

Challenges, Issues, and Climate-Driven Impacts of Geohazards on Society and Sustainability of Bangladesh: Perspectives from Media Coverage

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Abstract: This study explores the climate-driven challenges and societal implications of geohazards in Bangladesh, focusing on media-reported events and their relationship with rainfall patterns. Recent climatic changes have significantly influenced the frequency and intensity of geohazards such as floods, cyclones, landslides, lightning, and river erosion posing growing threats to infrastructure, livelihoods, and sustainable development. While media reports serve as a key source of hazard documentation, many reports in national dailies are imprecise or lack sufficient detail, making it difficult to fully understand the real-world impacts. Therefore, this research identifies the limitations of existing media coverage and aims to address research gaps related to the challenges, issues, and societal impacts of geohazards. The study analyzes 17 (seventeen) years of meteorological data and nine years of media-reported geohazard events to assess the influence of precipitation patterns, particularly during the monsoon season (June–September), on hazard occurrences. The findings confirm that monsoonal rainfall is a primary driver of geohazards, with river erosion, lightning, and tornadoes being among the most frequently reported. Housing and crop damage were found to be the most significant consequences, disproportionately affecting village-level communities, economy and livelihood. This research emphasizes the urgent need for an integrated approach for geohazard data collection, combining scientific and media sources. It recommends the development of a centralized and reliable media archive and establishment of a National Climate database for hazard monitoring, reporting and the incorporation of climate-sensitive strategies in national planning and policy implementation. Ultimately, the study supports Bangladesh's sustainable development efforts by enhancing understanding of how precipitation-linked hazards affect society and proposing practical measures for risk reduction, adaptation and resilience building.

Keywords: *Geohazards, Climate change, Monsoonal rainfall, Media reports, Bangladesh.*

Introduction

Bangladesh, situated in a low-lying deltaic region with a high population density, is extremely vulnerable to natural hazards such as floods, cyclones, landslides, and river erosion and other geohazards. The unprecedented frequency and severity of these types of geohazards are linked to climate change and the climatological nature of the country's tropical monsoon climate (Hossain and Toll, 2013). The

monsoon season, which contributes the major portion of annual rainfall, plays a critical role in intensifying the occurrence of these geohazards (Mahadi and Hossain, 2014). River erosion, lightning, and tornadoes are some of the most frequently occurring hazards among the most reported hazards in the media, with significant damage to housing, infrastructure, and crops, which disproportionately affect rural communities. The socio-economic impact of these hazards is so significant, as they disrupt livelihoods, food security, and infrastructure, exacerbating vulnerability (Ahmed et al., 2014).

However, media reporting always meets with under-reporting and inconsistent data, critical to the assessment of the geohazards and its impacts. This research aims to analyze the relationship between rainfall patterns and geohazard occurrences or risk analysis impacting sustainability in Bangladesh, with a focus on bridging the gaps in hazard data collection and improving media reporting for better disaster preparedness and policymaking.

Methodology

This is a unique study based on 17 years of meteorological data gathered from the Bangladesh Meteorological Department (BMD) and nine years of geohazard data extracted from the national media reports. The main aim is to find out the relationship between correlations between variations in rainfall patterns especially during the monsoon season and the occurrence of geohazards such as geohazards floods, landslides, lightning and river erosion (Ahasan et al., 2008). The data were analyzed for trends in annual, seasonal, and monsoonal rainfall. Specifically, the seasonal variations in rainfall during the pre-monsoon, monsoon, and post-monsoon periods were assessed to identify the periods most prone to hazard occurrences (Mahadi and Hossain, 2014). Media-reported events were categorized by hazard type, and the associated impacts such as fatalities, injuries, and damages on infrastructure and crops were analyzed.

Various Statistical tools, including correlation analysis and regression models, were applied to examine the relationship between the monsoonal

rainfall and the intensity of geohazards as well as its occurrences. Also, Graphical tools were used to visually represent the temporal trends and seasonal variations in rainfall and hazard events, with a particular focus on understanding how monsoonal rainfall influences the severity of geohazard events (Hossain and Toll, 2013).

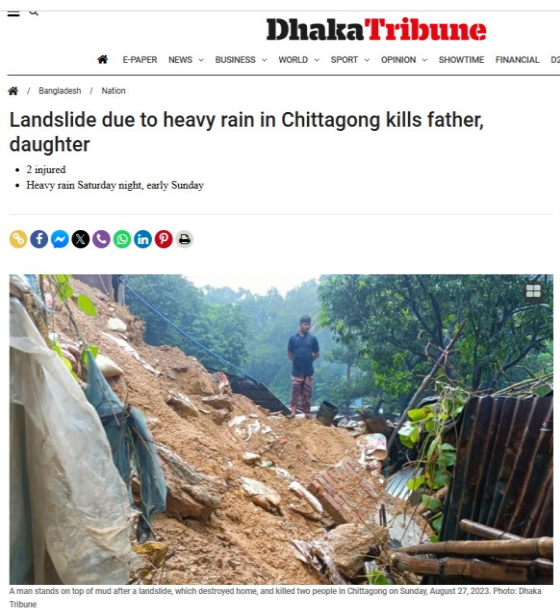


Figure 1, Landslide due to heavy rain in Chittagong.

Results and discussion

The results show a strong correlation between monsoonal rainfall (June–September) and geohazard occurrences in Bangladesh. River erosion, lightning, and tornadoes are the most frequently reported hazards, with house and crop loss being the major impacts (Ahmed et al., 2014). As the monsoon provides most of the annual rainfall, these hazards intensify, particularly river erosion and lightning (Ahasan et al., 2008). Village-level administrative units are the most affected, experiencing the highest damage frequencies. This aligns with Hossain and Toll's (2013) findings, which highlight the heightened vulnerability of these regions, where intense rainfall triggers landslides in hilly areas and floods elsewhere, resulting in significant socio-economic losses, especially in rural communities.

The research highlights limitations in relying solely on media reports, which often underreport geohazards and obscure the true extent of damage (Cutter and Emrich, 2008). Despite this, integrating media information with scientific meteorological data can offer a more complete understanding of geohazard impacts, improving hazard monitoring, preparedness, and policy development. The most significant socio-economic impacts identified were house loss and crop damage. These effects bore a disproportionate relation to rural populations. These findings align with those of Ahmed et al. (2014), who similarly reported that heavy monsoonal rainfall in other parts of Bangladesh led to widespread destruction, disrupting livelihoods and agricultural productivity.

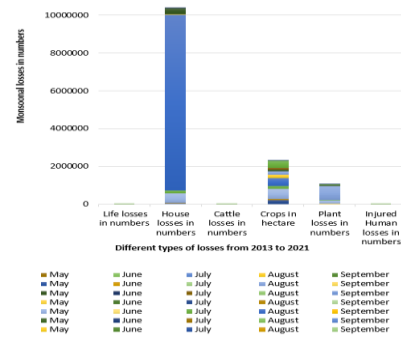


Figure 2, Monsoonal losses with respect to different types of hazard losses of Bangladesh, 2013 to 2021.

Conclusion

Monsoonal rainfall is a major driver of geohazards in Bangladesh, with the most severe socio-economic impacts—particularly housing and crop losses—occurring during the monsoon season. This paper highlights the need for an integrated hazard-reporting approach that combines scientific data with media insights to enhance understanding and preparedness. It recommends strengthening disaster risk management, improving early warning systems, and incorporating climate-sensitive strategies into national policies. These measures will improve Bangladesh's resilience to geohazards and help reduce the socio-economic impacts of climate-induced disasters.

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