Development Compilation

Bangladesh Institute of Professional Studies
https://bips.bd/journal
ISSN: 2072-3334 (Print), ISSN: 2663-1547 (Online)

Volume 19 | Issue 1 | Page: 45-55 | July 20, 2026 | Article |

Climate-Induced Internal Migration and Urban Challenges in Bangladesh: Evidence from Secondary Sources

Arpita Das[1]

1. School of Ecology and Environment Studies, Nalanda University, India. Email: arpi4462@gmail.com

HOW TO CITE

Das, A. (2026). Climate-induced internal migration and urban challenges in Bangladesh: Evidence from secondary sources. *Development Compilation, 19*(1), 45–55. https://bips.bd/journal

ARTICLE HISTORY

Received: 22 June 2026
Revised: 09 July 2026
Accepted: 13 July 2026
Available online: 20 July 2026

Abstract

Bangladesh is widely recognized as one of the most climate-vulnerable countries in the world, where recurring floods, cyclones, riverbank erosion, salinity intrusion, drought, and sea-level rise are increasingly driving internal population displacement. This study examines the relationship between climate-induced migration and urban challenges in Bangladesh using secondary data sources, including national datasets, disaster databases, meteorological records, and peer-reviewed literature. The study synthesizes evidence from institutions such as the Bangladesh Bureau of Statistics (BBS), Bangladesh Meteorological Department (BMD), Flood Forecasting and Warning Centre (FFWC), International Displacement Monitoring Centre (IDMC), and global climate repositories. Findings indicate that climate hazards significantly contribute to rural livelihood disruption, forcing large-scale migration toward major urban centers such as Dhaka, Chattogram, and Khulna. However, this migration intensifies existing urban vulnerabilities, including slum proliferation, housing shortages, informal employment, inadequate water and sanitation services, and increased health risks. The study further highlights that climate migration is multi-causal in nature, interacting with poverty, economic opportunities, and structural inequalities. By integrating climate exposure data with migration and urban development indicators, this paper demonstrates that climate-induced internal migration is not only a rural adaptation strategy but also an emerging urban governance challenge. The study contributes to the growing discourse on climate mobility by providing a synthesized evidence base for Bangladesh and emphasizing the need for integrated rural–urban climate adaptation policies.

Keywords: Climate, Migration, Climate change, Urban Planning, Urban Development.

1. Introduction

Bangladesh stands as one of the most climate-vulnerable nations in the world. It is vulnerable to climate change impacts, experiencing threats ranging from sea-level rise, cyclone intensification, flooding, river erosion, and salinity intrusion. The above effects from climate change are gradually causing the displacement of many communities within the countryside, leading to mass migration in the South. Environmental migration within Bangladesh is being seen more and more as an urban adaptation issue that is linked to several health hazards and economic and social problems for the affected people living in slum areas, necessitating a community-based approach to improve their adaptive capacity (Sarker, 2025). Although community interventions provide interesting avenues towards addressing the needs of climate migrants, their success continues to be hindered by governance fragmentation, resource shortages, and inadequate knowledge regarding the complex urban issues posed by internal migration. The sudden influx of climate refugees to urban areas like Dhaka, Chittagong, and Khulna adds more pressure on housing, water and sanitation systems, health care provision, job creation, and social stability in the cities. Comparable trends of displacement resulting from climate change have been witnessed in neighbouring regions of South Asia, where the entire village of Meenakshipuram in India's state of Tamil Nadu was completely deserted due to persistent drought conditions, lack of water availability, and failing agriculture owing to socio-economic weaknesses and poor governance (Moharaj et al., 2025). The rural-to-urban migration occurring in Bangladesh is not just a replication of India's experience; rather, it exacerbates already-existing urban problems like the development of slums. In addition, climate-related internal migration in Bangladesh has a huge impact on the mental wellbeing of adolescents, who are extremely vulnerable populations in urban slums, with a prevalence rate of depression among affected migrants being 84%, 30% of which were severe forms of depression, versus 54.77% in the non-migrant adolescent population, underlining the importance of providing psychological interventions targeting this demographic in particular (Siddik et al., 2025). It is observed from literature that migration to cities within Bangladesh is mostly driven by economic opportunities for men, and family responsibilities for women; however, recent developments in industries such as garment manufacturing have begun attracting more women migrants to urban areas (Biswas et al., 2019).

While many studies have focused on why people move (push and pull factors), very few have been conducted on what takes place years later when they settle in the city. Resettlement outcomes include integration into the labor force of the city or whether they continue to face discrimination throughout their lives. In addition to the above, some are "trapped" by their poverty that makes moving out difficult, while others remain out of a deep spirituality associated with their "ancestral home". In addition, current theories often view a "migrant family" as one unit. However, no studies have examined the plight of various members of the family. This synthesis of secondary evidence seeks to illuminate these underexplored urban dimensions in Bangladesh. This study aims to analyse the scope and trends of climate-induced internal migration, focusing on the multiple urban problems associated with such migratory flows, including housing issues, service provision challenges, integration difficulties, and household-level inequalities through an in-depth examination of available literature and reports.

2. Theoretical Framework

This study is grounded in a **multi-theoretical integrated framework** combining migration theory, climate vulnerability, and urban systems theory.

2.1 Push–Pull Migration Theory

The foundation of climate migration in Bangladesh can be explained through the **Push–Pull model**. Climate hazards such as floods, river erosion, salinity intrusion, and drought act as **push factors**, while urban employment opportunities, infrastructure, and services act as **pull factors**. However, this study emphasizes that climate migration is not purely environmental but structurally economic and socially mediated.

2.2 New Economics of Labour Migration (NELM)

NELM explains migration as a **household-level risk diversification strategy**, where families send members to cities to stabilize income in response to agricultural shocks caused by climate variability. This is highly relevant in Bangladesh's rural agrarian economy.

2.3 Climate Vulnerability and Risk Framework (IPCC-based)

The IPCC framework defines risk as a function of:

- **Hazard (climate events)**
- **Exposure (population in vulnerable zones)**
- **Vulnerability (socio-economic fragility)**

This study applies this model to show how coastal, riverine, and drought-prone regions generate differential migration pressures.

2.4 Sustainable Livelihoods Framework (SLF)

SLF explains migration as a response to **asset depletion**, particularly:

- Natural capital (land loss, salinity)
- Physical capital (infrastructure destruction)
- Financial capital (income loss)

Migration becomes a coping strategy when livelihood assets collapse.

2.5 Urban Systems & Resilience Theory

Urban destinations are treated as **stress-absorbing systems**. Rapid in-migration reduces system resilience by increasing demand on housing, sanitation, health, and employment systems, creating **cumulative urban vulnerability**.

Conceptual Linkage

Climate stress → Livelihood loss → Migration decision → Urban influx → Urban service pressure → Slum formation & inequality

3. Methodology

This study adopts a **secondary data–based descriptive and integrative research design** to examine the relationship between climate-induced internal migration and urban challenges in Bangladesh. The research synthesizes data from multiple authoritative secondary sources, including the Bangladesh Bureau of Statistics (BBS), Bangladesh Meteorological Department (BMD), Flood Forecasting and Warning Centre (FFWC), Soil Resources Development Institute (SRDI), Centre for Environmental and Geographic Information Services (CEGIS), International Displacement Monitoring Centre (IDMC), EM-DAT disaster database, World Bank Climate Change Knowledge Portal, and relevant peer-reviewed literature. Climate exposure variables such as flood frequency, cyclone intensity, riverbank erosion, salinity intrusion, drought trends, and sea-level rise are compiled alongside migration indicators including rural–urban mobility patterns and disaster-induced displacement estimates. These are further linked with urban outcome variables such as slum growth, housing pressure, informal employment, and access to basic services. The analysis is conducted through systematic narrative synthesis and thematic content analysis, allowing cross-comparison of climate risks, migration flows, and urban vulnerability patterns across regions and time periods. No primary data collection or econometric modeling is employed due to reliance on aggregated datasets; instead, the study emphasizes triangulation of evidence across institutional reports to ensure validity and reliability of findings.

4. Literature Review

Climate change is a significant push factor for population movement within Bangladesh. In a world characterized by increasing global temperatures and extreme weather conditions, deltaic nations such as Bangladesh are experiencing a situation where displacement challenges exceed their coping abilities. While there is an acceptance of climate migrants among local experts in Bangladesh, what they have highlighted is that the migration that takes place is never exclusively due to climate change. Rather, it is always part of a larger process involving economic considerations (Stojanov et al., 2016). This multi-causal nature of migration is evident not only in Bangladesh but also in other climate-vulnerable regions. For Instance, Andrianandrasana et al. (2025) demonstrate that climate change-related migration from the dry areas of Madagascar due to severe poverty and famine is directly related to forest destruction and illegal farming activity within the protected zone of the Menabe Antimena area. This trend is reflective of a global trend whereby environmental degradation and displacement interact in a vicious cycle, especially in biodiversity hotspots within the developing world, where local populations rely almost entirely upon natural ecosystems for their subsistence. Studies have found that whereas about 22% of the people have experienced climate migration as a result of various stress factors like flooding and droughts, almost 50% of the people have remained immobile, usually out of their strong sense of culture and the socio-economic conditions of their homeland (Appiah, 2025). According to Rahman & Rahman (2015), the coastal towns in Bangladesh are extremely vulnerable to climatic changes-related threats like cyclones, tidal floods, and salinity infiltration because of their geographical locations, which makes it imperative for Bangladesh to shift its approach towards sustainability through urban planning and development.

Climate change migration is identified by Kalukusu (2025) as a global health issue that leads to health inequalities as well as increased exposure to infections, poor mental wellbeing, and undernourishment, especially within disadvantaged communities within the Global South. Research findings show that although social-economic factors including employment and education play a vital role in migration in coastal Bangladesh, environmental pressures, especially the loss of agricultural lands due to soil erosion as well as changes in agriculture practices to shrimp farming, act as secondary factors promoting migration (Bernzen et al., 2019).

Gupta et al. (2025) through an analysis of 65 studies have found that although climatic stressors like rise in sea level, cyclones, and floods play the role of main causes of displacement in India and Bangladesh, their efforts are being hampered greatly by socio-economic vulnerabilities in addition to the fact that there is no formal law to acknowledge the issue of climate migrants. Tietjen et al. (2023) highlight that challenges faced by migrants who settle in informal urban areas include poor or non-existent infrastructure such as water, sanitation and drainage systems, lack of access to services such as health care and education, as well as increased exposure to climate change risks such as floods, landslides and heat waves. . As regards the fast-developing cities such as Dhaka, Chittagong, and Khulna, the combination of climate-induced migration and existing pressure on the infrastructure results in cumulative vulnerability as the risk gets transferred from rural areas to urban fringes without actually minimizing human exposure to climate risks. Rana and Ilina (2021) state that although climate change induced migration has been seen as an adaptation mechanism, it causes many negative urban impacts in developing countries such as Bangladesh by leading to slum growth and heavy pressure on the city's infrastructure and governance.

The research carried out in the Korail slums of Dhaka shows that climate-induced migrants have their own weaknesses, as they migrate from one environmentally dangerous place to another without having the economic resources, education, and connections that non-climate induced migrants possess (Adri, 2015). According to Naser et al., (2019), although climate change displacement in Bangladesh may act as an appropriate form of adaptation for vulnerable communities within the region, the current policy framework fails to integrate a full-fledged human rights perspective required for protecting the displaced. Finally, the social and political consequences of such migration warrant attention. While floods and property loss increase the likelihood of internal migration,

Petrova (2021) demonstrates that these movements are not necessarily associated with higher levels of protest activity compared to other forms of internal migration.

5. Findings and Discussion

5.1. Flood (Flood frequency, affected area, affected population, crop loss, duration**)**

The primary institutional sources for flood data in Bangladesh are the **Bangladesh Water Development Board (BWDB)** and its **Flood Forecasting and Warning Centre (FFWC)**. The FFWC publishes annual flood reports documenting inundation extent, water levels, and affected districts across Bangladesh (Flood Forecasting and Warning Centre [FFWC] & Bangladesh Water Development Board [BWDB], 2020). These reports also include historical trend data showing the percentage of the country's total area flooded each year from 1988 onwards, making them an essential time-series source for tracking flood frequency (FFWC & BWDB, 2020).

The scale of flood impacts in recent years is substantial. In June 2022, catastrophic flash flooding struck northeastern Bangladesh; FFWC data confirmed that around 94% of Sunamganj district and over 84% of Sylhet district were submerged, with more than 7.2 million people affected and hundreds of thousands of households isolated by floodwaters (International Federation of Red Cross and Red Crescent Societies [IFRC], 2023). In August 2024, floods in Feni, Cumilla, Chattogram, and adjoining southeastern districts affected an estimated 5.8 million people, displaced 502,501 individuals into 3,403 shelters, and damaged approximately 296,852 hectares of crops (Ministry of Disaster Management and Relief [MoDMR], 2024).

Economic losses from floods are also well documented. The 2017 flood caused damages equivalent to 2.44% of individual income and resulted in a 21.49% reduction in annual household earnings among affected populations (Shubho et al., 2022, as cited in Kanta et al., 2024).

5.2. Cyclone and Storm Surge (Cyclone frequency and intensity, storm surge height, affected population, fatalities, damaged structures**)**

Historical cyclone records from the **Bangladesh Meteorological Department (BMD)** and the Regional Specialized Meteorological Centre (RSMC), New Delhi, document that 89 cyclones made landfall on Bangladesh's coast between 1891 and 2015, of which 47% were cyclonic storms and 53% were severe cyclonic storms (International Federation of Red Cross and Red Crescent Societies [IFRC], 2021). Over the decade prior to 2021, cyclones affected more than one million people in Bangladesh whenever they made landfall, with approximately 35 million people living in vulnerable coastal communities (IFRC, 2021).

The deadliest cyclone on record since Bangladesh's independence was Cyclone Gorky (1991), which triggered storm surges of approximately 6.7 metres and claimed around 140,000 lives. By comparison, Cyclone Sidr (2007) generated approximately 6.1-metre storm surges but resulted in far fewer deaths (approximately 3,360), though it caused inflation-adjusted damage of $1.78 billion — equivalent to 2.6% of GDP in 2007 (Takagi et al., 2025). In April 1991, Cyclone Gorky also left 15 million people affected and caused approximately USD 1.8 billion in damage according to EM-DAT records (Hoque et al., 2022).

Cyclone Amphan (2020) is another important reference event: 154 unions across 34 upazilas were inundated, 2.6 million people were affected, 26 deaths were recorded, and over 200,000 houses were fully or partially damaged, with the worst impacts in Satkhira and Jashore (IFRC, 2020).

For aggregate disaster statistics, **EM-DAT** is the key source. Between 1950 and 2017, Bangladesh experienced 326 natural disasters in total, resulting in over 633,614 deaths, more than 446 million

household-level impacts, and US$19.54 billion in total damages (Centre for Research on the Epidemiology of Disasters [CRED], 2017, as cited in Rahman, 2020).

5.3. Riverbank Erosion (Annual land loss (hectares), displaced households, erosion-prone upazilas, char-area displacement, migration patterns**)**

Riverbank erosion is among the most persistent drivers of displacement in Bangladesh. Along the country's river bank lines, 283 locations, 85 towns, and growth centres are classified as vulnerable to erosion, with approximately 15 to 20 million people at risk from its effects (Hutton & Haque, 2003; Islam & Rashid, 2011, as cited in Bhuiyan et al., 2017). A large share of those made homeless by erosion migrate to cities or nearby towns and settle in urban slum areas (Centre for Environmental and Geographic Information Services [CEGIS], 2009; Das & Bela, 2011, as cited in Bhuiyan et al., 2017).

The major rivers — Jamuna, Ganges, and Padma — annually consume several thousand hectares of floodplain, rendering thousands of people landless and homeless each year (BWDB, as cited in UNFCCC, 2012). In 2019 alone, approximately 2,270 hectares of land were lost to riverbank erosion and at least 5,081 families were displaced (Ministry of Disaster Management and Relief, 2019, as cited in Ferdous et al., 2021). In Bangladesh overall, 24 out of 64 districts are classified as climate-displacement-prone, and approximately 500,000 people experience displacement annually (Ferdous et al., 2021).

Socioeconomic consequences of erosion are severe. A study along the Sandhya River in Barishal found that 65% of lost land was agricultural in nature, 73% of erosion-affected households migrated to urban centres, and 45% fell into debt (Hossain et al., 2025).

Erosion monitoring and forecasting is conducted by **CEGIS**, which publishes periodic technical reports on erosion along the Jamuna, Padma, and Meghna river systems (CEGIS, 2009).

5.4. Salinity Intrusion (Soil salinity extent (hectares), salinity-affected districts and upazilas, drinking-water stress, agricultural losses, projected increase**)**

Data on salinity is collected primarily by the **Soil Resources Development Institute (SRDI)** under the Ministry of Agriculture, and by the **Water Resources Planning Organization (WARPO)**. SRDI monitors salinity at stations across the southwestern and coastal regions, with some station records going back to 2004 (Murshed et al., 2025).

Between 1973 and 2009, soil salinity in Bangladesh increased from 0.833 million hectares to 1.056 million hectares — a rise of approximately 26% over 35 years. Out of approximately 1.689 million hectares of coastal land, around 1.056 million hectares across 49 upazilas in 19 districts are now affected by soil salinity of varying degrees (Soil Resources Development Institute [SRDI], 2010). New salinity ingression has also been recorded in previously unaffected inland districts, including Narail, Jashore, Barishal, Gopalganj, and Jhalakati, as well as major encroachment in Bhola, Patuakhali, Khulna, and Bagerhat (SRDI, 2010).

Climate projections compound the problem. Dasgupta et al. (2015) estimated, using SRDI salinity data from 41 monitoring stations for the period 2001–2009, that soil salinity across coastal Bangladesh will increase by a median of 39% by 2050 as a result of rising sea levels, temperature increases, and reduced freshwater river flows. A notable limitation is that SRDI's latest comprehensive coastal dataset is now over 14 years old, leaving a significant gap in up-to-date coverage (Murshed et al., 2025).

5.5. Drought and Heat Stress (Rainfall anomaly, temperature trends (°C/decade), SPI/SPEI drought indices, heatwave frequency, agricultural productivity loss**)**

The **Bangladesh Meteorological Department (BMD)** is the primary source of historical and current rainfall and temperature data. BMD operates a network of meteorological stations across all seven hydrological regions of Bangladesh (Kamruzzaman et al., 2022). The **World Bank Climate Change Knowledge Portal** provides additional sub-national climate projections for Bangladesh (World Bank Group, 2024).

Annual precipitation across Bangladesh averages approximately 1,700 mm nationally, but the northwestern Barind Zone — covering Rajshahi Division and its 16 districts — is among the driest regions, with annual rainfall below 1,400 mm (Kamruzzaman et al., 2022). A spatiotemporal drought analysis using 39 years of BMD data (1980–2018) from 29 meteorological stations found that drought frequency and intensity have increased across multiple physiographic zones, with the northwest and southwest regions showing the most pronounced trends (Kamruzzaman et al., 2022).

Temperature trends show a consistent upward pattern. Monthly maximum and minimum temperatures in Bangladesh have risen at rates of 0.35°C per decade and 0.16°C per decade respectively, based on BMD station data (Khan et al., 2019, as cited in Islam et al., 2024). Rainfall in the western region can reach up to 40°C during the pre-monsoon period, and annual temperature variability is high across the country's seasonal mosaic (Islam et al., 2025).

On heat stress, the current annual likelihood of a heatwave — defined as a three-day period in which daily temperature exceeds the long-term 95th percentile — is between 2% and 3%, but the median number of days per year with a Heat Index above 35°C is approximately 70, indicating widespread thermal stress for humans, agriculture, and ecosystems (World Bank Group, 2022, as cited in Ayesha et al., 2024).

5.6. Sea-Level Rise and Coastal Vulnerability (Local sea-level rise rates (mm/year), projected inundation area (km²), population at risk, vulnerable coastal districts, embankment exposure**)**

The **IPCC Sixth Assessment Report (AR6)** projects a global sea-level rise of up to 2 metres by 2100 under high-emission scenarios, posing major risks to Bangladesh's 720-km Bay of Bengal coastline (IPCC, 2021; Mitra et al., 2023). Local sea-level rise rates in Bangladesh substantially exceed the global average of 3.6 mm/year; observed rates along Bangladesh's coast range from 5.90 mm/year to 10.09 mm/year (Rahman et al., 2025). A 50-cm sea-level rise alone could inundate 11% of Bangladesh's land area and displace approximately 15 million people (Rahman et al., 2025).

GIS-based modelling under IPCC AR6 shared socioeconomic pathway (SSP) scenarios estimates that between 800 and 2,800 km² of Bangladesh's land may be permanently inundated by 2150, affecting between 0.5 and 2.8 million people in direct inundation terms (Mitra et al., 2023).

The **Bangladesh Delta Plan 2100** provides the government's official long-term projections. Under extreme scenarios, flooding extent in the central Coastal Zone will increase by 6–8% from its 2005 base by 2050 and 2100 respectively, while the western Coastal Zone will face 5–6% additional flooding over the same period (General Economics Division, Bangladesh Planning Commission, 2018). Rising sea levels will also accelerate salinity intrusion by impeding freshwater availability along the coast (General Economics Division, Bangladesh Planning Commission, 2018).

The districts identified as facing the highest risk of sea-level-rise-induced inundation by 2100 — consistently across multiple modelling studies — include Jhalakathi, Pirojpur, Barisal, Bagerhat, Barguna, Bhola, Chandpur, Chattogram, Cox's Bazar, Feni, Gopalganj, Jashore, Khulna, Laxmipur, Narail, Noakhali, Patuakhali, Satkhira, and Shariatpur (Mitra et al., 2023; Rahman et al., 2025).

6. Conclusion

This study demonstrates that climate-induced internal migration in Bangladesh is a multi-dimensional phenomenon driven by the interaction of environmental hazards and socio-economic vulnerabilities. Floods, cyclones, riverbank erosion, salinity intrusion, drought, and sea-level rise are increasingly displacing rural populations, particularly in coastal and riverine districts. However, migration does not end vulnerability; instead, it transfers risk to urban areas.

Urban centers such as Dhaka, Chattogram, and Khulna are experiencing growing pressure on housing, sanitation, employment, and public services due to continuous inflows of climate-displaced populations. This has led to rapid expansion of informal settlements and deepening urban inequality.

The findings highlight that climate migration in Bangladesh is not purely an environmental response but a structural development issue rooted in poverty, governance gaps, and spatial inequality. Therefore, addressing climate-induced migration requires an integrated policy approach that simultaneously strengthens rural climate resilience and urban planning capacity.

Future policy interventions should prioritize climate-resilient rural livelihoods, planned urbanization, and inclusive service delivery systems to reduce the compounding effects of displacement and urban stress.

7. References

Sarker, B. (2025). *Climate-induced migration in Bangladesh: Public health and socio-economic challenges in community integration.*

Moharaj, P., Muduli, D. K., & Sahoo, D. (2025). Climate induced migration and internal displacement in rural India. Discover Environment, 3, Article 169.

Siddik, M. A. B., Ali, A., Shakil, M. R., Syfullah, M. K., Hoque, M. S., Islam, M. A., Guo, H., & Ali, S. L. (2025). Impact of climate-induced migration on depression: A study between disaster-affected migrant and non-migrant adolescents. Climatic Change, 178(76).

Andrianandrasana, H. T., Jones, N., Viraina, F. F., Malesios, C., Campera, M., Zefania, S., Long, P. R., Panichelli-Batalla, S., Richardson, N. M., & Savage, J. (2025). Links between poverty, climate-induced migration and deforestation in western Madagascar. Environmental Development, 56, 101284.

Appiah, S. C. Y. (2025). Climate-induced migration and climate immobility in Ghana: A socio-ecological mixed method study. *Journal of Migration and Health*, *12*, 100364.

Kalukusu, A. T. (2025). Health impacts of climate-induced migration. Research Invention Journal of Public Health and Pharmacy, 4(1), 17–23.

Gupta, D., Kumar, P., Okano, N., & Sharma, M. (2025). Climate-induced migration in India and Bangladesh: A systematic review of drivers, impacts, and adaptation mechanisms. *Climate*, *13*(4), 81.

Tietjen, B., Jacobsen, K., & Hollander, J. (2023). Climate change and urban migration in Sub-Saharan African cities: Impacts and governance challenges. Journal of Climate Resilience & Climate Justice, 1, 20–32.

Biswas, R. K., Kabir, E., & Khan, H. T. A. (2019). Causes of urban migration in Bangladesh: Evidence from the Urban Health Survey. Population Research and Policy Review, 38(4), 593–614

Rana, M. M. P., & Ilina, I. N. (2021). Climate change and migration impacts on cities: Lessons from Bangladesh. Environmental Challenges, 5, 100242

Naser, M. M., Swapan, M. S. H., Ahsan, R., Afroz, T., & Ahmed, S. (2019). Climate change, migration and human rights in Bangladesh: Perspectives on governance. Asia Pacific Viewpoint.

Bernzen, A., Jenkins, J. C., & Braun, B. (2019). Climate change-induced migration in coastal Bangladesh? A critical assessment of migration drivers in rural households under economic and environmental stress. Geosciences, 9(1), Article 51.

Stojanov, R., Kelman, I., Ullah, A. K. M. A., Duží, B., Procházka, D., & Kavanová Blahůtová, K. (2016). Local expert perceptions of migration as a climate change adaptation in Bangladesh. Sustainability, 8(12), Article 1223.

Adri, N. (2015). 'Climate-induced' rural-urban migration in Bangladesh: Experience of migrants in Dhaka City [Doctoral dissertation, Royal Holloway, University of London].

Rahman, S., & Rahman, M. A. (2015). Climate extremes and challenges to infrastructure development in coastal cities in Bangladesh. Weather and Climate Extremes, 7, 96–108.

Petrova, K. (2021). Natural hazards, internal migration and protests in Bangladesh. Journal of Peace Research, 58(1), 33–49

Bhuiyan, M. A. H., Islam, S. M. D., & Azam, G. (2017). Exploring impacts and livelihood vulnerability of riverbank erosion hazard among rural households along the river Padma of Bangladesh. *Environmental Systems Research, 6*(25), 1–15. https://doi.org/10.1186/s40068-017-0102-9

Centre for Environmental and Geographic Information Services (CEGIS). (2009). *Update, improve and extend the erosion forecasting and warning tools in the three main rivers* [Technical report]. CEGIS.

Centre for Research on the Epidemiology of Disasters (CRED). (2024). *EM-DAT: The international disaster database*. Université catholique de Louvain. https://www.emdat.be/

Dasgupta, S., Hossain, M. M., Huq, M., & Wheeler, D. (2015). Climate change and soil salinity: The case of coastal Bangladesh. *Ambio, 44*(8), 815–826. https://doi.org/10.1007/s13280-015-0681-5

Flood Forecasting and Warning Centre (FFWC) & Bangladesh Water Development Board (BWDB). (2020). *Annual flood report 2020*. BWDB. http://www.ffwc.gov.bd/images/annual20.pdf

Ferdous, J., Mallick, D., Ahmed, M., Islam, R., & Nguyen, D. (2021). Effects of riverbank erosion on mental health of the affected people in Bangladesh. *PLOS ONE, 16*(7), e0254269. https://doi.org/10.1371/journal.pone.0254269

General Economics Division, Bangladesh Planning Commission. (2018). *Bangladesh Delta Plan 2100* [Abridged version]. Government of Bangladesh. https://oldweb.lged.gov.bd/UploadedDocument/UnitPublication/1/756/BDP%202100%20Abridged%20Version%20English.pdf

Hoque, M. A., Tasfia, S., Ahmed, N., & Pradhan, B. (2022). Bangladesh's vulnerability to cyclonic coastal flooding. *Natural Hazards and Earth System Sciences, 22*, 729–758. https://doi.org/10.5194/nhess-22-729-2022

Hossain, M. M., Ahmed, T., Islam, R., & Rahman, M. (2025). Geomorphic index alterations and socioeconomic implications: A case study of a coastal river system in Bangladesh. *Heliyon, 11*(3), e41987. https://doi.org/10.1016/j.heliyon.2025.e41987

International Federation of Red Cross and Red Crescent Societies (IFRC). (2020). *Bangladesh: Cyclone Amphan — Final report early action EAP2018BD01*. ReliefWeb. https://reliefweb.int/report/bangladesh/bangladesh-cyclone-final-report-early-action-eap2018bd01

International Federation of Red Cross and Red Crescent Societies (IFRC). (2021). *Bangladesh cyclone early action protocol summary (EAP number EAP2021BD04)*. ReliefWeb. https://reliefweb.int/report/bangladesh/bangladesh-cyclone-early-action-protocol-summary-eap-number-eap2021bd04

International Federation of Red Cross and Red Crescent Societies (IFRC). (2023). *Bangladesh: Floods — Final report (MDRBD028)*. ReliefWeb. https://reliefweb.int/report/bangladesh/bangladesh-floods-final-report-mdrbd028

IPCC. (2021). *Climate change 2021: The physical science basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press. https://doi.org/10.1017/9781009157896

Kamruzzaman, M., Almazroui, M., Salam, M. A., Mondol, M. A. H., Rahman, M. M., Deb, L., Kundu, P. K., Zaman, M. A. U., & Islam, A. R. M. T. (2022). Spatiotemporal drought analysis in Bangladesh using the standardized precipitation index (SPI) and standardized precipitation evapotranspiration index (SPEI). *Scientific Reports, 12*, Article 20694. https://doi.org/10.1038/s41598-022-24146-0

Kanta, M. K., Hossain, M. A., & Rahman, M. (2024). Flooding crisis in Bangladesh: Urgent measures required. *Commonwealth Youth and Development, 21*(1). https://doi.org/10.1080/14888386.2024.2330385

Mitra, B., Rahman, S. M., Uddin, M. S., Mahmud, K., Islam, M. K., Arifuzzaman, M., Rahman, M. M. H., & Rahman, M. M. (2023). Assessing demographic and economic vulnerabilities to sea level rise in Bangladesh via a nighttime light-based cellular automata model. *Scientific Reports, 13*, Article 13351. https://doi.org/10.1038/s41598-023-40329-9

Murshed, S., Islam, M. T., Rahman, M. M., & Das, S. K. (2025). A topsoil salinity observatory for arable lands in coastal southwest Bangladesh. *Scientific Data, 12*, Article 987. https://doi.org/10.1038/s41597-025-05447-1

Rahman, S., Islam, M., Roy, B., & Hossain, M. A. (2025). Assessing the correlation between sea level rise, temperature, and erosion–accretion along the coastline of Bangladesh. *Discover Geoscience, 3*, Article 24. https://doi.org/10.1007/s44288-025-00129-2

Soil Resources Development Institute (SRDI). (2010). *Saline soils of Bangladesh* (SRMAF Programme). Ministry of Agriculture, Government of Bangladesh.

Takagi, H., Kashihara, H., & Esteban, M. (2025). Tropical cyclones in Bangladesh: Retrospective analysis of storm information, disaster statistics, and preparedness. *Environmental Research Communications, 7*(1), Article 015031. https://doi.org/10.1088/2515-7620/ada239

World Bank Group. (2024). *Climate change knowledge portal: Bangladesh*. World Bank.