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Assessing current and future urban flash flood risk integrating qualitative and quantitative approaches: lessons from Monastir, Tunisia

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Cities are home to the majority of the world population and key drivers of the global economy. As urban populations continue to rise and climate-related extreme events are likely to become more frequent, urban disaster risk has become a global priority. Risk-informed planning has been highlighted as one essential step towards making cities more resilient. Notably, information on future scenarios of risk can provide relevant information to enable local authorities to better prepare for future hazards and take preventive action.

Here, we present the outcomes of a spatial assessment of current and future flash flood risk in all dimensions of hazard, exposure and vulnerability for the coastal city of Monastir, Tunisia. The analysis integrates the outputs of a flash flood model, downscaled population data and primary data collected during a household survey (n = 696) into an assessment of current flash flood risk at the sub-city scale drawing on indicators derived from expert interviews, a stakeholder workshop and literature review. Weights for vulnerability indicators were identified through an online survey with relevant local stakeholders. Future scenarios until 2030 were developed building on narrative storylines which were co-designed with local stakeholders during two dedicated scenario workshops, including a business-as-usual projection and four additional scenarios (controlled growth, uncontrolled growth, uncontrolled stagnation, and control & stagnation). These were used as an input for an urban growth and exposure simulation using the SLEUTH urban growth model as well as to develop spatial scenarios of vulnerability and risk at the sub-city scale.

The analysis of current hotspots has revealed that especially the city centre is prone to flash flood hazards with exposure rates of up to 42% of the residential population in some parts of the city. Combined with relatively high levels of social vulnerability throughout the city, spatial patterns of flash flood risk vary accordingly. The analysis has also revealed that although there are no major differences in social vulnerability across different parts of the city (index scores between 0.38 and 0.53 in a scale from zero to one), there are major differences in what drives vulnerability in different parts of the city hence calling for spatially targeted risk reduction and adaptation strategies.

The results of the urban growth and exposure simulations show that the city is likely to expand in the future with implications on future exposure to flash floods. Further, it is likely that there will be a reduction of social vulnerability in the city by 2030 reflecting the overall positive development trajectory of the city, yet to varying degrees, depending on the scenario.

The talk will present the background, methods and findings of the analysis and will close with a critical reflection on the challenges faced in a data scarce environment and the utility of such information for preventive/adaptive urban planning.