Level of expertise required	
Synergies with other indicators	Groundwater availability due to the surface-groundwater connections
Connection with SDGs	SDG 6
Opportunities for participatory data collection	
Additional information	
References	NAIAD, Deliverable D6.2, From hazard to risk: models for the DEMOs. Part 1: Spain– Medina del Campo. SC5-09-2016 Operationalising insurance value of ecosystems. Grant Agreement nº 730497

6.57 Water availability for irrigation purposes

Project Name: UNaLab (Grant Agreement no. 730052)

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Rainwater or greywater use for irrigation purposes	**Water Management** **Natural and Climate Hazards**
Description and justification	Rainwater and greywater have a potential to be reused for irrigation purposes if collected to a storage unit. This is especially prominent for areas exposed to drought. Domestic wastewater consists of greywater, the wastewater discharged from hand basins, showers and baths, dishwashers, and laundry machines, and blackwater from toilets. Depending on local regulations, water from the kitchen sink be regarded as greywater or blackwater. One person generates 90–120 L greywater each day depending on lifestyle, living standard, age, gender, and other factors. Greywater comprises 50-80% of all domestic wastewater but contains a relatively small fraction of the total pollutant load (Antonopoulou, Kirkou, & Stasinakis, 2013; Donner et al., 2010; Li, Wichmann, & Otterpohl, 2009). Separation of domestic greywater from blackwater and on site re-use for toilet flushing or

	irrigation of non-edible vegetation provides an alternative water source in areas facing water shortage. On-site greywater re-use can reduce potable water use by as much as 50% (Gross, Shmueli, Ronen, & Raveh, 2007).
Definition	Volume of rainwater or greywater used for irrigation purposes (L/y or similar unit)
Strengths and weaknesses	+ Secure reserve of water for irrigation at times of drought + Use of automatic meter reading could be a good choice to communicate with stakeholders regarding the benefits of rainwater capture and use for irrigation - Rainwater storage requires a substantial amount of external storage units - There are concerns about the potential for bacterial growth when nutrient-rich waste/greywater remains untreated for a period of time
Measurement procedure and tool	Accurate accounting of rainfall capture and use for irrigation requires use of a water level sensor to measure the volume of water contained within a given rainwater storage unit at any time. If the storage unit is completely sealed and the water level can be easily recorded each time it is opened (and again after water is discharged for use), it may be possible to manually record and calculate the volume of water captured and used for irrigation purposes. An alternate solution is to equip the discharge point of the rainwater storage unit/tank with a water meter, and record the volume of water used over a specific period of time. This is well suited to applications with multiple water storage tanks and/or in situations where it may be challenging to accurately quantify water use manually. The water meter(s) may be connected to an automatic meter reading (AMR) device that enables remote communication of water usage between the water meter and a central point. It is recommended that domestic greywater is filtered (e.g., sand and/or granular activated carbon filter and/or treatment in vertical subsurface-flow wetland or reed bed, etc.) prior to use for irrigation of non-edible vegetation such as landscaping.
Scale of measurement	Plot scale to street scale
Data source	
Required data	Volume of rainwater and greywater used for irrigation purposes

Data input type	Quantitative
Data collection frequency	Annually
Level of expertise required	Low
Synergies with other indicators	Related to *Monthly maximum value of daily maximum temperature, Quantitative status of groundwater* and *Depth to groundwater* indicators
Connection with SDGs	SDG 6 Clean water and sanitation, SDG 11 Sustainable cities and communities
Opportunities for participatory data collection	No opportunities identified
Additional information	
References	Antonopoulou, G., Kirkou, A. & Stasinakis, A.S. (2013). Quantitative and qualitative greywater characterization in Greek households and investigation of their treatment using physicochemical methods. Science of the Total Environment, 454-455, 426-432. Donner, E., Eriksson, E., Revitt, D.M., Scholes, L., Holten Lützhøft, H.-C. & Ledin, A. (2010). Presence and fate of priority substances in domestic greywater treatment and reuse systems. Science of the Total Environment, 408(12), 2444-2451. Gross, A., Shmueli, O., Ronen, Z., & Raveh, E. (2007). Recycled vertical flow constructed wetland (RVFCW)-a novel method of recycling greywater for irrigation in small communities and households. Chemosphere, 66(5), 916-623. Li, Y., Wichmann, K., & Otterpohl, R. (2009). Review of the technological approaches for grey water treatment and reuses. Science of the Total Environment, 407(11), 3439-3449.