Physical, social and institutional vulnerability assessment in small Alpine communities. Results of the SAMCO-ANR project in the Upper Guil Valley (French Southern Alps)

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1- Background

The Guil catchment is particularly prone to torrential and gravitational hazards such as floods, debris flows, landslides or avalanches due to several predisposing factors (bedrock: supplying abundant debris; strong hillside-channel connectivity) in a context of summer Mediterranean rainstorms as triggers. Since the second half of the 20th century, the progressive decline of aporeticalism and the development of tourism activities led to a concentration of human stakes on alluvial cones and valley bottom; therefore an increase of vulnerability for mountaneous communities. Following the 1957 and 2000 catastrophic floods and the 1948 and 2008 avalanche episodes, some measures were taken to reduce exposure to risks (engineering works, standards of construction, rescue training...). Nevertheless, in front of urban expansion (land pressures and political pressures) and obsolescence of the existing protective measures, it is essential to assess the vulnerability of the stakes exposed to hazards. In the frame of the SAMCO project designed for mountain risk assessment in a context of global change, we developed a systemic approach to assess three specific components of vulnerability: physical, social and institutional - for the six municipalities of the Upper Guil catchment: Ristolas, Abriès, Aiguilles, Château-Ville-Vieille, Moïnes-en-Queyras and St-Véran (Fig. 1).

2- Methods

Physical vulnerability (i.e. total potential consequences of hazards on stakes) was estimated and mapped via GIS model from Potential Damage Index (PDI) (Fig. 2). This index allowed us to quantify and describe both direct - physical injury, structural and functional impacts - and indirect consequences - socio-economic impacts - induced by hazards; this by combining weighted parameters reflecting the exposure of elements at risk: buildings, networks and land cover (Fig. 3). At least 1890 buildings, 367 km of land cover and 902 km of network were considered. Vulnerability maps were then crossed to hazard maps reflecting different scenarios of exposure. To take into account the temporal variability of vulnerability, we produced different maps for summer and winter periods. To assess social and institutional vulnerability we real-Isand questionnaires (5% of the total population investigated), interviews and mind-maps (30 collected) dealing with risk perception, mitigation measures and confidence in the actors of risk management.

3- Results: physical vulnerability assessment

For the sake of clarity for readers we present here only few scenarios: summer torrential vulnerability, isolated regions (Fig. 15). Regarding building, we observe a high degree of vulnerability on r.

4- Results: Social and institutional vulnerability assessment

5- Conclusion