

**Indicator Fact Sheet**

**(WQ04) Overall reservoir stocks**

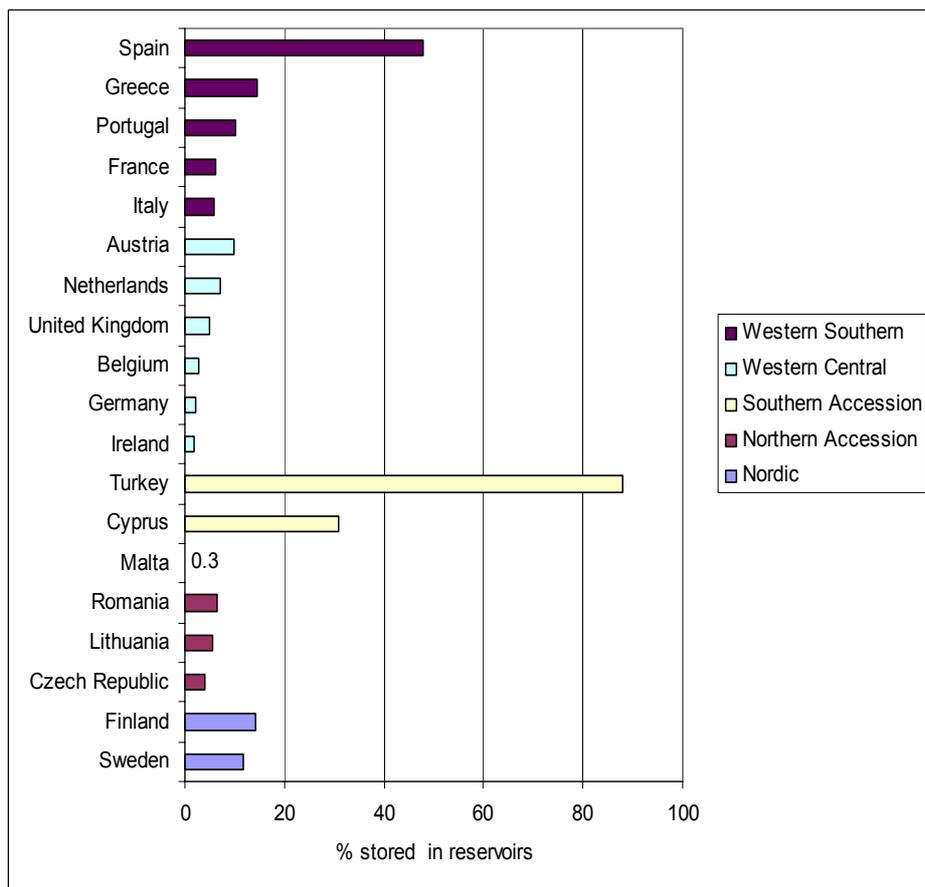
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**Key messages**

- Southern European countries retain the highest proportion of their total freshwater resources in storage reservoirs, often to safeguard supplies when other water resources are stressed. These countries use the highest proportion of their water resources for irrigation.
- Hydropower generation is also a major use of storage reservoirs, particularly in Nordic countries.

**Proportion of total freshwater resources stored in reservoirs in European countries**



**Notes:**

Western Southern: Italy, France, Portugal, Greece, Spain  
 Western Central: Ireland, Germany, Belgium, United Kingdom, Netherlands, Austria  
 Southern Accession: Malta, Cyprus, Turkey  
 Northern Accession: Czech Republic, Lithuania, Romania  
 Nordic: Sweden, Finland

## Results and assessment

### Policy relevance and context:

There are no policy targets, at European level, directly related to the evolution of this indicator. Nevertheless, one of the purposes of the Water Framework Directive for the EU countries is to *promote sustainable use based on a long-term protection of available water resources*.

Water uses require stored water quality to comply with the standards of the European Directives on drinking water (75/440/EEC), bathing water (76/160/EEC). Indirectly, all Directives concerning water quality of surface water should apply to water stored in reservoirs, such as the water pollution by dangerous substances (76/464/EEC) and daughter Directives, the UWWT Directive (91/71/EEC), the Nitrate Directive (91/676/EEC) and the IPPC Directive (96/61/EC).

Surface water bodies will also have to comply with requirements of the WFD (2000/60/EC) in order to achieve good ecological status in general and, in particular for reservoirs, a good ecological potential.

### Environmental context:

Total storage capacity in reservoirs (or total reservoir capacity, TRC) measures the available total surface water reserved for meeting water demands in a country. The percentage of TRC with respect to the total freshwater resources, provides a picture of the surface regulation in the country. In addition, this is an indicator of the alteration of the natural hydromorphology of the river, particularly in terms of river fragmentation.

Surface regulation by reservoirs report in most cases high social beneficial consequences, but they severely impact landscape and natural ecosystems. They bring about environmental changes that can be positively managed in order to balance water uses and biodiversity. However it has been widely recognized that river fragmentation and changes in the hydromorphological river features leads to a loss of naturally site-dependent water ecosystems and a shift to more 'general' species.

### Assessment

The use of reservoirs helps overcome the uneven distribution of natural water resources with time. Runoff in the wet season can be held back and used in the dry season (seasonal regulation), while water available in wet years can be stored and used in dry years (inter-annual regulation).

Temporal and spatial variability of water resources would result in some areas facing shortages if the natural regime of rivers had not been modified. For instance, only 12% of the total freshwater resources could have been available in Romania with no surface regulation. In Spain it would be about 8 %, which means that only one million of hectares could be irrigated, the same as in the beginning of the twentieth century, when river and aquifer regimes were almost natural.

The beneficial aspects of reservoirs in safeguarding water resources and supplies have to be balanced against the significant impacts that their construction and subsequent operation have on natural landscapes and ecosystems. In particular, good reservoir management needs take into account the hydromorphological river features downstream, in order to reduce the environmental impacts on ecosystems. This means that water releases must be done in accordance with the seasonal variations of the natural regime of the river. In addition and whenever possible and feasible, reservoirs should allow for mechanisms that help overcome the impossibility for species to have the mobility they require for natural survival. Regarding these aspects, more information should be available relating to the 'environmental' aspects of reservoir management.

The data for total storage capacity include all uses of reservoirs, which means that uses such as flood control, recreation or fisheries are accounted for.

The countries with the highest percentage of stored water in relation to their total freshwater resources (over 20 %) are: Turkey, Spain and Cyprus. These countries also use the highest percentage of their resources for irrigation. This activity demands the largest water volumes in the driest seasons, requiring winter storage. The amount of water required for irrigation depends on the agricultural practices in each region, from crop patterns to the efficiency of the irrigation systems. In particular the right performance of the agricultural practices is essential in order to allocate the needs for water between competing uses. This is of major interest in areas where the irrigation campaign and higher population rates in summer coincide in time.

In many countries (such as Austria, Finland, France, Greece, Ireland, Italy, Norway, Portugal and Sweden), the majority of major reservoirs are used for hydropower production. In particular, the primary purpose of major reservoirs in Sweden and Norway is almost exclusively for hydroelectricity (EEA, 1999).

See also fact-sheets: Precipitation and Water exploitation-consumption indexes.

### References

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UNECE, 2001. Environmental Performance Reviews Series No. 13. Country report Romania

### Data

Spreadsheet:

Reservoir\_RevJune03.xls

### Meta data

#### Technical information

1. Data source: For reservoir capacity: 'Lakes and reservoirs in the EEA area' EEA, 1999; FAO Aquastat for Balkan and AC countries; UNECE, 2001 Environmental Performance Reviews Series , country report:Romania. For Total Freshwater Resources: Eurostat Newcronos .
2. Description of data: Data collected from different bibliographic sources
3. Geographical coverage: Some EEA countries
4. Temporal coverage:
5. Methodology of data manipulation:

#### Qualitative information

6. Strength and weakness (at data level): Data are not completed and not updated regularly
7. Reliability, accuracy, robustness, uncertainty (at data level):
8. Overall scoring: (give 1 to 3 points: 1=no major problems, 3=major reservations)



Relevancy: 1

Accuracy: 2

Comparability over time: 3

Comparability over space: 3

**Further work required**

It is necessary to have updated information about total reservoir capacity and also about temporal variations of reservoir stocks in order to make accurate assessments about the storage vulnerability and reliability of a country or region.