ICUC12-852, updated on 14 Jan 2026
https://doi.org/10.5194/icuc12-852
12th International Conference on Urban Climate

Hamburg Pluvial Flood Risk Map

Malte von Szombathely[1], Jörn Behrens[2], Franziska S. Hanf[3], Marc Lennartz[1], Benjamin Poschlod[1], Anastasia Vogelbacher[4], and Jana Sillmann[1,5]

[1]Research Unit Sustainability and Climate Risks, Center for Earth System Research and Sustainability (CEN), Universität Hamburg, Grindelberg 5, Hamburg, Germany (malte.szombathely@uni-hamburg.de)

[2]Department of Mathematics, Universität Hamburg, Bundesstraße 55, Hamburg, Germany

[3]Meteorological Institute, Center for Earth System Research and Sustainability (CEN), Universität Hamburg, Bundesstraße 55, Hamburg, Germany

[4]Institute of Geo-Hydroinformatics, Hamburg University of Technology, Am Schwarzenberg-Campus 3 (E), Hamburg, Germany

[5]CICERO Center for International Climate and Environmental Research, Oslo, Norway

The "Hamburg Pluvial Flood Risk Map" aims to improve our understanding of the drivers, dynamics and interactions of climate-induced risks in Hamburg. Following the risk framework of the IPCC, we calculate a risk index based on hazard, exposure and (social) vulnerability. In this sense, we combine data from the previously published Social Vulnerability Index (von Szombathely et al., 2023) with novel meter-scale hydraulic simulations of urban flooding provided by the heavy rain hazard map of the city of Hamburg (BKG/FHH 2023), developing an integrated urban pluvial flood risk assessment.

We enhance the modeling of social vulnerability by applying the Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) and the Shannon Entropy procedure. We propose high-resolution exposure modeling for residents affected by urban flooding, with two distinct exposure layers influencing well-being on the one hand and restricting mobility and accessibility on the other. We show that fundamentally new spatial patterns emerge for integrated pluvial flood risk in Hamburg, which differ from familiar socio-economic urban structures and at the same time differ clearly from a pure representation of the hazard. Presented through high-resolution spatial maps, this analysis aids in identifying adaptation needs and potential for sustainable transformation in urban areas and in prioritizing policy measures for climate change adaptation.

References:

BKG/FHH 2023. Eine Starkregen-Gefahrenkarte für Deutschland:https://www.business-geomatics.com/2023/02/02/eine-starkregen-gefahrenkarte-fuer-deutschland/

von Szombathely M., Hanf F. S., Janka B., Meier L., Ossenbrügge J., Pohl T. 2023. An Index-Based Approach to Assess Social Vulnerability for Hamburg, Germany: International journal of disaster risk science. 14, 5, p. 782-794 13 p. DOI: 10.1007/s13753-023-00517-7