

## C-1: Renewable freshwater resources

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## 1) General description

### 1.1) *Brief definition*

This indicator covers the main components to assess the renewable freshwater resources and their availability in a country. Renewable freshwater (surface and groundwater) resources are replenished by precipitation (less evapotranspiration) that ends up as runoff to rivers and recharge to aquifers (internal flow), and by surface waters and groundwater flowing in from neighbouring countries (inflow). The indicator also includes the outflow of surface and groundwaters to neighbouring countries and to the sea.

### 1.2) *Units of measurement*

Million cubic metres per year.

### 1.3) *Context*

Relation to other indicators from the Guidelines: This indicator relates to indicators “C-2: Freshwater abstraction”, “C-3: Total water use”, and “C-8: Reuse and recycling of freshwater”.

## 2) Relevance for environmental policy

### 2.1) *Purpose*

The indicator provides a measure of the state of renewable freshwater resources in a country and of its change over time.

### 2.2) *Issue*

Renewable freshwater resources are of major environmental and economic importance. Their distribution varies widely among and within countries. Pressures on freshwater resources are exerted by overexploitation and by degradation of environmental quality. Relating renewable freshwater resources with freshwater abstraction is a central issue in sustainable freshwater

resource management. If a significant share of a country's water comes from transboundary rivers, tensions between countries can arise, especially if water availability in the upstream country is smaller than in the country downstream. Examples of transboundary rivers show that countries are interdependent with regard to water resources. Particularly in Central Asia, cooperation between countries sharing rivers such as the Syr Daria and the Amu Daria is crucial for the life of the population, for economic well-being and for political stability in the region. Azerbaijan's reliance on drinking water from the transboundary Kura River and its tributaries by the countries located upstream is another example for such interdependence..

### **2.3) International agreements and targets**

#### *a) Regional level:*

The ECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes obliges Parties to prevent, control and reduce transboundary impact, use transboundary waters in a reasonable and equitable way and ensure their sustainable and ecologically sound management.

#### *b) Subregional level:*

In the European Union, the Water Framework Directive (Directive 2000/60/EC) obliges the Member States to promote the sustainable use of available water resources based on long-term protection and to ensure a balance between abstraction and recharge of water with the aim of achieving a "good water status" by 2015.

## **3) Methodology and guidelines**

### **3.1) Data collection and calculations**

Data on renewable freshwater resources are usually collected at selected hydrological stations and calculated on the basis of long-term measurements of levels, flow rates and inflows/outflows carried out on rivers and lakes as well as groundwater horizons and countrywide precipitation. Precipitation is measured as the total volume of atmospheric wet precipitation (rain, snow, hail, dew, etc.) falling on the territory of the country over one year. Actual evapotranspiration is the total actual volume of evaporation from the ground, wetlands and natural water bodies and transpiration of plants. Based on precipitation and actual evapotranspiration the internal flow, i.e. the total volume of river run-off and groundwater generated over the period of a year, in natural conditions, exclusively by precipitation into a country, can be measured or calculated (precipitation minus actual evapotranspiration). The total renewable freshwater resources are calculated as internal flow plus inflow of surface and groundwaters from neighbouring countries. Moreover, data on the

actual outflow of rivers and groundwater into the sea and into neighbouring countries should be provided.

### **3.2) Internationally agreed methodologies and standards**

The WMO Guidelines on Hydrological Practice; The UNSD/UNEP Questionnaire on Environment Statistics (Table W1), coordinated with the Organization for Economic Co-operation and Development (OECD) and Eurostat questionnaires; International Recommendations for Water Statistics (IRWS), United Nations 2012.

## **4) Data sources and reporting:**

In many countries of South-Eastern and Eastern Europe, Caucasus and Central Asia, information concerning renewable freshwater resources is collected by hydro-meteorological services both at the national level and at the levels of main river basins and is published in statistical yearbooks as well as in collections dealing with environmental protection. The information is presented in a more comprehensive format in water cadastre materials. Statistical agencies report data to the UNSD Environment Statistics Database.

## **5) References at the international level:**

- Directive 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 (Water Framework Directive): [http://ec.europa.eu/environment/water/water-framework/index\\_en.html](http://ec.europa.eu/environment/water/water-framework/index_en.html)
- ECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes (1992): <http://www.unece.org/fileadmin/DAM/env/water/pdf/watercon.pdf>; amendment 2003: <http://www.unece.org/fileadmin/DAM/env/documents/2004/wat/ece.mp.wat.14.e.pdf>
- European Commission – Water Policy: [http://ec.europa.eu/environment/water/index\\_en.htm](http://ec.europa.eu/environment/water/index_en.htm)
- European Environment Agency (EEA): <http://www.eea.europa.eu/themes/water>
- Eurostat: <http://epp.eurostat.ec.europa.eu/portal/page/portal/sdi/indicators>
- Global water information system of the Food and Agriculture Organization (AQUASTAT): [http://www.fao.org/ag/agl/aglw/aquastat/water\\_res/waterres\\_tab.htm](http://www.fao.org/ag/agl/aglw/aquastat/water_res/waterres_tab.htm)
- International Recommendations for Water Statistics (IRWS): <http://unstats.un.org/unsd/envaccounting/irws/irwswebversion.pdf>
- Raskin, P., Gleick, P.H., Kirshen, P., Pontius, R. G. Jr. and Strzepek, K. Comprehensive Assessment of the Freshwater Resources of the World. (Stockholm Environmental

Institute, 1997) Document prepared for the fifth session of the UN Commission for Sustainable Development (1997);

- United Nations Statistics Division (UNSD): <http://unstats.un.org/unsd/environment>
- United Nations Statistics Division (UNSD)/United Nations Environment Programme (UNEP) Questionnaire on Environment Statistics (2013): <http://unstats.un.org/unsd/environment/questionnaire2013.html>
- World Meteorological Organization (WMO): [www.wmo.ch](http://www.wmo.ch)
- [A-2-en-final.doc](#)
- EEA: <http://themes.eea.europa.eu/IMS/CSI>.