6.55 Water Exploitation Index

Project Name: UNaLab (Grant Agreement no. 730052)

Author/s and affiliations: Laura Wendling[1], Ville Rinta-Hiiro[1], Maria Dubovik[1], Arto Laikari[1], Johannes Jermakka[1], Zarrin Fatima[1], Malin zu-Castell Rüdenhausen[1], Peter Roebeling[2], Ricardo Martins[2], Rita Mendonça[2]

[1] *VTT Technical Research Centre Ltd, P.O. Box 1000 FI-02044 VTT, Finland*

[2] *CESAM – Department of Environment and Planning, University of Aveiro, Campus Universitário de Santiago, 3810-193 Aveiro, Portugal*

Water Exploitation Index	**Water Management** **Climate and Natural Hazards**
Description and justification	The Water Exploitation Index (WEI) compares the volume of water consumed each year to the available freshwater resources. More specifically, the WEI presents total annual freshwater extraction as a proportion (%) of the long-term annual average freshwater available from renewable resources. The WEI warning threshold of 20% distinguishes a water-stressed area from one not suffering water scarcity. Severe scarcity is defined as WEI >40%.
Definition	Annual total water abstraction as a proportion (%) of available long-term freshwater resources in the geographically relevant area (basin) from which the municipality obtains its water
Strengths and weaknesses	+ European Environment Agency (EEA) uses the WEI to evaluate water scarcity across major river basins in Europe with time - Requires substantial amount of external information and data sources
Measurement procedure and tool	The WEI is calculated as follows (European Environment Agency [EEA], 2018): $$WEI = \left(\frac{Volume\ of\ water\ abstraction}{Volume\ of\ renewable\ freshwater\ resources}\right) \times 100$$ An advanced version of the WEI, called the WEI+, accounts for recharge of available freshwater supplies, or water return (EEA, 2018a): $$WEI+ = \left(\frac{Volume\ of\ water\ abstraction - Volume\ of\ water\ returns}{Volume\ of\ renewable\ freshwater\ resources}\right) \times 100$$

	The volume of long-term renewable freshwater resources in a natural or semi-natural geographically relevant area (e.g., basin or sub-basin) is calculated as (EEA, 2018): $Long\ term\ renewable\ freshwater\ resources = E_{xln} + P - ET_a - \Delta S$ where E_{xln} = external inflow, P = precipitation, ET_a = actual evapotranspiration and ΔS = change in storage (lakes and reservoirs). The equation for renewable freshwater resources can be simplified as follows for highly-modified (i.e., not natural or semi-natural) river basins or sub-basins (EEA, 2018): $Long\ term\ renewable\ freshwater\ resources = outflow + (abstraction - return) - \Delta S$ where outflow = downstream flow or discharge to sea and ΔS = change in storage (lakes and reservoirs).
Scale of measurement	Basin scale
Data source	
Required data	Necessary information about annual volumes of water abstraction (groundwater, surface water) from a given basin or sub-basin can be obtained from records of water supply companies and city documents relating to water abstraction permits. Wastewater treatment companies, water supply companies and municipal environment/environmental management departments are sources of information related to annual volumes of water returns. Information about long-term renewable water resources can be obtained from local water boards, municipal departments and/or national environment agencies.
Data input type	Quantitative
Data collection frequency	Annually
Level of expertise required	Moderate – for data acquisition and processing
Synergies with other indicators	Related to *Depth to groundwater* and *Qunatitative status of groundwater* indicators
Connection with SDGs	SDG 6 Clean water and sanitation, SDG 11 Sustainable cities and communities, SDG 13 Climate action
Opportunities for participatory data collection	No opportunities identified
Additional information	

References	European Environment Agency (EEA). (2018). Use of freshwater resources. Copenhagen: European Environment Agency. Retrieved from https://www.eea.europa.eu/data-and-maps/indicators/use-of-freshwater-resources-2/assessment-3

6.56 Net surface water availability

Project Name: NAIAD (Grant Agreement no. 730497)

Author/s and affiliations: *Beatriz Mayor[1], Laura Vay[1], Marisol Manzano[2], Virginia Robles[2], Mar García-Alcaraz[2], Javier Calatrava[3], Raffaele Giordano[4], Miguel Llorente[5], Africa de la Hera[5], Javier Heredida[5], Laura Basco[6], Marta Faneca[6], and Tiaravanni Hermawan[6], Elena Lopez-Gunn[1]*

[1] I-CATALIST S.L., C/ Borni, 20, 28232 Las Rozas, Madrid, Spain

[2] UPTC, Department of Mining and Civil Engineering, Technical University of Cartagena, 30202 Cartagena, Spain

[3] UPTC, Department of Business Economics, Technical University of Cartagena, 30202 Cartagena, Spain

[4] CNR-IRSA, National Research Council – Water Research Institute, Bari, Italy

[5] IGME, Instituto Geológico y Minero de España (IGME)/Geological Survey of Spain, Ríos Rosas 23, 28003 Madrid, Spain

[6] Deltares, Boussinesqweg 1 2629 HV Delft, P.O. Box 177, 2600 MH Delft

Net surface water availability	**Water Management** **Natural and Climate Hazards**
Description and cation	Provides an indication of the capacity of available surface water resources to meet the water demands.
Definition	Difference between surface water supply and demand (m^3/year)
Strengths and weaknesses	
Measurement procedure and tool	Modelling through Medina del Campo surface water allocation model.
Scale of measurement	Groundwater Body scale (Medina del Campo Groundwater Body)
Data source.	
Required data	Climatic data from local meteorological stations including rainfall, runoff, evapotranspiration, infiltration.
Data input type	Historical data series
Data collection frequency	Annual