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Community Mapping Supports Comprehensive Urban Flood Modeling for Flood Risk Management in a Data-Scarce Environment

Louise Petersson¹, Marie-Claire ten Veldhuis², Govert Verhoeven³, Zoran Kapelan², Innocent Maholi⁴, and Hessel Winsemius^{2,3}

¹World Bank, Dar es Salaam, Tanzania (lpetersson@worldbank.org)

²Department of Water Management, Delft University of Technology, Delft, Netherlands

³Inland Water Systems Unit, Deltares Research Institute, Delft, Netherlands

⁴Humanitarian OpenStreetMap Team, Dar es Salaam, Tanzania

We demonstrate a framework for urban flood modeling with community mapped data, particularly suited for flood risk management in data-scarce environments. The framework comprises three principal stages: data acquisition with survey design and quality assurance, model development and model implementation for flood prediction. We demonstrate that data acquisition based on community mapping can be affordable, comprehensible, quality assured and open source, making it applicable in resource-strained contexts. The framework was demonstrated and validated on a case study in Dar es Salaam, Tanzania. The results obtained show that the community mapped data supports flood modeling on a level of detail that is currently inaccessible in many parts of the world. The results obtained also show that the community mapping approach is appropriate for datasets that do not require extensive training, such as flood extent surveys where it is possible to cross-validate the quality of reports given a suitable number and density of data points. More technically advanced features such as dimensions of urban drainage system elements still require trained mappers to create data of sufficient quality. This type of mapping can, however, now be performed in new contexts thanks to the development of smartphones. Future research is suggested to explore how community mapping can become an institutionalized practice to fill in important gaps in data-scarce environments.