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EDITORIAL

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From flood impact modelling to flood impact forecasts

Once more, recent flood events in different regions of the world have revealed critical issues in disaster management. There are numerous examples globally where forecasts of upcoming natural hazards have resulted in poor disaster management and response (WMO, 2015). The warnings issued were, in many cases, either not received by decision-makers or by the public, or were misunderstood. Missed or inappropriate warnings hamper effective disaster response. The general public hardly understands the meaning of forecasts or warnings due to over-technical language. To overcome the shortcomings in the transmission of information from warning services to the targeted user groups before anticipated flood events, the World Meteorological Organization published the 'Guidelines on Multi-hazard Impact-based Forecast and Warning Services' (WMO, 2015). These aim to support authorities by introducing early warning systems that warn users of the possible consequences of a predicted extreme event. This concept is called impact forecasts or impact-based warnings.

Hitherto, warning messages have mainly focused on the characterization of the hazard. Impact forecasts complement these warning messages with explicit information about exposure and potential impacts of the hazard event on an individual, infrastructure, or community level. Impact-based warning systems inform target users about the impacts on their infrastructure that are expected due to the hazard of a forecasted weather event by considering the site-specific vulnerability (Meléndez-Landaverde & Sempere-Torres, 2022). In short, impact-based warning systems can communicate 'what the weather will do' in addition to 'what the weather will be' (Kaltenberger et al., 2020). This information should support the decisions of local stakeholders on what measures to undertake next. Thus, such early warning systems aim at optimizing short-term prevention and risk management actions and are therefore issued in a specific way for each target group. However, this requires focusing on the people and the site-specific vulnerabilities. Hence, impact forecasts and warnings are people-centred and site-specific approaches. They have a significant effect on the intended response to an extreme event and together with behavioural recommendations they can improve the perception and understanding of warnings (Weyrich et al., 2018). Furthermore, they increase the likelihood that protective decisions are taken (Meléndez-Landaverde et al., 2019).

However, the implementation of such warning systems is challenging, as it needs a strong collaboration between the warning services and specific user groups. The latter must know the vulnerabilities of their systems against the forecast hazards, and together with the warning services, site-specific thresholds are defined based on the system's vulnerability. Moreover, hazard forecast models have to be extended with impact models. The implementation of impact forecast systems extends the rather static impact assessments of risk analyses with a dynamic hazard assessment approach. Flood impact forecasts require continuous monitoring of the current situation and modelling the full process chain from numerical weather forecast models to hydrological, hydraulic, and flood impact models.

The Journal of Flood Risk Management covers all aspects of flood impact assessment. Many valuable contributions in the journal issues show examples of impact models and impact forecasts. Although most of the contributions focus on selected aspects of the process chain from rainfall to flood impacts, the sum of all topical contributions shed light on the way forward to implement impact forecasts and impact-based flood early warning systems. Recent articles in the Journal of Flood Risk Management cover the topics of flood impact assessments and warnings. As an example, Silvestro et al. (2024) evaluated the predictive ability of the Italian early warning system. Geddes et al. (2024) highlight the potential of direct messaging in flood alerts and warnings, namely actively disseminating warning information to many recipients simultaneously. This can include location-based warnings. Meléndez-Landaverde and Sempere-Torres (2023) evaluate the dissemination of site-specific impact-based flood warnings. Aldridge et al. (2020) presented a flood impact library approach

for generating flood impact forecasts in a computationally efficient way.

In this issue, for example, Liu et al. (2024) presented a method for analysing the impacts of floods on pedestrians and vehicles using a coupled coastal ocean and stormwater management model. Sorboni et al. (2024) showed a method for an automated estimation of first-floor heights of buildings using deep learning and Google Street View. This is an important step for assessing the vulnerability of buildings against floods. Tambal et al. (2024) demonstrate the added value of participatory approaches and citizen engagement for enhancing flood resilience. Participatory co-design and co-development processes are absolutely needed for developing impact-based warning systems.

It is now time to 'translate' flood forecasts into flood impact forecasts and to implement impact-based warning systems to enhance disaster response and emergency management. The *Journal of Flood Risk Management* continues to publish contributions in flood impact assessments to continuously advance the field of integrated flood risk management.

At the time of writing this editorial, David Proverbs just joined the Editorial Board of the Journal. He is Associate Pro Vice-Chancellor Enterprise and Business Innovation at De Montfort University, UK. We warmly welcome David as a member of the Editorial Board.

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