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.

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.

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.

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.

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

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.

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 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, 2.3, 7.1, 15.9, 16.3, 16.6, 16.7

Comments:

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