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Editorial

Facing the storm: climate change and disaster risk reduction in Bangladesh

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Bangladesh stands at the nexus of acute climate vulnerability and pressing developmental challenges. As one of the countries most affected by climate change globally, it experiences a multitude of hazards, ranging from severe flooding and cyclones to salinity intrusion and droughts (Pal *et al*., 2016). These climatic adversities threaten the livelihoods of millions and jeopardize the future sustainability of the nation's agricultural systems, infrastructure, and public health. Therefore, a comprehensive approach to disaster risk reduction (DRR) aligned with climate change adaptation (CCA) is critical for enhancing resilience in Bangladesh. This editorial synthesizes the current state of knowledge regarding the implications of climate change on disaster risk in Bangladesh, the existing adaptation strategies, and the synergistic potentials of DRR and CCA.

Bangladesh's geographical location in the delta of the Ganges-Brahmaputra river system, coupled with its high population density, exacerbates its vulnerability to climate-induced disasters. The nation experiences a recurring pattern of extreme weather events, including monsoonal floods, cyclones, and sea-level rise, which threaten food security and livelihoods across the country (Kibria *et al*., 2017; Sammonds *et al*., 2021; Rabbani *et al*., 2022). Rising temperatures and shifting precipitation patterns further complicate agricultural production, especially for staple crops such as rice, exposing farmers to increased risks in yield and food security (Ali *et al*., 2021; Rabbani *et al*., 2022). For instance, the national adaptation programme of action (NAPA) highlights the urgency of addressing these climatic adversities through strategic action (Filho *et al*., 2017).

The health consequences of climate change in Bangladesh are profound and multifaceted. Infectious disease outbreaks due to changing vector ecology, heat stress, and water contamination from flooding are notable challenges (Rahman *et al*., 2019; Biswas *et al*., 2021). Public awareness of these health impacts has been low, which hampers proactive measures for adaptation (Kibria *et al*., 2017). Research indicates that the combination of socio-economic factors and environmental changes creates a significant burden on vulnerable populations, particularly women and marginalized communities (Ayeb-Karlsson *et al*., 2016; Hossen *et al*., 2021). Therefore, enhancing community engagement and public health preparedness is crucial for building resilience against these climate-related health challenges.

Efforts to enhance resilience in Bangladesh are not new; various strategies have been implemented at both the national and local levels. The Bangladesh climate change strategy and action plan (BCCSAP) aims at comprehensive disaster management that encompasses climate-resilient infrastructure and livelihood security (Filho *et al*., 2017; Sammonds *et al*., 2021). Initiatives funded by both governmental and international agencies include the construction of over 2,000 cyclone shelters and the reinforcement of 6,000 km of coastal

embankments (Filho *et al*., 2017). Yet, while infrastructural developments are critical, fostering community-based adaptation initiatives is equally important for sustainable resilience.

Research demonstrates that local community engagement in DRR and CCA exerts a positive influence on resilience building. Community-based approaches that empower individuals, particularly women and marginalized groups, help tailor adaptive responses to specific local needs (Abedin *et al*., 2013; Tanjeela and Rutherford, 2018; Shammin *et al*., 2022) and ensure broader participation in decision-making processes. For example, participatory strategies facilitate knowledge sharing regarding traditional coping mechanisms in the face of environmental stressors, which further empower households to develop their own adaptive capacities (Jabeen and Guy, 2015).

Socio-economic disparities play a decisive role in the ability of communities to respond to climate hazards. Gender inequality remains a significant barrier, as women often face systemic restrictions that limit their involvement in climate adaptation programs (Tanjeela and Rutherford, 2018; Hossen *et al*., 2021). Recognizing and addressing these disparities is crucial for equitable DRR and CCA efforts. Empowering women through educational initiatives and capacity building can lead to enhanced community resilience, as women typically manage household resources and are pivotal in implementing adaptive strategies (Hossen *et al*., 2021).

Additionally, marginalized groups, such as those living in urban slums, experience heightened vulnerability due to inadequate infrastructure and limited access to resources. Assessing urban resilience through indices like the climate disaster resilience index (CDRI) can inform targeted interventions that support the most vulnerable populations (Filho *et al*., 2017; Mukherjee *et al*., 2020; Sammonds *et al*., 2021).

Effective integration of CCA and DRR strategies has been underscored as a pathway toward building resilient communities. As outlined in various case studies from Bangladesh and beyond, aligning DRR initiatives with CCA has led to improved outcomes in resource management, infrastructure development, and community preparedness (Shammin *et al*., 2022). This approach ensures that both immediate disaster responses and long-term climate resilience are addressed, ultimately reducing vulnerability to adverse climate impacts.

Local examples of success demonstrate that the implementation of multiplier effects of adaptation strategies can significantly enhance resilience. For instance, the promotion of climate-resilient agricultural practices, soil health improvement, coupled with infrastructural developments, has led to improved food security and reduced disaster impact in vulnerable regions like Khulna and Satkhira (Kundu *et al*., 2020; Rabbani *et al*., 2022).

Looking forward, enhancing Bangladesh's adaptive capacity requires a multifaceted approach that includes strengthening policy frameworks, improving scientific research, and fostering collaboration among various stakeholders from government institutions to local communities. Initiatives like the National Adaptation Plan (2023-2050) envision proactive adaptation measures that can mitigate against climate risks while promoting sustainable development objectives (Hossain and Fernández-Güell, 2024). Moreover, global partnerships and funding initiatives aimed specifically at climate adaptation are essential for building local capacity and resilience. These partnerships should emphasize innovation and knowledge sharing to address the unique vulnerabilities faced by Bangladesh. Fostering a culture of resilience combined with continuous learning will be fundamental to ensuring that the most vulnerable communities in Bangladesh can weather the storms of climate change and reduce disaster risks effectively.

Bangladesh's experience underscores the critical intersectionality of climate change, disaster risk reduction, public health, and socio-economic equity. By continuing to develop integrated strategies and fostering community resilience, Bangladesh can potentially serve as a beacon for other climate-vulnerable nations navigating similar challenges.

Ethical approval and informed consent

Not applicable.

Data availability

Not applicable.

Conflict of interest

None to declare.

Author's contribution

Conceptualization, formal analysis, writing-original draft preparation, review and editing: Md. Anwarul Abedin. The author has read and approved the final version of the published editorial.

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