Advancing flood resilience in Bangladesh: Transdisciplinary approaches to adaptation, policy, and practice

Md. Humayain Kabir[1,2]

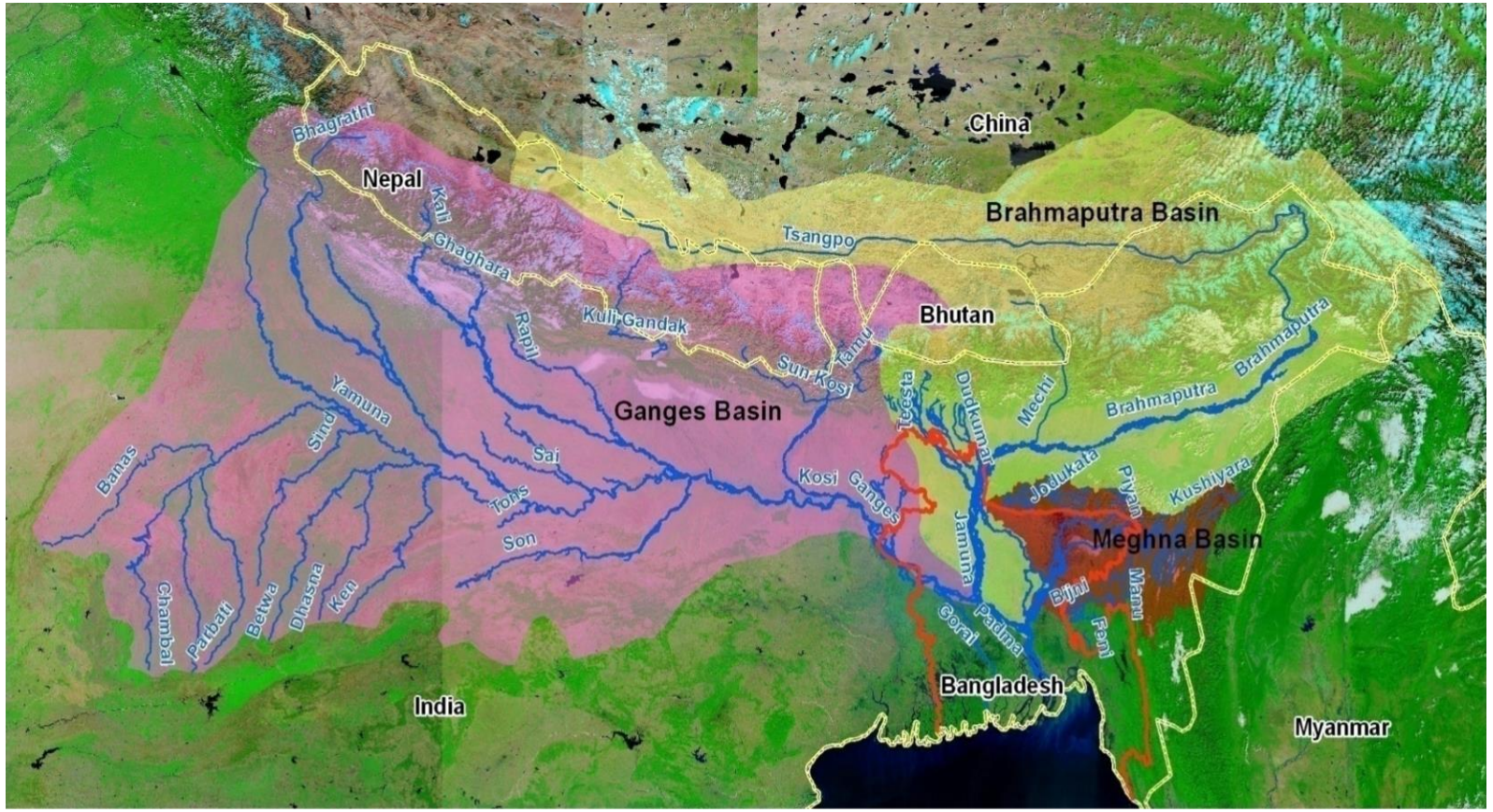
[1]Department for Knowledge and Communication Management, Danube University Krems, Austria
[2]Wegener Center for Climate and Global Change, University of Graz, Austria

GFP annual conference, September 15-17 2025
Budapest University of Technology and Economics, Budapest, Hungary
15 September 2025

Bangladesh-Geographical settings

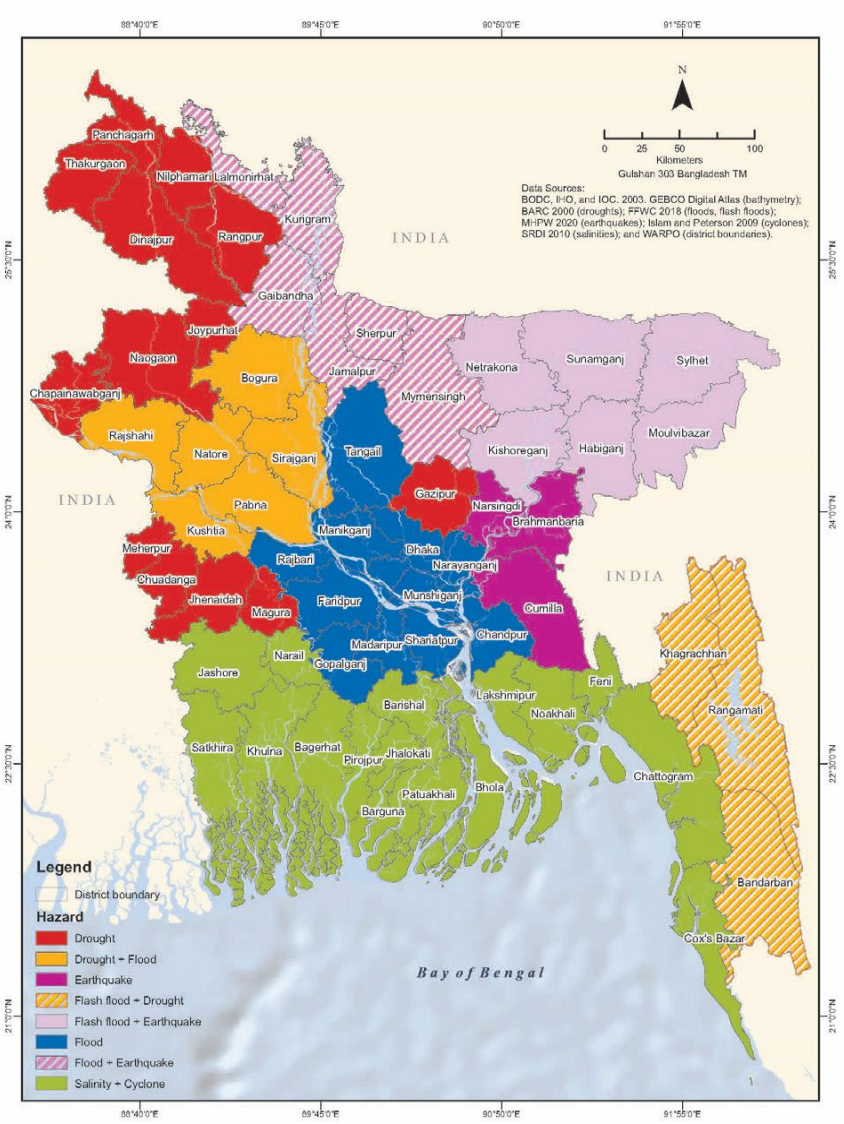
Bangladesh Delta Features:

- 3 mighty rivers- the Ganges, the Brahmaputra, and the Meghna;
- Largest dynamic delta in the world;
- Around 700 rivers: 57 Trans-boundary
- Annual sediment load of 1.0 to 1.4 billion tonnes (GED, Bangladesh Planning Commission)

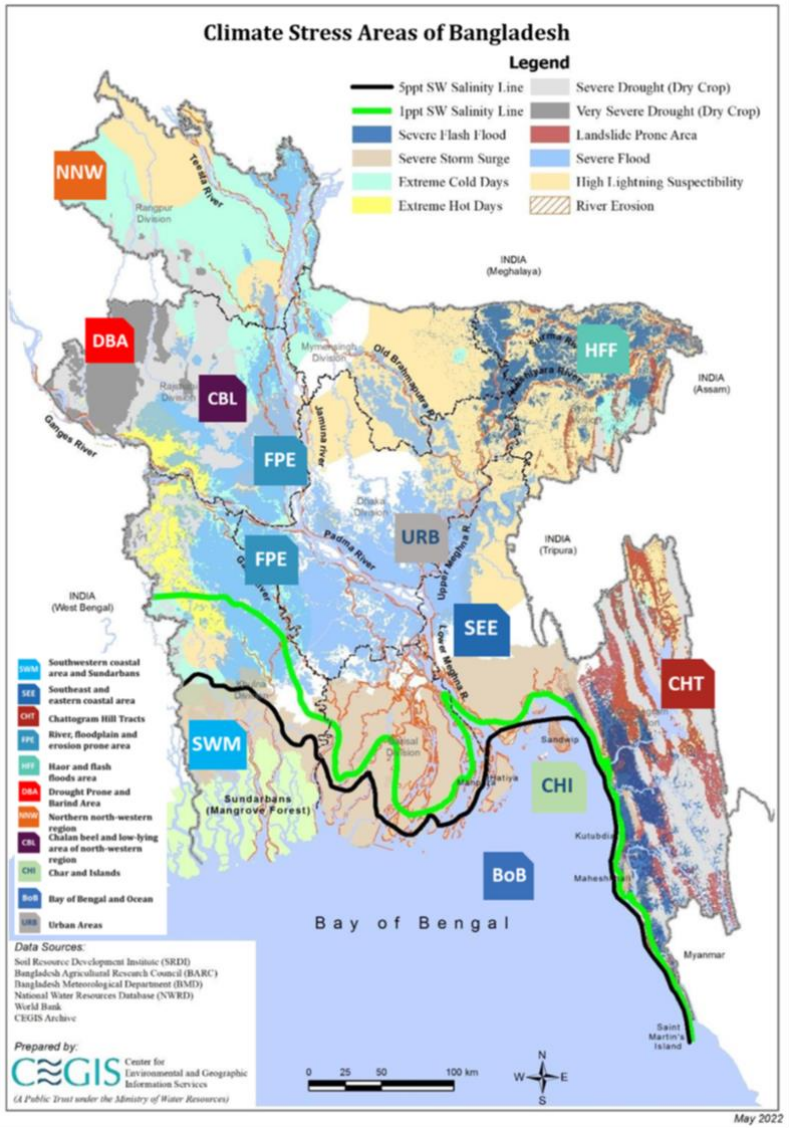


The Ganges, the Brahmaputra and the Meghna (GBM) Basin

Why Bangladesh is a hotspot for flooding?



Natural disaster map of Bangladesh (ADB, 2021)



Climate stress areas

- Landing station of natural disasters
- Socio-economic conditions
- Geographic location

Observed climate change and flooding in Bangladesh

- Sea levels have risen adjacent to the Bangladesh coast due to both the geographic location and nature of the delta.
- Between 1901 and 2010, sea level rose at 1.7 mm per year, and from 1993 to 2010, it rose 2.8±0.8 mm per year.
- Satellite altimetry data analysis also support this, showing a rising rate of 3.2±0.4 mm per year (NAP, 2022).

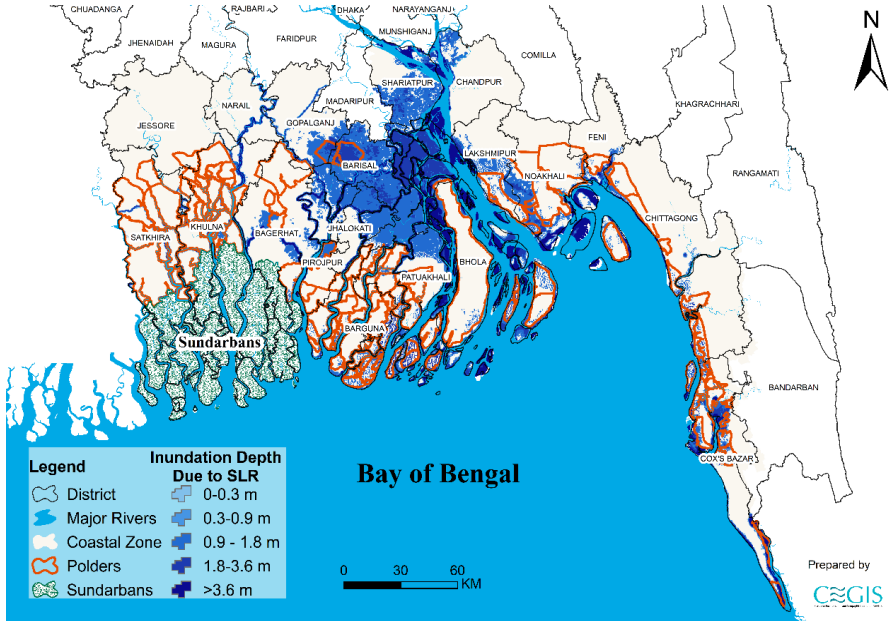


Figure: Potential inundation due to sea-level rise and cyclone storm surges in the coastal areas by the 2050s
(Data Source: CEGIS Bay of Bengal Model, 2021)

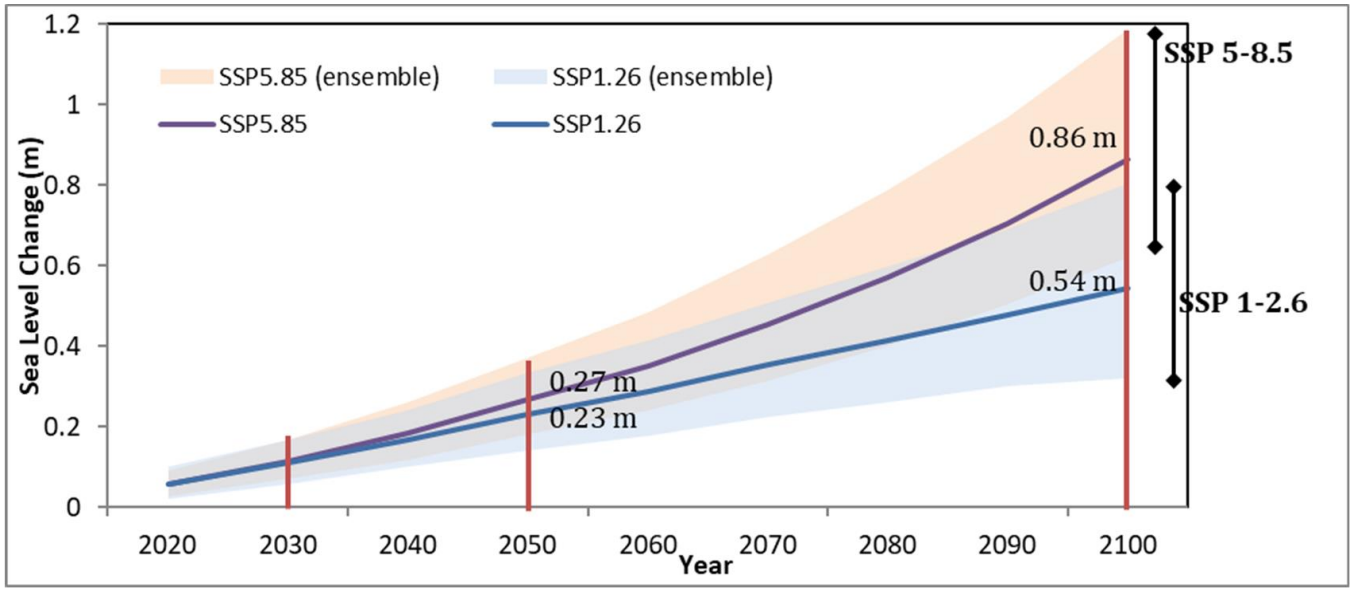


Figure: Sea-level rise projections near the Bangladesh coast in the Bay of Bengal (Source: Fox Kemper et al., 2021)

Sea level rise induced flooding in Bangladesh-Case 1

International Journal of Disaster Risk Reduction 73 (2022) 102905

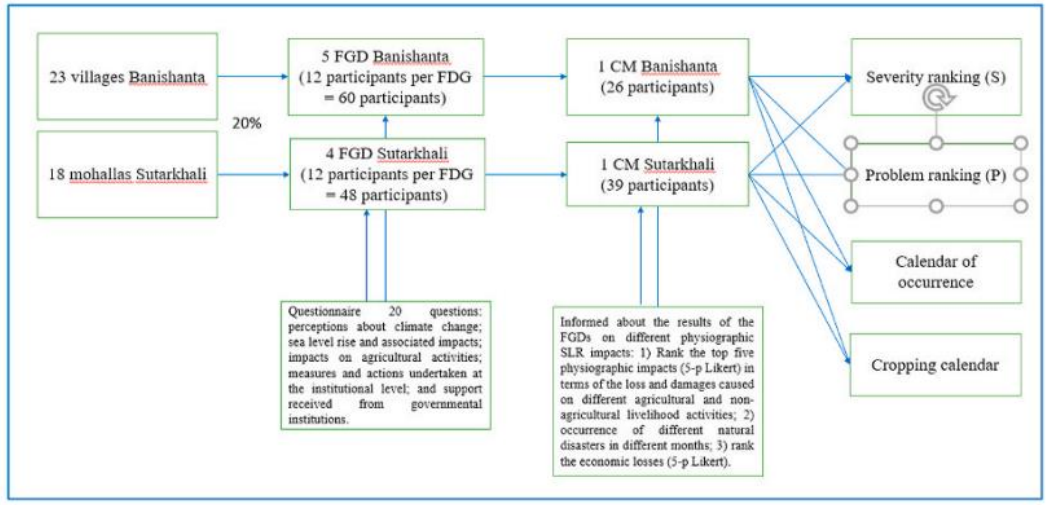
Contents lists available at ScienceDirect

International Journal of Disaster Risk Reduction

journal homepage: www.elsevier.com/locate/ijdrr

Sea level rise induced impacts on coastal areas of Bangladesh and local-led community-based adaptation

Bishwajit Roy [a,g,*], Gil Pessanha Penha-Lopes [a], M. Salim Uddin [b,c,g], Md Humayain Kabir [d,e], Tiago Capela Lourenço [a], Alexandre Torrejano [f]



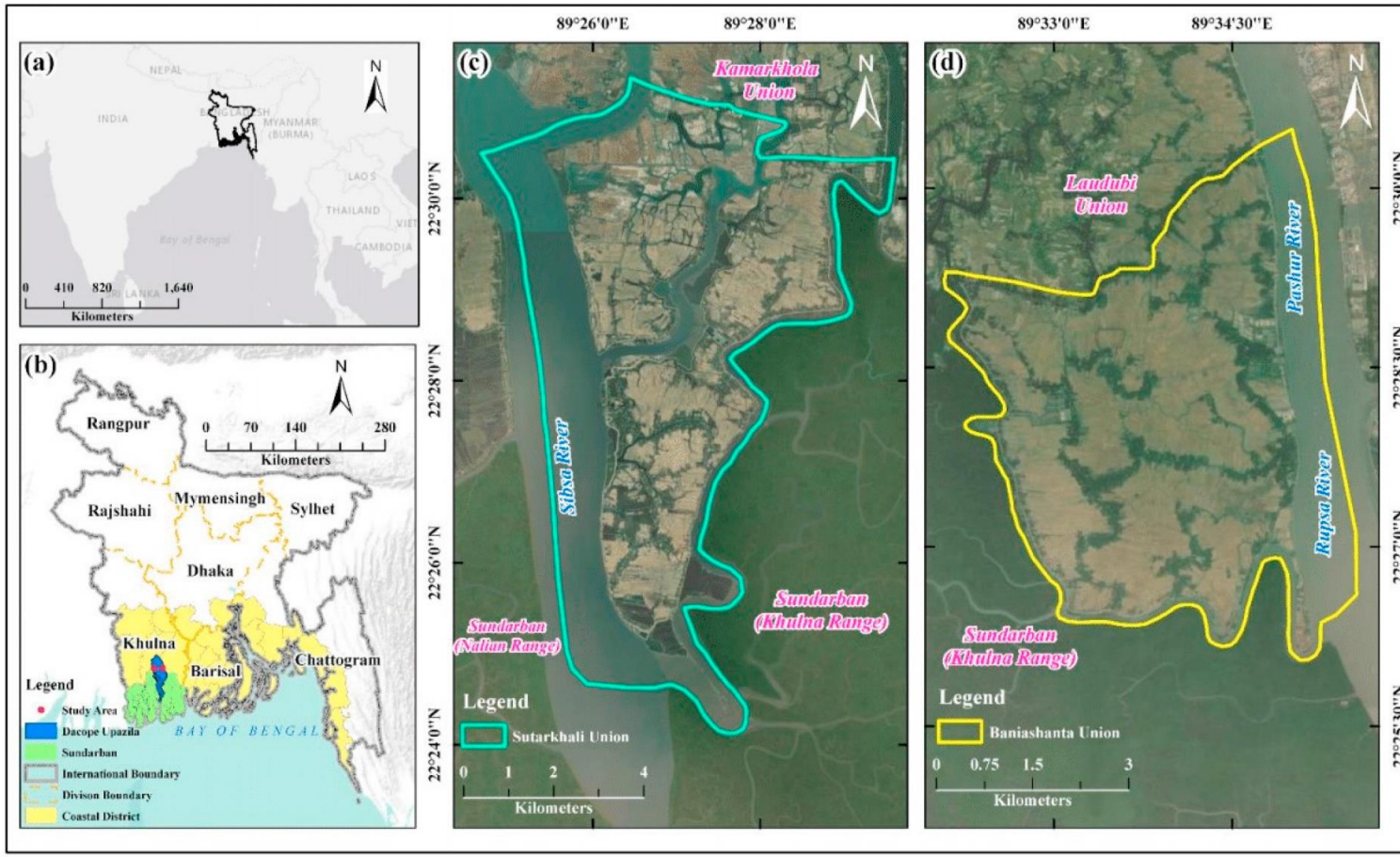


Figure: Profile of the study area

Causes and effects

- Both man-made and natural causes are responsible and vary between place and context.

- Sea level rise induced physiographic impacts:

    - *Salinity increase*
    - *Rising water level*
    - *Land erosion*
    - *Waterlogging/Inundation*
    - *Emergence of char lands*



Photo: Unsplash

Adaptation to coastal flooding impacts



Community Mangrove Aqua-Silviculture (CMAS) Kabir and Baten, 2019

Adaptation to coastal flooding



Adaptation initiatives in Bangladesh



Strengthening adaptation and resilience to flooding-Case 2

Shapna *et al. Dis Prev Res* 2024;3:5
DOI: 10.20517/dpr.2023.41

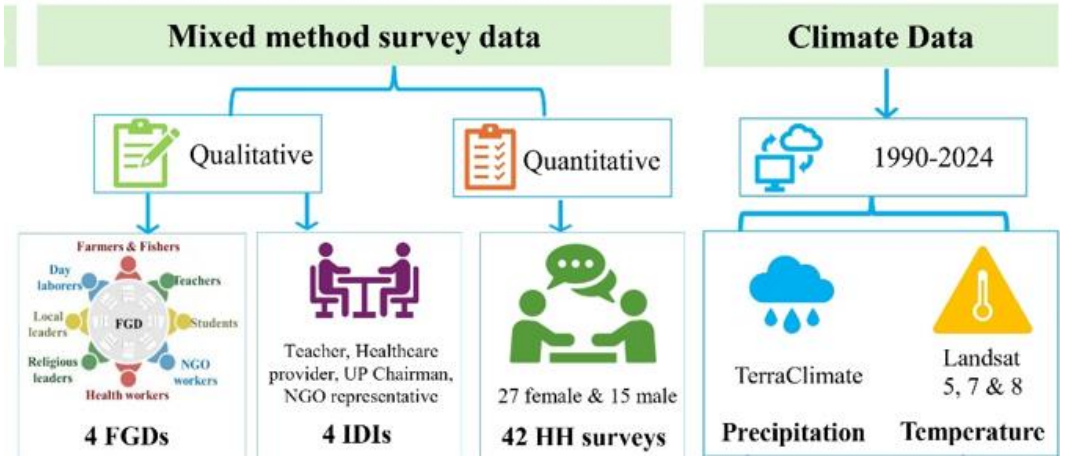
Disaster Prevention and Resilience

Research Article

Open Access

Strengthening adaptation in coastal Bangladesh: community-based approaches for sustainable agriculture and water management

Khusnur Jahan Shapna[1], Jianfeng Li[2], Md Humayain Kabir[3,4,5], Mohammed Abdus Salam[6], Saifullah Khandker[7], Md Lokman Hossain[7,8]



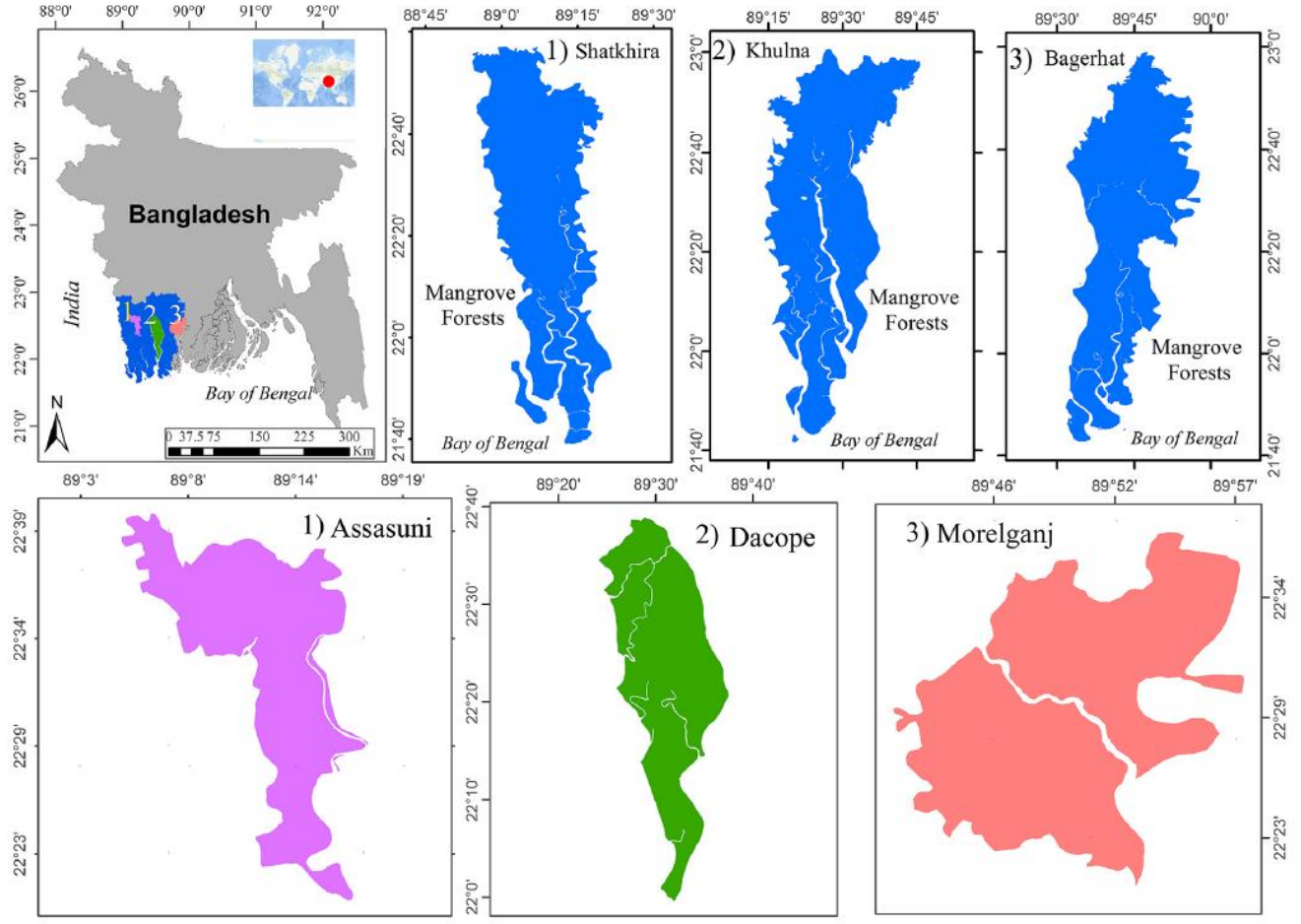


Figure 1. Location of the three sub-districts (Assasuni and Khajra unions in Assasuni, Sutarkhali and Kamarkholar unions in Dacope, and Putikhali and Chingrakhali unions in Morrelganj sub-districts) in the study.

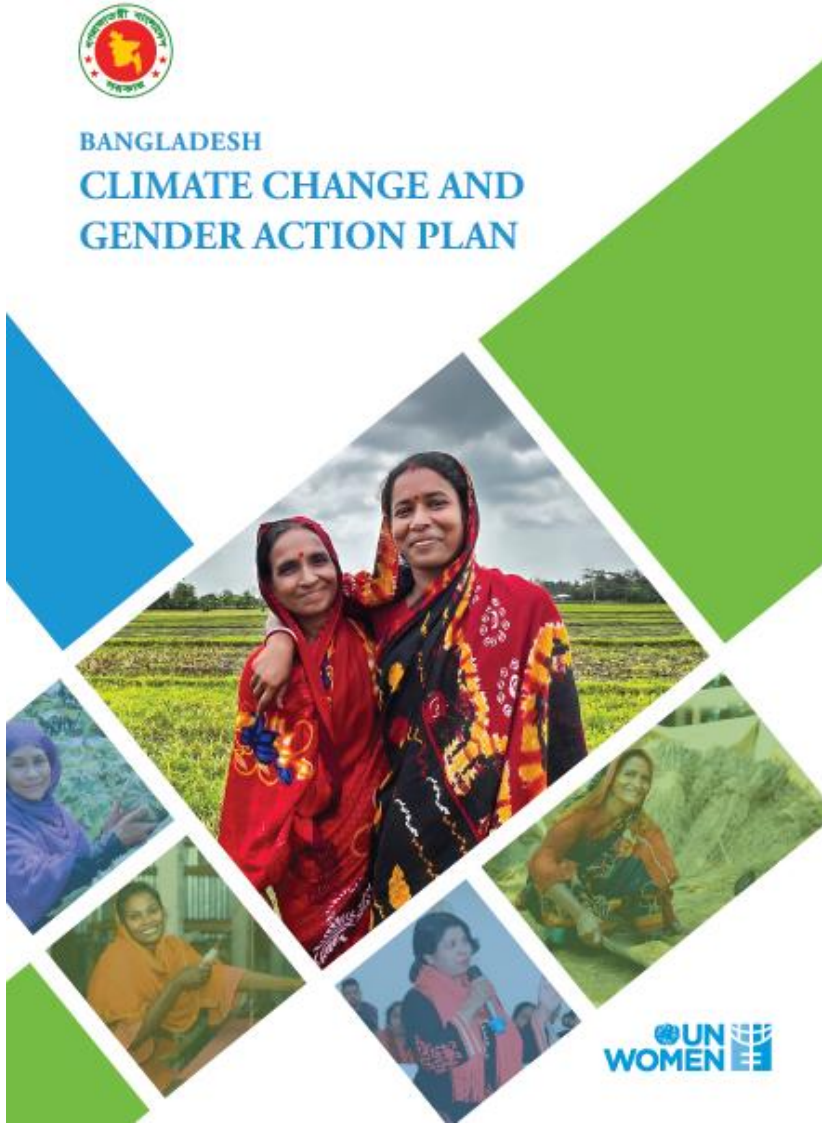
Community-based and locally-led practices in Bangladesh

- Use of **salt- and drought-tolerant crops**
- Adoption of **rainwater harvesting** systems and **small-scale irrigation ponds**
- **Raised-bed farming** and **sack-based cultivation**
- Application of **organic fertilizers** like vermicompost (Shapna et al., 2024)



Policy Response at National Level

- Bangladesh Climate Change Strategy and Action Plan (BCCSAP), 2009 (updated in 2022)
- Bangladesh Delta Plan, 2100
- National Adaptation Plan (NAP) 2023-2050
- Disaster Management Act, 2012
- National Disaster Management Policy, 2015
- Standing Orders on Disaster 2019
- Plan of Action to Implement Sendai Framework for Disaster Risk Reduction 2015-2030
- National Strategy on Internal Displacement Management 2021
- National Plan for Disaster Management 2021-2025



Summary/key messages

- Observed impacts on life, livelihood and natural environment in coastal Bangladesh
- Affected communities have been building resilience with these effects through sociocultural innovation such as adjusting cropping calendar, and structural breakthrough.
- Strengthening participatory governance and ensuring bottom-up engagement in policy formulation are essential for long-term flood resilience.
- Achieving sustainable flood resilience requires transdisciplinary collaboration that bridges science, policy, and practice.

Recommended Literature

- Roy, R., Pehna-Lopes, G. L., Uddin, M. S., **Kabir, M. H.,** Lourenço, T.C., Torrejano, A., 2022. Sea level rise induced impacts on coastal areas of Bangladesh and local-led community-based adaptation, International Journal of Disaster Risk Reduction, 63, 1-17.
- Shapna, K. J., Li, J., Kabir, M. H., Salam, M. A., Khandker, S., & Hossain, M. L. (2024). Strengthening adaptation in coastal Bangladesh: Community-based approaches for sustainable agriculture and water management. *Disaster Prevention and Resilience, 3*(5). https://doi.org/10.20517/dpr.2023.41

Thanks for your kind attention



Contacts:

E-Mail: mh.kabir.cu@gmail.com

LinkedIn: https://www.linkedin.com/in/md-humayain-kabir-56a811107/

ResearchGate: https://www.researchgate.net/profile/Md-Kabir-34