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4.32 Water Exploitation Index

Project Name: UNaLab (Grant Agreement no. 730052)

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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): $$WEI+ = \left(\frac{Volume\ of\ water\ abstraction - Volume\ of\ water\ returns}{Volume\ of\ renewable\ freshwter\ resources}\right) \times 100$$ 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	
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4.33 Water dependency for food production

Project Name: proGIreg (Grant Agreement no. 776528)

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Water dependency for food production	**Water Management**
Description and justification	Water is a primarily resource, and the water dependencies of food production is a key indicator of efficiency in the use of water and thus environmental footprint. The implementation nature based solution rested on aquaponics systems in urban areas is hypothesized to produce vegetables with a lower water consumption compared with soil based agriculture. The loss of water in these systems is only due to evapotranspiration, without percolation and runoff.
Definition	Amount of water used to produce food in aquaponics systems (m^3)
Strengths and weaknesses	+ Simple calculation - The results will be dependent to which soil based agricultural system is compared