

Editorial: Advances in urban flood studies: modelling, monitoring, strategic planning, and lessons learned

Original

Editorial: Advances in urban flood studies: modelling, monitoring, strategic planning, and lessons learned / Iliopoulou, T., Mazzoglio, P., Moccia, B., Sargentis, G.-. - In: FRONTIERS IN BUILT ENVIRONMENT. - ISSN 2297-3362. - ELETTRONICO. - 12:(2026). [10.3389/fbuil.2026.1907656]

Availability:

This version is available at: 11583/3013097 since: 2026-07-14T11:14:49Z

Publisher:

Frontiers

Published

DOI:10.3389/fbuil.2026.1907656

Terms of use:

This article is made available under terms and conditions as specified in the corresponding bibliographic description in the repository

Publisher copyright

(Article begins on next page)



OPEN ACCESS

EDITED AND REVIEWED BY
Izuru Takewaki,
Kyoto Arts and Crafts University, Japan

*CORRESPONDENCE
Theano Iliopoulou,
✉ tiliopoulou@hua.gr

RECEIVED 12 June 2026
REVISED 12 June 2026
ACCEPTED 23 June 2026
PUBLISHED 13 July 2026

CITATION

Iliopoulou T, Mazzoglio P, Moccia B and
Sargentis G-F (2026) Editorial: Advances in
urban flood studies: modelling,
monitoring, strategic planning, and
lessons learned.
Front. Built Environ. 12:1907656.
doi: 10.3389/fbuil.2026.1907656

COPYRIGHT

© 2026 Iliopoulou, Mazzoglio, Moccia
and Sargentis. This is an open-access
article distributed under the terms of the
[Creative Commons Attribution License](#)
(CC BY). The use, distribution or
reproduction in other forums is permitted,
provided the original author(s) and the
copyright owner(s) are credited and that
the original publication in this journal is
cited, in accordance with accepted
academic practice. No use, distribution or
reproduction is permitted which does not
comply with these terms.

Editorial: Advances in urban flood studies: modelling, monitoring, strategic planning, and lessons learned

Theano Iliopoulou^{1*}, Paola Mazzoglio², Benedetta Moccia³ and
G.-Fivos Sargentis⁴

¹Geography Department, School of Environment, Geography and Applied Economics, Harokopio University of Athens, Athens, Greece, ²Department of Environment, Land and Infrastructure Engineering, Politecnico di Torino, Torino, Italy, ³Department of Civil, Building and Environmental Engineering, Sapienza University of Rome, Roma, Italy, ⁴Department of Water Resource and Environment, School of Civil Engineering, National Technical University of Athens, Athens, Greece

KEYWORDS

built environment, flood modelling, flood risk, resilience, urban flooding

Editorial on the Research Topic

[Advances in urban flood studies: modelling, monitoring, strategic planning, and lessons learned](#)

Introduction

Urban flooding is one of the most complex and uncertain environmental hazards, as it results from the interplay of hydroclimatic variability, fine-scale rainfall dynamics, drainage systems, and the intricate and evolving topography of the built environment. It is a fast-evolving hazard that can claim lives and cause major disruptions to city life, including transportation, building functionality, and critical infrastructure. The short response times associated with urban flood events make both preparedness and a deeper understanding of flood processes particularly important.

The papers collected in this Research Topic span a wide range of urban flood studies, from modelling and hazard assessment to vulnerability, resilience, and the analysis of past disasters. Together, they provide perspectives from diverse geographical and socio-economic contexts, highlighting both the common challenges faced by cities and the context-specific factors that shape flood risk and its impacts.

Several contributions focus on improving the characterization of flood hazards and reducing uncertainties in urban flood assessments. These include studies on flood attribution, integrated modelling frameworks, sensitivity analyses, machine learning applications, and the use of non-conventional information sources. Other studies highlight that flood impacts cannot be understood solely through hazard analyses, emphasizing the role of vulnerability, social inequalities, governance, and preparedness in shaping disaster outcomes.

A recurring theme across several contributions is the growing use of non-conventional and high-resolution data sources, ranging from crowd-sourced information and field

observations to detailed building-level and socio-economic datasets, demonstrating their value for improving both flood-risk assessment and the understanding of flood impacts.

Collectively, the papers illustrate a broader shift in urban flood studies toward more integrated approaches that consider not only flood processes, but also the built environment and the vulnerabilities of exposed populations.

Understanding urban flood dynamics and improving risk assessment

Several contributions advance understanding of urban flood processes and improve hazard characterization through modelling, reconstruction, and predictive approaches. [Wulandari et al.](#) investigate the relative contributions of multiple river systems to urban flooding through scenario-based hydrologic-hydrodynamic modelling, highlighting flood attribution as a crucial step towards flood-risk mitigation and planning. Reliable hazard assessment also depends on how the urban environment itself is represented within flood models. In this respect, [Alexopoulos et al.](#) identify building representation in the rain-on-grid method as a critical source of uncertainty in urban flood modelling, showing that alternative building treatment approaches can lead to substantially different inundation patterns and hazard assessments at fine scales, with important implications for risk-informed decision making. [Sigourou et al.](#) develop an integrated methodology that combines complementary hydraulic modelling approaches for more robust flood-model calibration and risk evaluation, and supports the identification of vulnerable areas at the building scale. Beyond hazard characterization, [Kabeyama et al.](#) propose the use of multimodal LSTM methods to enrich building-level exposure information and improve flood damage estimation, highlighting the potential of data-driven approaches for high-resolution risk assessment. Finally, moving from predictive analysis to disaster learning, [Dal Sasso et al.](#) perform a detailed post-event reconstruction using non-conventional information sources such as testimonies, images, and videos and derive valuable insights into flood pathways, local exposure, and disaster interpretation, reinforcing the importance of learning from past events.

Beyond the hazard: vulnerability and resilience

A second major theme emerging from the Research Topic concerns the uneven distribution of flood impacts and the importance of vulnerability, resilience, and governance. [Kunguma et al.](#) reveal how vulnerability in informal settlements emerges from the combined effects of socio-economic marginalization, infrastructure deficits, and environmental conditions, illustrating that flood risk cannot be adequately understood through hazard exposure alone. [Raphela](#) broadens the scope of urban flood-risk assessment by drawing attention to the indirect and often overlooked social and psychosocial consequences of recurrent flooding, emphasizing that the impacts of flood disasters extend well beyond physical losses. Together, these studies illustrate that

flood risk is more than just a function of physical event characteristics, but is strongly shaped by social conditions and community capacity. In this respect, [Orimoogunje and Aniramu](#) argue that urban flood resilience should be viewed not merely as a flood-management objective, but as an integral component of sustainable urban development, requiring coordinated action across governance, infrastructure, and community levels.

Conclusion and remaining challenges

Overall, the studies collected in this Research Topic illustrate a broadening of urban flood research beyond hazard characterization alone. Advances in modelling, data availability, machine learning, and post-event analyses are enabling more detailed and uncertainty-aware assessments of urban flood risk, while growing attention is being given to vulnerability, resilience, and the social dimensions of flood impacts.

A notable observation emerging from the Research Topic is that challenges related to representing the urban environment recur across different case studies and geographical settings, highlighting the inherent complexity of modelling flood processes in densely built areas. In contrast, flood impacts and vulnerabilities are far less uniform, varying substantially across communities and disproportionately affecting populations with limited infrastructure, resources, and flood protection measures.

Progress in urban flood-risk research will therefore depend not only on advances in modelling and data collection, but also on a better understanding of vulnerability and the wider social processes that shape risk. The studies in this Research Topic collectively emphasize the need to combine structural and non-structural measures, including preparedness and resilience-building strategies, while recognizing the central role of the built environment. As both a driver of flood behaviour and a receptor of flood impacts, the built environment stands out as a key component of urban flood-risk assessment and management.

Author contributions

TI: Writing – original draft. PM: Writing – review and editing. BM: Writing – review and editing. G-FS: Writing – review and editing.

Funding

The author(s) declared that financial support was not received for this work and/or its publication.

Conflict of interest

The author(s) declared that this work was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

The author G-FS declared that they were an editorial board member of Frontiers at the time of submission. This had no impact on the peer review process and the final decision.

Generative AI statement

The author(s) declared that generative AI was not used in the creation of this manuscript.

Any alternative text (alt text) provided alongside figures in this article has been generated by Frontiers with the support of artificial intelligence and reasonable efforts have been made to ensure

accuracy, including review by the authors wherever possible. If you identify any issues, please contact us.

Publisher's note

All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.