwelling is not located in a flood plain; the dwelling is not located on a steep slope; the dwelling is not located in a dangerous right of way: rail, highway, airport, power lines).

[22] The original EGM's advice considered a range of less than three to four people per habitable room. When this indicator got operationalized during the MDG 7 Target 7.D's tracking, overcrowding was fixed at a maximum of three people per habitable room ('minimum of four square meters,' <http://mdgs.un.org/unsd/mdg/Metadata.aspx>).

[23] UN-Habitat (1998), Crowding and Health in Low Income Settlements of Guinea Bissau, SIEP Occasional Series No.1.

5) Security of tenure – Secure tenure is the right of all individuals and groups to effective protection by the State against forced evictions. Security of tenure is understood as a set of relationships with respect to housing and land, established through statutory or customary law or informal or hybrid arrangements, that enables one to live in one's home with security, peace and dignity (A/HRC/25/54). Regardless of the type of tenure, all persons with security of tenure have a legal status against arbitrary unlawful eviction, harassment and other threats. People have secure tenure when: there is evidence of documentation that can be used as proof of secure tenure status; and, there is either de facto or perceived protection from forced evictions. Important progress has been made to integrate the measurement of this component into the computation of the people living in slums.

Informal Settlements

b. Informal Settlements – Informal settlements are usually seen as synonymous of slums, with a particular focus on the formal status of land, structure and services. They are defined by three main criteria, according to Habitat III Issue Paper #22[10], which are already covered in the definition of slums. These are:

1. Inhabitants have no security of tenure vis-à-vis the land or dwellings they inhabit, with modalities ranging from squatting to informal rental housing,
2. The neighbourhoods usually lack, or are cut off from, formal basic services and city infrastructure, and
3. The housing may not comply with current planning and building regulations, is often situated in geographically and environmentally hazardous areas, and may lack a municipal permit.

Informal settlements can be occupied by all income levels of urban residents, affluent and poor.

Inadequate Housing

c. Inadequate Housing – Article 25 of the Universal Declaration of Human Rights includes housing as one of the components of the right to adequate standards of living for all.[11] The United Nations Committee on Economic, Social and Cultural Rights' general comments No.4 (1991) on the right to adequate housing and No.7 (1997) on forced evictions have underlined that the right to adequate housing should be seen as the right to live somewhere in security, peace and dignity. For housing to be adequate, it must provide more than four walls and a roof, and at a minimum, meet the following criteria:

1. Legal security of tenure, which guarantees legal protection against forced evictions, harassment and other threats;
2. Availability of services, materials, facilities and infrastructure, including safe drinking water, adequate sanitation, energy for cooking, heating, lighting, food storage or refuse disposal;

[10] United Nations (2015), Conference on Housing and Sustainable Urban Development – Habitat III, Issue Paper No. 22 on Informal Settlements; UN-Habitat (2015), Slum Almanac 2015-2016.

[11] Article 25 (1) "Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing and medical care and necessary social services, and the right to security in the event of unemployment, sickness, disability, widowhood, old age or other lack of livelihood in circumstances beyond his control."

3. Affordability, as housing is not adequate if its cost threatens or compromises the occupants' enjoyment of other human rights;
4. Habitability, as housing is not adequate if it does not guarantee physical safety or provide adequate space, as well as protection against the cold, damp, heat, rain, wind, other threats to health and structural hazards;
5. Accessibility, as housing is not adequate if the specific needs of disadvantaged and marginalized groups are not taken into account (such as the poor, people facing discrimination; persons with disabilities, victims of natural disasters);
6. Location, as housing is not adequate if it is cut off from employment opportunities, health-care services, schools, childcare centres and other social facilities, or if located in dangerous or polluted sites or in immediate proximity to pollution sources; and
7. Cultural adequacy, as housing is not adequate if it does not respect and take into account the expression of cultural identity and ways of life.

Table 1. Criteria defining slums, informal settlements and inadequate housing

	Slums	Informal Settlements	Inadequate Housing
access to water	X	X	X
access to sanitation	X	X	X
sufficient living area, overcrowding	X		X
structural quality, durability and location	X	X	X
security of tenure	X	X	X
affordability			X
accessibility			X
cultural adequacy			X

Rationale:

As seen in Table 1, most of the criteria for defining slums, informal settlements and inadequate housing overlap. The three criteria of informal settlements are essentially captured in the definition of slums, which sustains the combination of both (slums/informal settlements). From the seven criteria of adequate housing, the three that are not covered by slums / informal settlements are affordability, accessibility and cultural adequacy. For the purpose of composing an indicator, affordability is the most relevant and easier to measure.

Thus, in order to come up with a composite indicator, the metadata for the SDG Indicator 11.1.1 is proposing to group the definition of slums and informal settlements, to allow for comparison with MDGs, and add the element of *affordability* from the definition of adequate housing.

In this regard, *housing affordability* is not only a key housing adequacy criterion, but is a suitable means of measuring inadequate housing in a more encompassing manner, as it remains a global challenge across different countries and income levels, with strong negative impact on urban inequality.
The underlying principle is that household financial costs associated with housing should not threaten or compromise the attainment and satisfaction of other basic needs such as, food, education, access to health

care, transport, etc. Based on the existing method and data of UN-Habitat's Urban Indicators Program (1996-2006), unaffordability is currently measured as the net monthly expenditure on housing cost that exceeds 30% of the total monthly income of the household.

Thus, Indicator 11.1.1 is expected to be a **composite one**, with the main components of slum/informal settlements' and the added component of affordability defining inadequate housing. Table 1 details the proposed definition of Slum/Informal Settlements and Inadequate Housing as well as the respective measurements.

Table 1 – Definition and measurement criteria for slums, informal settlements and inadequate housing

Slums / Informal Settlements	**DEFINITION:** As adopted in the MDG, household where the inhabitants suffer one or more of the following 'household deprivations': 1) Lack of access to improved water source, 2) Lack of access to improved sanitation facilities, 3) Lack of sufficient living area, 4) Lack of housing durability and, 5) Lack of security of tenure).	**MEASUREMENT[24]:** *Security of Tenure:* • Proportion of households with formal title deeds to both land and residence. • Proportion of households with formal title deeds to either one of land or residence. • Proportion of households with agreements or any document as a proof of a tenure arrangement. *Adequate water:* A settlement has an inadequate drinking water supply if less than 50% of households have an improved water supply: •household connection; •access to public stand pipe; •rainwater collection; with at least 20 liters/person/day available within an acceptable collection distance. *Access to sanitation:* A settlement has inadequate sanitation if less than 50% of households have improved sanitation: • public sewer; • septic tank; • pour-flush latrine; • Ventilated improved pit latrine. The excreta disposal system is considered adequate if it is private or shared by a maximum of two households. *Structural quality of Housing and location:* Proportion of households residing on or near a hazardous site. The following locations should be considered: • housing in geologically hazardous zones (landslide/earthquake and flood areas); • housing on or under garbage mountains; • housing around high-industrial pollution areas; • housing around other unprotected high-risk zones

[24] Measurements based on those in the (2003) UN-Habitat Challenge of Slums, p.12.

		(e.g. railroads, airports, energy transmission lines). *Structural quality of the housing and permanency of the structure:* Proportion of households living in temporary and/or dilapidated structures. The following factors should be considered when placing a housing unit in these categories: • quality of construction (e.g. materials used for wall, floor and roof); • compliance with local building codes, standards and bylaws. *Sufficient living area / Overcrowding:* • Proportion of households with more than two persons per room.
Inadequate housing	**DEFINITION:** Proposed to complement the slums/informal settlements measuring affordability of housing at the global level.	**MEASUREMENT:** *Affordability:* • Proportion of households with net monthly expenditure on housing exceeding 30% of the total monthly income of the household.

Comments and limitations:

As with all indicators, there are a number of potential challenges and limitations. Some of these are outlined below.

- Difficulties to agree universally on some definitions and characteristics when referring to deteriorated housing conditions, often due to political or economic considerations.
- Lack of appropriate tools at national and city levels to measure all components required by Indicator 11.1.1, sometimes resulting in the underestimation of deteriorated housing units.
- The complicated relation between security of tenure with land and property makes it a difficult, but vital, aspect to include in the different surveys, and thus, to measure and monitor.
- Indicator 11.1.1 does not capture homelessness.
- Many countries still have limited capacities for data collection, management and analysis, their update and monitoring. These are key to ensure national and global data consistency.

Methodology

Computation Method:

The indicator considers two components to be computed as follows:

a) Slum/Informal Settlements households (SISH):

$$= 100 \left[\frac{Number\ of\ people\ living\ in\ SISH\ households}{City\ population} \right]$$

b) Inadequate housing households (IHH):

$$= 100 \left[\frac{Number\ of\ people\ living\ in\ IHH}{City\ population} \right.$$

The unit of measurements for all these indicators will be %. Currently, the data for this indicator is already being reported in nearly all developing countries on what refers to slums and informal settlements, and in some countries for what refers to expenditure on housing. The SDG indicator 11.1.1 will therefore contribute to report on a broader spectrum of inadequate housing conditions affecting households in all countries.

Disaggregation[25]:

Potential Disaggregation:

- Disaggregation by location (intra-urban)
- Disaggregation by income group
- Disaggregation by sex, race, ethnicity, religion, migration status (head of household)
- Disaggregation by age (household members)
- Disaggregation by disability (household members)

Quantifiable Derivatives:

- Proportion of households with durable housing
- Proportion of households with improved water
- Proportion of households with improved sanitation
- Proportion of households with sufficient living space
- Proportion of households with security of tenure
- Proportion of households with one (1) housing deprivation
- Proportion of households with multiple (3 or more) housing deprivations
- Proportion of households with approved municipal permit
- Proportion of households with (in) adequate housing (affordability)

Treatment of missing values:

- At country level

All countries are expected to fully report on this indicator more consistently with few challenges where missing values will be reported at the national/global level. At the national level, it is possible that missing values will be recorded perhaps representing gaps of non-measurements among populations whose status of slum-hood or informality or inadequate housing is not recorded, unknown or where data is unavailable. Because the values will be aggregated at the national levels, missing values will be less observed at these levels, but are likely to affect the estimates. At the survey and data collection level, survey procedures for managing missing values will be applied based on the unit of analysis/ primary sampling units.

- At regional and global levels

  Global estimates will be adjusted with modelling based on trends to cater for missing information or data.

[25] The proposed framework for potential disaggregation should consider that disaggregation has a cost. It is recommended that the level of development and the statistical capacity of countries be taken into consideration. As countries progress in their institutional capacities, further level of disaggregation can be undertaken.

Regional aggregates:

Regional and global estimates will be derived from national figures with an appropriate disaggregation level. Specialized tools will be developed and agreed upon with local and international stakeholders. Systems of quality assurance on the use of the tools, analysis and reporting will be deployed regionally, and global to ensure that standards are uniform and that definitions are universally applied.
We expect that investments in improved data collection and monitoring at country level will produce incentives for governments to improve reporting and performance and also greater readiness to engage with multiple stakeholders in data collection and analysis and in achieving better understanding of the strengths and weaknesses of existing slum definitions and their applications.

Sources of discrepancies:

As national agencies are responsible for data collection, no differences between country produced data and international estimated data on the indicator are expected to arise if standard methodologies and procedures are followed at all stages of the reporting process. Missing data and other local variables and frequency of data collection usually affects the figures reported at the global and national level. For this indicator, national data will be used to derive global figures. In instances where global values differ from national figures, efforts will be made for harmonization.

Data Sources

Sources and data collection:

Data for the slum/informal settlements components of the indicator can be computed from Census and national household surveys, including DHS and MICS. Data for the inadequate housing component can be computed through income and household surveys that capture housing expenditures.

As per all the agreed Agenda 2030's goals and targets, to measure the achievement of this indicator will require the mobilisation of means required to efficiently monitor them, calling for revitalised partnerships with the participation of all countries, all stakeholders and all communities concerned.

For primary reporting, national data providers (especially the Statistical agencies) will play an important role generating the primary data through census and surveys. Regional and global estimates will be derived from national figures with appropriate disaggregation. Specialized tools will be developed and agreed upon with local and international stakeholders. Quality assurance on the use of the tools, analysis and reporting will be

deployed regionally and globally, to ensure that standards are uniform and that definitions are universally applied.

Data Availability

Description:

Data on slums is available for all developing countries, as it has been reported yearly by UN-Habitat in the MDGs' reports. Recently, UN-Habitat has disaggregated information on this indicator at city level, increasing its suitability for SDG 11. The people living in slums' indicator is currently measured in more than 320 cities across the world as part of UN-Habitat City Prosperity Initiative. UN-Habitat and World Bank computed this indicator for many years (1996-2006) as part of the Urban Indicators Programme. Data on inadequate housing, measured through housing affordability, is available for all OECED

countries as well as in UN Global Sample of Cities covering 200 cities. Data on inadequate housing, measured through housing affordability, is
available in many countries. UN-Habitat and World Bank computed this indicator for many years (1996-2006) as part of the Urban Indicators Programme. Recently, the Global Housing Indicators Working Group, a collaborative effort of Cities Alliance, Habitat for Humanity International, the Inter-American Development Bank, UN-Habitat proposed the collection of data on this indicator worldwide.

Calendar

All major surveys and census data collection process will continue to incorporate the aspects/components necessary for reporting on this indicator. The monitoring of this indicator will be repeated at regular intervals of 3-5 years, allowing for three-five year reporting points until the year 2030.

Data providers and compilers

This indicator has largely been successfully due to the collaborations between several organizations and institutions including UN- Habitat, UNEP, Cities Alliance, Slum dwellers International, and World Bank. There are several other experts who have also contributed to the development of the concepts, rationale and definitions, and metadata and will also support measurement, reporting and policy dialogue at the country level, based on the indicators.
For primary reporting, National data provider especially the Statistical agencies will play an important role of generation of the primary data through census and surveys. Final Compilation & reporting at the global level will be lead and guided by UN-Habitat with support from selected partners.

References

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[2] : http://unhabitat.org/urban-indicators-guidelines/
[3] : http://mdgs.un.org/unsd/mdg/Metadata.aspx?IndicatorId=0&SeriesId=710,
[4] : http://unhabitat.org/urban-initiatives/initiatives-programmes/participatory-slum-upgrading/
[5] : http://unhabitat.org/slum-almanac-2015-2016/
[6] : http://wcr.unhabitat.org/
[7] : http://www.unhabitat.org/programmes/guo/documents/EGM final report 4 Dec 02.pdf

Related indicators

Direct relation

1.1.1 Poverty rate; 1.1.2 Poverty rate, national; 6.1.1 Access to Improved Water; 6.2.1 Access to Improved Sanitation; 7.1.1 Access to Electricity; 8.3.1 Informal Employment; 8.5.2 Unemployment Rate
8.6.1 Youth Unemployment; 10.2.1 Population below Median Income; 10.1.1 Grow rates of the poorest 40%;
11.2.1 Public Transit Stop Coverage; 11.5.1 Population Affected by Hazardous Events; 11.6.1 Solid Waste Collection; 11.7.1 Accessibility to Open Public Area; 11.7.2 Public Space Safety for Women;
16.1.1 Homicide rate; 16.1.3 Population subjected to Violence.

MSSD 18: Status of UNESCO world heritage sites

Culture has a crucial role to play in SDG 11: Make cities and human settlements inclusive, safe, resilient and sustainable. Target 11.4 calls for strengthening efforts to protect and safeguard the world's cultural and natural heritage.

Definitions

To be included on the World Heritage List, sites must be of outstanding universal value and meet at least one out of ten selection criteria.

These criteria are explained in the Operational Guidelines for the Implementation of the World Heritage Convention which, besides the text of the Convention, is the main working tool on World Heritage. The criteria are regularly revised by the Committee to reflect the evolution of the World Heritage concept itself.

Until the end of 2004, World Heritage sites were selected on the basis of six cultural and four natural criteria. With the adoption of the revised Operational Guidelines for the Implementation of the World Heritage Convention, only one set of ten criteria exists.

Selection criteria

(i) to represent a masterpiece of human creative genius;

(ii) to exhibit an important interchange of human values, over a span of time or within a cultural area of the world, on developments in architecture or technology, monumental arts, town-planning or landscape design;

(iii) to bear a unique or at least exceptional testimony to a cultural tradition or to a civilization which is living or which has disappeared;

(iv) to be an outstanding example of a type of building, architectural or technological ensemble or landscape which illustrates (a) significant stage(s) in human history;

(v) to be an outstanding example of a traditional human settlement, land-use, or sea-use which is representative of a culture (or cultures), or human interaction with the environment especially then it has become vulnerable under the impact of irreversible change;

(vi) to be directly or tangibly associated with events or living traditions, with ideas, or with beliefs, with artistic and literary works of outstanding universal significance. (The Committee considers that this criterion should preferably be used in conjunction with other criteria);

(vii) to contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance;

(viii) to be outstanding examples representing major stages of earth's history, including the record of life, significant on-going geological processes in the development of landforms, or significant geomorphic or physiographic features;

(ix) to be outstanding examples representing significant on-going ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals;

(x) to contain the most important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation

The Committee shall establish, keep up to date and publish, whenever circumstances shall so require, under the title of "List of World Heritage in Danger", a list of the property appearing in the World Heritage List for the conservation of which major operations are necessary and for which assistance has been requested under this Convention. This list shall contain an estimate of the cost of such operations. The list may include only such property forming part of the cultural and natural heritage as

is threatened by serious and specific dangers, such as the threat of disappearance caused by accelerated deterioration, large- scale public or private projects or rapid urban or tourist development projects; destruction caused by changes in the use or ownership of the land; major alterations due to unknown causes; abandonment for any reason whatsoever; the outbreak or the threat of an armed conflict; calamities and cataclysms; serious fires, earthquakes, landslides; volcanic eruptions; changes in water level, floods and tidal waves. The Committee may at any time, in case of urgent need, make a new entry in the List of World Heritage in Danger and publicize such entry immediately.

References:

https://whc.unesco.org/en/list/

https://whc.unesco.org/en/158/

MSSD 19: SDG Indicator 12.5.1 National recycling rate, tons of material recycled

Agency: UNSD, UNEP

Has work for the development of this indicator begun? **Yes**

Who are the entities, including national and international experts, directly involved and consulted in developing the methodology/and or data collection tools?

UNSD - Environment Statistics
Section OECD
Eurostat
UNEP – BRS Secretariat (Secretariat of the Basel, Rotterdam and Stockholm Conventions)

UN Environment convened an Expert Group Meeting in January 2018 in Geneva to consult with a broad range of international experts on waste, including from the entities above, on a number of definitional issues related to this indicator as well as indicators 11.6.1 and 12.5.1, and to present draft methodologies for feedback and discussion. Outcomes and other documents from this Expert Group Meeting can be found at https://environmentlive.unep.org/egm/waste. A second Expert Group Meeting is planned for Q1 2019.

The draft methodology for this indicator was presented by UN Environment to the Fifth Meeting of the Expert Group on Environment Statistics in May 2018 in New York for comments and feedback.

UNSD consults with OECD, Eurostat and the BRS Secretariat on the concepts and definitions, as well as on the structure and content of the respective questionnaires to promote harmonization of data at the international level. [see section data/metadata below]

The UNECE's Task Force on Waste Statistics is also consulted with regard to the methodologies under development for this indicator and 12.4.2 to ensured harmonized language and concepts.

What is the involvement of or how do you plan to involve National Statistical Systems in the development of the methodology?

Data is already being collected for the related statistics contained in the UNSD/UNEP Questionnaire, and methodological guidance for the statistics is being developed in the methodology sheet on waste statistics of the Manual on the Basic Set of Environment Statistics (https://unstats.un.org/unsd/envstats/fdes/manual_bses.cshtml). Selected variables on Waste Electric and Electronic Equipment (WEEE) have been pilot tested by OECD and UNSD, and are now included in the UNSD/UNEP Questionnaire that is sent to National Statistical Offices and Ministries of Environment.

Pilot testing for the draft methodology for the indicators 12.5.1 and 12.4.2 has begun, led by UN Environment, in 3 participating pilot countries, Bosnia and Herzegovina, Costa Rica, and Mauritius, with their respective National Statistical Systems. Pilot testing in Bosnia occurred in May 2018, while Costa Rica and Mauritius are planned for August/September 2018. Further details on the pilot work in Bosnia can be found at https://environmentlive.unep.org/egm/bosnia. The Bosnian NSO's prominent role in the UNECE's Task Force on Waste Statistics contributed positively to the outcome of the pilot testing, andwill promote alignment and harmonization between the draft methodology and the work of the Task Force.

A Data Assessment Tool is under development to assist National Statistical Systems in their compilation of waste-related data relevant to this indicator as well as by highlighting gaps in their current data collection. It is being piloted in Bosnia, Costa Rica and Mauritius alongside the indicator methodologies, as well as in Mexico. The Data Assessment Tool will ultimately be released for NSOs to conduct self-assessments of their waste statistics system.

Please briefly describe the process of developing the methodology for the indicator

It is necessary to continue the methodological development of the indicator in parallel to and in harmony with the work of the UNECE Task Force on Waste Statistics, which aims at solving some of the conceptual issues pertaining to waste statistics, including the definition of recycling, by providing a Conceptual Framework on Waste Statistics by June 2019. UNECE, UN Environment, UNSD, and UNU are collaborating on the development of stronger guidance materials, which also aim to be ready for June 2019.

To produce this indicator, two statistics seem to be required: Total waste recycled and Total waste generation. UNSD, through its UNSD/UNEP Questionnaire on Environment Statistics (waste section), collects data on Total waste generation. The definition of this statistic originates from the OECD/Eurostat Joint Questionnaire. However, for the second statistic, Total waste recycled, no data are currently being collected. Data on waste recycled are collected as part of the treatment of municipal waste and hazardous waste. However, there is an overlap between the two. Moreover, non-hazardous industrial waste is not represented in these two categories.

As a practical solution, it is possible to use the municipal waste recycling rate as a proxy. Even though municipal waste represents only a small part of the total waste, especially in developing countries where municipal waste collection is not available outside of the main cities, there are some advantages to using it. Data are already being collected by UNSD on municipal waste collected, municipal waste managed (municipal waste collected plus imports minus exports), and municipal waste recycled through the UNSD/UNEP Questionnaire on Environment Statistics. The UNSD/UNEP 2018 Questionnaire also includes the amount of municipal waste generated at the country level (Table R3) and at the city level (Table R5). Finally, statistics about the municipal waste recycling rate will help countries to assess whether they need to build new waste treatment facilities.

With the increasing importance of e-waste as a policy priority, a sub-indicator on e-waste is proposed. This sub-indicator will require additional definitional refinement. Two statistics will be required to separate the e-waste stream from the total waste: total e-waste recycled, and total e-waste generation. UNSD, through the UNSD/UNEP 2018 Questionnaire, is starting to collect data on the total e-waste generated and total e-waste collected. Depending on the data availability, UNSD will consider including variables on e-waste treatment and disposal in future data collection. As e-waste recycled is not collected from countries yet, discussions are under way with UNU regarding estimation methods and the use of their global e-waste database which is mostly based on estimated values.

Progress has been made on several definitional issues thanks to the UN Environment Expert Group Meeting described above, such as: the exclusion of mineral and construction/demolition wastes for both numerators and denominators across all waste-related SDG indicators, the inclusion of composting and of biomass used for feed and biofuel into the definition of recycling, the exclusion of incineration with energy recovery from the definition of recycling, and the need for a material flow approach to capture recycling rate in such a way as to provide information on circular economy concepts.

Please indicate new international standards that will need to be proposed and approved by an intergovernmental process (such as UNSC) for this methodology.

No new international standards will need to be approved by intergovernmental processes for this methodology – the methodology already exists; it only requires further work to ensure definitional alignment. Agreement between participating entities will be ensured, in consultation with the Expert Group on Environment Statistics and the UNECE Task Force on Waste Statistics.

When do you expect the methodological work on this indicator to be completed?

July 2019

Are data and metadata already being collected from the National Statistical System for one or more components of this indicator?

Yes

If yes, please describe:

UNSD Environment Statistics Section collects data from official national sources for water and waste statistics through its biennial UNSD/UNEP Questionnaire on Environment Statistics from non-OECD/Eurostat countries. Data for OECD and Eurostat countries are collected through the biennial OECD/Eurostat Questionnaire that is consistent with the UNSD/UNEP Questionnaire, so data are comparable. The terms and definitions used in both the UNSD/UNEP Questionnaire and the OECD/Eurostat Questionnaire are mostly identical with those used by other sources, and where not, bridges or correspondence are developed where possible. For the number of responses to the 2016 round of the UNSD/UNEP Questionnaire reference should be made to Part I of the Background Document to the Report of the Secretary-General on Environment Statistics (E/CN.3/2018/31) (https://unstats.un.org/unsd/statcom/49th-session/documents/BG-Item4k-EnvironmentStatistics-E.pdf).
The Background Document also includes in its Annex A the number of responses by variable and year. UNSD is launching the 2018 round of the UNSD/UNEP Questionnaire in September 2018.

Data collection on Waste Electric and Electronic Equipment (WEEE) was piloted in the 2016 UNSD/UNEP Questionnaire and is now included in the UNSD/UNEP 2018 Questionnaire. As part of this data collection, variables on WEEE generation and collection are included. Depending on the data availability, UNSD will consider including variables on e-waste treatment and disposal in future data collection.

The United Nations University's Sustainable Cycles Programme hosts a global database on Waste Electric and Electronic Equipment statistics, which can be consulted for data validation.

Data on recycling of hazardous waste is already collected by BRS Secretariat.

The statistics collected by UNSD through the UNSD/UNEP Questionnaire that can be used to produce this indicator are presented below. The number of responses to the UNSD/UNEP Questionnaire for the year 2015 is in brackets for UNSD. It should be noted that the number of responses to UNSD for those variables have increased between the 2013 and 2016 data collections.

OECD/Eurostat also collects these statistics which are harmonized conceptually with those collected by UNSD therefore promoting internationally comparable data.

UNSD/UNEP Questionnaire Table R1 and R3

If the goal is to have an indicator representing all waste, then so far UNSD is only able to provide data for the total waste generation, but not for the total waste recycled.

- R1.8 Total waste generation (25 to UNSD + 34 to OECD/Eurostat (2014))

$$\text{Indicator} = \frac{Total\ waste\ recycled}{R1.8}$$

If Municipal waste is used as a proxy, UNSD can provide the two underlying statistics for the indicator. However, the response rate to the questionnaire is very low due to the lack of resources and data in the countries. For the denominator, one can use the municipal waste managed or the municipal waste collected. OECD/Eurostat also have data for 2016 for these variables.

- R3.6 Municipal waste managed in the country (29 to UNSD + 36 to OECD/Eurostat)
- R3.7 Municipal waste recycled (29 to UNSD + 35 to OECD/Eurostat)

$$\text{Indicator} = \frac{R3.7}{R3.6}$$

Or

- R3.3 Municipal waste collected (40 to UNSD + 36 to OECD/Eurostat)
- R3.7 Municipal waste recycled (29 to UNSD + 35 to OECD/Eurostat)

$$\text{Indicator} = \frac{R3.7}{R3.3}$$

A sub-indicator is proposed to specifically monitor Waste Electric and Electronic Equipment (WEEE, also known as e-waste), a rapidly growing waste stream of particular concern due to its potential hazardousness and high residual value. Disaggregating total waste generated and total waste recycled to isolate the WEEE waste flow would allow better identification of its potentially significant contribution to the waste stream, and enable targeted policies to better recapture WEEE and promote circular economy concepts including the 6 R's (reduce, re-use, recycle, repair, rethink, refuse) and urban mining.

$$\text{Sub-indicator} = \frac{Total\ e\text{-}waste\ recycled}{Total\ e\text{-}waste\ generated}$$

The United Nations University's Sustainable Cycles Programme should be consulted for this sub-indicator, given that they have the largest global database on e-waste flows and quantities and have developed methodologies in this area.

UNSD is starting to collect data on e-waste generated and collected. Depending on the data availability, UNSD will consider including variables on e-waste treatment and disposal in future data collection, which includes e-waste recycled, to provide country data for the numerator of the sub-indicator.

How do you plan to collect the data?

Send questionnaire(s) to country,
Other: OECD, EUROSTAT, BRS. UN Environment is working on modelling proxy indicators which can be considered.

If the indicator involves multiple components from different data sources, please describe how each individual component of the indicator will be collected here.

With what frequency is data expected to be collected?

Data are already being collected every two years. [see section data/metadata]
Data on WEEE is starting to be collected by UNSD through the UNSD/UNEP Questionnaire, however it includes only e-waste generated and collected. Depending on the data availability, UNSD will consider including variables on e-waste treatment and disposal in future data collection. UNU, as the curator of a leading global database on e-waste, will be consulted.
Data on recycling of hazardous waste is collected annually by the BRS Secretariat.

Is there a process of data validation by countries in place or planned for this indicator?

Yes

If yes, please briefly describe:

To promote data quality assurance UNSD carries out extensive data validation procedures that include built-in automated procedures, manual checks and cross-references to national sources of data.
Communication is carried out with countries for clarification and validation of data. UNSD does not make any estimation or imputation for missing values so the number of data points provided are actual country data. Only data that are considered accurate or those confirmed by countries during the validation process are included in UNSD's environment statistics database and disseminated on UNSD's website.

If you have any additional comments that you believe would be helpful to IAEG-SDG members in analysing the work plan and methodological development of the indicator, please provide them here:

Data for the underlying statistics for this indicator are already collected from the countries (NSO and Ministry of Environment). Moreover, there is no intention to increase the frequency of the UNSD/UNEP Questionnaire due to lack of resources and data, and the fact that the Questionnaire is aligned to that of OECD/Eurostat, which is also conducted every two years.
UNSD is starting to collect data on WEEE generation and collection. Depending on the data availability, UNSD will consider including variables on e-waste treatment and disposal in future data collection. UNU, however, can provide estimated data on WEEE recycled from their global database until international Questionnaires are updated to include WEEE treatment and disposal.

(as of August 2018)

MSSD 20: Green House Gas emissions

Definition:
Greenhouse gases: The atmospheric gases responsible for causing global warming and climatic change. The major greenhouse gases are carbon dioxide (CO2), methane (CH4) and nitrous oxide (N2O). Less prevalent, but very powerful, GHGs are hydrofluorocarbons (HFCs),perfluorocarbons (PFCs) and sulphur hexafluoride (SF6).

In the Dashboard, the indicator is "CO2 emissions from fossil fuel combustion, cement, production and other industrial processes excluding emissions from land-use change"

Unit:
Gigagrammes of CO_2- equivalent per 12 months period.

Methodological description:

Estimates of GES emissions are carried out according to IPCC methodology (International Panel one Climatic Change). The 2006 IPCC Guidelines for National Greenhouse Gas Inventories (2006 IPCC Guidelines) provide a technically sound methodological basis of national greenhouse gas inventories, and therefore fundamental revision is unnecessary. A new methodology report "2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories" will be available in may 2019.

The overall aim of this new report is to provide an updated and sound scientific basis for supporting the preparation and continuous improvement of national GHG inventories.

The 2019 Refinement will not revise the 2006 IPCC Guidelines, but update, supplement and/or elaborate the 2006 IPCC Guidelines where gaps or out-of-date science have been identified. It will not replace the 2006 IPCC Guidelines. It should be used in conjunction with the 2006 IPCC Guidelines.

Data sources identified and possible:

https://unfccc.int/process-and-meetings/transparency-and-reporting/greenhouse-gas-data/ghg-data-unfccc/ghg-data-from-unfccc
https://www.climatewatchdata.org/
https://www.wri.org/resources/websites/cait

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https://www.ipcc-nggip.iges.or.jp/public/gl/invs1.html
https://unfccc.int/process/transparency-and-reporting/greenhouse-gas-data/what-is-greenhouse-gas-data
https://www.ipcc.ch/report/2019-refinement-to-the-2006-ipcc-guidelines-for-national-greenhouse-gas-inventories/

MSSD 21: SDG Indicator 7.3.1 Energy intensity measured in terms of primary energy and GDP and SDG indicator 7.2.1 Renewable energy share in the total final energy consumption

Goal 7: Ensure access to affordable, reliable, sustainable and modern energy for all
Target 7.3: By 2030, double the global rate of improvement in energy efficiency
Indicator 7.3.1: Energy intensity measured in terms of primary energy and GDP

Institutional information

Organization(s):
International Energy Agency (IEA) United
Nations Statistics Division (UNSD)
United Nations' Inter-Agency Mechanism on Energy (UN Energy)

Concepts and definitions

Definition:
Energy intensity is defined as the energy supplied to the economy pet unit value of economic output.

Rationale:
Energy intensity is an indication of how much energy is used to produce one unit of economic output. It is a proxy of the efficiency with which an economy is able to use energy to produce economic output. A lower ratio indicates that less energy is used to produce one unit of output.

Concepts:
Total energy supply, as defined by the International Recommendations for Energy Statistics (IRES), as made up of production plus net imports minus international marine and aviation bunkers plus-stock changes. Gross Domestic Product (GDP) is the measure of economic output. For international comparison purposes, GDP is measured in constant terms at purchasing power parity

Comments and limitations:
Energy intensity is only an imperfect proxy for energy efficiency. It can be affected by a number of factors, such as climate, structure of the economy, nature of economic activities etc. that are not necessarily linked to pure efficiency.

Methodology

Computation Method:
This indicator is based on the development of comprehensive energy statistics across supply and demand for all energy sources – statistics used to produce a national energy balance. Internationally agreed methodologies for energy statistics are described in the "International Recommendations for Energy Statistics" (IRES), adopted by the UN Statistical Commission, available at: https://unstats.un.org/unsd/energy/ires/.

Once a national energy balance is developed, the indicator can be obtained by dividing total energy supply over GDP.

Disaggregation:
Disaggregation of energy intensity, e.g. by sector, could provide further insights into progress towards energy efficiency. At present it is only feasible to calculate such sector disaggregations for the following sectors – industry, residential, transport, agriculture, households – as reported in the Global Tracking Framework. It would be desirable, over time, to develop more refined sectoral level energy intensity indicators that make it possible to look at energy intensity by industry (e.g. cement, steel) or by type of vehicle (e.g. cars, trucks), for example. Doing so will not be possible without statistical collaboration with the relevant energy consuming sectors.
Decomposition analysis of energy intensity trends seeks to filter out factors that affect energy demand, such as economy wide scale and structure shifts, from more narrowly defined energy intensity shifts. The methodology applies decomposition analysis to isolate a more refined measure of energy intensity, one that sifts out the temporal shift of relative sector weights. This analysis is also reported in the Global Tracking Framework.

Regional aggregates:
Aggregates are calculated, whether by region or global, using total energy supply as weights.

Data Sources

Total energy supply is typically calculated in the making of national energy balances. Energy balances are available for around 150economies from the International Energy Agency (IEA) and for all non-OECD countries in the world from the United Nations Statistics Division (UNSD).

Data Availability

Description:
IEA and UN energy balances combined provide total energy supply data for all countries on an annual basis. GDP data is available for all countries on an annual basis.

Time series:
1990-present

Calendar

Data collection:
Data is collected on an annual basis.

Data release:
The IEA Energy Balances are updated early Fall (publishing information for two calendar years prior). The UN energy balances are made available towards the end of the calendar year (publishing information for two calendar years prior)

Data providers

National statistical offices

Data compilers

The International Energy Agency (IEA) and the United Nations Statistics Division (UNSD) Description: The IEA and UNSD are the primary compilers of national energy statistics and are develop internationally comparable energy balances based on internationally agreed methodologies. Aggregates are based on World Bank analysis of IEA and UNSD data.

References

URL:

iea.org; unstats.un.org

References:

IEA Energy Balances and Statistics
http://www.iea.org/statistics/
UN Energy Statistics Database http://unstats.un.org/unsd/energy/edbase.htm

IEA SDG 7 webpage: http://www.iea.org/sdg

International Recommendations on Energy Statistics (IRES) https://unstats.un.org/unsd/energy/ires/

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International Energy Agency (IEA) and the World Bank. 2013. “Global Tracking Framework 2013”

MSSD 22: SDG Indicator 12.2.2: Domestic material consumption, domestic material consumption per capita, and domestic material consumption per GDP

Goal 12: Ensure sustainable consumption and production patterns
Target 12.2: By 2030, achieve the sustainable management and efficient use of natural resources

Institutional information

Organization(s):
United Nations Environment Programme (UNEP)

Concepts and definitions

Definition:
Domestic Material Consumption (DMC) is a standard material flow accounting (MFA) indicator and reports the apparent consumption of materials in a national economy.

Rationale:
DMC reports the amount of materials that are used in a national economy. DMC is a territorial (production side) indicator. DMC also presents the amount of material that needs to be handled within an economy, which is either added to material stocks of buildings and transport infrastructure or used to fuel the economy as material throughput. DMC describes the physical dimension of economic processes and interactions. It can also be interpreted as long-term waste equivalent. Per-capita DMC describes the average level of material use in an economy – an environmental pressure indicator – and is also referred to as metabolic profile.

Concepts:
Domestic Material Consumption (DMC) and MF need to be looked at in combination as they cover the two aspects of the economy, production and consumption. The DMC reports the actual amount of material in an economy, MF the virtual amount required across the whole supply chain to service final demand. A country can, for instance have a very high DMC because it has a large primary production sector for export or a very low DMC because it has outsourced most of the material intensive industrial process to other countries. The material footprint corrects for both phenomena.

Comments and limitations:
DMC cannot be disaggregated to economic sectors which limits its potential to become a satellite account to the System of National Accounts (SNA).

Methodology

Computation Method:
It is calculated as direct imports (IM) of material plus domestic extraction (DE) of materials minus direct exports (EX) of materials measured in metric tonnes. DMC measure the amount of materials that are used in economic processes. It does not include materials that are mobilized the process of domestic extraction but do not enter the economic process. DMC is based on official economic statistics and it

requires some modelling to adapt the source data to the methodological requirements of the MFA. The accounting standard and accounting methods are set out in the EUROSTAT guidebooks for MFA accounts in the latest edition of 2013. MFA accounting is also part of the central framework of the System of integrated Environmental-Economic Accounts (SEEA).

Disaggregation:
The DMC indicator can be disaggregated into imports, domestic extraction and exports by a large number of material follow categories. At the highest level of aggregation biomass, fossil fuels, metal ores and non-metallic minerals are distinguished. DMC is usually reported for 11 material categories, DE for 44 material categories.

Treatment of missing values:

- At country level

A zero is imputed when no positive real value was officially recorded, in the base data sets used, for any of the underlying components which make up this aggregated total. Thus "0.0" can represent either NA, or a genuine 0.0, or (crucially) a combination of both, which is a common situation. This allows for values to be easily aggregated into further aggregations; however, it should be thus noted that due to imputing missing values as '0.0', the aggregations may represent a lower value than actual situation.

- At regional and global levels

Similarly, missing values are imputed as zero in the regional and global aggregations. However, in the case where no data is available at all for a particular country then the per capita and per GDP estimates are weighted averages of the available data.

Regional aggregates:
See: http://uneplive.unep.org/media/docs/graphs/aggregation_methods.pdf

Sources of discrepancies:

Data Sources

Description:
The global material flows database is based on country material flow accounts from the European Union and Japan and estimated data for the rest of the world. Estimated data is produced on the bases of data available from different national or international datasets in the domain of agriculture, forestry, fisheries, mining and energy statistics. International statistical sources for DMC and MF include the IEA, USGS, FAO and COMTRADE databases.

Collection process:
The IRP Global Material Flows and Resource Productivity working group compiles the data from countries and from other sources.

Data Availability

Description:
The data covers more than 170 countries.

Time series:
The data set covers each nation individually, over a time period of 47 years (1970-2017).

Calendar

Data collection:
Under discussion

Data release:
11 September 2017

Data providers

National Statistical Offices

Data compilers

UNEP, OECD and EUROSTAT

References

URL:

References:
EUROSTAT (2013). Economy-wide material flow accounts. Compilation guide 2013.
Wiedmann, T., H. Schandl, M. Lenzen, D. Moran, S. Suh, J. West, K. Kanemoto, (2013) The Material Footprint of Nations, Proc. Nat. Acad. Sci. Online before print.
Lenzen, M., Moran, D., Kanemoto, K., Geschke, A. (2013) Building Eora: A global Multi-regional Input-Output Database at High Country and Secotr Resolution, Economic Systems Research, 25:1, 20-49.

Related indicators

Indicator 8.4.2

MSSD 23: SDG Indicator 17.14.1 Number of countries with mechanisms in place to enhance policy coherence of sustainable development

Agency: UNEP

Has work for the development of this indicator begun?

After initial research on existing work, literature, partners and existing indicators on similar issues, UN Environment developed a draft conceptual framework and initial elements for this indicator. The work done so far has been inspired by examples of mechanisms in place in countries to foster policy coherence for sustainable development, observed through efforts on the ground or reported by countries through their voluntary national reviews or other mechanisms. UN Environment has set up an international working group with experts from different types of organizations (Academia, governments, NGO's, International Organizations, UN-entities) and from different regions, who have experience in measuring policy coherence for sustainable development, to further develop this methodology. Agreement has been reached on the general approach for the indicator, which is a composite indictor outlining the various types of policy coherence mechanisms that could exist at the national level. The indicator framework is currently being refined.

Who are the entities, including national and international experts, directly involved and consulted in developing the methodology/and or data collection tools?

1. UN Environment as custodian agency
2. Other UN agencies and international organisations with relevant work streams, such as UNDP, UNDESA and the OECD
3. Think tanks, research institutions and academic institutions working on policy coherence, such as Stockholm Environment Institute, Center for Global Development, German Development Institute, Center for Policy Dialogue, Finnish NGDO platform to the EU, International Institute for Sustainable Development, Institute for International Integration Studies at Trinity College, Arabian Gulf University (AGU), University of Buenos Aires, Pontifica Universidad Católica de Perú
4. Government institutions with relevant experience to share, such as the Ministry of Finance and Economic Planning Rwanda, and DG Environment of the European Commission

What is the involvement of or how do you plan to involve National Statistical Systems in the development of the methodology?

This is primarily a policy process indicator, therefore we assume that at the national level information will be collected from relevant line ministries, however, as part of the methodological development we shall consult with National Statistical Offices both on the methodological approach and on the data collection plan.

Please briefly describe the process of developing the methodology for the indicator

Date	Meeting/deadline
November 2017 – June 2018	Development of draft methodological approach and indicator framework by UN Environment

June- October 2018	Establishment of International Expert Group and refinement of indicator framework
October- November 2018	Piloting of draft methodology with member states
November- 2018	Refinement of methodology and Expert Group Meeting to validate.
Beginning of 2019	**Submission of methodology proposal to IAEG-SDG for validation and Tier upgrade**
2020-2030	**Data collection for all UN member countries**

Please indicate new international standards that will need to be proposed and approved by an intergovernmental process (such as UNSC) for this methodology.
None at this time.

When do you expect the methodological work on this indicator to be completed?

By 2019

Are data and metadata already being collected from the National Statistical System for one or more components of this indicator?

No

If yes, please describe**:**

How do you plan to collect the data?
To be determined with the Expert Group, but most likely through a Government Survey, potentially combined with other policy-related surveys for Goal 12, if the focal points are appropriate.

If the indicator involves multiple components from different data sources, please describe how each individual component of the indicator will be collected here.

To be determined, depending on the final methodology.

With what frequency is data expected to be collected?

Every two years.

Is there a process of data validation by countries in place or planned for this indicator?

Data will be provided by countries.

If yes, please briefly describe:

(as of July/August 2018)

MSSD 24: Proportion of bank credit allocated to the private sector

Domestic credit to private sector (% of GDP)

Domestic credit to private sector refers to financial resources provided to the private sector by financial corporations, such as through loans, purchases of nonequity securities, and trade credits and other accounts receivable, that establish a claim for repayment. For some countries these claims include credit to public enterprises. The financial corporations include monetary authorities and deposit money banks, as well as other financial corporations where data are available (including corporations that do not accept transferable deposits but do incur such liabilities as time and savings deposits). Examples of other financial corporations are finance and leasing companies, money lenders, insurance corporations, pension funds, and foreign exchange companies.

Source: International Monetary Fund, International Financial Statistics and data files, and World Bank and OECD GDP estimates.

Aggregation Method: Weighted average

Development Relevance: Private sector development and investment - tapping private sector initiative and investment for socially useful purposes - are critical for poverty reduction. In parallel with public sector efforts, private investment, especially in competitive markets, has tremendous potential to contribute to growth. Private markets are the engine of productivity growth, creating productive jobs and higher incomes. And with government playing a complementary role of regulation, funding, and service provision, private initiative and investment can help provide the basic services and conditions that empower poor people - by improving health, education, and infrastructure.
Limitations and Exceptions: Credit to the private sector may sometimes include credit to state-owned or partially state-owned enterprises.

Long Definition: Domestic credit to private sector refers to financial resources provided to the private sector by financial corporations, such as through loans, purchases of nonequity securities, and trade credits and other accounts receivable, that establish a claim for repayment. For some countries these claims include credit to public enterprises. The financial corporations include monetary authorities and deposit money banks, as well as other financial corporations where data are available (including corporations that do not accept transferable deposits but do incur such liabilities as time and savings deposits). Examples of other financial corporations are finance and leasing companies, money lenders, insurance corporations, pension funds, and foreign exchange companies.

Periodicity: Annual

Statistical Concept and Methodology: Credit is an important link in money transmission; it finances production, consumption, and capital formation, which in turn affect economic activity. The data on domestic credit provided to the private sector are taken from the financial corporations survey (line 52D) of the International Monetary Fund's (IMF) International Financial Statistics or, when unavailable, from its depository survey (line 32D). The banking sector includes monetary authorities (the central bank) and deposit money banks, as well as other financial corporations where data are available (including institutions that do not accept transferable deposits but do incur such liabilities as time and savings deposits). Examples of other financial corporations are finance and leasing companies, money lenders, insurance corporations, pension funds, and foreign exchange companies.

References: https://data.worldbank.org/indicator/FS.AST.PRVT.GD.ZS

MSSD 24: Public and private expenses for research and development in percentage of GDP

Research and development expenditure (% of GDP)

Gross domestic expenditures on research and development (R&D), expressed as a percent of GDP. They include both capital and current expenditures in the four main sectors: Business enterprise, Government, Higher education and Private non-profit. R&D covers basic research, applied research, and experimental development.

Source: UNESCO Institute for Statistics

Aggregation Method: Weighted average
Development Relevance: Expenditure on research and development (R&D) is a key indicator of government and private sector efforts to obtain competitive advantage in science and technology.
General Comments: Each economy is classified based on the classification of World Bank Group's fiscal year 2018 (July 1, 2017-June 30, 2018).

Limitations and Exceptions: Estimates of the resources allocated to R&D are affected by national characteristics such as the periodicity and coverage of national R&D surveys across institutional sectors and industries; and the use of different sampling and estimation methods. R&D typically involves a few large performers, hence R&D surveys use various techniques to maintain up-to-date registers of known performers, while attempting to identify new or occasional performers. R&D totals from SNA accounts may differ from these estimates, due in part to the different treatments of software R&D in the totals.

Long Definition: Gross domestic expenditures on research and development (R&D), expressed as a percent of GDP. They include both capital and current expenditures in the four main sectors: Business enterprise, Government, Higher education and Private non-profit. R&D covers basic research, applied research, and experimental development.
Periodicity: Annual

Statistical Concept and Methodology: The gross domestic expenditure on R&D indicator consists of the total expenditure (current and capital) on R&D by all resident companies, research institutes, university and government laboratories, etc. It excludes R&D expenditures financed by domestic firms but performed abroad. The OECD's Frascati Manual defines research and experimental development as "creative work undertaken on a systemic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications." R&D covers basic research, applied research, and experimental development. (1) Basic research - Basic research is experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundation of phenomena and observable facts, without any particular application or use in view (2) Applied research - Applied research is also original investigation undertaken in order to acquire new knowledge; it is, however, directed primarily towards a specific practical aim or objective. (3) Experimental development - Experimental development is systematic work, drawing on existing knowledge gained from research and/or practical experience, which is directed to producing new materials, products or devices, to installing new processes, systems and services, or to improving substantially those already produced or installed. The fields of science and technology used to classify R&D according to the Revised Fields of Science and Technology

Classification are: 1. Natural sciences; 2. Engineering and technology; 3. Medical and health sciences; 4. Agricultural sciences; 5. Social sciences; 6. Humanities and the arts. The data are obtained through statistical surveys which are regularly conducted at national level covering R&D performing entities in the private and public sectors.

References: https://data.worldbank.org/indicator/GB.XPD.RSDV.GD.ZS

MSSD 26: Indicator 16.10.2: Number of countries that adopt and implement constitutional, statutory and/or policy guarantees for public access to information

Goal 16: Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels
Target 16.10: Ensure public access to information and protect fundamental freedoms, in accordance with national legislation and international agreements

Institutional information

Organization(s):

United Nations Educational, Scientific and Cultural Organization (UNESCO)

Concepts and definitions

Definition:

Number of countries that adopt and implement constitutional, statutory and/or policy guarantees for public access to information

The focus of this indicator is thus on the status of adoption and implementation of constitutional, statutory and/or policy guarantees for public access to information.. The definition relates directly to "public access to information", which is wider than, but is also very much based upon, the established fundamental freedoms of expression and association. Conversely, these freedoms also both impact on the environment for public access to information.

Rationale:

As suggested by the Sustainable Development Solutions Network (SDSN) and UNESCO in earlier presentations to the UN Technical Support Team (UN TST), this is a relevant and measurable indicator.

It also responds to the growing number of UN member states that have already adopted legal guarantees, and many others that are currently considering relevant legislation or regulation in the field.

The rationale for assessing the implementation dimension is to assess the relevance of legal steps to practical information accessibility. It is not a composite indicator, but a logical linkage of laws and policies to practical impact that is relevant to SDG concerns.

For this indicator, the operative words are "adoption" and "implementation". As such, it establishes: (a) whether a country (or at the global level, the number of countries) has constitutional, statutory and/or policy guarantees for public access to information; (b) the extent to which such national guarantees reflect 'international agreements' (e.g. Universal Declaration of Human Rights, etc.); and (c) the implementation mechanisms in place for such guarantees, including the following variables:
- Government efforts to publicly promote the right to information.
- Citizens' awareness of their legal right to information and their ability to utilize it effectively.

- The capacity of public bodies to provide information upon request by the public.

This indicator thus collates data from multiple sources, including National Human Rights Institutions, national and international non-governmental organizations, academic institutions, and national media regulatory authorities, among others. Such information will be gathered, processed and checked by international organizations - UNESCO and World Bank.

UNESCO collects some aspects of this data using the Media Development Indicators, in addition to the biennial World Trends in Freedom of Expression and Media Development report.

Data on the existence of freedom of information laws are available for at least 195 countries.

Concepts:

Conceptually, 'public access to information' refers to "the presence of a robust system through which information is made available to citizens and others." Such a system represents a combination of intellectual, physical, and social elements that affect the availability of information to individuals. In other words, in discussing the issue of public access to information, it is important to recognize that any measurement of its practical outworking needs to take into account how individuals perceive the quality of information in the public domain, the nature of the communicative infrastructure in place to facilitate access, and how that information is ultimately utilized by individuals as members of a particular polity.

In general, then, these are the issues that go into legislation and policy on public access. More specifically, such legislation and policy take the form of Freedom of Information laws (FOI laws) which are aimed at allowing access by the general public to data held by national governments and, increasingly, by private companies whose work intersect with government operations.

The emergence of freedom of information legislation was a response to increasing dissatisfaction with the secrecy surrounding government policy development and decision making. They establish a "right-to- know" legal process by which requests may be made for government-held information, to be received freely or at minimal cost, barring standard exceptions.

Such a formulation has a basis in international agreements. For example, the right to freedom of expression, which is not only recognized as a basic human right in the Universal Declaration of Human Rights (1948), is also upheld in the International Covenant on Civil and Political Rights (1966), the European Convention on Human Rights (1950), the American Convention on Human Rights (1969) and the African Charter on Human and Peoples' Rights (1981), thus lending itself to universal political recognition and application. More specifically, in the European context, reference may be made to the Council of Europe Convention on Access to Official Documents, adopted on 18 June 2009. In the Americas, the Organization of American States' Inter-American Juridical Committee developed a set of Principles on the Right of Access to Information in 2008.

Comments and limitations:

This indicator does not assess the totality of "public access to information" component of the full Target of 16.10. Nevertheless, it focusses on a key determinant of the wider information environment.

Methodology

Computation Method:

The method of computation is both quantitative and qualitative, with data generated from a global review of existing surveys (e.g. UNESCO's World Trends in Freedom of Expression & Media Development reports, etc.), administrative records, expert assessments (e.g. World Justice Open Government Index), etc. More specifically, the following key variables will be assessed:

1. Does a country have constitutional, statutory and/or policy guarantees for public access to information?
2. Do those constitutional, statutory and/or policy guarantees reflect known international agreements (e.g. the Universal Declaration of Human Rights, the International Covenant on Civil and Political Rights, etc.)?
3. What implementation mechanisms are in place to ensure that such guarantees work optimally?

To address these questions, the following will serve as performance sub-indicators:
- National law or constitutional guarantee on the right to information
- Country has signed and ratified relevant treaty obligations, with no significant exemptions, and these are reflected, to the extent possible, in domestic FOI legislation
- Public is aware of and exercises right to access official information
- Public bodies release information both pro-actively and on demand
- Effective and efficient appeals mechanism via independent administrative body e.g. information commissioner or ombudsman
- Any restriction on grounds of protection of personal privacy is narrowly defined so as to exclude information in which there is no justifiable public interest.

The means of verification will include:
- Any law or policy on right to information that accords with international standards
- Reports from credible agencies/experts about right to information guarantees and the extent to which they reflect international standards/agreements
- Policies of public bodies concerning release of information (which ensure readily, freely available public access to information, including online)
- Evidence of state commitment to open government e.g. publication and dissemination of laws, court decisions, parliamentary proceedings, spending programmes (vis-à-vis SDG undertakings)
- Statistical information about public requests for official information and their fulfilment or rejection
- Statistical information about appeals or complaints over information requests that have been refused

Disaggregation:

The indicator can be disaggregated in terms of the extent to which the residence of citizens affects their ability to access information (e.g. how do rural, peri-rural, urban and peri-urban dwellers access information from public bodies). It can also be disaggregated in terms of whether gender influences ability to access information. Furthermore, aspects of how disability affects public access to information can also be assessed.

Treatment of missing values:

- At country level

  An expert assessment of state-of-the-art literature on FOI laws establishes:

(I) the number of countries currently with FOI laws/policies;
(2) the extent to which they reflect 'international agreements'; and
(3) the effectiveness of the implementation mechanisms

- At regional and global levels

  An expert assessment of state-of-the-art literature on FOI laws, along with in-country data from UNESCO ACIs (Advisors for Communication and Information) in the field, establishes:
  (I) the number of countries currently with FOI laws/policies;
  (2) the extent to which they reflect 'international agreements'; and
  (3) the effectiveness of the implementation mechanisms

Regional aggregates:

An expert assessment of state-of-the-art literature on FOI laws, along with in-country data from UNESCO ACIs (Advisors for Communication and Information) in the field, establishes:
(I) the total number of countries currently with FOI laws/policies;
(2) the extent to which these laws/policies reflect 'international agreements'; and
(3) the effectiveness of the implementation mechanisms in place (This aspect is measured in terms of surveys undertaken by different international organizations active in this field)

Data Sources

Description:

UNESCO and World Bank reports Other UN
bodies, such as UNDP
National bodies such as commissioners responsible for right to information implementation Media regulators
Academic and research institutions
Media support NGOs (national and international)

Methods used for data collection for this data are varied, drawing upon both quantitative and qualitative ones, including:

- Qualitative expert assessments (World Justice Open Government Index, launched in 2015 and covering 102 countries);
- Administrative records (e.g. number of requests for information; number of requests process in the last 12 months; number of women who submit such requests, etc.)
- Surveys (e.g. UNESCO World Trends in Freedom of Expression & Media Development and Media Development Indicators (MDI) reports; Open Society Foundation's series of surveys on 'access to information laws and practices'; the World Values Survey [www.worldvaluessurvey.org]; IPU data on access-to-information legislation and constitutional guarantees of access to information; World Values Survey on trust of news media]; etc.)

UN or relevant regional bodies that carry details of each treaty, including countries that have signed, ratified or registered any exemptions to their obligations, together with the treaty bodies' general comments on implementation.

Various international and regional rapporteurs on freedom of expression issue country-specific reports.

For data on national laws and constitutional guarantees, sources include: national libraries, law commissions, official records of parliament and government records.

List:

UNESCO and World Bank reports; Other UN bodies; National bodies; World Justice Open Government Index, Administrative records, World Justice Open Government Index, UNESCO World Trends in Freedom of Expression & Media Development and Media Development Indicators (MDI) reports; Open Society Foundation's, World Values Survey [www.worldvaluessurvey.org]; IPU data on access-to-information legislation and constitutional guarantees of access to information; World Values Survey on trust of news media]; etc.)

Collection process:

UNESCO uses a triangulated method to compare data for global monitoring, which includes (I) databases maintained by other international agencies; (2) own international surveys carried out in countries by independent entities and (3) modelled and estimated data, based on other data sources. More specifically, UNESCO analyses data inputs from a variety of sources to produce a consensus list of countries with freedom of information laws or equivalent. Among those organizations and experts that make available their data are: Freedominfo.org, Fringe Special by Robert Vleugels, Open Society Justice Initiative, Right to Information Rating, by Access Info Europe and the Centre for Law and Democracy, ARTICLE 19. Others include international agencies and UN bodies, such as: The World Bank, The Office of the High Commissioner for Human Rights, The UN Special Rapporteur on the Promotion and Protection of the Right to Freedom of Opinion and Expression.

Data Availability

Description:

Data on the existence of freedom of information laws are available for at least 195 countries. However, for future data collection and analysis, efforts are underway to ensure that the data is analyzed to yield information on aspects relating to how FOI laws are actually "implemented", rather than just their existence.

Calendar

Data collection: From Jan-

17 toJul-17 **Data release:**

1-Oct-2017

Data providers

Name:

UNESCO, World Bank, UNDP, and other UN bodies; National bodies, Academic and research institutions, Media support NGOs

Description:

UNESCO, represented by National Programme Officers and regional Advisors for Communication and Information in the field offices; Other UN bodies, such as World Bank, UNDP, etc.; National bodies such as commissioners responsible for right to information implementation; Media regulators; Academic and research institutions; Media support NGOs (national and international)

Data compilers

UNESCO

References

URL:

http://en.unesco.org/

References:

1. UNESCO Media Development Indicators: Framework for assessing media development. http://unesdoc.unesco.org/images/0016/001631/163102e.pdf

2. World Trends in Freedom of Expression and Media Development: http://www.unesco.org/new/en/world-media-trends

3. Universal Periodic Review: [UNESCO contributes data on freedom of expression, including constitutional guarantees thereof, in addition to tracking killings of journalists]. http://www.ohchr.org/en/hrbodies/upr/pages/BasicFacts.aspx

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6. Inter-Parliamentary Union (IPU). 2009. Freedom of Expression and the Right to Information (Resolution adopted by consensus by the 120th IPU Assembly, Addis Ababa, 10 April 2009). Available [0]: http://www.right2info.org/resources/publications/ngo-statements/ngo-statements_ipu-declaration

7. Article 19. 1999. The Public's Right to Know Principles on Freedom of Information Legislation. Available [0]: http://www.ipu.org/splz-e/sfe/foi_ps.pdf.