



## Implementation of a Congolese observatory of urban gullies for research, governance, and early warning system

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Urban gullies are an emerging geo-hydrological hazard of the Anthropocene, particularly in rapidly urbanizing tropical cities. In the Democratic Republic of the Congo (DRC), intense rainfall, steep slopes, erodible soils, and uncontrolled urban expansion combine to create highly favorable conditions for the formation and rapid expansion of UGs. Recent national-scale inventories reveal that more than half of Congolese cities are significantly affected, with nearly 3,000 urban gullies mapped. These features can reach tens of meters in depth and width within a few years, causing widespread destruction of housing, roads, and infrastructure, and leading to population displacement, injuries, and fatalities.

Recent analyses estimate that approximately 118,000 people were displaced by urban gullies in the DRC between 2004 and 2023, with displacement rates more than doubling after 2020. Currently, about 3.2 million people live within potential gully expansion zones, a number expected to increase dramatically as urbanization continues. Despite this growing risk, major knowledge gaps persist regarding the socio-economic impacts, rainfall thresholds, and short-term dynamics controlling gully initiation and expansion, severely limiting disaster risk management and early warning capacities.

This project aims to address these gaps through the implementation of a Congolese observatory of urban gullies, focusing on the cities of Kinshasa and Bukavu. Building on previous achievements, the project combines geomorphological research, citizen science, and policy advocacy to provide a proof of concept for an operational observatory.

The project adopts a participatory citizen science approach, engaging at-risk communities as

“citizen observers” to collect in-situ data on gully dynamics, rainfall events, and socio-economic impacts. Community information sessions support risk awareness, co-development of data collection tools, and validation of observations. Data are collected using mobile applications, complemented by high-resolution geomorphological monitoring through rain gauge networks, GPS surveys, and drone imagery. These datasets enable improved characterization of gully expansion processes and identification of rainfall thresholds associated with hazardous events.

Beyond data generation, the project emphasizes governance and advocacy by translating scientific results into policy briefs and stakeholder workshops involving communities, authorities, NGOs, and urban planners. The project ultimately seeks to strengthen disaster risk management, inform sustainable urban planning, and demonstrate the feasibility and necessity of a dedicated national observatory for urban gullies in the DRC.