



## **Physical resilience of buildings to torrential hazards-relationship and interaction with physical vulnerability**

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Although a significant amount of studies focusing on social resilience may be found in the literature, research on physical resilience of elements is still limited. Physical vulnerability and physical resilience are two concepts that complement each other: Vulnerability is considered to be an ex-ante condition of the element at risk reducing its performance when threatened by a natural hazard whereas resilience is associated with the ex-post adaptation necessary to return to the initial condition. Physical vulnerability may be influenced by a number of indicators (e.g. construction material, number of floors etc.) whereas physical resilience is directly related to the time period between the occurrence of the event and the return to the initial state. Vulnerability indicators, therefore, may influence the level of physical resilience of a building significantly. In the present study the relationships and interactions between physical vulnerability and resilience are investigated and highlighted through a case study for debris flows in the European Alps.