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A coupled human and landscape conceptual model of risk and resilience in mountain communities

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Recent extreme natural disasters have focused the attention of the global community to society's vulnerability to these events. Simultaneously these natural disasters occur within a broader social and physical context that is interconnected and may include social upheavals, economic crises, and climate change. While progress has been made to mitigate and adapt to natural hazards, much of the existing research lacks interdisciplinary approaches that equally consider both natural and social processes. More importantly, this lack of integration between approaches remains a major challenge in developing disaster risk management plans for communities. In this study we focus on European Alpine communities that face numerous human and environmental risks and differ regarding their ability to cope with these risks and develop resilience.

Herein we present a conceptual model of mountain communities exposed to socio-economic (e.g. economic downturn) and biophysical (e.g. floods) "shocks". We identify system boundaries, structure, components, and processes required to describe both human and landscape systems for mountain communities. More importantly we determine feedbacks within and between both systems. The purpose of the model is to investigate which shocks overcome the buffering capacity of mountain communities, and determine which shocks have a greater effect on mountain communities. Socioeconomic, climate, and hazard 'shock' scenarios have been developed for communities with different geographic sizes. Examples of inputs for the model and methods required to test the model are provided. Guided by the model and scenarios we discuss potential outcomes regarding community resilience.