Data input type	Quantitative
Data collection frequency	
Level of expertise required	High
Synergies with other indicators	
Connection with SDGs	13
Opportunities for participatory data collection	
Additional information	
References	

6.37 Landslide risk – Digital elevation / terrain modelling

Project Name: OPERANDUM (Grant Agreement no. 776848)

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Topography (digital elevation / terrain models)	**Natural and Climate Hazards**
Description and justification	Topography and relief of a slope are needed as a basis for the assessment of the stability of the terrain where the NBS will be built or operated in. It is also needed for siting and conceptual design of NBS against any form of natural or climate hazard.
Definition	Digital elevation model (DEM), digital terrain model (DTM) or digital surface model (DSM) is a 3D CG representation of a terrain's surface created from a terrain's elevation data.
Strengths and weaknesses	+: DTMs exist globally (provided by: BGS, USGS, ERSDAC, CGIAR, Spot Image, etc); algorithms to retrieve topographical attributes such as slope gradient, aspect, and curvature exist. DTMs can be used for digital soil mapping. Topographic indices related to landscape ecology and dynamics are available and need DTM-derived information.

	-: the resolution of the DTM needs to be commensurate with the size of the NBS put in place; it needs data processing and knowledge of GIS and spatial analysis
Measurement procedure and tool	Commonly built using data collected using remote sensing techniques, but they may also be built from land surveying (e.g., photogrammetry, lidar, etc)
Scale of measurement	millimetres to kilometres
Data source	
Required data	Point cloud or similar depending on the type of survey.
Data input type	Numerical, quantititative; A DEM can be represented as a raster (a grid of squares, also known as a heightmap when representing elevation) or as a vector-based triangular irregular network (TIN). The TIN DEM dataset is also referred to as a primary (measured) DEM, whereas the Raster DEM is referred to as a secondary (computed) DEM.
Data collection frequency	Periodically
Level of expertise required	Intermediate for surveying, high for data processing
Synergies with other indicators	Soil strength, slope stability (FoS), erosion (soil loss), water table depth, surface water accumulation and flow, plant establishment and growth, soil organic matter, soil nutrients
Connection with SDGs	11, 13, 15, 17
Opportunities for participatory data collection	Yes, through open source and citizen science data exchange platforms
Additional information	
References	Gonzalez-Ollauri, A., Mickovski, S.B., 2017. Shallow landslides as drivers for slope ecosystem evolution and biophysical diversity. Landslides, 14:1699-1714. Peckham, R.J. and Gyozo, J. (Eds.)(2007): Development and Applications in a Policy Support Environment Series: Lecture Notes in Geoinformation and Cartography. Heidelberg.