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# Assessing Surface Drainage Efficiency in Urban Pluvial Flood Hazard and Risk Mitigation: A Case Study of Braunschweig City

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Due to rapid urbanization and the increase of extreme precipitation events driven by climate change, urban areas have experienced more frequent and severe pluvial floods in recent years. This trend is anticipated to continue in the future. One of the causes of flooding in these urban zones is the limited effectiveness or temporary reduction in surface drainage capacity, even when storm sewers adhere to technical standards. A notable instance was the June 2023 flooding in Braunschweig, situated in Lower Saxony, Germany, where the city received 60 liters per square meter of rainfall within a short time span, largely excessing sewer system capacity and leading to widespread inundation.

This research investigates the impact of implementing diverse strategies aimed at expanding urban drainage capacity to mitigate pluvial flood risk in Braunschweig. To accomplish this, a moderately detailed hydrodynamic model for the city was set up using the RIM2D hydrodynamic model, allowing for quick computational processing times which enabled the exploration of various measures through sensitivity analysis. The setup involved employing a high-resolution digital elevation model and various remote sensing data for land classification. The model incorporated high-resolution precipitation radar data from the 2023 event and additional precipitation scenarios of varying occurrence probabilities. Validation of the model against available event data and existing flood hazard maps specific to Braunschweig was conducted.

The validated model was then utilized to assess the effectiveness of different surface de-sealing scenarios within the city. These scenarios aim to enhance drainage capacity by means of increased infiltration to complement the existing sewer drainage system. The evaluation of these de-sealing scenarios focused on reducing surface inundation and anticipated damage, serving as a foundational aspect for conducting a cost-benefit analysis and detailed planning. This analysis can contribute to future-oriented urban pluvial flood risk management plans for the city.