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An integrated multi-risk framework considering climate change impacts on African cities

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The objective of this work is to state a multi-risk assessment framework considering climate change impacts on African urban areas; it takes in account physical vulnerabilities, social fragilities, and non-stationary climate-related hazards. Multi-risk modeling poses different challenges than classical risk assessment and has several features and implications to be considered both in the technical modeling process and in the use of results. Given the complexity of processes and the peculiarities that African urban areas present in terms of kind of hazards and vulnerabilities, two levels of analysis have been considered: the first level is the evaluation of potential physical damages resulting from the combination of different hazards and physical vulnerabilities, whereas the second level considers social context conditions aggravating the physical effects. In a multi-risk approach, climate-related events (as for example rainfall, river discharge, extreme temperatures, wind gusts, sea level rise, etc.) can be considered direct hazards or triggering phenomena; nevertheless, as we consider different climate-change scenarios, non-stationary processes have to be considered in order to determine probabilities of occurrence of certain intensities of that kind of events. In our work, a Bayesian framework is considered, which implies that (1) probabilities are treated as probability distributions, and (2) the creation of a basic structure in which different types of information may be considered and integrated in order to obtain the best guess of the parameters to be considered for the risk assessment. This approach is being applied to the city of Dar Es Salaam, Tanzania.