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Indicators for building damage assessment

Mark Malgwi and Margreth Keiler
University of Bern, Institute of Geography, Bern, Switzerland (mark.malgwi@giub.unibe.ch)

Physical vulnerability indicators are important variables considered to be the main drivers of hydro meteorological hazard impact, causing either building damage or monetary losses. These indicators help to identify areas which are likely to be highly susceptible to hazard impact, hence, they help to develop strategies for disaster risk reduction, through mitigation or emergency planning. In this way scarce resources can be efficiently used for identified susceptible areas. However, although indicators are well developed in many western countries, research gaps still exist in developing the indicator approach in many data scarce regions and in linking developed index with building damage grades.

In response to identified research gaps, we develop a conceptual framework utilizing both inductive and deductive approaches to identify drivers of building vulnerability to flood hazard. The framework comprehensively integrates parameters of building exposure, susceptibility and resilience or local protection measures to develop a building resistance index (BRI). The BRI serves as a pre-hazard function for identifying possible susceptible areas to flood. In a next step, flood hazard parameters (flood depth, duration and velocity) and the BRI are systematically combined to develop a function that links an exposed building to a probable damage state. The indicator parameters can be updated with new information after a flood event and can be adapted to regional situation.

To demonstrate the applicability of the developed framework, we carry out a test for Nigeria using a case study region. Regional information from literature review, expert survey and building damage data was utilized in identifying drivers of building damage to floods. Preliminary results shows main classes of regional building types, building damage patterns and main damage drivers. Identified damage drivers can help policy makers in prioritizing mitigation or emergency efforts for disaster risk reduction. Next steps will involve collection of empirical data to develop relationships between probable building damage state and vulnerability indicators.