

## Geo-hydrological hazard risks in changing tropical Africa: natural or human-induced processes?

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### Abstract:

The changing climate is affecting the frequency and intensity of rainfall-triggered geo-hydrological hazards (GH) such as flash floods, landslides and gully erosion. These hazards are also influenced by human-induced land transformations such as deforestation and urbanization. GH events often co-occur and interact, leading to cascading and compound hazards with amplified impacts. In the future, the frequency and/or severity of GH events are expected to rise, not only as a result of climate change and land transformation but also due to population growth and expanding exposure to disasters. Tropical regions, in particular, are environments often characterized by data scarcity and remain under-researched with respect to GH processes. In Africa, high and rapidly increasing population densities, combined with elevated societal vulnerability, make these regions disproportionately exposed to GH impacts. In this study, we assess the influence of land transformation and climate on the occurrence of GH risks in tropical Africa. We adopt a holistic and transdisciplinary approach that integrates extensive fieldwork, satellite remote sensing, historical archive analysis, climate data collection, citizen science and awareness-raising tools. Our findings demonstrate the role of human activities and climate on the spatial and temporal patterns of GH risks in both rural and urban environments. Overall, we emphasize the importance of considering the human context when investigating GH processes in regions under anthropogenic pressure, as this is essential for improving hazard prediction, understanding disaster dynamics, and anticipating the effects of global change.