Required data	Soil type, particle size distribution, soil moisture, matric suction
Data input type	Numerical, category
Data collection frequency	once
Level of expertise required	Low for sampling/measurement; high for prediction
Synergies with other indicators	Moisture content, soil strength, vegetation cover
Connection with SDGs	11, 13, 15, 17
Opportunities for participatory data collection	yes
Additional information	
References	Gonzalez-Ollauri, A. and Mickovski, S.B., 2017. Plant-Best: A novel plant selection tool for slope protection. Ecological Engineering 106 (154–173) Bouma, J. (1989). "Using soil survey data for quantitative land evaluation". Advances in Soil Science. 9: 177–213.

8.21 Soil water flux and degree of soil saturation

Project Name: OPERANDUM (Grant Agreement no. 776848)

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Soil water flux and degree of saturation	**Water Management** **Green Space Management**
Description and justification	Soil water flux – is the transport of water into the soil from the atmosphere, into the atmosphere from the soil and within the soil, establishing the soil water mass balance. It is intrinsically related to the stress state of the soil and to ecohydrological processes occurring at the plant-soil-atmosphere continuum (e.g., plant uptake and evapotranspiration).

	Degree of saturation is a measure of the soil water mass balance. It is directly related to soil strength, matric suction, and soil water flux. Vegetation plays a key role in ecosystems by linking biophysical processes—such as absorption of solar radiation, rainfall interception, and evapotranspiration—to biogeochemical processes—such as photosynthesis and volatile organic compound emission. Moreover, vegetation links the terrestrial carbon cycle to hydrology through stomatal aperture (Jarvis and McNaughton, 1986), and through other processes such as soil-water extraction by roots (de Jong van Lier et al., 2006). Terrestrial water fluxes are controlled to a large extent by above-ground and below-ground biological processes where vegetation plays a major role.
Definition	The degree of saturation is the ratio of the volume of water to the volume of voids, usually represented as percentage, it can vary from 0 (totally dry soil) to 100 (completely saturated soil). The gradient of the total potential of soil water in both, the soil fully saturated by water (saturated flow) as well as in soil not fully saturated by water (unsaturated flow) creates a flow (flux) in the soil.
Strengths and weaknesses	+: a number of models exist for monitoring and prediction of fluxes, albeit usually at a larger scale. Degree of saturation: easy to measure with gravimetric methods in the lab and in situ with reflectometers; intrinsically related to matric suction through soil water retention function; related to meteorological variables rainfall and temperature -: some phenomena associated with vegetation, and this NBS, have not been modelled through the soil water flux
Measurement procedure and tool	Soil water flux is calculated using the hydraulic gradient measured with a tensiometer at two depths and the hydraulic ·conductivity corresponding to the average soil water content between the two depths determined with a neutron probe or by direct sampling and lab testing (moisture content determination). The degree of saturation is calculated as a ratio of the moisture content and specific gravity on one side and the void ratio on the other. Time domain reflectometry sensors
Scale of measurement	Point, micro
Data source	
Required data	For the flux: hydraulic gradient between two points; soil water content

	For the saturation degree: soil water content, specific gravity of the soil particles, void ratio of the soil
Data input type	Quantitative, numerical
Data collection frequency	Continuous
Level of expertise required	Intermediate to high
Synergies with other indicators	Digital terrain model; soil moisture content, groundwater table level, soil strength
Connection with SDGs	11,13,15,17
Opportunities for participatory data collection	Yes, through citizen science
Additional information	
References	Gonzalez-Ollauri, A. and Mickovski, S.B., 2017. Hydrological effect of vegetation against rainfall-induced landslides. Journal of Hydrology, 549 (374–387) Gonzalez-Ollauri, A. and Mickovski, S.B., 2017. Plant-Best: A novel plant selection tool for slope protection. Ecological Engineering 106 (2017) 154–173.

8.22 Stemflow funnelling ratio

Project Name: OPERANDUM (Grant Agreement no. 776848)

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Stemflow funnelling ratio	**Water Management** **Green Space Management**
Description and justification	Aboveground vegetation parts funnel rainfall around the plant stem and promote its infiltration preferentially into the soil. The volume of water funnelled around the stem is substantial and its infiltration into the soil may promote changes in the stress state of the soil. Also, when rainfall interacts with the canopy it becomes richer with nutrients and organic matter that will then be transported into the soil.