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Policy Paper

Flood Responses in Bangladesh: Challenges and Way Forward

Prepared by:

M. Zakir Hossain Khan[*], Dr. Mohammad Shamsudduha[†] and Shadman Sakib Khalili[‡]

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[*] Chief Executive of Change Initiative and International Environmental and DRR Policy Expert; For further communication, please contact to: zhkhan@changei.org;

[†] Associate Professor, Department of Risk and Disaster Reduction, University College London

[‡] Manager-Research and Innovation of Change Initiative

Background:

Bangladesh, a deltaic nation situated at the confluence of major rivers originating in neighboring countries, is inherently vulnerable to flooding. The average annual flood-affected area is around 20–25% of the country's landmass, (Monirul Qader Mirza, 2002)and an average of over 5 million people are affected by floods every year (Zayed et al., 2024) The average number of annual deaths due to floods is over 100. However, the IPCC (Intergovernmental Panel on Climate Change) predicts a sea-level rise of up to 60 cm by the end of the century, posing a significant threat to Bangladesh's low-lying coastal areas (IPCC, n.d.) The country has experienced an increase in the frequency and severity of natural disasters, particularly floods, over the last few decades. Approximately 80% of the country's landmass is considered floodplain (Hossain et al., 2020). The devastating floods of 2024 have exposed critical vulnerabilities in our national infrastructure and disaster management systems. Recent events, such as the 2024 floods in Feni and surrounding districts and the 2022 floods in Sylhet, have highlighted the devastating impact of these disasters on lives, livelihoods, and infrastructure. A recent study by the 4 Council on Energy, Environment and Water (CEEW) projected an increase in monsoon rainfall of up to 10-14% by end of the century, leading to increased flood risks.[4]

Table 1: Bangladesh experiences various types of floods

Flood Type	Affected Area	Frequency	Main Causes
Monsoon Floods	Up to 68% of the country	Annual	Heavy rainfall, Himalayan snowmelt
Flash Floods	Northeastern, Southeastern regions	2-3 times per year	Intense rainfall in upstream areas and within the country
Tidal Floods	Coastal areas	Seasonal	Storm surges, sea-level rise

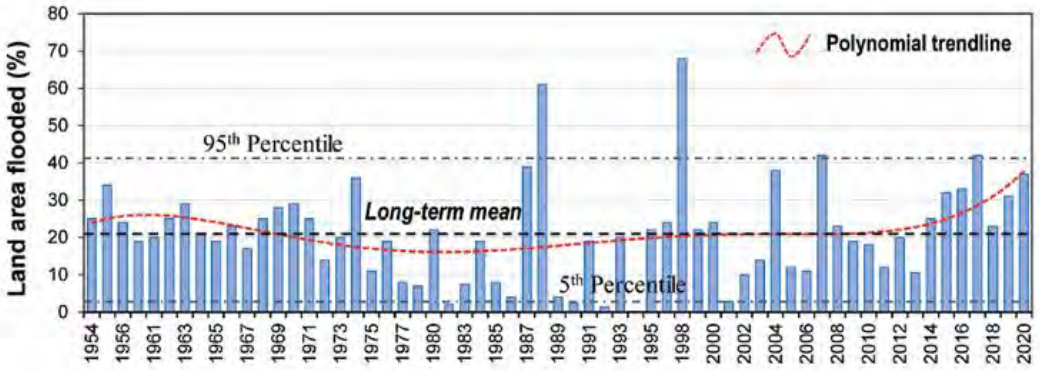
Source: Bangladesh Flood Forecasting and Warning Centre, 2022

In a year, about 92% of the rain-related and snowmelt water that occurs in the Ganges (Padma), Brahmaputra (Jamuna), and Meghna basins goes to the sea through Bangladesh. The country owns only 7% of the combined basin's land. Again, 80% of the overall 1,160 billion cubic meters of water flows through annually from June to September, roughly in these four monsoon months (Ahmed & Roy, 2007). The transboundary water-sharing between Bangladesh and India involves 54 shared rivers, with Bangladesh heavily dependent on India for water resources (Parven & Hasan, 2018). Climate change, increasing rainfall intensity, and rising sea levels amplify the vulnerability. India's construction of dams and water diversion

[4] https://www.ceew.in/sites/default/files/decoding-how-climate-change-is-changing-monsoon-rainfall-patterns-in-india.pdf

projects without agreements has resulted in water scarcity, reduced agricultural yields, and

Figure 1: Flood-affected area in Bangladesh (total area: 147,570 km^2) for the period of 1954 to 2020. The long-term (1954–2020) polynomial trendline is plotted.

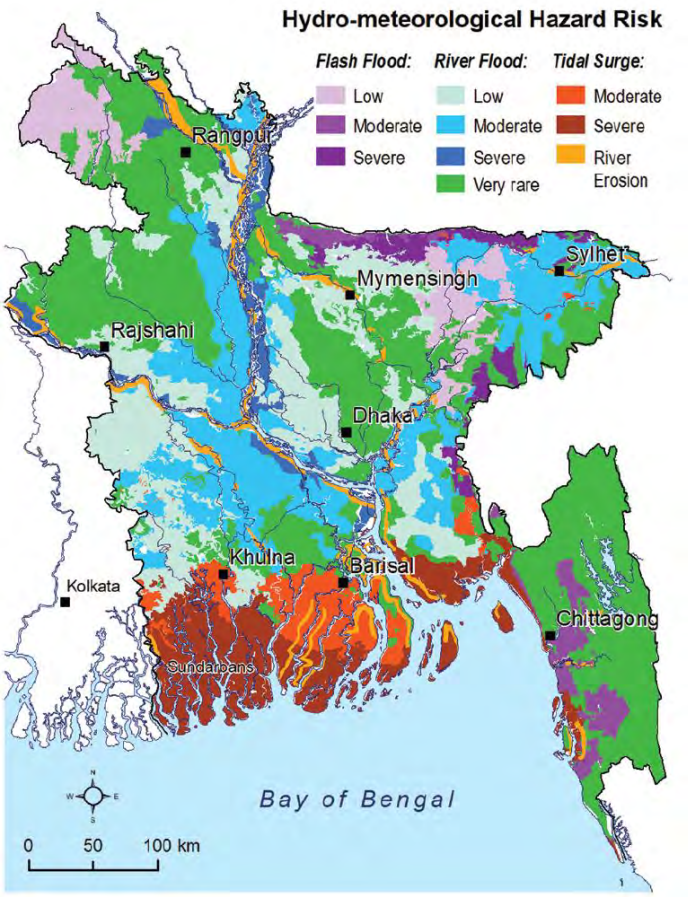


Source: Sammonds P., Shamsudduha M. and Ahmed B., Journal of the British Academy, 9(s8), 55–77, 2021

ecological imbalances in Bangladesh (Baten & Titumir, 2016).

The recent floods in Bangladesh and Tripura triggered by heavy rainfall and exacerbated by the release of water from upstream dams in India, have caused widespread devastation. Cumilla has been flooded due to the opening of the Dambur barrage, while Noakhali has also been flooded due to being connected to the same basin. These two areas are connected by the Gomti River basin. Feni has been affected due to the basin of the Feni River; it has a link to the Kalsi Barrage. Due to the lack of coordination and data sharing of the Joint River Commission (JRC), it was not possible to reduce the loss and damage. These floods displaced millions and inflicted severe economic losses,

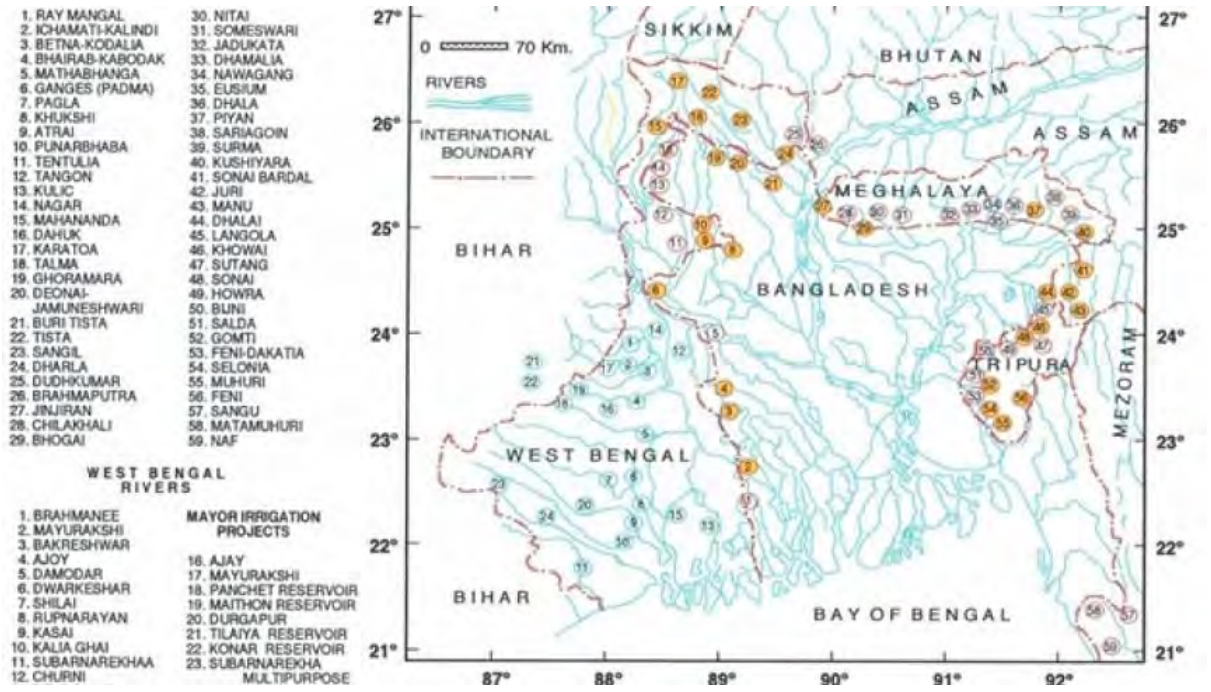
Figure 2: National-scale map showing rapid-onset groups of hydro-meteorological (e.g. flash floods, river floods, tidal surges, and river erosion) hazard risks.



underscoring the urgent need for comprehensive flood management strategies.

Teesta, the largest river in North Bengal is also facing the dual whammy of rubbish and hydropower projects. Over 20 hydropower projects have turned the river into a series of artificial lakes. Due to the dams built for hydropower projects and the barrages built for irrigation, by the time the Teesta reaches Bangladesh, it has just one-sixteenth of the water flow assumed by both Bangladesh and India, as mentioned in the draft Teesta treaty (Singh, 2018).

Figure 3: Distribution of dams and barrages in international rivers between India and downstream Bangladesh



Yellow-colored circles denote structures or dams built by India on rivers shared with Bangladesh. Source: The Daily Star, 24th August 2024

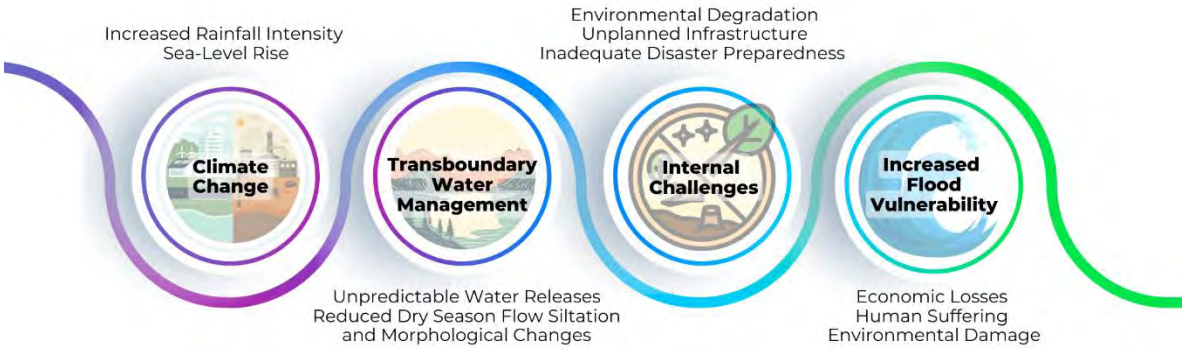
"Flooding caused or aggravated by decisions made by the operators of the dams and barrages that India has built on almost all the rivers that it shares with Bangladesh. Consequently, India's river intervening structures not only reduce dry season flow in Bangladesh's rivers but have also become a source of untimely and more severe floods. This has particularly been the case with the Teesta basin in Bangladesh, where residents have witnessed seven such floods within a year timeline."

"The massive deforestation on both sides of the river coupled with barrages and dams have disturbed the ecosystem. The area falls under seismic zone IV and the damage could be massive during an earthquake. Cracks in the dams could cause havoc downstream," Jatishwar Bharati, a geographer based in Jalpaiguri told *thethirdpole.net*.

The lack of mutually acceptable data and classification of river flow data as secret hinders effective negotiations. The recent floods in Feni, Noakhali, and other districts, triggered by

heavy rainfall and exacerbated by the release of water from upstream dams in India, have caused widespread devastation. These floods, displacing millions and inflicting severe economic losses, underscore the urgent need for comprehensive flood management strategies. We must address both the natural and human-induced factors contributing to the crisis. To address these challenges, suggestions include implementing a hydro-community like the EU Water Framework Directive (Parven & Hasan, 2018) and developing water-sharing agreements beyond the existing Ganges Water Treaty of 1996 (Aktar, 2021). An ecosystem-oriented approach to international norms and regimes for the GBM basins is also recommended (Baten & Titumir, 2016). The financial losses caused by floods between 2009 and 2015 amounted to an average of 3,070.8 crore Taka ($287 million) per year (BBS, 2021). According to data from the Bangladesh Bureau of Statistics (BBS), the 2022 floods alone caused an estimated US$1.5 billion in damages, highlighting the escalating economic burden of these disasters. These losses have hindered GDP growth, with the potential to achieve an additional 0.30% GDP growth annually if such losses were mitigated (BBS, 2021). Floods have a devastating impact on Bangladesh's economy and society.

Figure 4: Key challenges to increased flooding in Bangladesh



This policy suggestion advocates for a multi-pronged approach that prioritizes scientific knowledge, international cooperation, community engagement, and sustainable development practices, aiming to build a future where floods are anticipated and managed effectively, minimizing their impact on the lives and livelihoods of the Bangladeshi people.

Challenges:

Transboundary Water Management: India's upstream water management practices significantly increase Bangladesh's vulnerability to flooding. India's control over transboundary river flows due to dams and barrages poses the following major challenges:

- **Ineffective SAARC and Joint River Commission:** The Joint River Conservation Commission (JRC) was formed in March 1972 for the management of joint rivers between India and Bangladesh. Even after 52 years, this commission has not been able to play an effective role in ensuring equitable distribution of water of the inter-country rivers. However, the share of water surrounding the Indus basin is South Asia's oldest and longest-running treaty, the Indus Water Treaty, signed between India and Pakistan

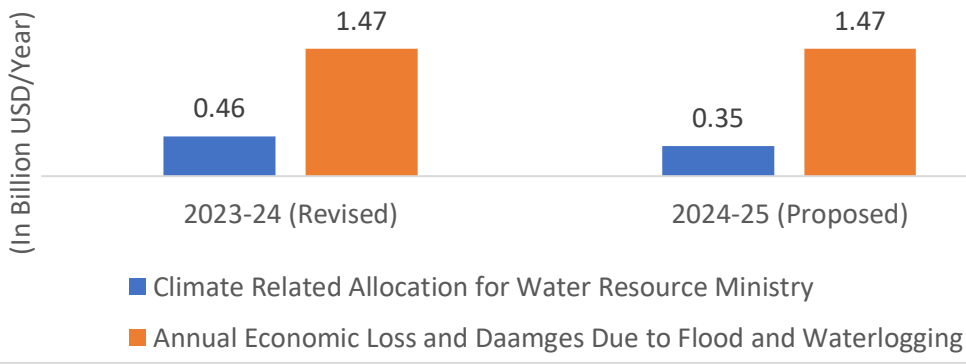
in 1960. The World Bank mediated the talks between the two countries. The commission has been very successful in the last 64 years.

- **Unpredictable Water Releases:** Sudden releases from Indian dams, often without sufficient warnings, cause devastating downstream floods in Bangladesh. The 2023 Feni and Sylhet floods, linked to the Dumbur dam release, exemplify the upcoming danger of using the dams and barrages as devastating techno-weapons.
- **Reduced Dry Season Flow:** Water storage in Indian dams during dry seasons reduces water availability in Bangladesh, impacting agriculture and ecosystems. A BIDS study found this practice has led to decreased agricultural productivity and increased salinity in Bangladesh.
- **Lack of Comprehensive Agreements:** The absence of water-sharing agreements for most transboundary rivers, particularly the Teesta, creates uncertainty and hinders cooperation. This perpetuates disputes and jeopardizes Bangladesh's water security.

Internal challenges further exacerbate Bangladesh's flood vulnerability:

- **Environmental Degradation:** Deforestation, hill cutting, and floodplain encroachment have drastically reduced the land's water retention capacity, increased runoff and sedimentation, and making floods more severe. An IUCN study found Bangladesh has lost over 60% of its forest cover, exacerbating flood vulnerability.
- **Grabbing Rivers, Canals, and Unplanned Infrastructure:** About 40,000 river grabbers including 18,000 in Comilla, Noakhali, Laxmipur**,** and Feni are on the list of grabbers (mostly deceased Awami League leaders and activists) illegally occupied all internal rivers and canals, flood water can't move. Poorly planned roads, embankments, and urban expansion disrupt natural water flow, often worsening flooding. The 2022 Sylhet floods demonstrated how unplanned urbanization blocked drainage, amplifying impacts.

Figure 5: Gaps in climate related allocation for flood management



Source: Climate Budget for Fiscal Year of 2024-25 of Ministry of Finance, Change Initiative, 2024

- **Inadequate Disaster Preparedness and Funding:** Limited investment in forecasting technologies, weak communication channels for warnings, and insufficient community preparedness contribute to the devastating impact of floods. The 1998 flood exposed these inadequacies, highlighting the urgent need for improvement.

Recommendations:

This policy paper proposes immediate, mid-term, and long-term approaches to address the challenges of flood management in Bangladesh, which are illustrated below:

Recommendation	Actionable Steps	Primary Stakeholders
Immediate Actions (0-12 Months)		
Emergency Relief and Rehabilitation		
	1. Since floods are frequent in the country and will be in the future, rescue efforts should be more specific. Create a youth-led Disaster Response Team at each community including existing volunteers. According to the SOD 2019, there is provision for creating volunteering team, but it is not monitored, maintained or they are givern any appropriate trainning for it. 2. Utilize satellite imagery, GIS, and mobile app for youth-led rapid and accurate loss and damage assessment. 3. Partner with NGOs and international organizations like the Red Cross/Red Crescent, UN agencies (WFP, UNICEF, UNHCR) for efficient list of affected community, relief distribution, leveraging their expertise in logistics and humanitarian aid. 4. Integrate private donations, e.g., Zakat with the public support for targeting planned rehabilitation programs following the public-private-partnership policy. 5. Provide direct cash and asset transfers to affected families through mobile banking platforms like bKash and Rocket to expedite aid delivery and empower communities to prioritize their needs. 6. Introduce more flood-tolerant rice and vegetable varieties. Arrange seed planting in highlands engaging agriculture college and universities. 7. The Agricultural Information Service will have to be equipped to provide accurate information about the post-flood plantation and government support. 8. Establish mobile medical units staffed with qualified doctors and nurses, and senior medical students to deploy them to affected areas and distribute essential	✓ Ministry of Disaster Management and Relief (MoDMR) ✓ Armed Forces Division ✓ Ministry of Health and Family Welfare ✓ The Ministry of Finance, in collaboration with the Insurance Development and Regulatory Authority (IDRA) ✓ Local Government Institutions ✓ NGOs

Recommendation	Actionable Steps	Primary Stakeholders
	medicines and hygiene supplies to prevent the spread of waterborne diseases. 9. Establish a national flood insurance program to protect livelihoods and assets, providing financial assistance to individuals and businesses affected by floods. This can encourage risk reduction measures and ensure a faster recovery after flood events. As a key non-life mechanism this should be integrated with climate-related social protection programs. 10. Mapping potential shelters across countries prioritizing public and private buildings of three stories or more in each community; develop a guideline regarding that. 11. Introduce solar-based power systems in all cyclone/flood shelters with the capacity building of community clinic staff for effective health care support during disasters.	
Strengthening Early Warning Systems and Meaningful Accountability		
	12. There are two types of forecasts, a) Weather forecast which is easily predictable and accessible from online; but need to disseminate properly as well as proactively; b) Correct seasonal forecast is not possible to predict this with the American/European model because the climate model of each country is different. Need to engage multi-disciplinary team, managing multi-hazard, to create its own custom-made seasonal forecast, which will be quite effective in the socio-economic context of Bangladesh. 13. Invest in advanced meteorological technologies in the BMD, including weather radars in all Upazilas, a network of automatic weather stations in flood-prone areas, and high-resolution numerical weather prediction models, to improve the accuracy and timeliness of flood forecasts. Use solar-based power systems for all stations. 14. Establish a multi-channel dissemination system for flood warnings, utilizing SMS/audio/video message alerts to all mobile phones, community radio broadcasts, loudspeakers in vulnerable areas, and social media to reach a wide audience. Develop targeted messages in local dialect. 15. Train youths in each community on flood monitoring, data collection, and communication protocols, equipping them with basic tools and knowledge to understand flood risks and participate in early warning systems. Promote freelancing on disaster data management. 16. The mindset of personnel in all water-related agencies must evolve to adapt to expanding hazards, with a focus on	✓ Bangladesh Meteorological Department (BMD) ✓ Ministry of Information and Communication Technology (MoICT) ✓ Bangladesh Telecommunication Regulatory Commission (BTRC) ✓ Local Government Institutions ✓ Flood Forecasting and Warning Centre, BWDB ✓ National River Conservation Commission ✓ Supreme Court

Recommendation	Actionable Steps	Primary Stakeholders
	a multidisciplinary approach rather than engineering that produces opportunities for profit. 17. Keeping water retention areas clear, focusing on solid waste management, water lobbying, and keeping channels clean requires the attention of the concerned authorities. 18. The Prosecutor of the International Criminal Court announced a new policy initiative to advance accountability for environmental crimes under the Rome Statute to ensure that it takes a systematic approach to dealing with crimes within the Court's jurisdiction committed by means of, or that result in, environmental damage. National River Conservation Commission (জাতীয় নদী রক্ষা কমিশন) should establish a dedicated Green Tribunal to prosecute the alleged River grabbers.	
Strengthen Transboundary Flood Management		
	19. Bangladesh should sign the UN Water Courses Convention 1997 to seek the help of the United Nations to decide on water sharing of the international rivers and settle disputes.	✓ Ministry of Foreign Affairs ✓ Ministry of Water Resources
	20. Engage in high-level diplomatic discussions with China and SAARC for equitable and justified water sharing mechanism as well as clear protocols for joint flood management. This should include Direct Hotline to the Flood Response Centers of the related countries, joint monitoring mechanisms, pre-release notifications, and gradual water release mechanism. 21. Initiate negotiations for comprehensive water-sharing agreements for all transboundary rivers, ensuring equitable water distribution throughout the year. 22. Explore collaborative mechanisms for flood forecasting and early warning.	✓ Ministry of Foreign Affairs
Mid-Term Strategies (13-24 Months)		
Sustainability Focus River Dredging and Restoration and Transboundary Efforts		
	1. Open embankments gradually, remove the obstructions on the floodplains, and use sediments to raise the ground level of villages and towns.	✓ Bangladesh Water Development Board (BWDB) ✓ Ministry of Environment and Forest (MoEF)

Recommendation	Actionable Steps	Primary Stakeholders
	2. Elevate all roads in floodplains using pillars. That is how we will be able to equip Bangladesh and its people to confront the impact of climate change. 3. Conduct comprehensive hydrological surveys and sediment transport studies to identify priority areas for dredging based on scientific assessments of sedimentation patterns, river morphology, and flood risks. 4. Necessity of moving away from the Cordon approach towards the rivers, which Bangladesh has been following since the 1950s, to the Open approach. While the former approach strives to constrict rivers (by constructing embankments) to their channels only, the latter allows rivers to overflow onto the floodplains during the rainy season. This allows floodplains to serve as an additional passage for river water to move to the sea and for sediment to be deposited on floodplains, allowing ground level elevation. 5. Prioritize the use of cost-effective and environmentally sensitive dredging technologies, such as cutter suction dredgers, which minimize disturbance to riverbeds and ecosystems. 6. Implement bioengineering techniques, such as planting vetiver grass and other native vegetation with deep root systems, to stabilize riverbanks and prevent erosion, enhancing the river's natural defenses. 7. Prioritize the construction of strategically located reservoirs to regulate water flow and reduce peak flood levels. 8. Propose and implement joint hydrological surveys and data-sharing initiatives with India to establish a common understanding of river flows, water availability, and flood risks. This can build trust and create a scientific basis for negotiation. 9. Develop a roadmap to withdraw all dams across the international rivers as excess flow of water from overpouring as well as alarm melting of glaciers of Himalayans has jeopardizing the old dams as weapon against Bangladesh.	✓ Institute of Water Modelling (IWM) ✓ Research Institutions specializing in river morphology and hydrology
Sustainable Infrastructure Development		
	10. Enforce strict floodplain zoning regulations, prohibiting construction in high-risk areas designated as floodplains, and encourage development in safer locations with lower flood risks. 11. Design and construct critical infrastructure, including roads, bridges, power stations, and hospitals, with elevated	✓ Ministry of Housing and Public Works ✓ Ministry of Local Government, Rural Development and Co-operatives

Recommendation	Actionable Steps	Primary Stakeholders
	structures and flood-proof materials to withstand flood events and minimize disruptions to essential services. 12. Implement planned relocation programs, offering incentives and support to communities living in high-risk flood zones to relocate to safer areas, reducing their exposure to flood hazards. 13. Designate floodplains and wetlands as protected areas and implement measures to enhance their water retention capacity.	✓ City Corporations and Municipalities ✓ Department of Disaster Management
Long-Term Solutions (3-5 Years)		
Paradigm Shift Towards Nature-Centric Transboundary Water Management		
	1. Potential Conflict to Cooperation Potential (PCCP) facilitates multi-level and interdisciplinary conversations to encourage peace, cooperation, and development related to cross-border water resources management in South Asia. In this case, the **Mekong River Commission** in the Southeast Asia Region can be considered, where 6 countries (Cambodia, Laos, Thailand, Vietnam, China, Myanmar) have a direct transboundary river relationship with this Mekong River. But through cooperation, there has been joint development and distribution of river resources among the regions. 2. Elevate the priority of water diplomacy and engage in active and sustained diplomatic efforts to reach comprehensive water-sharing agreements with India for all transboundary rivers, starting with the Teesta. These agreements should be legally bound, based on principles of equitable utilization and mutual benefit, and include clear mechanisms for data sharing, joint monitoring of river flows, and a robust framework for dispute resolution. 3. Using local, indigenous feasible DRR methods, practices and principles in mainstream disaster management. Such as the “Ostomashi Badh” (8 months long dam), Bamboo bandalling in the coastal regions. 4. If bilateral negotiations remain stalled, actively seek third-party mediation, potentially involving the UN, the World Bank, or a panel of international water experts, to facilitate dialogue and bridge differences. 5. Advocate for a basin-wide water management framework for the GBM basin, involving all riparian countries—Bangladesh, India, Nepal, Bhutan, and China in a cooperative and coordinated approach. This requires	✓ Ministry of Foreign Affairs ✓ Ministry of Water Resources ✓ Joint Rivers Commission (JRC) ✓ Bangladesh Institute of International and Strategic Studies (BIISS)

Recommendation	Actionable Steps	Primary Stakeholders
	establishing a regional body with a clear mandate for data sharing, joint planning, and collaborative management of shared water resources. 6. Utilize relevant provisions of international water law, such as the UN Watercourses Convention, to strengthen Bangladesh's legal position and challenge India's unilateral actions. This may involve exploring legal options in international courts or tribunals, asserting Bangladesh's rights to a fair share of transboundary water resources. 7. Consider the "transit in exchange for rivers" formula, under which India would restore the natural flows of the shared rivers and, in exchange, Bangladesh would grant India transit and transshipment facilities to access its northeastern states under the SAARC. 8. “Build Back Better” Approach in accordance with the Sendai framework. Where every implementation of government, NGOs or private projects involving DRR and Resilience should be sustainable and have long term positive impact.	
National Master Plan for Water Management		
	9. Adopt the principles of Integrated Water Resource Management (IWRM), promoting a coordinated and participatory approach to managing water resources, balancing the needs of different sectors (agriculture, industry, domestic use, environment) while ensuring sustainability and equity. 10. Integrate flood control measures with water conservation strategies, implementing rainwater harvesting systems, promoting groundwater recharge, and adopting efficient irrigation technologies to enhance water availability during dry seasons and reduce the need for large-scale water storage in upstream dams. 11. Develop detailed flood hazard maps and risk assessments for all vulnerable areas, identifying high-risk zones and informing land-use planning, infrastructure development, and community preparedness efforts. 12. Promote community-led adaptation strategies, drawing upon traditional knowledge and local coping mechanisms, and empower communities to implement these strategies through training, resources, and required financial support for flood resilience in Bangladesh.	✓ Ministry of Water Resources ✓ Bangladesh Water Development Board (BWDB) ✓ Ministry of Finance ✓ Research Institutions ✓ Insurance Development and Regulatory Authority (IDRA)

Dam-lethal weapons have either broken or overflowed in Sikkim and Tripura due to excessive water pressure not only in downstream Bangladesh but also in India, threatening millions of

lives and nature. In Nepal, major rivers are dying in the name of hydropower. Moreover, the snow in the Himalayas is melting at an alarming rate, and the floods will be more widespread ahead (Ives & Messerli, 1989). In this context, no barrage or dam will survive, creating a risk like a nuclear bomb.

Riverine South Asia can survive by demolishing all dams and barrages and restoring life to living rivers and adapting to nature. Moreover, effective flood management in Bangladesh demands a holistic and proactive approach that transcends political boundaries, embraces scientific knowledge, and empowers local communities. By implementing the recommendations outlined in this policy brief, Bangladesh can take decisive steps toward a future where floods are anticipated and managed effectively, minimizing their impact on the lives and livelihoods of its people. We must act now to build a safer and more resilient Bangladesh for generations to come.

Snapshots on Change Initiative

Change Initiative (CI) is an independent research and knowledge-building organization. CI promotes equitable and inclusive change through generating ethical, evidence-based solutions. CI's expertise spans diverse fields including climate resilience, sustainable finance, DRR, environmental health, and green prosperity. Through collaborations with local and international partners, CI leverages to inform policy advocacy, and community-led solutions.

2nd Dhaka Renewable Energy and Finance Talk (DREFT 2)

Breakfast with Team European Initiative and CSOs in Bangladesh

Communication

E-mail and Website	info@changei.org; www.changei.org
Social Pages	Facebook, LinkedIn, X (formerly Twitter)

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