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Editorial: Climate services for risk informed anticipatory action

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Editorial on the Research Topic
Climate services for risk informed anticipatory action

It is increasingly evident that disaster occurrence and the magnitude of disaster impacts continue to evolve, with these changes driven by climatic, cultural, socio-political and economic factors (Peek and Mileti, 2002; Lewis and Kelman, 2010; Raju et al., 2022). Yet, gaps remain in understanding the extent to which Early Warning Systems (EWS), Anticipatory Action (AA) programs and other Disaster Risk Reduction (DRR) strategies are appropriately structured to be sufficiently agile in incorporating evolutions of both natural and socio economic systems (Garcia and Fearnley, 2012; Kruczkiewicz et al., 2021).

However, certain aspects of AA are improving, such as integration of Earth Observations (EO) into trigger model development and the production of funding structures that are designed to facilitate distribution of resources pre-disaster (Nauman et al., 2021; Pache et al., 2022). Yet, additional progress is needed, particularly related to prediction of geophysical and climatic variables, validation of forecasts, governance, and in defining processes for selection of one AA approach over another for a particular context (de Ruiter et al., 2020; Kruczkiewicz et al., 2022; de la Poterie et al., 2023). Best practices and opportunities for engagement within climate services, and for alignment with adaptation and mitigation strategies, as well as collaborating across various sectors in private industry, are also lacking, while demand accelerates. There is also a lack of incentives and standards for providing substantive details around if and to what extent how all people subjected to an AA or EWS program experience these programs, across a spectrum from benefiting to actually being worse off. Such descriptions of influence should include both potential gains, losses and additional hardships introduced, in order to assess potential effectiveness and risks. Understanding types of governance, and potential for scalability and sustainability, is crucial for this purpose.

In addition, opportunities for integration of data from social media, crowdsourcing and artificial intelligence are evermore present, driving a perception of the potential for high spatial resolution demographic analyses. Yet similar gains in understanding how the presence of DRR programs, including AA and EWS, changes the disaster impact profile across all communities in an area of implementation have not been realized (Nielsen and Raju, 2021). This has contributed to the persistence of various gaps related to moving from availability of potentially useful data to taking action before a disaster, to minimize impact. Without more focused attention on the most disproportionality impacted populations, these gaps are likely to continue to be present and are likely to deepen. A specific focus

on the most underserved and traditionally deprioritized populations must also apply to assessing the effectiveness of AA, especially within the development of guidance and standards for monitoring and evaluation.

In Enenkel et al. the need for more appropriate monitoring, evaluation, accountability and learning (MEAL) frameworks specific to AA is described, while noting the unique advantages in designing these around the capabilities of satellite data. In doing so, the authors note the importance of a multi-disciplinary community of practice to develop standards for EO-driven approaches that allows for the integration of socioeconomic data at sufficient temporal scales. This suggests an improvement from the current status of monitoring and evaluation processes related to AA, and more broadly within DRR, whereby the spatiotemporal elements are many times smoothed over in order to fit within the available frames of policy makers and donors.

In addressing the growing challenges related to compound events, Chaves-Gonzalez et al., outline various ways in which humanitarian crises are becoming more complex and interconnected, across both climate and socioeconomic factors. In addition to the computational burden of risk assessment for compound events, they note the challenges of creating financial tools and mechanisms that appropriately incorporate the uncertainty levels that will always, to some extent, be present in AA. Building off of the physical science related challenges to scaling up, they emphasize the importance of understanding the constraints related to "operational readiness"—supporting the need to understand if and to what extent certain enabling elements for AA are in place from the earliest stage possible—including when identifying candidate areas for implementation (WMO, 2021). But even as such, improving AA program design by instituting new standards and guidelines can be made more efficient if incentives were in place for assessing gradients of effectiveness, and failures, of DRR approaches, particularly related to changes in disproportionality of impact.

The concepts related to governance and institutionalization of DRR and AA presented in a national level case study for Bangladesh clearly note the importance of locally-led approaches. In Zaman et al., it is noted that in recent years, programs and policies in Bangladesh have evolved to become more nuanced and detailed each in terms of more representative of certain populations and communities, more clearly noting a shift from improved response to a comprehensive perspective including resilience and risk reduction, with a cross-cutting theme of locally-led action. However, While locally led action and prioritization based on community demographics can be key enabling elements for AA in the context of a country with a stable and growing economic context, these are contingent upon having sufficient data and stable logistics (Kovács and Spens, 2007). Various questions remain related to the appropriateness, including the potential for unintended consequences, of developing AA for certain contexts, such as in conflict zones and fragile states (Maxwell, 2019).

Within these more complex socio-political contexts, such as refugee camps, informal settlements and during periods of active conflict, DRR strategies are arguably more important (compared to more stable contexts) if the intention of such programs is indeed to prioritize supporting the people that are most likely to be disproportionately affected by extreme weather events. This echoes the sentiment of providing appropriately scalable DRR and AA systems and normalizing steps for a pre-implementation assessment of both potential and likely effectiveness, and if there is a significant likelihood of failure or ineffectiveness, to incentivize designing strategies to reduce risk of "unexpected consequences" (Revi et al., 2014). Peters et al., note that not only do informal settlements experience disproportionately higher risk, but there are fewer potential actions to take in such contexts, leading to lower prioritization for operational DRR. Further, Peters et al., highlight the necessity to include multisectoral approaches in any program that is designed, reinforcing the importance of avoiding purely technocratic approaches and supporting the allocation of resources to facilitate substantive engagement not only with communities, but with all actors that comprise a sustainable or sufficiently actionable system.

It's clear that the movement away from purely data-driven approaches to DRR and AA is gaining traction. Each paper in this collection raises awareness for the importance of both multi-disciplinary and people centric approaches irrespective of the type of DRR approach. While this increased awareness is encouraging, the rise of AA approaches that are framed in the context of an oversimplified interface, app or toolkit demands critical reflection, validation and analysis to ensure they are not deemed successful or effective due primarily to the presence of a particular enabling environment—such as a people-centric approach or multi-disciplinary working groups.

It is critical to develop enhanced monitoring and evaluation metrics to decrease the risk of inappropriate candidacy for scaling up, however if scaling up or iteration occurs, this should be done only with sufficient understanding of caveats in both opportunities and constraints in their replicability [United Nations Office for Disaster Risk Reduction (UNDRR), 2022]. Moreover, with the development of people-centered strategies comes responsibility related to understanding the spectrum of expectations that may arise across groups of people regarding accountability and governance. For example, the humanitarian community, particularly the AA and DRR subsets within, should build capacities within their organizations to operate as translators and brokers between scientists, policy makers and decision makers at the community level. If these skills become part of the standard operating procedures within humanitarian organizations, there is an increased likelihood of enhanced understanding of both limitations and constraints of science in informing how to justify prioritization and the prioritization of resources based on risk. This type of justification should not fall only on the data developers or the data itself, even if doing so seems objective or "simplified." The reality of justifying who, where and when action is taken based on risk is inherently complex, multi-layered and uncertain. Appropriately complex, yet still actionable, approaches must be sought out in lieu of a perceived user-friendly or simplified data driven solution such as an app or interface. But influencing incentive structures around clarity of intention and evaluation of DRR programs will not be easy, and the current state is at least partially driven by a need to design *ad-hoc* solutions when situations of rapid rise in risk are indicated within models and forecasts. That said,

we are at a critical juncture as various national, regional and global efforts, such as The United Nations Early Warnings for All initiative, are designed and implemented to ensure they include specific attention to decreasing disproportionate impact of disasters across areas that experience similar levels of natural hazard magnitude.

It is critical to motivate a shift in incentives to normalize the description of AA and EWS to include how they can drive impacts, as well as consequences, for all populations within the area of implementation. Doing so will lead to clarity on the extent to which the most disproportionately impacted populations are intended to benefit, and how various actions will lead to differences in how such populations experience the intended benefit or consequences. This type of population disaggregation is also important for monitoring, evaluation and learning as it must be clear how specific groups, across various settings of risk and vulnerability, received benefit or perhaps even ended up experiencing the same or greater levels of disproportionate impact from similar magnitudes of climatic or geophysical hazards compared to if the DRR system was not implemented.

Steps must be taken now, across guidelines for standards and guidelines within science, policy and practice, to ensure that the traditionally underserved and systematically de-prioritized populations are centered in AA and EWS. A first step is to normalize discussions and create space for critical and perhaps uncomfortable dialogue related to the ability of AA and EWS to decrease, or not, the disproportionality within communities that need it the most. This must be assessed from research through policy to community engagement levels of AA and EWS, and must not focus only on the physical science elements. This means more than just getting the right people around the table, and ensuring that their opinions, experiences and perspectives lead to a material shift in the way AA and EWS systems are conceived, developed and implemented, as well as if and how they are revised or defined as candidates for scaling up or iteration.

Author contributions

AK, CR, and ER conceived and wrote this article. AK was responsible for the initial outline of the topic, with CR and ER contributing equally on the writing. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

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