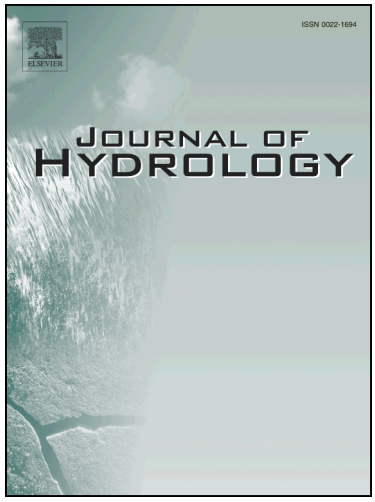

Research papers

Evaluating the cascading impacts of sea level rise and coastal flooding on emergency response spatial accessibility in Lower Manhattan, New York City

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PII: S0022-1694(17)30732-1
DOI: https://doi.org/10.1016/j.jhydrol.2017.10.067
Reference: HYDROL 22347

To appear in: *Journal of Hydrology*

Received Date: 27 July 2017
Revised Date: 10 October 2017
Accepted Date: 23 October 2017

Please cite this article as: Yin, J., Yu, D., Lin, N., Wilby, R.L., Evaluating the cascading impacts of sea level rise and coastal flooding on emergency response spatial accessibility in Lower Manhattan, New York City, *Journal of Hydrology* (2017), doi: https://doi.org/10.1016/j.jhydrol.2017.10.067

Evaluating the cascading impacts of sea level rise and coastal flooding on emergency response spatial accessibility in Lower Manhattan, New York City

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Abstract: This paper describes a scenario-based approach for evaluating the cascading impacts of sea level rise (SLR) and coastal flooding on emergency responses. The analysis is applied to Lower Manhattan, New York City, considering FEMA's 100- and 500-year flood scenarios and New York City Panel on Climate Change (NPCC2)'s high-end SLR projections for the 2050s and 2080s, using the current situation as the baseline scenario. Service areas for different response timeframes (3-, 5- and 8-minute) and various traffic conditions are simulated for three major emergency responders (i.e. New York Police Department (NYPD), Fire Department, New York (FDNY) and Emergency Medical Service (EMS)) under normal and flood scenarios. The modelling suggests that coastal flooding together with SLR could result in proportionate but non-linear impacts on emergency services at the city scale, and the performance of operational responses is largely determined by the positioning of emergency facilities and the functioning of traffic networks. Overall, emergency service accessibility to the city is primarily determined by traffic flow speed. However, the situation is expected to be further aggravated during coastal flooding, with is