

Enhancing flood resilience through a community-led, impact driven framework for data-scarce regions

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Abstract:

Addressing data scarcity in the Global South is increasingly critical as climate change is expected to result in more frequent and severe flood events in highly vulnerable regions. A novel risk assessment framework tailored to these challenges is demonstrated on a use case based in Angwan Iku, a flood prone community in Gwagwalada, Abuja, Nigeria. The community experienced a high magnitude flood event in 2020, which sustained adverse consequences for built structures, local residents, and their livelihoods. Key inputs include local context provided through community engagement, high resolution data acquired conducting household-level field surveys, and freely available medium resolution (30 m) topography data.

The study first identifies key local flood risk drivers, including flood mechanisms and building vulnerability classes. A multivariate analysis is performed on field data to identify building features that contribute most to flood damage. Flood risk zones are further delineated by performing contour analysis on identified flood threshold levels on local river banks. These zones are then validated against a 2020 flood extent map derived from field surveys, which served as a point of reference or ground truth. Finally, adaptation strategies are proposed for at-risk buildings, informed by the risk zones and building vulnerability classes.

The approaches within this framework can generate custom, baseline flood risk profiles for data-scarce communities, which can also be further refined and validated over time. Integration of community insights ensures that local risk factors are accurately captured and that proposed adaptation measures directly address community defined priorities and needs and are sustainable. Moreover, the methods make use of data that can be acquired for any data-scarce region, and are therefore transferrable to comparable communities and scalable with available resources. Most notably, we demonstrate how the framework extends beyond working with existing data gaps, towards the translation of evidence-based insights into actionable solutions specific to the needs of each community, so that flood risk is effectively minimised on the ground.

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