Application of SlideforMap for the hydrological risk assessment in sustainable managed forests

Introduction

Forests are vital in protecting property and people against hydrogeological slope failure. From this perspective, the importance of forest management is crucial, given the increase in the frequency of extreme rainfall events driven by climate change. Knowing a priori the susceptibility of an area to rainfall-induced shallow landslides is, therefore, a pivotal point in avoiding or limiting environmental and social damage.

SlideforMAP is a probabilistic model created by the International Association of Natural Hazard Risk Management, called ecorisQ (ecorisq.org). Its application allows for assessing the probability of shallow landslides triggering on a regional scale, considering the structure and composition of forests as input data in the process. Through the calculation of root reinforcement, both at the scale of individual trees and forest stands, it provides valuable decision support in the planning and managing direct protection forests.

In the BIOSEIFORTE OG, this model was applied to evaluate how land cover changes over the years have affected slope stability in the Mt. Nerone area and also to assess the effectiveness of the current land cover condition in case of extreme rainfall events.
The stability analysis highlighted the central role of forests in warranting slope stability through the contribution of trees root reinforcement. In particular, increased forest cover surface has remarkably stabilized landslide susceptible areas, reducing the impact of hazardous events.

The stability analysis through SlideforMAP allowed to detect areas where geo-environmental factors (e.g. morphology and soil properties) are preeminent, like those near urban settlements and infrastructures, becoming a potential risk and requiring more careful monitoring.

Lessons learned

Analyzing and quantifying the forest contribution to slope stability is essential in research and practical applications. Knowing the probability of rainfall-induced shallow landslides at a regional scale can help to understand how environmental factors variability can influence such dynamics. Using slope stability models such as SlideforMAP is essential for guiding land use planning and providing quantitative information about the stability conditions of an area. Nonetheless, for even better outputs, more detailed information is necessary, including accurate resolutions of digital terrain and surface models, not always easy to obtain from regional and national databases.

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Further information

https://www.innovarurale.it/pei-agri/gruppi-operativi/bancadati-go-pei/biodiversita-e-servizi-ecosistemici-foreste-e-territorio

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