



## **Can mountain communities buffer socio-economic and natural shocks?**

Jorge Ramirez (1), Md Sarwar Hossain (1), Tina Haisch (2), Olivia Martius (1), Chinwe Ifejika Speranza (1), Heike Mayer (1), and Margreth Keiler (1)

(1) University of Bern, Institute of Geography, Bern, Switzerland (jorge.ramirez@giub.unibe.ch), (2) School of Business, Institute for Nonprofit and Public Management, University of Applied Sciences and Arts Northwestern Switzerland, Basel, CH

Natural disasters occur within a broader social and physical context that is interconnected and may include climate change and economic crises. 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. To shed light on this topic we have developed a conceptual model of a coupled human-landscape system (MC-CHLS, Mountain Community Coupled Human Landscape System) for mountain communities exposed to multiple socio-economic and physical challenges, risks and “shocks”. MC-CHLS contains a system dynamics component to reproduce community level, socio-economic developments and shocks that include economic crises leading to unemployment, depopulation and diminished community revenue. Additionally, MC-CHLS contains climate, hydrology, and geomorphic components that replicate risks and physical shocks (damaging events) consisting of floods and debris flows. Feedbacks between the socio-economic and physical systems permit adaptation to flood and debris flow risks or losses by implementing spatially explicit mitigation options including flood defenses and land cover changes. Moreover, feedbacks between hydrology and economy exist because hydropower is a major industry and employer within many mountain communities. Here we provide examples from the scientific literature to justify the components, scales, and feedbacks present in MC-CHLS. Moreover, we provide guidance on how to operationalize MC-CHLS to ultimately measure risk and community resilience as well as determine which shocks overcome the buffering capacity of mountain communities.