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Editorial: Flood risk perception, vulnerability, and risk: from assessments to analyses

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Editorial on the Research Topic
Flood risk perception, vulnerability, and risk: from assessments to analyses

Rising global temperatures are increasing the frequency and intensity of floods worldwide (Chang and Franczyk, 2008). Although efforts are being made to contain global warming to below 2°C rise, compared to the pre-industrial levels (1850–1900) and making an all-out effort to limit this increase to 1.5°C (UNFCC, 2015), it is still crucial to focus on flood risk reduction by understanding the vulnerabilities and capacities of both the communities and relevant institutions handling disaster response. This Research Topic explores the analytical methods and strategies to understand the human–environment linkages and complexities that underpin flood risk assessments, preparedness, response, recovery, and mitigation activities. The proposed methods and findings could help improve flood risk management through effective community preparedness, enhanced yet simplified flood information systems, and mitigation strategies suited to specific communities or regions.

Coastal flooding is one of the different types of floods, which is mainly caused by processes such as storm surges, large waves, intense rainfall, high river discharge, or a combination of any of these. Coastal topography also plays a role in determining the duration of such flooding. Mostafiz et al. developed and presented a comprehensive modeling approach to assess coastal flood loss in Grand Isle, Louisiana, United States, which is among the world's most vulnerable places to coastal flooding. They examined the current pluvial flood depth and evaluated the contribution of coastal subsidence and eustatic sea level rise (ESLR) toward future pluvial flooding. Additional analyses were carried out to understand the probable impacts of tropical-cyclone-induced storm surge events. Losses at individual building levels from a 100-year pluvial flood and a 100-year tropical cyclone-induced storm surge event were estimated for the study area. Although the methods developed in this study are highly specific to the study area, the overall approach is promising at offering a more realistic coastal flood risk assessment.

Flood risk information tools are key to reducing damages in communities prone to flooding. Although risk communication is generally carried out in a top-down fashion (government institutions down to the local communities), the study by Habib et al. examined the need for community-anchored tools and technologies to improve the understanding of

flood risk mitigation among diverse communities. They noted that hydroinformatic tools such as hydrodynamic models, geospatial visualization, and socioeconomic analysis can play a key role in this regard. A set of workshops was conducted with various groups of citizens, city engineers and planners, realtors and builders, and media representatives within a flood-prone community in Louisiana, United States, where the participants were asked to use and comment on various prototype flood risk informational tools. The findings of this study stress the importance of developing simplified communication tools to allow the citizens to expand their flood risk knowledge beyond their homes, businesses, and places of work, while embracing the local context that includes local historical and simulated events at multiple levels of community impact. The takeaway here is that communicating complex flood risk information could be challenging, and therefore, local communities and relevant stakeholders must be involved in the process of deciding or devising the tools that could perform this task effectively.

Recovery from a disaster, such as floods, requires deliberate assistance from the government and non-governmental organizations. The cost to support communities impacted by inland and coastal floods is increasing with the frequency and intensity of such events. The level of support received by communities, however, is not always equitable. Wilson et al. synthesized the peer-reviewed and gray literature on flood recovery for vulnerable populations, specifically focusing on access barriers in United States federal disaster recovery programs and outcomes. The literature analyses revealed that renters, low-income households, and racial and ethnic minorities faced barriers to accessing federal assistance and experienced adverse recovery outcomes, primarily owing to the onerous application processes, restrictive identification requirements, and eligibility requirements linked to absolute economic loss. The results highlight the opportunities to improve equity in the distribution of resources to underserved communities affected by flood disasters.

With an increase in exposure to natural hazards such as heatwaves, floods, wildfires, cyclones, and others because of global warming and climate change, it becomes ever more important to enhance community resilience to cope with such events. Risk perception is a key element that drives how people respond and adapt to different hazards. The study by Bixler et al. examines how social capital and social vulnerability shape risk perception and household flood mitigation actions in Austin, Texas, United States. Various hypotheses were tested using survey data, and it was found that bonding social capital (personal networks, neighborhood cohesion, and trust) is positively related to mitigation behavior and that social vulnerability (e.g., age, ethnicity, income, gender, etc.) is negatively related to risk perception. This implies that the policies that strengthen the social connectedness within neighborhoods can increase adaptive behaviors, which could subsequently help improve community resilience to flood events. Although individual risk perceptions are important in preparing risk communication strategies (Fuchs et al., 2017), more must be done to increase the adaptive behaviors among populations already at disproportionate exposure to flooding.

In another study, Skilton et al. used focus groups to examine and understand the disconnect between individual and community perceptions of flood risks, and how emerging hydroinformatic tools can bridge these gaps in Lafayette Parish (county) in south Louisiana, United States. The hypotheses testing revealed that community members tend to perceive flood risk based on their personal experience with past flood events and may lack an understanding of the causes of floods or their geographical dynamics (spatial proximity and association). This individual-centric perception leads to several community-level challenges, such as a lack of awareness of the risks faced by vulnerable groups within a community, a lack of trust within and across communities and stakeholders, and contradictory views on the best possible flood mitigation strategies. Although some tools already exist to address the gaps in communicating flood risks beyond parcel level to a subdivision, city, or broader region (Mäkinen, 2006; Voinov et al., 2018), study-area specific information systems could benefit the communities by the inclusion of local historic flood events. These findings also resonate with the work of Wilson et al. and Bixler et al..

These studies offer excellent insight into the multifaceted and heterogeneous approaches to mitigating and managing flood risks and have a great potential to assist disaster risk managers, urban planners, engineers, legislators, and decision-makers in devising effective flood risk management strategies.

Author contributions

SB: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Validation, Writing—original draft, Writing—review and editing. IR: Data curation, Investigation, Validation, Writing—review and editing. JR: Investigation, Validation, Writing—review and editing.

Conflict of interest

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