Goal 6: Ensure availability and sustainable management of water and sanitation for all
Target: 6.3 By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally.
Indicator: 6.3.2 Proportion of bodies of water with good ambient water quality

Institutional information

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

Concepts and definitions

Definition:
The indicator is defined as the proportion of water bodies in the country that have good ambient water quality. Ambient water quality refers to natural, untreated water in rivers, lakes and groundwaters and represents a combination of natural influences together with the impacts of all anthropogenic activities. The indicator relies on water quality data derived from in situ measurements and the analysis of samples collected from surface and groundwaters. Water quality is assessed by means of core physical and chemical parameters that reflect natural water quality related to climatological and geological factors, together with major impacts on water quality. The continuous monitoring of all surface and groundwaters is economically unfeasible and not required to sufficiently characterize the status of ambient water quality in a country. Therefore, countries select river, lake and groundwater bodies that are representative and significant for the assessment and management of water quality to monitor and report on indicator 6.3.2. The quality status of individual water bodies is classified based on the compliance of the available water quality monitoring data for the core parameters with target values defined by the country. The indicator is computed as the proportion of the number of water bodies classified as having good quality (i.e. with at least 80 % compliance) to the total number of assessed water bodies, expressed as a percentage.

Rationale:
Good ambient water quality is essential for protecting aquatic ecosystems and the services they provide, including: the preservation of biodiversity; the protection of human health during recreational use and through the provision of drinking water; the support of human nutrition through the provision of fish and water for irrigation; the enabling of a variety of economic activities; and the strengthening of the resilience of people against water-related disasters. Good ambient water quality is therefore closely linked to the achievement of many other Sustainable Development Goals.

Target 6.3 aims at improving water quality and indicator 6.3.2 provides a mechanism for determining whether, and to which extent, water quality management measures are contributing to the improvement of water quality over time. The indicator is also directly linked to indicator 6.3.1 on wastewater treatment because inadequate wastewater treatment leads to degradation in quality of the waters receiving the wastewater effluents. It directly informs progress towards target 6.3 and is strongly linked to target 6.6 on water-related ecosystems, as well as target 14.1 on marine pollution (coastal eutrophication).

The methodology recognises that countries have different capacity levels to monitor water quality, with many developed countries operating extensive and complex programmes that collect and report data to existing reporting frameworks beyond the scope of this methodology. For these countries it is recognised that this methodology will not contribute to improving their water quality; however it must be sufficiently flexible to capture data from existing monitoring frameworks without burdening countries with additional reporting obligations. Conversely, many of the least developed countries currently do not monitor water quality or operate very limited monitoring programmes. The methodology must therefore allow these countries to contribute to the global indicator, according to their national capacity and available resources.

The development of the methodology builds on best practice for water quality monitoring promoted by the UN Environment GEMS/Water programme since 1978 together with testing by several pilot countries during the Integrated Monitoring Initiative Proof of Concept phase of 2016, and external review by experts and international organizations. This led to revision of the original methodology, which was then further tested through the 2017 global data drive. The feedback received has contributed to the present refined methodology.

Concepts:

The concepts and definitions used in the methodology have been based on existing international frameworks and glossaries (WMO 2012) unless where indicated otherwise below.

Aquifer: Geological formation capable of storing, transmitting and yielding exploitable quantities of water.

Classification of water quality: If at least 80% of the monitoring values for prescribed parameters in a water body comply with their respective target values, the water body is classified as having a “good” water quality status**.** Each water body is classified as being of “good” or “not good” status.

Groundwater: Subsurface water occupying the saturated zone.

Groundwater body: A distinct volume of groundwater within an aquifer or aquifers (EU 2000). Groundwater bodies that cross river basin district (RBD) boundaries should be divided at the boundary with each separate portion of the groundwater body being reported separately along with its respective RBD.

Lake: Inland body of standing surface water of significant extent.

Non-point-source pollution: Pollution of water bodies from dispersed sources such as fertilizers, chemicals and pesticides used in agricultural activities.

Parameter: Water quality variable or characteristic of water quality, also called a determinand.

Point source pollution: Pollution with a precisely located origin.

Pollution (of water): Introduction into water of any undesirable substance which renders the water unfit for its intended use.

Pollutant: Substance which disrupts and interferes with the equilibrium of a water system and impairs the suitability of using the water for a desired purpose.

Reservoir: Body of water, either natural or man-made, used for storage, regulation and control of water resources.

River: Large stream which serves as the natural drainage for a basin.

River basin: Geographical area having a common outlet for its surface runoff.

River basin district: Area of land, made up of one or more neighbouring river basins together with their associated groundwaters (EU, 2000).

River water body: A coherent section of a river that is discrete (does not overlap with another water body) and is significant rather than arbitrarily designated.

Stream: Flowing body of water in a natural surface channel.

Surface water: Water which flows over, or lies on, the ground surface. Note: Indicator 6.3.2 does not include the monitoring of water quality in wetlands under monitoring level 1.

Target value: A value (or range) for any given water quality parameter that indicates the threshold for a designated water quality, such as good water quality rather than acceptable water quality.

Toxic substance: Chemical substance which can disturb the physiological functions of humans, animals and plants.

Transboundary waters: Surface or ground waters which mark, cross or are located on boundaries between two or more States; wherever transboundary waters flow directly into the sea, these transboundary waters end at a straight line across their respective mouths between points on the low-water line of the banks (UNECE, 1992).

Water quality index: The measured water quality results for all parameters combined into a numeric value for each monitoring location. These scores are then aggregated over the time of the assessment period. The index score can range between zero (worst) to 100 (best).

Comments and limitations:

The monitoring and reporting of SDG Indicator 6.3.2 requires considerable national financial and human capacities to regularly measure water quality parameters at sufficient spatial and temporal resolutions, and to consistently collect, quality-assure and process the monitoring data to compute the indicator. Substantial investments in monitoring and data management infrastructures, as well as targeted capacity development in water quality monitoring programme design and operation, will be required in many countries to enhance national capacities to regularly and consistently report on the indicator.

Recognizing the differences in monitoring and data processing capacities among countries, the indicator methodology offers a progressive monitoring approach allowing countries to start with reporting based on their existing capacity and progressively enhance the data coverage and indicator significance with increasing capacity.

Level 1 monitoring includes a set of general, easily measurable, physico-chemical water quality parameters that can indicate water quality degradation. They can be used to assess the quality status of water bodies, facilitating global comparability and maintaining a balance between the significance of the indicator and the monitoring requirements for each country.

Level 2 monitoring allows countries with enhanced capacities to include additional water quality parameters, such as toxic substances and biological monitoring, as well as more sophisticated quality classification schemes to assess and report on the quality of their water bodies more accurately.

Methodology

Computation Method:

The indicator is computed by first classifying all assessed water bodies based on the compliance of the monitoring data collected for selected parameters at monitoring locations within the water body with parameter-specific target values:

$$C_{wq} = \frac{n_c}{n_m} \times 100$$

Where

C_{wq} is the percentage compliance [%];
n_c is the number of monitoring values in compliance with the target values;
n_m is the total number of monitoring values.

A threshold value of 80% compliance is defined to classify water bodies as "good" quality. Thus, a body of water is classified as having a good quality status if at least 80% of all monitoring data from all monitoring stations within the water body are in compliance with the respective targets.

In a second step, the classification results are used to compute the indicator as the proportion of the number of water bodies classified as having a good quality status to the total number of classified water bodies expressed in percentage:

$$WBGQ = \frac{n_g}{n_t} \times 100$$

Where

$WBGQ$ is the percentage of water bodies classified as having a good quality status;
n_g is the number of classified water bodies classified as having a good quality status;
n_t is the total number of monitored and classified water bodies.

Disaggregation:

The indicator can be disaggregated by water body type (river, lake, groundwater) and river basin district. This disaggregated data can support informed decision-making at the national and sub-national scale to monitor and improve water quality management measures.

Treatment of missing values:

- At country level

Missing values are not imputed.

- At regional and global levels

Missing values are not imputed.

Regional aggregates:

http://pre-uneplive.unep.org/media/docs/graphs/aggregation_methods.pdf.

Sources of discrepancies:

Not applicable as no internationally estimated data is used to impute.

Data Sources

Description:
The recommended sources of data are water quality monitoring data derived from in situ measurements and the analysis of samples collected from surface and groundwaters in national or sub-national ambient water quality monitoring programmes implemented by governmental authorities. Additional water quality monitoring data from research or citizen-science monitoring programmes can be used to supplement the available authoritative monitoring data, provided they are authorised by the national reporting agency.

The number of monitoring locations required to determine the quality status of a water body depends on the type and size of the water body, but a minimum of one monitoring location per water body is required. The minimum data requirements for calculating this indicator are measurements for all of the recommended or alternative core parameters appropriate to the type of water body as defined in the methodology.

Measurements should be taken routinely, at prescribed intervals, or the same time of year each year, from the same locations. Even if new monitoring stations are introduced, data should continue to be collected from the original locations. This ensures that results are comparable between reports, thereby enabling trends to be established over time. The monitoring data needed for the indicator computation may be collected by different monitoring programmes involving different agencies and organizations. It is therefore important to establish and maintain centralized data repositories at the national level that collate the data from the various stakeholders, ensuring compatibility in reporting units between all agencies submitting data. Data should be compiled for each core parameter at each sampling location in order to calculate the indicator.

Collection process:
The data will be collected by UN Environment and its Global Environment Monitoring System for Water (GEMS/Water) through electronic reporting in the global water quality information system GEMStat. At the national level, data reports will be provided by the GEMS/Water National Focal Points or any other official counterpart appointed by the respective government. GEMS/Water offers consultation and support in selecting and compiling the required monitoring data, defining suitable river basin districts and delineating water bodies, as well as computing the indicator, upon request through its helpdesk. Data reported by the countries will be checked for consistency with respect to the monitoring parameters, target values and spatial units and compared with monitoring data available in GEMStat, if applicable.

Data Availability

Description:
An initial baseline data collection has been conducted in 2017 with 48 country data submissions as of February 2018.

Time series:

The reporting on this indicator will follow a 5-year cycle.

- Initial baseline data collection completed in 2017; First reporting cycle in 2020: data collected from 2015 to 2019; Second reporting cycle in 2025: data collected from 2020 to 2024; Third reporting cycle in 2030: data collected from 2025 to 2029.

Calendar

Data collection:

1. First reporting cycle: 2020;
2. Second reporting cycle: 2025;
3. Third reporting cycle: 2030.

Data release:

1. First reporting cycle: June 2021;
2. Second reporting cycle: June 2026;
3. Third reporting cycle: June 2031.

Data providers

1. GEMS/Water National Focal Points in relevant Ministries, Water Authorities, etc. or their nominated representative.

Data compilers

1. UN Environment (United Nations Environment Programme)

References

URL: http://www.sdg6monitoring.org/indicators/target-63/indicators632/

References:

EU (European Parliament, Council of the European Union) 2000. Water Framework Directive (WFD) 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy, Official Journal L327, 1–72. Available at: http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32000L0060

UNECE 1992 Convention on the Protection and Use of Transboundary Watercourses and International Lakes. Available at: http://www.unece.org/fileadmin/DAM/env/water/pdf/watercon.pdf

WMO 2012 *International Glossary of Hydrology.* No. 385 World Meteorological Organization and United Nations Educational, Scientific and Cultural Organization. Available at: http://library.wmo.int/pmb_ged/wmo_385-2012.pdf

Related indicators

Indicators 6.3.1, 6.6.1, 14.1.1

Goal 6: Ensure availability and sustainable management of water and sanitation for all
Target 6.a: By 2030, expand international cooperation and capacity-building support to developing countries in water- and sanitation-related activities and programmes, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies
Indicator 6.a.1: Amount of water- and sanitation-related official development assistance that is part of a government-coordinated spending plan

Institutional information

Organization(s):

World Health Organization (WHO)

United Nations Environment Programme (UNEP)

Organisation for Economic Co-operation and Development (OECD)

Concepts and definitions

Definition:

Amount of water- and sanitation-related official development assistance that is part of a government-coordinated spending plan is defined as the proportion of total water and sanitation-related Official Development Assistance (ODA) disbursements that are included in the government budget.

Rationale:

The amount of water and sanitation-related Official Development Assistance (ODA) is a quantifiable measurement as a proxy for “international cooperation and capacity development support” in financial terms. It is essential to be able to assess ODA in proportion with how much of it is included in the government budget to gain a better understanding of whether donors are aligned with national governments while highlighting total water and sanitation ODA disbursements to developing countries over time.

A low value of this indicator (near 0%) would suggest that international donors are investing in water and sanitation related activities and programmes in the country outside the purview of the national government. A high value (near 100%) would indicate that donors are aligned with national government and national policies and plans for water and sanitation.

Concepts:

“International cooperation and capacity-building support” implies aid (most of it quantifiable) in the form of grants or loans by external support agencies. The amount of water and sanitation-related Official Development Assistance (ODA) can be used as a proxy for this, captured by OECD Creditor Reporting

System (CRS). ODA is defined as flows of official financing administered with the promotion of the economic development and welfare of developing countries as the main objective, and which are concessional in character with a grant element of at least 25 per cent (using a fixed 10 per cent rate of discount). By convention, ODA flows comprise contributions of donor government agencies, at all levels, to developing countries ("bilateral ODA") and to multilateral institutions. ODA receipts, from a recipient perspective, comprise disbursements by bilateral donors and multilateral institutions. Lending by export credit agencies—with the pure purpose of export promotion—is excluded (see http://www.oecd.org/dac/stats/officialdevelopmentassistancedefinitionandcoverage.htm).

"Developing countries" refer to countries, which are eligible to receive official development assistance (see http://www.oecd.org/dac/stats/daclist.htm). This limits the scope of reporting to those countries receiving water and sanitation ODA, and the number of such countries is expected to decrease going forward.

Water and sanitation-related activities and programmes include those for water supply, sanitation and hygiene (WASH) (targets 6.1, 6.2), wastewater and water quality (6.3), water efficiency (6.4), water resource management (6.5), and water-related ecosystems (6.6). As per target 6.a wording, it includes activities and programmes for water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies.

A government coordinated spending plan is defined as a financing plan/budget for the water and sanitation sector, clearly assessing the available sources of finance and strategies for financing future needs.

Comments and limitations:

Data on water and sanitation-related ODA included in the government budget will be available by end-2016 with the current cycle of UN-Water Global Analysis and Assessment of Sanitation and Drinking-Water (GLAAS) data. Until then, total water and sanitation-related ODA (denominator) will be reported. Total water and sanitation-related ODA will continue to be reported as an additional indicator going forward.

In addition, the proportion of ODA channelled through the government treasury will be reported as an additional indicator. ODA channelled through treasury indicates a high level of cooperation and alignment between donors and national government in which the donors channel funds through the national budget process.

The OECD Creditor Reporting System (CRS) currently disaggregates ODA for the water and sanitation among several categories including: sector policy and administration, water resources protection, large and basic water and sanitation systems, river basin infrastructure, waste management, agricultural water resources, and education and training. While these categories do not align directly with the target areas of SDG 6 individually, which limits the disaggregation of ODA among the SDG target areas, the combined ODA from these categories does align with a majority of the reported ODA to the water sector.

As the numerator and denominator come from different sources, there is the possibility of different underlying assumptions regarding what should be included/excluded in the ODA figures. This could lead to situations in which the proportion of ODA included in government budget is greater than 1 (100%) if

total ODA reported to OECD is lower than ODA reported to be included the budget. To guard against this possibility, the OECD will supply GLAAS with the reported ODA figures, broken down to the project level, so that respondents can match these with their on-budget project data.

ODA represents only one aspect of international cooperation. To capture other dimensions, additional supporting indicators are available, including indicators for the Collaborative Behaviours identified by the Sanitation and Water for All (SWA) partnership. Each behaviour has one or two key indicators for governments and for development partners. If the behaviours are jointly adapted by governments and development partners, long-term sector performance and sustainability would improve. For additional information on the Collaborative Behaviours see: http://sanitationandwaterforall.org/about/the-four-swa-collaborative-behaviours/

Methodology

Computation Method:

The indicator is computed as the proportion of total water and sanitation-related ODA that is included in the government budget, i.e. the amount of water and sanitation-related ODA in the government budget divided by the total amount of water and sanitation-related ODA.

The numerator on water and sanitation-related ODA in the government budget will be obtained from the UN-Water Global Analysis and Assessment of Sanitation and Drinking-Water (GLAAS) survey for the 2016-2017 cycle. The question on external funding collects data on the amount of donor funds that were included in government budget. Data for 2015 ODA disbursements through GLAAS will be available by end-2016. The scope of the question on external funding has been expanded beyond WASH for the 2016-17 cycle to address all targets under SDG 6, including wastewater and water quality, water efficiency, water resource management, and water-related ecosystems.

The denominator on total water and sanitation-related ODA disbursements will be obtained through OECD Creditor Reporting System (CRS) (purpose codes 14000-series for the water sector and purpose code 31140 for agricultural water resources). Data on ODA disbursements for 2015 will be made available through CRS in December 2016.

Disaggregation:

Subsector disaggregation (basic vs. large systems)

Treatment of missing values:

- At country level

  Due to the highly country- and context-specific nature of ODA disbursements and whether they are aligned with national government plans, no estimates are produced for countries that are missing data.

- At regional and global levels

If no data is provided for the amount of ODA included in the budget, then the country is excluded from the regional and/or global analysis.

Regional aggregates:

Global and regional aggregates for ODA are derived based on summation of recipient country ODA disbursement for the water sector (purpose codes 14000- series) and agricultural water resources (purpose code 31140) from the OECD Creditor Reporting System.

Global and regional proportions of ODA disbursements as part of a government budget are derived for countries based on a summation of ODA for the water sector that is included in the budget divided by a summation of total ODA for water sector. The calculation of global and regional aggregates would only be performed for those countries reporting the amount of ODA for the water sector that is included in the budget. If no data is provided for the amount of ODA in the budget, then the country is excluded from the regional and/or global analysis.

Sources of discrepancies:

There may be differences in how much development aid is reported by a recipient country and the amount of ODA disbursed to that country as reported by the OECD-CRS. While OECD captures a significant amount of the aid flows (as reported by external donors) to the water and sanitation sector, countries may receive development aid for water and sanitation from national and international donors that do not report to the OECD-CRS data system. Other differences may occur if recipient countries define development aid more or less rigorously than OECD's definition of ODA, or use different timeframes (e.g. fiscal year instead of calendar year) to report aid flows. In order to ensure data is as consistent as possible, the OECD will supply the reported ODA figures broken down to the project level, so that respondents can match these with their on-budget project data.

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

Questionnaires for providers of development cooperation are available at the following link: http://www.oecd.org/dac/financing-sustainable-development/development-finance-standards/ The data included in the indicator are ODA flows from all donors to developing countries eligible for ODA for the water sector (water and sanitation (purpose codes 14000- series), agricultural water resources (purpose code 31140), flood prevention/control (purpose code 41050), and hydroelectric power plants (purpose code 23220)).

The OECD Development Assistance Committee (DAC) has been collecting data on aid flows since 1973 through the OECD Creditor Reporting System based on a standard methodology and agreed definitions from member countries and other aid providers. The data are generally obtained on an activity level, and include numerous parameters to allow disaggregation by provider and recipient country, by type of finance, and by type of resources provided. Data are available for essentially all high-income countries as bilateral donors, and for an increasing number of middle-income aid providers, as well as multi-lateral lending institutions. Methodology on ODA data collection by OECD can be found here: http://www.oecd.org/dac/stats/methodology.htm.

Quality assurance:

Data are collected using a converged reporting system whereby bilateral and multilateral providers of development co-operation use a single file format (Creditor Reporting System – CRS) to report at item level on all flows of resources to developing countries. Item-level reporting is validated against key aggregates also reported by donors and then serves as the basis for producing various other aggregate statistics. For further details, see: http://www.oecd.org/dac/stats/methodology.htm

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 Sources

Description:

The UN-Water Global Analysis and Assessment of Sanitation and Drinking-Water (GLAAS) provides information on governance, monitoring, human resources, and financing in the water, sanitation, and hygiene (WASH) sector. The UN-Water GLAAS survey is currently conducted on a biennial basis, led by WHO, and collected data from 94 countries (predominantly low and lower-middle income countries) in the most recent cycle in 2013-2014. The scope of the question on external funding has been expanded beyond WASH for the 2016-17 GLAAS cycle to include wastewater and water quality, water efficiency, water resource management, and the status of water-related ecosystems. GLAAS has completed three full cycles (2009-2010, 2011-2012, and 2013-2014), as well as a pilot conducted in 2008.

National governments participating in the GLAAS survey fill out the questionnaire, preferably supported by a multi-stakeholder review. Although one ministry leads the process, it is often the case that many different ministries and departments must be involved in the process in order to obtain the data required to complete the questionnaire. A GLAAS national focal person supports the lead ministry to coordinate data collection, to compile the national response to the questionnaire, and to lead on the process of data validation.

The OECD Development Assistance Committee (DAC) has been collecting data on aid flows since 1973 through the OECD Creditor Reporting System based on a standard methodology and agreed definitions from member countries and other aid providers. The data are generally obtained on an activity level, and include numerous parameters to allow disaggregation by provider and recipient country, by type of finance, and by type of resources provided. Data are available for essentially all high-income countries as bilateral donors, and for an increasing number of middle-income aid providers, as well as multi-lateral lending institutions. Methodology on ODA data collection by OECD can be found here: http://www.oecd.org/dac/stats/methodology.htm

The data will be complemented by Integrated Water Resources Management (IWRM) reporting in SDG target 6.5 (for wastewater and water quality, water efficiency, water resource management, and the status of water-related ecosystems) (UNEP 2016). The analysis of IWRM has been done in the past by UN-Water in 2008 (led by UN-DESA) and in 2012 (led by UNEP, UNDP, GWP and SIWI) as requested by the UN Commission for Sustainable Development (UN-Water 2008, 2012).

Collection process:

National governments participating in the UN-Water Global Analysis and Assessment of Sanitation and Drinking-Water (GLAAS) survey fill out the questionnaire, preferably supported by a multi-stakeholder review. Although one ministry leads the process (e.g. Ministry of Water, Ministry of Environment, etc. depending on country), it is often the case that many different ministries and departments must be involved in the process in order to obtain the data required to complete the questionnaire. A GLAAS national focal person supports the lead ministry to coordinate data collection, to compile the national response to the questionnaire, and to lead on the process of data validation. For each GLAAS submission, information on the country processes is collected (number of ministries involved, whether a national meeting was held to support the filling of the questionnaire, stakeholder validation, use of documentation, etc.). Once received, the country submission undergoes a thorough data validation process, which is often an iterative process requiring communication and feedback with regional and country counterparts.

Countries are also requested to provide consent to publish individual, validated data responses as supplied to GLAAS. Thus through the data collection, validation and consultation processes, the results are expected to be comparable and no further adjustments are foreseen.

Data Availability

Description:

Asia and Pacific: Most countries (at least 80% of the countries covering 90% of the population from the region)
Africa: Most countries (at least 80% of the countries covering 90% of the population from the region)
Latin America and the Caribbean: Most countries (at least 80% of the countries covering 90% of the population from the region)
Europe, North America, Australia, New Zealand and Japan: Some countries
Please note that these reflect availability of data on total water and sanitation ODA. Data on proportion included in government budget will be available through the current cycle of GLAAS (cf. 7.1, 10.1, and 10.2).

Time series:

Time series of parameters under the indicator are available for 2008, 2010, 2012, and 2014.

Calendar

Data collection:

The current round of GLAAS has been launched and data for 2015 ODA disbursements channelled through national government budgets will be available by end-2016. OECD data on ODA disbursements for 2015 will be made available through CRS in December 2016. (From NA to NA)

Data release:

Q1 2017

Data providers

Description:

Ministries with responsibilities related to finance, water supply and sanitation, agriculture, water resources development and management, environment, and foreign affairs

Data compilers

Name:

WHO and OECD, UNEP

Description:

WHO and OECD, with support from UNEP

References

URL:

http://www.who.int/water_sanitation_health/glaas/en/
http://www.unep.org/
http://www.oecd.org/dac/stats/data.htm

References:

- UN-Water Global Analysis and Assessment of Sanitation and Drinking-Water. http://www.who.int/water_sanitation_health/glaas/en/

- UN-Water 2008: Status Report on IWRM for CSD-16, http://www.unwater.org/publications/publications-detail/en/c/206480/UNEP-DHI

- UN-Water 2012: Status Reports on IWRM. http://www.unwater.org/publications/status-report-on-integrated-water-resources-management/en/

- Data from the 2012 Survey on the Application of Integrated Approaches to Water Resources Management. http://www.unepdhi.org/rioplus20

- UNEP 2016. Degree of implementation of integrated water resources management. Draft survey to support SDG indicator 6.5.1 http://www.unepdhi.org/whatwedo/gemi .

Organisation for Economic Co-operation and Development Creditor Reporting System http://www.oecd.org/dac/stats/data.htm

Related indicators

6.5:
Number of deaths, missing persons and persons affected by disaster per 100,000 people [a]

7.a:
Number of deaths, missing persons and persons affected by disaster per 100,000 people [a]

13.b:
Number of deaths, missing persons and persons affected by disaster per 100,000 people [a]

15.9:
Number of deaths, missing persons and persons affected by disaster per 100,000 people [a]

Comments:

6.5 (implement integrated water resources management at all levels, including transboundary cooperation as appropriate) 7.a (enhance international cooperation to facilitate access to clean energy research and technology) 13.b (mechanisms for raising capacity for climate change-related planning and management, focusing on women, youth and local and marginalized communities) 15.9 (integrate ecosystem and biodiversity values into national and local planning, development processes, poverty reduction strategies and accounts).

Goal 6: Ensure availability and sustainable management of water and sanitation for all
Target 6.b: Support and strengthen the participation of local communities in improving water and sanitation management
Indicator 6.b.1: Proportion of local administrative units with established and operational policies and procedures for participation of local communities in water and sanitation management

Institutional information

Organization(s):

World Health Organization (WHO)

United Nations Environment Programme (UNEP)

Organisation for Economic Co-operation and Development (OECD)

Concepts and definitions

Definition:

The indicator assesses the percentage of local administrative units (as defined by the national government) that have an established and operational mechanism by which individuals and communities can meaningfully contribute to decisions and directions about water and sanitation management.

The indicator Proportion of local administrative units with established and operational policies and procedures for participation of local communities in water and sanitation management is currently being measured by the Proportion of countries with clearly defined procedures in law or policy for participation by service users/communities in planning program in water and sanitation management, and hygiene promotion and the Proportion of countries with high level of users/communities participating in planning programs in water and sanitation management, and hygiene promotion.

Rationale:

Defining the procedures in policy or law for the participation of local communities is vital to ensure the needs of all the community are met, including the most vulnerable and also encourages ownership of schemes which in turn contributes to their sustainability.

A low value of this indicator would suggest that participation of local communities in water and sanitation management is low, whereas a high value would indicate high levels of participation, indicating greater ownership and a higher likelihood of sustainable delivery and management of water and sanitation services.

Concepts:

Stakeholder participation is essential to ensure the sustainability of water and sanitation management options over time, e.g. the choice of appropriate solutions for a given social and economic context, and the full understanding of the impacts of a certain development decision. Defining the procedures in policy or law for the participation of local communities is vital to ensure needs of all the community is met, including the most vulnerable and also encourages ownership of schemes which in turn contributes to their sustainability.

Local administrative units refers to non-overlapping sub-districts, municipalities, communes, or other local community-level units covering both urban and rural areas to be defined by the government.

Policies and procedures for participation of local communities in water and sanitation management would define a formal mechanism to ensure participation of users in planning water and sanitation activities.

A policy or procedure is considered to be established if the mechanism for participation of local communities is defined in law or has been formally approved and published. It is considered to be operational if the policy or procedure is being implemented, with appropriate funding in place and with means for verifying that participation took place.

'Water and sanitation' includes all areas of management related to each of the targets under SDG 6, namely: water supply (6.1), sanitation and hygiene (6.2), wastewater treatment and ambient water quality (6.3), efficiency and sustainable use (6.4), integrated water resources management (6.5) and water-related ecosystems (6.6).

Comments and limitations:

Data on local administrative units with established and operational policies and procedures for local participation is being collected through the current cycle of GLAAS, and will be available by end-2016. Until then, the presence of policies and procedures as reported at the national level for different subsectors will be reported.

Additional data, including data measuring local participation from the OECD Water Governance Indicators and administrative data, will be progressively included in the calculation of the indicator as they become available.

Methodology

Computation Method:

The UN-Water Global Analysis and Assessment of Sanitation and Drinking-Water (GLAAS) questionnaire provides information on whether there are "clearly defined procedures in laws or policies for participation by service users (e.g. households) and communities in planning programs". For countries that have data available from the local administrative unit level, they are asked to provide data on the

number of local administrative units for which policies and procedures for local participation (i) exist, and (ii) are operational, as well as (iii) the number of local administrative units assessed, and (iv) the total number of units in the country. The indicator is computed as (ii) the number of local admin units with operation policies and procedures for local participation divided by (iv) the total number of local administrative units in the country.

Both numerator and denominator will be obtained through the GLAAS survey for the 2016-2017 cycle.

Treatment of missing values:

- At country level

  Due to the highly country- and context-specific nature of the indicator, no estimates are produced for countries that are missing data.

- At regional and global levels

  Operational mechanism by which individuals and communities can meaningfully contribute to water and sanitation management then the country will be excluded from the regional and global estimates for this indicator.

  Global and regional estimates for a related indicator on the presence and use of participation policies and procedures at the national level for different water subsectors are also derived to support the target indicator. Similarly, countries with missing values are excluded from global and regional analysis for this indicator.

Regional aggregates:

For global and regional aggregates, the percentage of local administrative units that have a defined and operational mechanism by which individuals and communities can meaningfully contribute to decisions and directions about water and sanitation management will be averaged among countries, with each country's percent value weighted based on total country population for the data year, as a proportion of the global population.

Sources of discrepancies:

This indicator will be generated by countries, thus no differences in global and national figures are expected.

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

National governments participating in GLAAS fill out the country survey, preferably supported by a multi-stakeholder review. Although one ministry leads the process, it is often the case that many different ministries and departments must be involved in the process in order to obtain the data required to complete the questionnaire. A GLAAS national focal person supports the lead ministry to coordinate data collection, to compile the national response to the questionnaire, and to lead on the process of data validation. GLAAS survey documents for the current cycle can be found at the following link: http://www.who.int/water_sanitation_health/monitoring/investments/glaas-2017-survey/en/

The UN-Water Global Analysis and Assessment of Sanitation and Drinking-Water (GLAAS) provides information on governance, monitoring, human resources, and financing in the water, sanitation, and hygiene (WASH) sector. The UN-Water GLAAS survey is currently conducted on a biennial basis, led by WHO and has completed three full cycles (2009/2010, 2011/2012, and 2013/2014), as well as a pilot conducted in 2008. GLAAS survey documents for the current cycle of data collection (2016/2017) can be found at the following link: http://www.who.int/water_sanitation_health/monitoring/investments/glaas-2017-survey/en/

Quality assurance:

Once received, the country submission undergoes a thorough data validation process, which is often an iterative process requiring communication and feedback with regional and country counterparts. Quality of the submission is also assessed through an analysis of data collected on country processes (number of ministries involved, whether a national meeting was held to support the filling of the questionnaire, stakeholder validation, use of documentation, etc.) as well as supporting documentation provided. In addition, an external validation with key informants is conducted, in which WASH experts who have not participated in the GLAAS process respond to selected questions from the survey for a specific country within their area of expertise, and agreement with country responses is evaluated.

Data submitted through GLAAS are endorsed by the national government prior to submission. A form (http://www.who.int/entity/water_sanitation_health/monitoring/investments/glaas-consent-form-2016.doc?ua=1) providing consent to WHO for the release and publication of the country data is signed and submitted along with the filled survey.

Data Sources

Description:

The UN-Water Global Analysis and Assessment of Sanitation and Drinking-Water (GLAAS) provides information on governance, monitoring, human resources, and financing in the water, sanitation, and hygiene (WASH) sector. The UN-Water GLAAS survey is currently conducted on a biennial basis, led by WHO, and collected data from 94 countries (predominantly low and lower-middle income countries) in the most recent cycle in 2013-2014. The scope of the question on community and user participation has been expanded beyond WASH for the 2016-17 GLAAS cycle to address all targets in SDG 6, including water quality, water rights/allocation, water resource management, and the status of water-related ecosystems. GLAAS has completed three full cycles (2009-2010, 2011-2012, and 2013-2014), as well as a pilot conducted in 2008.

National governments participating in the GLAAS survey fill out the questionnaire, preferably supported by a multi-stakeholder review. Although one ministry leads the process, it is often the case that many different ministries and departments must be involved in the process in order to obtain the data required to complete the questionnaire. A GLAAS national focal person supports the lead ministry to coordinate data collection, to compile the national response to the questionnaire, and to lead on the process of data validation.

The data will be complemented by Integrated Water Resources Management (IWRM) reporting in SDG target 6.5 (for wastewater and water quality, water efficiency, water resource management, and the status of water-related ecosystems) (UNEP 2016). A key component of IWRM is community participation and management of water resources at the local level. The analysis of IWRM has been done in the past

by UN-Water in 2008 (led by UN-DESA) and in 2012 (led by UNEP, UNDP, GWP and SIWI) as requested by the UN Commission for Sustainable Development (UN-Water 2008, 2012).

The OECD Water Governance Initiative (WGI), a technical platform gathering 100+ members from the public, private and non-for-profit sectors, is currently developing a set of Water Governance Indicators, within the implementation strategy of the OECD Principles on Water Governance (OECD 2015a). The Water Governance Indicators are expected to be able to provide additional information on local participation on the basis of an indicators system proposed in OECD (2015b) for measuring "stakeholder engagement for inclusive water governance". An indicator providing metrics on local participation will be developed and tested by 2017. Data will be made available through interactive platforms and databases in a format to foster policy dialogue and peer learning by 2018. A dedicated publication on "Water Governance at a Glance" will be launched at the 8th World Water Forum in Brasilia (2018).

Collection process:

National governments participating in the GLAAS survey fill out the questionnaire, preferably supported by a multi-stakeholder review. Although one ministry leads the process (e.g. Ministry of Water, Ministry of Environment, etc. depending on country), it is often the case that many different ministries and departments must be involved in the process in order to obtain the data required to complete the questionnaire. A GLAAS national focal person supports the lead ministry to coordinate data collection, to compile the national response to the questionnaire, and to lead on the process of data validation. For each GLAAS submission, information on the country processes are collected (number of ministries involved, whether a national meeting was held to support the filling of the questionnaire, stakeholder validation, use of documentation, etc.) Once received, the country submission undergoes a thorough data validation process, which is often an iterative process requiring communication and feedback with regional and country counterparts.

Countries are also requested to provide consent to publish individual, validated data responses as supplied to GLAAS. Thus through the data collection, validation and consultation processes, the results are expected to be comparable and no further adjustments are foreseen.

Data Availability

Description:

Asia and Pacific: Most countries (at least 50% of the countries covering 60% of the population from the region)
Africa: Some countries (approximately 50% of the countries covering 50% of the population from the region)
Latin America and the Caribbean: Most countries (at least 60% of the countries covering 80% of the population from the region)
Europe, North America, Australia, New Zealand and Japan: Most countries (at least 60% of the countries covering 60% of the population from the region)

Please note that these reflect data on presence of policies and procedures for local participation at the national level. Data at the local administrative unit level is being collected through the current cycle of

GLAAS and through administrative data that will be progressively included in the calculation of the indicator (cf. 7.1, 10.1, and 10.2).

Time series:

Time series of parameters under the indicator are available for 2008, 2010, 2012, and 2014.

Calendar

Data collection:

The current round of UN-Water Global Analysis and Assessment of Sanitation and Drinking-Water (GLAAS) has been launched and data will be available by end-2016. (From NA to NA)

Data release:

Q1 2017

Data providers

Description:

Ministries with responsibilities related to water supply and sanitation, agriculture, water resources development and management, and environment

Data compilers

Name:

WHO, OECD and UNEP

Description:

WHO, with support from OECD and UNEP

References

URL:

http://www.who.int/water_sanitation_health/glaas/en/
http://www.unep.org/
http://www.oecd.org/env/watergovernanceprogramme.htm

References:

UN-Water Global Analysis and Assessment of Sanitation and Drinking-Water. http://www.who.int/water_sanitation_health/glaas/en/

OECD (2015a), OECD Principles on Water Governance, available at: https://www.oecd.org/gov/regional-policy/OECD-Principles-on-Water-Governance-brochure.pdf

OECD (2015b), Stakeholder Engagement for Inclusive Water Governance, OECD Studies on Water, OECD Publishing, Paris., http://dx.doi.org/10.1787/9789264231122-en

UN-Water 2008 : Status Report on IWRM for CSD-16, http://www.unwater.org/publications/publications-detail/en/c/206480/UNEP-DHI

UN-Water 2012: Status Reports on IWRM. http://www.unwater.org/publications/status-report-on-integrated-water-resources-management/en/

Data from the 2012 Survey on the Application of Integrated Approaches to Water Resources Management. http://www.unepdhi.org/rioplus20

UNEP 2016. Degree of implementation of integrated water resources management. Draft survey to support SDG indicator 6.5.1 http://www.unepdhi.org/whatwedo/gemi

OECD 2015. Stakeholder Engagement for Inclusive Water Governance. http://www.oecd-ilibrary.org/governance/stakeholder-engagement-for-inclusive-water-governance_9789264231122-en

Related indicators

6.5:
Number of deaths, missing persons and persons affected by disaster per 100,000 people [a]

15.9:
Number of deaths, missing persons and persons affected by disaster per 100,000 people [a]

Comments:

6.5 (implement integrated water resources management at all levels, including transboundary cooperation as appropriate) 15.9 (integrate ecosystem and biodiversity values into national and local planning, development processes, poverty reduction strategies and accounts)

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

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 and available when needed and free of faecal (and priority chemical) contamination. 'Improved' source defined the same as used for MDG monitoring i.e. piped water into dwelling, yard or plot; public taps or standpipes; boreholes or tubewells; protected dug wells; protected springs 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 and rainwater. Packaged drinking water is considered improved if households use an improved water source for other domestic purposes

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 exist to make global and regional estimates of safely managed drinking water services from 2017.

Methodology

Computation Method:

Method of computation: 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 and Sanitation (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 accompanying Methodological Note 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 proposed indicator.
http://www.wssinfo.org/fileadmin/user_upload/resources/Methodological-note-on-monitoring-SDG-targets-for-WASH-and-wastewater_WHO-UNICEF_8October2015_Final.pdf.

Disaggregation:

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 doesn't publish estimates for countries for which national data are not available. Regional and global estimates are made as long as data are available for 50% of the population with the region, weighting by the latest UN Population Division population estimates.

Regional aggregates:
For more details on JMP rules and methods, please consult the website: www.wssinfo.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 1,600 surveys, and for over 140 countries at least five data points are available which include information about basic water and sanitation for the period 1990-2015. In high-income countries where household surveys or censuses do not usually collect information on basic access, estimates are drawn from administrative records.

Data on availability and faecal and chemical quality of drinking water, and regulation by appropriate authorities will be collected by JMP through consultation with the government departments responsible for drinking water supply and regulation. 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 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 reconciliations. JMP has been engaged with more than fifty countries over the last 10 years in explaining JMP estimates, and reasons for discrepancies if any. JMP has also developed an online tool to facilitate future data validation and expanded its online capabilities so that these reconciliations could be done in much more interactive and real time manner, reducing cost of reconciliations missions.

Data Availability

Description:

From 2010 to present:
Asia and Pacific: Most countries (at least 80% of the countries covering 90% of the population from the region)
Africa: Many countries (at least 60% of the countries covering 80% of the population from the region)
Latin America and the Caribbean: Most countries (at least 80% of the countries covering 90% of the population from the region)
Europe, North America, Australia, New Zealand and Japan: Most countries (at least 90% of the countries covering over 90% of the population from the region)
Note: Data from 2000 to 2010 are available for roughly 50% of countries, covering at least 50% of the population in all regions.

Preliminary estimates are available for 140 countries:
http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2016/02/11/090224b084172a75/1_0/Original/The0costs0of0m0iene000data0catalog.xlsx

Time series:

Time series data are available for the basic drinking water level of service over the period 1990-2015. 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 1990 to 2015)

Calendar

Data collection:

The current biennial data collection cycle began in early 2016 and will run through the beginning of 2017.

Data release:

The baseline SDG report is due mid-2017 to feed into the SG's report to be released in July 2017. (The baseline SDG report is due mid-2017 to feed into the SG's report to be released in July 2017.)

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 and Sanitation

References

URL:
www.wssinfo.org

References:

JMP website: www.wssinfo.org.

JMP Methodological Note:
http://www.wssinfo.org/fileadmin/user_upload/resources/Methodological-note-on-monitoring-SDG-targets-for-WASH-and-wastewater_WHO-UNICEF_8October2015_Final.pdf.

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

Preliminary estimates for 140 countries on the use of safely managed drinking water services were published in a recent report produced in collaboration between the World Bank and the JMP. The report and data sources are available here: http://www.worldbank.org/en/topic/water/publication/the-costs-of-meeting-the-2030-sustainable-development-goal-targets-on-drinking-water-sanitation-and-hygiene

Related indicators

6:
(a) Proportion of total agricultural population with ownership or secure rights over agricultural land, by sex; and (b) share of women among owners or rights-bearers of agricultural land, by type of tenure

1.2:
(a) Proportion of total agricultural population with ownership or secure rights over agricultural land, by sex; and (b) share of women among owners or rights-bearers of agricultural land, by type of tenure

1.4:
(a) Proportion of total agricultural population with ownership or secure rights over agricultural land, by sex; and (b) share of women among owners or rights-bearers of agricultural land, by type of tenure

2.2:
(a) Proportion of total agricultural population with ownership or secure rights over agricultural land, by sex; and (b) share of women among owners or rights-bearers of agricultural land, by type of tenure

3.2:
(a) Proportion of total agricultural population with ownership or secure rights over agricultural land, by sex; and (b) share of women among owners or rights-bearers of agricultural land, by type of tenure

3.8:
(a) Proportion of total agricultural population with ownership or secure rights over agricultural land, by sex; and (b) share of women among owners or rights-bearers of agricultural land, by type of tenure

3.9:
(a) Proportion of total agricultural population with ownership or secure rights over agricultural land, by sex; and (b) share of women among owners or rights-bearers of agricultural land, by type of tenure

4a:
(a) Proportion of total agricultural population with ownership or secure rights over agricultural land, by sex; and (b) share of women among owners or rights-bearers of agricultural land, by type of tenure

5.4:
(a) Proportion of total agricultural population with ownership or secure rights over agricultural land, by sex; and (b) share of women among owners or rights-bearers of agricultural land, by type of tenure

11.1:
(a) Proportion of total agricultural population with ownership or secure rights over agricultural land, by sex; and (b) share of women among owners or rights-bearers of agricultural land, by type of tenure

Comments:

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

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

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 an improved basic sanitation facility at the household level which is not shared with other households and where excreta is safely disposed in situ or treated off-site. 'Improved' source defined the same as used for MDG monitoring i.e. 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 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 transport of wastes to designated treatment sites. 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 plant. 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 be assessed through consideration of both the overall treatment effectiveness and end-use/disposal arrangements.

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 immediately. However, sufficient data exist to make global and regional estimates of safely managed sanitation services from 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.

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 access to 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 Methodological Note describes in more detail how estimates of the proportion of household wastewater that is safely disposed of in situ or treated off-site will be combined with data on use of different types of sanitation facilities, as recorded in the current JMP database.

http://www.wssinfo.org/fileadmin/user_upload/resources/Methodological-note-on-monitoring-SDG-targets-for-WASH-and-wastewater_WHO-UNICEF_8October2015_Final.pdf

Disaggregation:

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. 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 doesn't publish estimates for countries for which national data are not available. Regional and global estimates are made as long as data are available for 50% of the population with the region, weighting by the latest UNPD population estimates.

Regional aggregates:

For more details on JMP rules and methods, please consult the website: www.wssinfo.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 1,600 surveys, and for over 140 countries at least five data points are available which include information about basic water and sanitation for the period 1990-2015. In high-income countries where household surveys or censuses do not usually collect information on basic access, estimates 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 50 DHS and MICS surveys have included the module. JMP published handwashing data from 12 countries in its 2014 update report, and for 54 countries in the 2015 report.

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 reconciliations. JMP has been engaged with more than fifty countries over the last 10 years in explaining JMP estimates, and reasons for discrepancies if any. JMP has also developed an online tool to facilitate future data validation and expanded its online capabilities so that these reconciliations could be done in much more interactive and real time manner, reducing cost of reconciliations missions.

Data Availability

Description:

From 2010 to present:
Asia and Pacific: Most countries (at least 80% of the countries covering 90% of the population from the region)
Africa: Many countries (at least 60% of the countries covering 80% of the population from the region)
Latin America and the Caribbean: Most countries (at least 80% of the countries covering 90% of the population from the region)
Europe, North America, Australia, New Zealand and Japan: Most countries (at least 90% of the countries covering over 90% of the population from the region)

Note: Data from 2000 to 2010 are available for roughly 50% of countries, covering at least 50% of the population in all regions.

Preliminary estimates are available for 140 countries: http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2016/02/11/090224b084172a75/1_0/Original/The0costs0of0m0iene000data0catalog.xlsx

Time series:

Time series data are available for the basic sanitation level of service over the period 1990-2015. 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 1990 to 2015)

Calendar

Data collection:

The current biennial data collection cycle began in early 2016 and will run through the beginning of 2017.

Data release:

The baseline SDG report is due mid-2017 to feed into the SG's report to be released in July 2017.

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 and Sanitation

References

URL:

www.wssinfo.org

References:

Progress on sanitation and drinking water 2015 update and MDG assessment. New York: UNICEF/WHO, 2015. http://www.wssinfo.org/fileadmin/user_upload/resources/JMP-Update-report-2015_English.pdf

JMP website: www.wssinfo.org.

JMP Methodological Note:

http://www.wssinfo.org/fileadmin/user_upload/resources/Methodological-note-on-monitoring-SDG-targets-for-WASH-and-wastewater_WHO-UNICEF_8October2015_Final.pdf.

JMP Task Force on Methods Final Report. New York: WHO/UNICEF, December 2014. http://www.wssinfo.org/task-forces/

Guidelines for drinking water quality, fourth edition. Geneva: WHO; 2011.

http://www.who.int/water_sanitation_health/publications/2011/dwq_guidelines/en/

Preliminary estimates for 140 countries on the use of safely managed drinking water services were published in a recent report produced in collaboration between the World Bank and the JMP. The report and data sources are available here: http://www.worldbank.org/en/topic/water/publication/the-costs-of-meeting-the-2030-sustainable-development-goal-targets-on-drinking-water-sanitation-and-hygiene

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

Goal 6: Ensure availability and sustainable management of water and sanitation for all
Target 6.3: By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally
Indicator 6.3.1: Proportion of wastewater safely treated

Institutional information

Organization(s):
World Health Organization (WHO)
United Nations Human Settlements Programme (UN-HABITAT)

Concepts and definitions

Definition:
Proportion of wastewater generated by households and by economic activities which is safely treated based on treatment ladders as defined by the SEEA: (http://unstats.un.org/unsd/envaccounting/water.asp, and International Recommendations for Water Statistics and IRWS: http://unstats.un.org/unsd/envaccounting/irws/irwswebversion.pdf) compared to total wastewater generated by households and economic activities.

This indicator covers households and the entire economy, and builds on the monitoring framework of JMP, UNSD/UNEP Water Questionnaire for non OECD/Eurostat countries, OECD/Eurostat Questionnaire for OECD countries, AQUASAT, IBNET. Statistical methods for measurement of wastewater treatment is aligned with the SEEA21 statistical standard and associated definitions, classifications and treatment categories (Encompasses all wastewater generated and treated by the economy. Treatment Categories will be consistent, as much as possible within the context of global monitoring purposes, with those defined in the SEEA (http://unstats.un.org/unsd/envaccounting/water.asp), and International Recommendations for Water Statistics (IRWS: http://unstats.un.org/unsd/envaccounting/irws/irwswebversion.pdf)

In addition, combining UNIDO industries database (http://stat.unido.org/) ISIC standard Classification system (http://unstats.un.org/unsd/publication/seriesM/seriesm_4rev4e.pdf), will allow for data to be disaggregated for industrial/commercial wastewater into various economic activities, as well as differentiate hazardous industries from the rest. USEPA has harmonized hazardous waste classification with EU regulations compliment ISIC codes for all waste classes. (www.epa.ie/pubs/reports/waste/stats/wasteclassification/EPA_Waste_Classification_2015_Web.pdf)

The household portion of wastewater is the same indicator as 6.2.1, and the monitoring of that will be interlinked to JMP monitoring for 6.2.1. Over the last 25 years the JMP has established global norms and standards for monitoring drinking water, sanitation and hygiene. The proposed 6.2.1. indicator builds on

these and was developed following extensive consultations with sector experts. Major international consultations took place in 2011 and 2012, as well as many regional and country consultations in various parts of the world.

Existing global norms and standards and technical recommendations for SDG monitoring are documented here: http://www.wssinfo.org/fileadmin/user_upload/resources/Methodological-note-on-monitoring-SDG-targets-for-WASH-and-wastewater_WHO-UNICEF_8October2015_Final.pdf.

Rationale:
Purpose and rationale for this indicator can also be found in the methods document: http://www.wssinfo.org/post-2015-monitoring/ and summarised in the following methodological note (p12): http://www.wssinfo.org/fileadmin/user_upload/resources/Methodological-note-on-monitoring-SDG-targets-for-WASH-and-wastewater_WHO-UNICEF_8October2015_Final.pdf

Concepts:
See above. Global norms and standards and technical recommendations for SDG monitoring are documented here: http://www.wssinfo.org/fileadmin/user_upload/resources/Methodological-note-on-monitoring-SDG-targets-for-WASH-and-wastewater_WHO-UNICEF_8October2015_Final.pdf.

System of Environmental and Economic Accounting for Water, adopted by Statistical Commission in 2014. This accounting structure means that these activities cover the whole economy and are considered for each industry, which are defined according to the International Standard Industrial Classification of all Economic Activities (ISIC), and covering 1) abstraction and distribution of water, 2) discharge, reuse and treatment of wastewater, and 3) consumption and returns of water back to the environment, in this accounting structure, disaggregated by industry in a standardised way. Economic activities by ISIC broadly covers agriculture, hazardous industries and other economic activities

Comments and limitations:
The main issue regarding safely managed drinking water services will be comparability of data on the definition of what is considered safe treatment. Although there are international guidelines and standards, their compliance by countries is not internationally binding. Countries can set their own standards which can vary from international norms and standards. For this reason, country data may not follow the international standard that JMP likes to follow for its global monitoring purposes.

Having said the above, using MDG experiences of data reconciliation, and working collaboratively with JMP on this will help reconciling definitional discrepancies and hence variations in estimates. This vast experience in dealing with such issues will be very useful in dealing with the above issues for the SDG period.

Methodology

Computation Method:
The calculation of the indicator value as derived from the framework is the amount treated (off-site and on-site) divided by the total amount of waste produced. Data on treatment of domestic wastewater will come from the multi- purpose indicator 6.2.1. Data on volumes of industrial wastewater can be estimated from inventories of industries, which will be available in the majority of Member States disaggregated by ISIC classifications. The breakdown of treated wastewater can be calculated based on compliance records, related to national standards. Unless verified otherwise, through audited compliance records, the waste generated will be considered untreated.

Disaggregation:
Since this indicator is disaggregated for households and non-households (industrial and commercial establishments, as per the classification of ISIC Rev4); more can be found on the methods note: http://www.wssinfo.org/fileadmin/user_upload/resources/Methodological-note-on-monitoring-SDG-targets-for-WASH-and-wastewater_WHO-UNICEF_8October2015_Final.pdf.

Treatment of missing values:

- At country level
  The calculation of the indicator value as derived from the framework is the amount treated (off-site and on-site) divided by the total amount of waste produced. Data on treatment of domestic wastewater will come from the multi- purpose indicator 6.2.1. Data on volumes of industrial wastewater can be estimated from inventories of industries, which will be available in the majority of Member States disaggregated by ISIC classifications. The breakdown of treated wastewater can be calculated based on compliance records, related to national standards. Unless verified otherwise, through audited compliance records, the waste generated will be considered untreated.
- At regional and global levels
  No data is published for countries for which we couldn't find country data

Regional aggregates:
See methods note mentioned above and 11.2 above.

Sources of discrepancies:
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 reconciliations.

Data Sources

Description:

Preliminary estimates are available for 140 countries for 6.2.1, which is the same as the household part of this indicator: http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2016/02/11/090224b084172a75/1_0/Original/The0costs0of0m0iene000data0catalog.xlsx.

Since the publication of this, joint searches with JMP found national data available for most countries of the world. However extensive data from various sources could be combined from i) UNSD-UNEP questionnaire: http://unstats.un.org/unsd/environment/questionnaire.htm; ii) OECD: https://data.oecd.org/water/waste-water-treatment.htm. Iii) AQUASTAT: http://www.fao.org/nr/water/aquastat/data/query/index.html?lang=en, iv) IBNET: https://www.ib-net.org/. v) GWI: https://www.globalwaterintel.com/.

Collection process:
As mentioned earlier, data is collected directly from country sources, and following established method, estimates are shred with countries to receive their feedback before publication. See 6.1 above for more details.

Data Availability

Description:
1. Although classified ahead of the 3rd IAEG meeting as Tier III indicator showing needing methodological developments, as we showed at that meeting that this indicator should be classified as a tier I indicator as it has established methodology, following international standards, as well as it has extensive data coverage for most countries for it to be a solid SDG indicator. We also have had since 3rd IAEG meeting extensive discussions with several countries about this indicator, including IAEG member countries.

2. Most countries of the world, including the MDG regions, covering 90% of the global population (2010 onwards), as well as 50% of the countries of the world, covering at least 50% of the global population, including all MDG regions, for 2000-2009 period.

3. Preliminary estimates are available for 140 countries for 6.2.1, which is the same as the household part of this indicator: http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2016/02/11/090224b084172a75/1_0/Original/The0costs0of0m0iene000data0catalog.xlsx. Since the publication of the report above, WHO and UNHABITAT have been collecting data directly from country sources, and have now data on treatment of wastewater from majority of countries of the world, many of which also provide time series data.

4. Following further testing, a revised SDG baseline estimate will be available soon, along with estimates for other parts of this wastewater indicator, i.e. industrial and commercial parts broken down by economic activities following SEEA definitions and standards.

5. For links to a few data sources mentioned in Q11 below: i) UNSD-UNEP questionnaire: http://unstats.un.org/unsd/environment/questionnaire.htm; ii) OECD: https://data.oecd.org/water/waste-water-treatment.htm. Iii) AQUASTAT: http://www.fao.org/nr/water/aquastat/data/query/index.html?lang=en, iv) IBNET: https://www.ib-net.org/. v) GWI: https://www.globalwaterintel.com/."

Time series:

WHO and UNHABITT plans to publish its first SDG baseline report with 2015 estimate, and build a time series as we move into the SDG period. (From NA to NA)

Calendar

Data collection:

Started data collection and will run through the beginning of 2017. (From NA to NA)

Data release:

The baseline SDG report is due mid-2017 to feed into the SG's report to be released in July 2017. (The baseline SDG report is due mid-2017 to feed into the SG's report to be released in July 2017.)

Data providers

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

Data compilers

WHO and UNHABITAT

References

URL:

www.wssinfo.org (website to be enhanced to accommodate wastewater data, as JMP sanitation indicator also to address wastewater part)

References:

1. The latest data from 140 countries on the use of safely managed sanitation services, which is the same as domestic part of wastewater indicator, published in the report that was produced in collaboration between the World Bank and the JMP. The report and data sources could be found at this link: http://www.worldbank.org/en/topic/water/publication/the-costs-of-meeting-the-2030-sustainable-development-goal-targets-on-drinking-water-sanitation-and-hygiene

2. Additionally, as explained in the methods note (see link above), other data from international databases like UNSD-UNEP, OECD, EUROSTAT, AQUASTAT (FAO), IBNET (World Bank), Global Water Intelligence, as well as data from national regulators, and other parts of national statistical systems from around the world will be integrated for monitoring 6.3.1. Combining the various data sources, it is believed that data from over 180 countries could be used for global reporting purposes.

3. This indicator is classified as a Tier I indicator, as it is conceptually clear, has an established methodology as well as standards, and data are regularly produced by almost all countries that can be used for global reporting."

Related indicators

6.2:
(a) Proportion of total agricultural population with ownership or secure rights over agricultural land, by sex; and (b) share of women among owners or rights-bearers of agricultural land, by type of tenure

Comments:
Target 6.2

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
Indicator 6.4.1: Change in water-use efficiency over time

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 (km^3/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) (km^3/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 (km^3/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 (km^3/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 (km^3/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 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.

[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.

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.

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

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 stress indicator 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 channelled 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]

Goal 6: Ensure availability and sustainable management of water and sanitation for all
Target 6.5: By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate
Indicator 6.5.1: Degree of integrated water resources management implementation (0-100)

Institutional information

Organization(s):

United Nations Environment Programme (UNEP)

Concepts and definitions

Definition:

The indicator degree of implementation of Integrated Water Resources Management (IWRM), measured in per cent (%) from 0 (implementation not yet started) to 100 (fully implemented) is currently being measured in terms of different stages of development and implementation of Integrated Water Resources Management (IWRM).

The definition of IWRM is based on an internationally agreed definition, and is universally applicable. IWRM was officially established in 1992 and is defined as “a process which promotes the coordinated development and management of water, land and related resources in order to maximise economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems.” (GWP 2010).

The method builds on official UN IWRM status reporting, from 2008 and 2012, of the Johannesburg Plan of Implementation from the UN World Summit for Sustainable Development (1992).

Rationale:

The indicator provides a direct progress measurement of the first part of Target 6.5 “…implement integrated water resources management at all levels …”. The percentage score provides an easy and understandable way of measuring progress towards the target, with ‘0’ interpreted as no implementation of IWRM, and ‘100’ interpreted as IWRM being fully implemented.

To further aid interpretation and comparison, the indicator results can be categorized in a similar way to the survey questions: Degree of implementation =

- Very low (0-9.9)
- Low (10-29.9)
- Medium-low (30-49.9)
- Medium-high (50-69.9)
- High (70-89.9)
- Very high (90-100)

The concept of the survey is that it provides sufficient information to be of real value to the countries in determining their progress towards the target, and through this, various aspects of IWRM. A balance has been sought between providing sufficient information to cover the core principles of IWRM, and thus providing a robust indicator value, and not overburdening countries with unnecessary reporting requirements.

Countries are encouraged to provide additional information on each question, which may help to qualify their choice of score, and/or put that score into their national context.

Indicator 6.5.1 is supported by indicator 6.5.2 "Proportion of transboundary basin area with an operational arrangement for water cooperation", which directly addresses the portion of Target 6.5 "…, including through transboundary cooperation as appropriate.".

Concepts:

The concept of IWRM is measured in 4 main components:

1. Enabling environment: this includes the policies, laws, plans and strategies which create the 'enabling environment' for IWRM.
2. Institutions: includes the range and roles of political, social, economic and administrative institutions that help to support the implementation of IWRM.
3. Management Instruments: The tools and activities that enable decision-makers and users to make rational and informed choices between alternative actions.
4. Financing: Budgeting and financing made available and used for water resources development and management from various sources.

The indicator is based on a national survey structured around these four main components (UNEP 2016). Each component is split into two parts: questions concerning the 'National level' and 'Other levels' respectively. 'Other levels' includes sub-national (including provinces/states for federated countries), basin level, and the transboundary level as appropriate. These two parts address the wording of Target 6.5 'implement [IWRM] at all levels …'.

Comments and limitations:

The challenge of subjectivity in responses associated with this type of survey is being addressed in a number of ways:

a. Draft responses are reviewed by a number of governmental and non-governmental stakeholders in an open, inclusive and transparent process.
b. Countries are encouraged to provide further information to qualify their responses and/or set them in the national context.
c. Guidelines are provided for each of the four main components, each question, and each of the six thresholds for every single question, to ensure responses are as objective as possible, and are comparable both between countries, and between reporting periods.

To achieve robust indicator results requires a country process involving a wide range of stakeholders which will require a certain amount of time and resources. The advantage of this is that it puts in place a process that addresses the integrated and indivisible nature of the SDG targets, as well as stressing the importance of “leaving no on behind”.

Methodology

Computation Method:

1. The survey contains 32 questions divided into the four main components described above.
2. Each question is given a score between 0 and 100, in increments of 10, based on the following 6 main categories:
   - Very low (0)
   - Low (20)
   - Medium-low (40)
   - Medium-high (60)
   - High (80)
   - Very high (100)

   Note that guidance is provided for each threshold for each question, to ensure objective and comparable results.

3. The un-weighted average of the question scores within each of the four components is calculated to give a score of 0 – 100 for each component.
4. The component scores are averaged (un-weighted) to give the indicator score, expressed as a percentage between 0 and 100.

Disaggregation:

The strength of the indicator lies in the potential for disaggregating the country score into the four main components of IWRM, and further to the questions in the survey. This provides countries with a quick assessment of which aspects of IWRM are progressing well, and which aspects require increased efforts to obtain the target.

The nature of the target, indicator and survey does not lend itself to disaggregation by sex, age group, income etc. However, social equality is an integral part of IWRM, and there are questions which directly address issues such as gender, vulnerable groups, geographic coverage and broad stakeholder participation in water resources development and management. These questions provide an indication of the national and sub-national situation regarding social equality.

Treatment of missing values:

- At country level

  The indicator and survey have been designed for all countries to be able to submit an indicator value. A number of countries that did not submit a survey during the last round of data collection included fragile states / countries in conflict, or small island developing states. It is therefore estimated that the number of country responses under the SDG process will be in excess of 90%. Estimates for countries not responding to the survey will therefore not be made.

- At regional and global levels

  It is estimated that the number of country responses will be in excess of 90%. This coverage of data will be deemed to be representative of global aggregates. Estimates for countries not responding to the survey will therefore not be made.

Regional aggregates:

Following the Agenda 2030 principle of "leaving no one behind", regional and global values will be based on simple, un-weighted averages of country scores. The country scores will be presented as a percentage, and regional and global averages will also be presented as a percentage. Global averages will be based on country values, not regional averages.

Regional values may be assembled by regional bodies responsible for water resources in the region, such as the African Ministerial Council on Water (AMCOW), and the European Environment Agency (EEA).

Sources of discrepancies:

As described in section 11, there will be no internationally estimated data, with all data to be produced by countries.

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

1. National focal points selected by each country.
2. Data collection is via a simple questionnaire with 32 questions. Responses can be submitted either online via SurveyMonkey or emailed using a MS Word format. Responses to each question are to be given on a scale of 0 – 100, in increments of 10. Threshold descriptions are given for six thresholds between 0 and 100.
3. National focal points are responsible for coordinating a national process to engage governmental and non-governmental stakeholders, as appropriate in the context of each country, to develop draft responses and finalise responses. This may be via email, workshops, and online notices. The following materials are available for national focal points in 5 languages (English, Spanish, French, Arabic, Russian, Chines), at http://iwrmdataportal.unepdhi.org/iwrmmonitoring.html: a detailed step-by-step guide; the questionnaire in MS Word and electronic formats; and webinar presentations and videos.

Extensive explanations are provided in the step-by-step guide, the webinars, and in the questionnaire itself. The questionnaire contains: an overall introduction and explanation; a glossary; an introduction and glossary in each of the four sections; threshold descriptions for six thresholds for each question; and

a number of footnotes to explain aspects of questions or threshold descriptions. All materials can be downloaded from http://iwrmdataportal.unepdhi.org/iwrmmonitoring.html. In addition, a dedicated helpdesk is available to provide assistance at all times. The helpdesk is accessible via email <Iwrm.Sdg6survey@unep.org>.

Quality assurance:

The following quality assurance guidelines are available to all individuals involved in quality assurance for 6.5.1. Process:

1. Nominate person responsible for QA for a country response once it is submitted for the first time.
2. Acknowledge receipt and inform the country of QA process.
3. Update spreadsheet 'Country_scores_QC.xlsx', indicating date of receipt and who submitted.
4. Upload Word versions, or Suvery Monkey versions as PDF, to the dropbox folder 6.5.1.IWRM 2017 Country Survey> 6.5.1 Country Questionnaire Submissions.
5. Undertake ALL checks described below.
6. If there are any discrepancies, revert to UNEP-DHI colleagues.
7. Once action is agreed, respond to the countries.
8. Complete all checks on each subsequent version of the questionnaire until all quality issues are resolved and questionnaire is marked 'final'.

Checks:

1. Focal point: Confirm the person submitting is the formal national focal point. If not, any reply should also add the national focal point in CC.
2. Question responses:
    a. All questions answered. Official guidance is that all questions should be answered (either with a score or n/a).
    b. Scores in range from 0-100, in increments of 10.
    c. Check that n/a (not applicable) is used appropriately.
3. Justification/evidence fields:
    a. Check that the free text make sense in the context of the score (and vice versa).
    b. If n/a is used appropriately, or if a score of 100 is given, check that a justification is provided, as per instructions in the questionnaire
4. Calculations: Check that section averages are correct and that final average is correct, using the spreadsheet 'Country_scores_QC.xlsx' on Dropbox. Fill in the given responses in columns M - AX, and the differences are calculated automatically in columns C – G. If the difference is greater than +/- 0.5, the cells are automatically highlighted in red using conditional formatting.
5. Compare with 2011: Compare with 2011 and discuss with colleagues if necessary. Use file '2011_IWRM_Data_for_SDG_comparison.xlsx', on Dropbox, which has rescaled the 2011 results to 0-100, and selected the individual questions, or groups of questions, which are comparable to the 2017 SDG version, as described in the file SDG_6.5.1_vs_2011-IWRM_questions.pdf, on Dropbox.
6. Transboundary issues:
    a. Check the 'transboundary basins' table in the introductory section. A full list of transboundary basins can be found here: http://twap-rivers.org/indicators/Report.ashx?type=IndicatorResultsSummary. Go to the final worksheet/tab to see the countries in each basin. Also check the maps here: http://twap-rivers.org/indicators/ to see if the basin is likely to be important for that country, or if there is only a small portion of the basin in their country (in which case they may not list it).
    b. Check the transboundary questions: 2.2d; 2.2e; 3.2d; and 4.2c, and see if these make sense in the context of the country. Island countries should give 'n/a' for all of these questions.

All data is provided by each country and is therefore fully owned by the countries. Each country undertakes stakeholder consultation, to a level that is appropriate given resources and capacity available to them, to ensure that the data has adequate acceptance and ownership within the country. Guidance on consultation processes are provided in the step-by-step guide and through the inception webinar (all materials available at http://iwrmdataportal.unepdhi.org/iwrmmonitoring.html).

Data Sources

Description:

Monitoring progress on meeting SDG 6.5 is owned by and is the responsibility of the national government. The government will assign a ministry with the primary responsibility for overseeing this survey, which will be asked to take on the responsibility of coordinating the national IWRM monitoring and reporting process. As water issues, and water management issues in particular, cut across a wide number of sectors, often overseen by different ministries and other administrative bodies at national or other levels, the process should be inclusive. Major stakeholders should be involved in order to contribute to well informed and objective answers to the questionnaire.

The ministry may wish to nominate a national "IWRM focal point", who may or may not be a government official. The UN will provide support where needed and possible. The following steps are suggested as guidance only, as it is up to countries to decide which process or processes would best serve their needs. It should also be noted that the following steps represent a 'ladder' approach, in that completing all the steps will generally lead to a more robust indicator. However, it may not be possible or necessary for all countries to complete all steps.

1. The responsible ministry or IWRM focal point contacts other relevant ministries/agencies to compile responses to the questionnaire. Each possible response option has a score which will be used to calculate the overall indicator score.
2. The completed draft questionnaire is reviewed by government stakeholders. These stakeholders could include those involved in water-relevant sectors, such as agriculture, energy, water supply and environment, as well as water management at different administrative levels. This process may be electronic (e.g. via email) and/or through workshops.
3. The revised draft questionnaire is validated at a multi-stakeholder workshop. Apart from government representatives these stakeholders could include water user associations, private sector, interest groups concerned with e.g. environment, agriculture, poverty, and academia. The suggested process is through a workshop but alternative means of consultation e.g. email, online call for public submissions could be considered. Note that steps 2 and 3 could be combined if desired.
4. The responsible ministry or IWRM focal point discusses with relevant officials and consolidates the input into a final version. This version will be the basis for calculating the degree of IWRM implementation (0-100) for global reporting. Countries can enter responses electronically into an online version of the survey, which will automatically calculate the degree of IWRM implementation score, and also generate graphs and automatic reports to help countries identify areas for attention.
5. The responsible ministry submits the final indicator score to the national statistics office responsible for compiling all national SDG target data.

Based on the national survey, UN-Water will periodically prepare synthesis reports for regional and global levels to provide overall progress on meeting SDG target 6.5.

Temporal Coverage: A reporting cycle of three years is recommended.

Collection process:

Official counterparts at the country level and the validation and consultation process.

The survey has been designed so that the indicator is comparable between countries and time periods. No adjustments are foreseen.

Data Availability

Description:

Total number of countries: 133 (69% of UN Member States) (UN-Water 2012)

The following covers the region (MDG regional groupings): followed by the number of countries with data (/total countries in region) (as of 2012); followed by the percentage of countries with data
Oceania: 5/12; 42%
Eastern Asia: 4/4; 100%
Southern Asia: 5/9; 56%
South-Eastern Asia: 9/11; 82%
Western Asia: 5/12; 42%
Caucasus and Central Asia: 5/8; 63%
Latin America & the Caribbean: 22/33; 67%
Developed regions: 38/50; 76%
Sub-Saharan Africa: 35/49; 71%
Northern Africa: 5/5; 100%
World: 133/193; 69%

Time series:

2008, 2012 (UN-Water 2008, 2012, IWRM Data Portal)

Calendar

Data collection:

December 2016 – August 2017 (9 months).

Data release:

1st quarter 2018.

Data providers

The information required to complete the survey is expected to be held by government officials responsible for water resources management in the country, supported by official documentation. E.g. Ministry of Water in coordination with Ministry of Environment, Ministry of Finance, Ministry of Planning, Ministry of Lands and Agriculture, Ministry of Industry and Mining etc. See also section 6 above. As a minimum, a small group of officials may be able to complete the survey. However, these government officials may belong to various government authorities, and coordination will be required to determine and validate the responses to each question. Increased government and non-government stakeholder participation in validating the question scores will lead to a more robust indicator score and facilitate tracking progress over time.

Data compilers

UNEP and UN-Water partners, under GEMI (Integrated Monitoring of Water and Sanitation Related Targets)

References

URL:

http://www.unepdhi.org

References:

- AMCOW 2012: Status Report on Water Resources Management in Africa, http://www.amcow-online.org/index.php?option=com_content&view=article&id=262&Itemid=141&lang=en

- GEMI – Integrated Monitoring of Water and Sanitation-related SDG Targets. http:/

Related indicators

As it measures the degree of implementation of an enabling environment for better water resources management, it directly supports the other outcome targets under SDG 6 (6.1 – 6.6). It does this by providing further information to countries on the context and possible explanation for the progress on other targets, and points to barriers and enablers to obtaining the other targets. It also directly supports the means of implementation targets 6.a and 6.b, as disaggregation is possible to provide data on financing (6.a) and stakeholder participation (6.b). Beyond SDG 6, indicator 6.5.1 has linkages with a number of other targets across the SDGs, as integrated water resources management is concerned with integrating the demands and impacts on water resources and water-related ecosystems from a number of different SDGs and their targets, including: poverty (1.4); agriculture (2.3); education (4.7); gender

(5.5); energy (7.1); work (8.5); equality (10.2); urban areas (11.3); climate change (13.2); ecosystems (15.9); governance (16.3, 16.5 – 16.7) (UN-Water 2016).

Goal 6: Ensure availability and sustainable management of water and sanitation for all
Target 6.5: By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate

Indicator 6.5.2: Proportion of transboundary basin area with an operational arrangement for water cooperation

Institutional information

Organization(s):

International Hydrological Programme of United Nations Educational, Scientific and Cultural Organization (UNESCO-IHP)

United Nations Economic Commission for Europe (UNECE)

Concepts and definitions

Definition:

The proportion of transboundary basin area with an operational arrangement for water cooperation is defined as the proportion of transboundary basins area within a country with an operational arrangement for water cooperation. It is derived by adding up the surface area in a country of those transboundary surface water catchments and transboundary aquifers (i.e. 'transboundary' basins) that are covered by an operational arrangement and dividing the obtained area by the aggregate total area in a country of all transboundary basins (both catchments and aquifers). The result is multiplied by 100 to obtain it expressed as percentage share.

Rationale:

Most of the world's water resources are shared: 592 transboundary aquifers have been identified and transboundary lake and river basins cover nearly one half of the Earth's land surface and account for an estimated 60% of global freshwater. Approximately 40% of the world's population lives in river and lake basins shared by two or more countries and over 90% lives in countries that share basins. Development of water resources has impacts across transboundary basins, potentially on co-riparian countries, and use of surface water or groundwater may affect the other resource, these usually being interlinked. Intensive water use, flow regulation or pollution risks going as far as compromising co-riparian countries' development aspirations and therefore transboundary cooperation is required. However, cooperation is in most cases not advanced.

Specific agreements or other arrangements concluded between co-riparian countries are a key precondition to ensure long-term, sustainable cooperation. International customary water law (as reflected in the Convention on the Law of the Non-navigational Uses of International Watercourses (New York, 1997), the Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Helsinki, 1992), and the draft Articles on The Law of Transboundary Aquifers (2008; UN General Assembly resolutions 63/124, 66/104, and 68/118)), as well as existing experience and good practices, all point to minimum requirements for operational cooperation. These minimum requirements are captured by the four criteria for operationality.

This is the basis for the explicit call for transboundary water cooperation in the wording of target 6.5 and the importance of monitoring this indicator to complement indicator 6.5.1 which measures the advancement of Integrated Water Resources Management (IWRM).

Progress by a particular country towards the cooperation aspect of target 6.5, reflected by the value of indicator 6.5.2, can be achieved either by establishing new operational cooperation arrangements with co-riparian countries, or making existing arrangements operational by developing and regularizing activities, or expanding the coverage of cooperation arrangements with the ultimate objective to cover all surface waters and groundwaters.

Concepts:
"The proposed monitoring has as basis the spatial coverage of transboundary basins shared by each country, and focuses on monitoring whether these are covered by cooperation arrangements that are operational. The criteria needing to be met for the cooperation on a specific basin being considered “operational” seeks to capture whether the arrangement(s) indeed provide an adequate basis for cooperation in water management.

Transboundary basins are basins of transboundary waters, that is, of any surface waters (notably rivers, lakes) or groundwaters which mark, cross or are located on boundaries between by two or more states. For the purpose of the calculation of this indicator, for surface waters, the basin is the extent of the catchment area; for groundwater, the area considered is the extent of the aquifer.

Arrangement for water cooperation: a bilateral or multilateral treaty, convention, agreement or other formal arrangement, such as memorandum of understanding) between riparian countries that provides a framework for cooperation on transboundary water management. Agreements or other kind of formal arrangements may be interstate, intergovernmental, interministerial, interagency or between regional authorities.

Operational: For an agreement or other kind of formal arrangement (e.g. a memorandum of understanding) for cooperation between the riparian countries to be considered operational, all the following criteria needs to be fulfilled:

- There is a joint body, joint mechanism or commission (e.g. a river basin organization) for transboundary cooperation
- There are regular formal communications between riparian countries in form of meetings
- There is a joint or coordinated water management plan(s), or joint objectives have been set
- There is a regular exchange of data and information.

Comments and limitations:

The spatial information on transboundary surface water basins' boundaries and the extents of the catchment areas are commonly available and essentially static; consequently, once determined, no updating need is expected.

The information on the areal extent of transboundary aquifers may evolve over time as such information is generally more coarse but likely to improve because of the evolving knowledge on aquifers. Technical studies and exchange of information will improve the delineation and might also lead to the identification of additional transboundary aquifers.

In situations where more than two riparian countries share a basin, but only some of them have operational cooperation arrangements, the indicator value may mask the gap that a riparian country does not have cooperation arrangements with both its upstream and downstream neighbours. Such complementary information can be obtained by aggregating data at the level of the basins but not from the reporting at the national level.

The legal basis for cooperation develops slowly: conclusion of new agreements on transboundary waters is commonly a long process that takes many years.

The operationality of cooperation is more dynamic as it evolves with the expansion of cooperation. The operationality can be expected to evolve over shorter time frames, and in a year or two, progress could potentially be observed.

Methodology

Computation Method:
Step 1 Identify the transboundary surface waters and aquifers

While the identification of transboundary surface water is straightforward, the identification of transboundary aquifers requires investigations.

If there are no transboundary surface waters or groundwaters, reporting is not applicable.

Step 2 Calculate the surface area of each transboundary basin and the total sum
Commonly at least the basins of the rivers and lakes have been delineated through topographic maps and the basin area is known or easily measurable.

The total transboundary surface area in the country is the sum of the surface areas in the country of each of the transboundary basins and aquifers (expressed in km2). Transboundary areas for different types of systems (e.g. river basin and aquifer) or multiple aquifers may overlap. The area of transboundary aquifers, even if located within a transboundary river basin, should be added to be able to track progress of cooperation on transboundary aquifers.

The calculations can most easily be carried with Geographical Information Systems (GIS). Once generated, with appropriate tools for spatial analysis, the shapes of the surface catchments and the aquifers can be used to report both disaggregated (for the surface water basin or aquifer) and aggregated (agreement exists on either one).

Step 3 Review existing arrangements for transboundary cooperation in water management and verify which transboundary waters are covered by a cooperation arrangement
Some operational arrangements for integrated management of transboundary waters in place cover both surface waters and groundwaters. In such cases, it should be clear that the geographical extent of both is used to calculate the indicator value.
In other cases, the area of application may be limited to a border section of the watercourse and in such cases only the corresponding area should be considered as potentially having an operational arrangement for calculating the indicator value.
At the end of this step, it should be known which transboundary basins are covered by cooperation arrangements (and their respective areas).

Step 4 Check which of the existing arrangements for transboundary cooperation in water management are operational

The following check-list allows determining whether the cooperation arrangement on a particular basin or in relation to a particular co-riparian country is operational:

- existence of a joint body, joint mechanism or commission for transboundary cooperation
- regularity of formal communication in form of meetings
- existence of joint or coordinated water management plan(s), or of joint objectives
- regular exchange of information and data

If any of the conditions is not met, the cooperation arrangement cannot be considered operational. This information is currently available in countries and can also be withdrawn from global, regional or basin reporting systems.

Step 5
Calculate the indicator value, that is, the area share by adding up the surface area in the country of those transboundary surface water basins or aquifers that are covered by an operational cooperation arrangement and dividing it by the total summed up area in the country of all transboundary basins (including aquifers), multiplied by 100 to obtain a percentage share."

Disaggregation:
Data would be most reliably collected at the national level. Basin level data can also be disaggregated to country level (for national reporting) and aggregated to regional and global level.

Treatment of missing values:

- At country level

  In the case of spatial data: For the basin delineations, Digital Elevation Model information can be used to delineate surface water basin boundaries. For aquifers, geological maps can provide a basis for approximating aquifer extent. In the case of groundwater, uncertainty about transboundary nature remains unless investigations of hydraulic properties have been made. In the absence of administrative records, gaps about the cooperation arrangements are difficult to fill.

- At regional and global levels

  The indicator is not appropriate for countries without a terrestrial border, so notably island states will not be reporting a value on this indicator.

  International databases and inventories (as described in section 6) are available for reference in the absence of information reported by countries. Missing surface water basin extent can be extracted from Digital Elevation Models available globally. Global geological maps and maps of hydrogeology/groundwater potential also exist which could be used to approximate aquifer extent (surface area).

  Concerning agreements, consistency of information reported by co-riparian countries can be used to fill gaps in information about agreements and their operationality.

Regional aggregates:

Regional and global estimates will be obtained by summing up the total transboundary basin areas with arrangement and dividing the result by the total transboundary basin area of the countries. It means that the total transboundary basin area need to be reported at national level, in addition to the indicator value.

The information collected with the reporting under the Water Convention can support disaggregation at basin level and distinguishing aquifers and river basins, and support aggregation at the global or regional level.

Baseline assessment from global database can be performed at any desired geographical scale: sub-national, national, regional, basin scale, global, etc.

Sources of discrepancies:

As the computation of the indicator is based on the spatial information (“transboundary basin area”) and operationality of arrangements as the two basic components, differences can arise in difference of the computation of each of these components individually.

Regarding both components, the Member States have the most up-to-date information, which can be supplemented by the data from various international projects and inventories, which contribute also to establishing a baseline globally.

The difference on the value of transboundary basin area can arise from a different delineation of the transboundary water bodies, especially aquifers, or even the consideration of their transboundary nature as their identification and delineation can be based on different hydrogeological studies and can be updated, which is not necessarily reflected in international database.

The difference in the consideration of the operationality of the arrangements may arise from not identifying the same arrangements or considering differently the four criteria that serve as the basis for the operationality classification:

- existence of a joint body, joint mechanism or commission for transboundary cooperation
- regularity of formal communication in form of meetings
- existence of joint or coordinated water management plan(s), or of joint objectives
- regular exchange of information and data

A different interpretation in the object of application (only surface water or both surface water and groundwater) may constitute another reason.

Collection of country input through validation mechanisms, notably the reporting under the Water Convention is expected to improve the consistency and accuracy of the information across the countries as the monitoring progresses."

Data Sources

Description:
At the country level, ministries and agencies responsible for surface water and groundwater resources (depends on the country but commonly ministry of the environment, water, natural resources, energy or agriculture; institutes of water resources, hydrology or geology, or geological surveys) typically have the spatial information about the location and extent of the surface water basin boundaries and aquifer delineations (as Geographical Information Systems shapefiles). Information on existing arrangement and their operationality is also commonly available from the same institutions.

Regular reporting contributing to the information collection
Reporting under the Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Water Convention) will also gather the information needed for the calculation of the indicator, especially on the cooperation arrangements, transboundary waters covered by them as well as operationality. The Convention’s regular reporting on transboundary water cooperation, involving both Parties and non-Parties to the Convention, will collect this information every 3 years as of 2017. The reporting covers trans-boundary rivers, lakes and ground waters. UNESCO IHP will contribute to the reporting on transboundary aquifers. More than 100 countries participate in the Water Convention’s activities. The United Nations Economic Commission for Europe acts as Secretariat for the Water

Convention.
Some countries already report to regional organizations on the advancement of transboundary water cooperation, and similar arrangements could be strengthened and facilitated.

In the absence of available information at the national level global datasets on transboundary basins as well as about agreements and organizations for transboundary cooperation are available, which could be used in the absence of more detailed information, in the short term in particular.

Delineations of transboundary basins
In global databases, the most up-to-date delineations are available through the Transboundary Waters Assessment Programme (TWAP). TWAP covered 286 main transboundary rivers, 206 transboundary lakes and reservoirs and 199 transboundary aquifers. Relevant information have also been compiled for 592 transboundary aquifers by the UNESCO ISARM project.

Cooperation arrangements
Existence of treaties is available from the International Freshwater Treaties Database, maintained by Oregon State University (OSU). This was last updated to include all arrangements up to 2008. The treaty database includes in total 686 international freshwater treaties.
Organizations for transboundary water cooperation: International River Basin Organization (RBO) Database detailed information about over 120 international river basin organizations, including bilateral commissions, around the world.

Regional assessments describing and inventorying agreements have been undertaken, contributing to the baseline globally, for example, regional inventories of transboundary aquifers under the UNESCO-IHP ISARM.

Collection process:
Data are not so far included in the National Statistical Systems but the information needed to calculate the indicator is simple, does not require advanced monitoring capacities and is normally available to all countries.

Spatial information (“transboundary basin area”) is normally available in ministries in charge of water resources. Regarding operationality of arrangement the data needed for calculating the indicator can be directly obtained from information from administrative records (Member States have records of cooperation arrangements).

The limitations in terms of comparability of the results between countries are the same as the ones described in Section 12. However, a clear definition and consideration of the criteria as developed in the detailed methodology currently tested under the UN-Water GEMI initiative and that will be available to countries ensure a common reference for the countries.

Moreover, the elements of the indicator are based on the main principles of customary international water law, also contained in the two UN conventions - Convention on the Law of the Non-navigational Uses of International Watercourses (New York, 1997) and the UNECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Helsinki, 1992) – as well as the draft Articles on The Law of Transboundary Aquifers (2008; UN General Assembly resolutions 63/124 and 66/104).

The proposed mechanism of reporting under the water Convention will allow also having sub-components of the indicator reported by countries, which will ensure both more confidence on the final indicator value (validation) and increased comparability.

Data Availability

Description:
Data are not so far included in the National Statistical Systems but the information needed to calculate the indicator is simple, does not require advanced monitoring capacities and is normally available to all countries at the ministries or agencies responsible for water resources.

Data is available for the 154 countries having territorial borders in a number of existing databases.

Asia and Pacific: 39
Africa: 47
Latin America and the Caribbean: 22
Europe, North America, Australia, New Zealand and Japan: 46

Time series:
NA

Calendar

Data collection:
2016-2017 for reporting under the Water Convention

Data release:
Early 2018

Data providers

Data are not so far included in the National Statistical Systems but the information needed to calculate the indicator is simple, does not require advanced monitoring capacities and is normally available to all countries at the ministries or agencies responsible for water resources. Spatial information (“transboundary basin area”) is normally available in ministries in charge of water resources. The value of this component is relatively fixed although the precision may vary (especially on aquifers), and may require only limited

update on the basis of improved knowledge. Regarding operationality of arrangement the data needed for calculating the indicator can be directly obtained from information from administrative records (Member States have records of cooperation arrangements).

Data compilers

UNECE and UNESCO-IHP Reporting under the Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Water Convention) will also gather the information needed for the calculation of the indicator, especially on the cooperation arrangements, transboundary waters covered by them as well as operationality. The Convention's regular reporting on transboundary water cooperation, involving both Parties and non-Parties to the Convention, will collect this information every 3 years as of 2017. The reporting covers transboundary rivers, lakes and groundwaters. UNESCO IHP will contribute to the reporting on transboundary aquifers. More than 100 countries participate in the Water Convention's activities. The United Nations Economic Commission for Europe acts as Secretariat for the Water Convention. Some countries already report to regional organizations (e.g. the European Union or the Southern African Development Community) on the advancement of transboundary water cooperation, and similar arrangements could be strengthened and facilitated.

References

URL:

http://www.unesco.org/new/en/ihp; http://www.unece.org/env/water/

References:

The methodology is established and is based on the main principles of customary international water law, also contained in the two UN conventions - Convention on the Law of the Non-navigational Uses of International Watercourses (New York, 1997) and the Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Helsinki, 1992) – as well as the draft Articles on The Law of Transboundary Aquifers (2008; UN General Assembly resolutions 63/124 and 66/104).

Convention on the Protection and Use of Transboundary Watercourses and International Lakes: a globalizing framework
http://www.unece.org/env/water.html

Reporting under the Water Convention
http://www.unece.org/fileadmin/DAM/env/documents/2015/WAT/11Nov_1719_MOP7_Budapest/ECE_MP.WAT_2015_7_reporting_decision_ENG.pdf

GEMI – Integrated Monitoring of Water and Sanitation-related SDG Targets. Internet site.
http://www.unwater.org/gemi/en/

Global Environment Facility's Transboundary Waters Assessment Project

http://www.geftwap.org/

Treaties on transboundary waters:
Transboundary Freshwater Dispute Database (TFDD) at Oregon State University
http://www.transboundarywaters.orst.edu/publications/atlas/index.html

River Basin Organisations
http://www.transboundarywaters.orst.edu/research/RBO/index.html

A regional example: Status of transboundary water cooperation in the pan-European region:
http://www.unece.org/env/water/publications/pub/second_assessment.html

Internationally Shared Aquifer Resources Management (UNESCO's International Hydrological Programme): Regional inventories of transboundary groundwaters
http://www.isarm.org/

Transboundary Waters Assessment Programme
http://www.geftwap.org/

Related indicators

1.4:
Number of deaths, missing persons and persons affected by disaster per 100,000 people [a]

2.3:
Number of deaths, missing persons and persons affected by disaster per 100,000 people [a]

7.1:
Number of deaths, missing persons and persons affected by disaster per 100,000 people [a]

15.9:
Number of deaths, missing persons and persons affected by disaster per 100,000 people [a]

16.3:
Number of deaths, missing persons and persons affected by disaster per 100,000 people [a]

16.6:
Number of deaths, missing persons and persons affected by disaster per 100,000 people [a]

16.7:
Number of deaths, missing persons and persons affected by disaster per 100,000 people [a]

Comments:
Poverty (1.4); agriculture (2.3); energy (7.1); ecosystems (15.9); governance (16.3, 16.6 – 16.7)