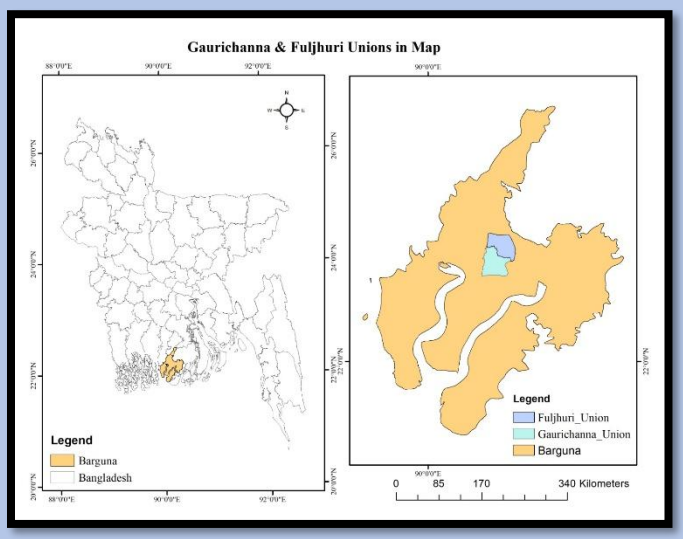

Participatory Community Needs Assessment on Lightning Risk Reduction and Community Resilience Barguna District, Bangladesh

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Data collection & Transcription
MD. Abul Kashem & Samima Aktar (PC-JN)

Tools, Data analysis & Report writing:
MD. Hasan Shahriar, Dirctor-RME, JAGO NARI

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1. EXECUTIVE SUMMARY

This assessment presents a participatory qualitative analysis of lightning-related risks, vulnerabilities, and resilience capacities of Barguna districts. The assessment was conducted to inform the design of a community-led disaster risk reduction initiative focused on reducing lightning-related casualties and strengthening resilience among highly exposed populations.

The study conducted in Fuljhuri and Gourichanna Unions of Barguna Sadar Upazila that combined Focus Group Discussions (FGDs), Key Informant Interviews (KIIs), and secondary literature review to understand community perceptions of lightning risk, identify vulnerable groups, assess existing protection mechanisms, and explore locally driven solutions. Findings demonstrate that lightning is increasingly perceived as one of the most serious disaster risks affecting the area, alongside cyclones and waterlogging. Community members consistently reported fatalities, injuries, educational disruptions, and livelihood losses resulting from lightning strikes.

The assessment identified farmers, agricultural labourers, school children, teachers, and livestock owners as the most vulnerable groups. Their vulnerability is primarily driven by prolonged exposure to open agricultural fields and educational institutions during periods of thunderstorms. The study found significant protection gaps, including the absence of lightning protection systems in schools and the lack of safe shelters within agricultural lands.

Secondary evidence reinforces these community perceptions. National statistics indicate that Bangladesh records approximately 300 lightning-related deaths annually, with more than 3,485 deaths documented between 2015 and 2024. Rural populations, particularly farmers, account for the overwhelming majority of victims. Recent incidents in Barguna further illustrate the severity of the risk, including fatalities among farmers and injuries to students caused by lightning strikes.

The assessment revealed strong community support for two locally identified solutions: installation of lightning arresters in schools and establishment of farmer shelters within open agricultural fields. Community members, teachers, local government representatives, School Management Committees (SMCs), and Parent Teacher Associations (PTAs) expressed willingness to contribute to implementation and maintenance, demonstrating strong local ownership and sustainability potential.

The findings suggest that lightning-related vulnerability is driven by the interaction of three reinforcing systems: exposure, infrastructure deficits, and preparedness gaps. Addressing these interconnected factors through targeted, community-led interventions offers a practical pathway to reducing casualties, strengthening resilience, and generating a scalable model for wider replication across coastal Bangladesh.

2. CONTEXT AND RATIONALE

Bangladesh is widely recognized as one of the world's most climate-vulnerable countries due to its low-lying geography, high population density, and exposure to climate-related hazards including cyclones, floods, storm surges, and sea-level rise (World Risk Report, 2023[1]; IPCC,

[1] Bündnis Entwicklung Hilft & Ruhr University Bochum. (2023). World Risk Report 2023.

2022[2]). While disaster risk reduction efforts in Bangladesh have historically focused on large-scale hazards such as cyclones and floods, lightning has increasingly emerged as a significant but comparatively under-addressed threat to rural populations (Dewan et al., 2017[3]). In recognition of rising lightning-related fatalities, the Government of Bangladesh officially declared lightning a natural disaster in 2016, enabling greater attention to prevention and response measures (Government of Bangladesh, Ministry of Disaster Management and Relief, 2016).

Lightning has emerged as a significant public safety and disaster risk in Bangladesh. A long-term analysis by Dewan et al. (2017)[4] found that between 1990 and 2016, Bangladesh recorded 3,086 lightning-related deaths and 2,382 injuries, with approximately 93 percent of fatalities occurring in rural areas. The study further identified farmers and other outdoor workers as the most affected occupational groups due to prolonged exposure in open environments. More recent statistics[5] from the Department of Disaster Management (DDM) indicate that 3,485 people died from lightning strikes between 2015 and 2024, representing an annual average of approximately 348 deaths. These figures demonstrate that lightning remains one of the deadliest weather-related hazards in Bangladesh and disproportionately affects rural communities dependent on agriculture and other outdoor livelihoods.

Barguna District is located in the south-central coastal region of Bangladesh and is widely recognized as one of the country's most disaster-prone districts. Due to its proximity to the Bay of Bengal, low-lying topography, and extensive river network, the district is regularly exposed to cyclones, tidal surges, flooding, river erosion, waterlogging, and other hydro-meteorological hazards (Bangladesh Delta Plan 2100[6]; BBS, 2023[7]). The livelihoods of local communities are predominantly dependent on agriculture, fisheries, and other climate-sensitive occupations, increasing their vulnerability to weather-related shocks and disasters. In recent years, lightning has emerged as an additional and increasingly visible threat, particularly for populations working or studying in open environments.

Recent incidents in Barguna illustrate the growing severity of lightning-related risks. A fisherman was killed by lightning while fishing in Taltoli Upazila[8]. In April 2026, a farmer was killed in Amtali Upazila while working in an agricultural field, while a separate lightning strike near Fuljhuri School and College injured multiple students[9]. In June 2026, another farmer lost his life in Burirchar Union while working outdoors during a thunderstorm[10]. These incidents demonstrate the

[2] IPCC. (2022). Climate Change 2022: Impacts, Adaptation and Vulnerability.
[3] Dewan, A., et al. (2017). "Characteristics of lightning-related fatalities in Bangladesh: A long-term analysis." Weather, Climate, and Society, American Meteorological Society.
[4] Dewan, A., Hossain, M.F., Rahman, M.M., Yamane, M., Holle, R.L. and Mahmood, R. (2017). *Lightning-related fatalities and injuries in Bangladesh from 1990–2016*. Weather, Climate, and Society, 9(3), pp.575–589.
[5] Department of Disaster Management (DDM). (2025). *Lightning Fatality Statistics in Bangladesh (2015–2024)*. Ministry of Disaster Management and Relief, Government of Bangladesh.
[6] Government of Bangladesh. (2018). *Bangladesh Delta Plan 2100*. General Economics Division, Planning Commission.
[7] Bangladesh Bureau of Statistics (BBS). (2023). *District Statistics: Barguna*.
[8] https://en.prothomalo.com/bangladesh/local-news/lightening-kills-one-in-barguna
[9] https://thedailymorningglory.com/2026/04/29/farmer-dies-in-barguna-lightning-strike-8-children-injured-in-classroom/
[10] https://www.daily-sun.com/bangladesh/878472/eight-killed-in-lightning-strikes

disproportionate impact of lightning on farmers, fishers, and students and highlight the urgent need for locally appropriate risk reduction measures, particularly in educational institutions and agricultural areas. The assessment was therefore conducted to understand the specific nature of lightning-related vulnerability in Fuljhuri and Gourichanna Unions of Barguna district and to identify practical, community-led solutions capable of reducing risk and strengthening resilience.

3. ASSESSMENT OBJECTIVES:

The assessment searched to:

- Examine community perceptions of lightning-related risks and impacts.
- Identify the most vulnerable populations and exposure patterns.
- Assess existing protection measures and preparedness capacities.
- Explore community-prioritized solutions for reducing lightning risk.
- Generate evidence to inform the design of locally led resilience interventions.
- Assess opportunities for sustainability, community ownership, and scaling.

4. METHODOLOGY:

A qualitative and participatory assessment approach was adopted to ensure that local experiences, perceptions, and priorities informed the analysis. Data collection included:

- Two Focus Group Discussion (FGD) involving farmers and community members.
- Five Key Informant Interviews (KIIs) with teachers, elected representatives of local government (UP), and community leaders.
- Secondary review of national lightning statistics, government reports, scientific literature, and media reports related to Barguna District.
- The assessment covered Fuljhuri and Gourichanna Unions under Barguna Sadar Upazila.

Data were analysed using a thematic analysis framework. Responses from FGD participants and KII respondents were systematically coded and grouped into recurring themes. Findings were triangulated across data sources to strengthen validity and reliability. The analysis focused on identifying patterns of vulnerability, exposure, institutional gaps, community capacities, and locally driven solutions.

5. DEMOGRAPHIC AND HAZARD PROFILE

Fuljhuri and Gourichanna Unions represent predominantly rural and agrarian communities within Barguna Sadar Upazila.

The population of Gourichanna Union is estimated at between 18,500 and 22,610 people, while Fuljhuri Union has an estimated population of approximately 17,250 people. Households typically consist of around 4.65 members. Agriculture and fisheries constitute the primary sources of livelihood, supplemented by daily wage labour, petty trade, and small-scale service occupations. Economic conditions remain fragile, with many households dependent on seasonal and climate-sensitive income sources.

The population is predominantly Muslim, accounting for approximately 93.5 percent of residents. Literacy levels remain lower than the broader Upazila average, indicating potential challenges in accessing and utilizing risk information. Both unions are situated within low-lying coastal polder systems and face recurrent exposure to cyclones, tidal surges, waterlogging, and extreme weather events. This geographic context contributes to high levels of disaster vulnerability and limited adaptive capacity.

6. SECONDARY DATA REVIEW

National evidence demonstrates that lightning has become one of the deadliest weather-related hazards in Bangladesh. Between 1990 and 2016[11]:

- ✓ 3,086 people died from lightning strikes.
- ✓ 2,382 people were injured.
- ✓ Approximately 93 percent of fatalities occurred in rural areas.

Department of Disaster Management records further indicate[12]:

- ✓ 3,485 deaths between 2015 and 2024.
- ✓ Annual average mortality of approximately 348 people.
- ✓ Peak mortality of 427 deaths in 2020.

These statistics suggest that lightning now represents a major public safety challenge affecting rural communities throughout Bangladesh.

Evidence from Barguna reflects a similar pattern. Media reports document repeated fatalities among farmers working in open agricultural fields, fishers operating during storms, and injuries among students attending school during thunderstorm events. The concentration of incidents among farmers and school children closely aligns with findings from the primary assessment and reinforces the need for targeted interventions focused on these groups.

7. ANALYTICAL FINDINGS

7.1 Lightning as an Emerging and Increasing Community Risk:

The assessment found strong consensus among participants that lightning is one of the most serious hazards affecting their communities. Respondents consistently ranked lightning alongside cyclones and waterlogging as a priority disaster concern. Participants described lightning as sudden, unpredictable, and increasingly frequent. Community members cited multiple incidents involving deaths, injuries, and near-miss events. The recurrence of these experiences has contributed to heightened risk perception and growing concern among households.

[11] Dewan, A., Hossain, M.F., Rahman, M.M., Yamane, M., Holle, R.L. and Mahmood, R. (2017). *Lightning-related fatalities and injuries in Bangladesh from 1990–2016*. Weather, Climate, and Society, 9(3), pp.575–589.
[12] https://www.dhakatribune.com/bangladesh/381613/lightning-strikes-with-deadly-impact

From an analytical perspective, lightning is no longer perceived as an isolated weather event. Rather, it is increasingly understood as a recurring hazard that directly threatens lives, livelihoods, and educational continuity.

7.2 Exposure-Driven Vulnerability

The assessment revealed that vulnerability is largely determined by exposure patterns. Farmers remain highly exposed because agricultural activities take place in open fields where shelter options are limited. Similarly, school children and teachers face elevated risk because large numbers of people congregate within educational institutions during periods when thunderstorms commonly occur.

The concentration of risk among these groups suggests that targeted interventions can achieve significant reductions in casualties and injuries.

7.3 Protection Infrastructure Deficit

A major finding of the assessment is the absence of protective infrastructure. Schools lack lightning arresters, while agricultural fields lack safe shelters. As a result, people remain exposed even when they are aware of the danger. This infrastructure deficit significantly increases vulnerability and contributes to preventable injuries and fatalities.

7.4 Preparedness and Institutional Gaps

The assessment findings indicate that despite growing awareness of lightning as a serious hazard, preparedness and risk management mechanisms remain limited at community level. Participants acknowledged that they are aware of the dangers associated with thunderstorms and lightning; however, they often lack practical options to reduce their exposure once a storm begins.

Community members reported receiving general weather information through television, mobile phones, and informal social networks, but these messages are not always timely, localized, or actionable. Farmers often continue working in fields due to livelihood pressures, while students remain in schools during school hours despite deteriorating weather conditions. As one participant noted, “We know lightning is dangerous, but when we are in the field, there is often nowhere safe to go.”

Key informants highlighted that local disaster preparedness initiatives primarily focus on cyclones, storm surges, and flooding. Lightning-specific preparedness measures, awareness campaigns, and safety protocols are largely absent from local disaster management planning. Schools generally do not have formal lightning safety procedures, while agricultural workers receive little guidance on safe behavior during thunderstorms.

From an analytical perspective, the challenge is not solely a lack of awareness but rather a lack of institutionalized preparedness mechanisms. Existing disaster risk reduction systems have not adequately adapted to address the increasing threat posed by lightning. Consequently, communities remain exposed despite recognizing the danger.

The findings suggest that strengthening preparedness requires a combination of infrastructure investments, community awareness, localized early warning dissemination, and integration of lightning risk management into existing disaster preparedness systems.

7.5 Strong Community Demand for Lightning Protection Solutions

One of the strongest findings emerging from the assessment is the high level of community consensus regarding appropriate risk reduction measures. Across both the FGD and KIIs, respondents consistently identified two priority interventions:

- ✓ Installation of Lightning Arresters in educational institutions.
- ✓ Establishment of Farmer Shelters within open agricultural fields.

Participants viewed these interventions as practical, visible, and immediately beneficial. Importantly, these solutions were not introduced by external facilitators but emerged directly from community discussions regarding local needs and priorities.

Community members repeatedly expressed concern regarding student safety during thunderstorms. Teachers and parents emphasized that the absence of lightning protection systems creates anxiety and increases perceived risk. Similarly, farmers highlighted the lack of safe refuge while working in open fields, particularly during sudden weather changes.

The consistency of responses across different stakeholder groups demonstrates a strong degree of local ownership over the proposed solutions. This finding is particularly significant because donor-funded resilience initiatives are often more effective and sustainable when interventions emerge from community priorities rather than external assumptions. From a resilience perspective, the proposed interventions directly address the most critical points of exposure identified during the assessment. They therefore represent targeted solutions to clearly defined risk pathways.

7.6 Community Ownership and Sustainability Potential

The assessment revealed substantial local commitment to sustaining project interventions beyond the implementation period. Participants consistently expressed willingness to support maintenance, oversight, and community mobilization activities associated with both Lightning Arresters and Farmer Shelters.

Potential local actors identified during the assessment include:

- School Management Committees (SMCs)
- Parent Teacher Associations
- Teachers
- Farmers' groups
- Union Parishad representatives
- Community leaders
- Youth volunteers

Key informants indicated that these existing structures could play a significant role in ensuring long-term functionality of installed infrastructure. Participants suggested that communities would be willing to contribute labor, oversight, and routine monitoring where appropriate.

This finding reflects an important enabling factor for sustainability. Many infrastructure-based interventions fail because maintenance responsibilities remain unclear. In contrast, respondents demonstrated a clear understanding of ownership responsibilities and expressed willingness to participate in ongoing management. From an analytical perspective, the existence of local institutions capable of supporting maintenance significantly increases the likelihood that project benefits will continue beyond the grant period. It also reduces dependency on external actors and strengthens community resilience capacities.

7.7 High Potential for Replication and Scaling

The assessment found widespread agreement among community members and key stakeholders that successful implementation could serve as a model for wider replication across Barguna District and other coastal regions. Participants highlighted that lightning risk is not unique to Fuljhuri and Gourichanna Unions. Similar exposure patterns exist throughout neighboring unions where communities depend heavily on agriculture and fisheries and where protective infrastructure remains limited.

Key informants noted that if demonstrated effectively, the proposed interventions could be expanded through:

- Union Parishad investment.
- Government disaster risk reduction programs.
- NGO-supported resilience initiatives.
- Community contributions and partnerships.

The proposed Farmer Shelter model was particularly viewed as innovative because such facilities remain uncommon within coastal Bangladesh despite the high exposure of farmers to lightning risk. Participants believed that visible evidence of effectiveness could encourage adoption in other communities facing similar challenges. The findings therefore indicate strong potential for scaling and replication, aligning closely with broader resilience-building objectives and innovation-focused funding opportunities.

8. SYNTHESIS OF FINDINGS

The assessment findings reveal that lightning-related vulnerability in Fuljhuri and Gourichanna Unions is shaped by the interaction of three interconnected systems: an exposure system, an infrastructure deficit system, and a preparedness system.

- **Exposure System:** The primary drivers of risk are occupational and educational exposure patterns. Farmers, agricultural labourers, students, teachers, and livestock owners spend extended periods in open environments where protection from lightning is limited or absent.

- **Infrastructure Deficit System:** The assessment identified a significant absence of physical protection mechanisms. Educational institutions lack lightning protection systems, while agricultural fields lack designated safe shelters. Consequently, even when individuals recognize danger, they have few options to reduce exposure.
- **Preparedness System:** Although communities recognize lightning as a serious hazard, formal preparedness measures remain limited. Existing disaster management efforts focus largely on cyclones and tidal surges, leaving lightning risk insufficiently addressed within local preparedness structures.

These three systems reinforce one another. High exposure combined with inadequate infrastructure and limited preparedness creates a cycle of recurring vulnerability and preventable casualties. The assessment further demonstrates that community members clearly understand these challenges and have identified practical solutions capable of addressing the root causes of risk.

9. CONCLUSION:

The assessment confirms that lightning represents a significant and increasingly recognized disaster risk within Fuljhuri and Gourichanna Unions. Community members consistently identified lightning as one of the most serious hazards affecting their safety, livelihoods, and educational activities. Evidence from both primary and secondary sources demonstrates that lightning-related deaths and injuries are not isolated incidents but recurring events that disproportionately affect farmers, students, and other outdoor populations. The assessment highlights that vulnerability is driven less by a lack of awareness and more by structural factors including high exposure, absence of protective infrastructure, and limited preparedness mechanisms. Schools lack lightning protection systems, agricultural fields lack safe shelters, and localized lightning preparedness measures remain underdeveloped.

At the same time, the findings reveal significant strengths within the community. Local stakeholders have demonstrated a strong understanding of risk, clear prioritization of solutions, willingness to participate in implementation, and commitment to maintaining project outputs. These factors create favorable conditions for sustainable and community-led resilience interventions.

The assessment therefore concludes that targeted investments in lightning protection infrastructure, community preparedness, and localized risk reduction mechanisms have the potential to significantly reduce casualties, strengthen resilience, and provide a scalable model for wider replication across coastal Bangladesh.

10. STRATEGIC RECOMMENDATIONS

A. Install Lightning Arresters in High-Risk Educational Institutions: Educational institutions should be prioritized for installation of certified lightning protection systems to reduce risks faced by students, teachers, and school staff. Selection criteria should consider student population, historical exposure, and geographical vulnerability.

B. Establish Farmer Shelters in Open Agricultural Fields: Strategically located Farmer Shelters should be constructed in large agricultural areas where workers currently lack access to safe refuge during thunderstorms. Shelter locations should be determined through participatory community mapping and risk assessment exercises.

C. Strengthen Community-Based Lightning Preparedness: Community awareness initiatives should be implemented to improve understanding of lightning safety practices, risk behaviors, and protective actions. Special attention should be given to farmers, students, youth, and vulnerable households.

D. Integrate Lightning Risk into Local Disaster Management Systems: Union Disaster Management Committees, schools, and community organizations should incorporate lightning preparedness measures into existing disaster risk reduction plans, training programs, and emergency procedures.

E. Establish School-Based Disaster Risk Reduction Education: Schools should introduce age-appropriate awareness sessions covering lightning safety, early warning interpretation, evacuation procedures, and risk reduction practices.

F. Develop Local Maintenance and Governance Mechanisms: Community-based management systems involving SMCs, farmers, and local government representatives should be established to oversee routine inspection, maintenance, and sustainability of project infrastructure.

G. Strengthen Early Warning Dissemination: Partnerships with local authorities and meteorological information providers should be explored to improve community access to timely and understandable weather alerts. Although Bangladesh Meteorological Department (BMD) and its partners can forecast lightning risks several hours in advance, assessment findings and national evidence indicate that vulnerable rural populations often do not receive or act upon these warnings. Farmers working in agricultural fields, students in schools, and rural households typically rely on informal communication channels and have limited access to weather applications or real-time digital alerts.

H. Promote Learning, Documentation, and Replication: Project implementation should include systematic documentation of lessons learned, effectiveness, community feedback, and operational experiences. Findings should be shared with local government, NGOs, and resilience networks to support scaling and replication.

I. Establish a Community Volunteer Network: Youth volunteers can play a critical role in awareness raising, dissemination of weather information, support to schools, and community mobilization. Structured volunteer systems can strengthen local ownership while enhancing sustainability.

J. Develop a Demonstration Model for Coastal Bangladesh: The combined approach of school-based Lightning Arresters, Farmer Shelters, preparedness activities, and community-led maintenance should be positioned as an innovative demonstration model capable of informing broader lightning risk reduction programming across vulnerable coastal districts.