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Assessment of systemic vulnerability in landslide prone areas: a proposed model

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This paper deals with the conceiving, the development and the subsequent validation of an integrated numerical model for assessment of the systemic vulnerability in complex and urbanizing areas subject at landslide risk.

The proposed assessing model, which is based on the studies of Tamura et al., 2000 and Minciardi et al., 2004, considers the vulnerability not as a characteristic of a particular element at risk, but as a peculiarity of a complex territorial system, in which the different elements are reciprocally linked in a functional way. Therefore it allows to point out, in checked areas, the elements which mostly experience a functional lost and make the whole system critical.

This characteristic makes the proposed model effectively able to support a correct territorial planning and a suitable management of the emergency following natural disasters which trigger or mobilize again mass movements.

This model, anchored in a GIS system, has been characterized by the following phases:

1. The first phase has aimed at the topological characterization of the studied territorial system and the assessment of the scenarios in terms of spatial landslide hazard. As concerns the assessment of the landslide hazard, a statistical method has been proposed, which is based on the neural networks;

2. the second phase has been characterized by the analysis of the direct consequences of a scenario event on the system;

3. the third phase has been focalized on the definition of the assessing model of the systemic vulnerability in landslide areas;

4. the forth phase aim at description of possible trigger of further risks beginning from a particular event;

5. the fifth phase aim at spatial analysis of elements.

The proposed model has been applied with good results on the territory of Potenza, which is well known for being characterized by a widespread state of hydrogeological upheaval.