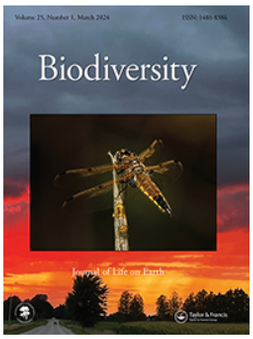

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Flooding crisis in Bangladesh: urgent measures required

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EDITOR'S CORNER

Flooding crisis in Bangladesh: urgent measures required

Floods are among the most common and devastating natural disasters in the world. Unfortunately, floods have become an alarming regularity in riverine Bangladesh, with significant flood events in 2004, 2007, 2009–2014 and 2020. According to the World Health Organization (WHO 2020), the global impact of floods between 1998 and 2017 affected over 2 billion people, underscoring the severity and widespread nature of this natural disaster.

Bangladesh, situated in a vast river delta, barely above sea level, contends with natural challenges like flooding rivers and bay-borne cyclones. The Ganges, Brahmaputra and Meghna rivers, along with their distributaries and tributaries, also contribute to the high vulnerability of Bangladesh to flood. To combat these flood issues, the country has developed defences over time. These measures include warning systems, storm shelters, salt-resistant crops, and a network of 139 coastal polders – 5700 km of protective walls shielding farmland from inundation (Cornwall 2018). The escalating threats of floods, salinization, and waterlogging pose dire risks to over 35 million individuals inhabiting Bangladesh's coastal region. These challenges imperil not just lives but also the sustenance and livelihoods of those who live and work within this vulnerable zone. Urgent attention, action and mitigation strategies are required to safeguard the populace and their economic activities (Barbour et al. 2022).

Constant and recurring flooding in Bangladesh creates a significant hazard to the country's socioeconomic and environmental stability. With its complex riverine systems, monsoonal climate, and low-lying topography, the country is particularly vulnerable to inundation, making it one of the most flood-prone regions in the world.

Flooding in Bangladesh can be classified into four main types based on the source of water and the processes involved: flash floods, local rainfall floods, monsoon river floods, and storm-surge floods. These floods occur almost yearly due to Bangladesh's unique geographical setting as the most downstream country in the Hindu-Kush-Himalayan (HKH) region (Uddin, Matin, and Thapa 2021). One of the worst flood events, the one in 1998, saw 68% of Bangladesh affected (77,700 km^2) and claimed 2379 lives. The flood destroyed 3.2 million tons of crops and caused financial losses of 40,000 million BDT. This calamity revealed the nation's vulnerability to nature's forces (Uddin and Matin 2021), and since then annual flood events have been tracked and continue to be significant (Figure 1). According to the Grantham Research Institute on Climate Change (2023), approximately 60% of Bangladesh's population faces an elevated flood risk, and about 45% of the population is exposed to high fluvial flood risk, the highest at-risk population proportion in the world. The adverse impacts of climate change further escalate these risks, resulting in heightened financial and humanitarian costs associated with damages in Bangladesh.

The inundation experienced in Bangladesh during the 2017 flood resulted in substantial harm to agricultural crops and various infrastructures. The associated damages amounted to 2.44% of individual income, causing a noteworthy 21.49% reduction in annual earnings (Shubho et al. 2022). As per a UNICEF report (2023), a comprehensive assessment indicated that 2.4 million individuals were subjected to the adverse impacts of the recent flood events occurring between 5 and 10 August 2023, in four markedly affected districts – Chittagong, Bandarban, Ragamati, and Cox's Bazar. In the more recent occurrence of flash floods in 2022, an estimated 90% of the total area in the Sylhet division was submerged. Factors contributing to this event included heavy rainfall, hill slopes descending from upstream areas, sedimentation of canals and rivers, inappropriate canal and river digging, and suboptimal management of the drainage system in Sylhet city (Shamsul and Kashima 2022).

Additionally, economic losses from floods are high; coupled with the erratic weather induced by climate change, Bangladesh is suffering. The erratic weather events have included drought events and hailstorms as well as flooding, leading to rice crop losses of $228 million between 2009 and 2014. The 2004 and 2007 floods caused major agricultural loss in Dhaka and Rajshahi, with the highest economic loss in the Barisal division (Biswas 2018). The 2017 flash flood in the Sunamganj district resulted in damage to about 90% of agricultural crops and fish production, impacting the livelihoods of local people (Chakraborty et al. 2021).

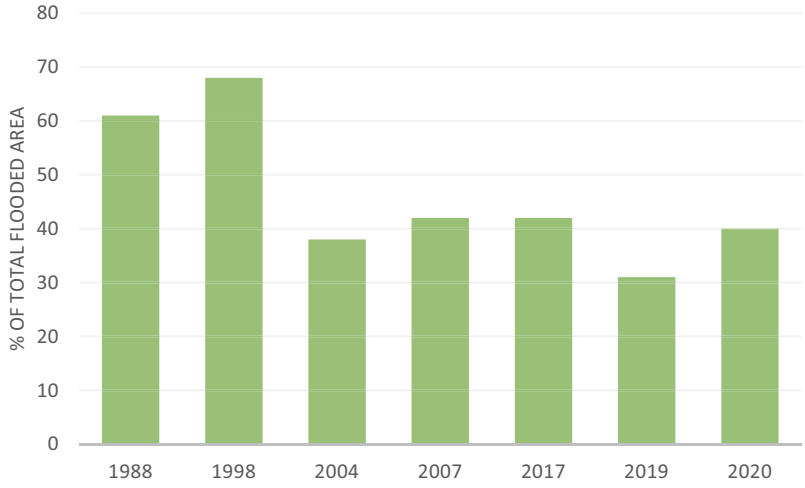

Figure 1. Percentage of total flooded area (1988 to 2020) in Bangladesh (data from FFWC and BWDB 2020).

Tragically, death due to flooding events has also been a recurrent theme in Bangladesh's history. The relentless force of the water has claimed countless lives, often due to the sudden onset of floods, inadequate infrastructure, and the vulnerability of impoverished communities. When summed up, Bangladesh has experienced a total of 86 floods since 1972, resulting in the deaths of 42,279 people (Baten, González, and Delgado 2018). The country has worked hard to develop disaster management programmes. However, we are writing this editorial to highlight the challenges faced in Bangladesh as a result of elevated greenhouse gas emissions, such as sea level rise, erratic weather events, and increased precipitation.

Floods are increasing in Bangladesh due to anthropogenic climate change, land-use changes, and demographic pressure. July 2023 broke unofficial records for the hottest average global temperatures on a single day and month, and 2023 will almost certainly be the hottest year on record (Witze 2023). Elevated temperatures increase evapotranspiration and increase the capacity of the atmosphere to hold and redistribute water, leading to more intense precipitation events. Land-use changes such as deforestation and urbanization reduce water storage capacity and exacerbate flood hazards. Climate impacts, including higher temperatures and more intense precipitation, contribute significantly to increased flood exposure (Ward et al. 2020). Low-income populations, particularly those in low-lying coastal areas, are most at risk from flooding. The government of Bangladesh has recognized the recurring issue of flooding as a significant concern affecting the entire population, and it has taken essential measures to address disaster management by allocating funds for relief efforts. According to United Nations (UN) terminology, disaster risk governance is the system of institutions, mechanisms, policy, and legal frameworks and other arrangements to guide, coordinate, and oversee disaster risk reduction and related areas of policy (UNDRR 2017). However, there have been critiques regarding the government's response to these challenges, highlighting the importance of a well-functioning democracy for effective emergency response. It is imperative for the government to implement a combination of structural and non-structural flood management strategies and to prioritize community-based vulnerability and adaptation initiatives. Additionally, there is a need to re-examine the feasibility and affordability of comprehensive flood and water management systems, considering the increased risks associated with climate change. The government of Bangladesh has publicly recognized the need to address in-country factors contributing to flooding, such as land use changes, and to implement flood susceptibility mapping and management programmes.

Bangladesh is not alone in facing challenges related to flooding. Global data, such as that provided by WHO, emphasizes the widespread impact of floods on human populations and the alarming loss of life due to extreme weather events. In 2006, the United Nations Platform for Space-based Information Disaster Management and Emergency Response (UN-SPIDER) was founded to face flooding challenges by coordinating, facilitating and supervising the formulation and implementation of the National Policy and the National Risk Management Plan worldwide (IDNDR 2006). Various interventions, such as river management, establishment of flood defence systems, creation of bypass channels, and construction of reservoirs, have the potential to modify the local flood risk landscape. However, to effectively address the flooding crisis worldwide, policymakers, government agencies, and international

organizations must collaborate closely. We hope that this editorial will bring to light the serious flooding issues in Bangladesh and inspire individuals to get involved and support finding solutions.

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Md. Jahidul Islam is a dedicated author affiliated with Barishal Engineering College in Barishal-8202, Bangladesh. He brings a wealth of expertise in civil and environmental engineering and has been actively contributing to the literary field. During his undergraduate studies in civil engineering, he delved into hydrological science, which inspired him to embark on research in the domain of flood studies.

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Patient and public involvement

Patients and/or the public were not involved in the design, conduct, reporting, or plans for dissemination of this research.

Data availability statement

The article contains all the data necessary to support the results. Thus, no additional data sources are required.

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