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## Climate Vulnerability Assessment and Building Community Resiliency at Kalaskati Union, Bakerganj

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### ABSTRACT

Bangladesh is frequently cited as a country that is extremely vulnerable to climate change. Socioeconomic sectors like agriculture and fishing are more climate sensitive in the country. These climate change impacts are extremely detrimental to the economy, the environment, and social development of the people in the study area. To complete the objectives, both qualitative and quantitative data have been collected through questionnaire surveys, photography and observation methods, and those data have been involved with primary and secondary data collected from community, government, and NGO officials. To conduct the survey for the research, the total sample size was 100. From the study, different climate vulnerabilities like 38% cyclone, 46% river bank erosion, 41% flood, 36% seasonal change are severely noticed and 43% moderate condition of drought affects the socio-economic conditions. 84% of people faced problems in crop production and 75% changed their lifestyle due to irregular events. Consequently, most poor families experienced food insecurity, health problems, water shortage, and hygiene problems. Damaged infrastructure also hampered earnings and production. People try to control the situations and approve a diversity of options and technologies to adapt to the climate change impacts in the area. The government and different NGOs actively perform adaptation practices for building disaster resiliency. Union Disaster Management Committee serves resilience activities such as disseminating early warnings among the community during cyclones. NGOs help to build cooperative agricultural farms and inspire local people to engage in afforestation, balancing the local climate. Using developed seeds of vegetables and food crops, changing cropping patterns, using organic fertilizer to improve soil fertility instead of chemical fertilizers, and irrigating vegetables and some crops for increasing productivity. The community people in the study area recommended increasing climate resilient activities through community participation and enhancement of their capacity.

**Keywords:** Climate vulnerability, Adaptation, Disaster management, Community, and Resiliency.

### INTRODUCTION:

The IPCC's third assessment report acknowledged that South Asian countries are highly vulnerable to changing climate scenarios (McCarthy *et al.*, 2001). According to the international community, Bangladesh is

among the most vulnerable countries. The country experienced nearly two hundred climate-related disasters, including heavy rainfall, floods, river bank erosion, storm surges, coastal cyclones, increased temperature, seasonal change, drought, etc. As a result of

these events, people have lost their lives, damaged livelihoods and homes, and also cost approximately sixteen billion dollars in damages (Oxfam International, 2011). The people of Kalaskati union at Bakerganj upazila under Barishal district lose their lives and livelihoods extremely due to the climate vulnerabilities. Agriculture, infrastructure, livelihoods, human health, utility services, forestry and biodiversity are greatly hampered in the area. For example, GDP could lead to a decline between 27 and 57 percent (Agrawala *et al.*, 2003; Haile, 2020). In addition to risks related to climate inconsistency and variation, many other challenges lie ahead of Bangladesh, including pressure on land use, governance, environmental protection, macro-economic development, & globalization (Moef, 2012).

In support of this process, an integrated approach is needed to assess Bangladesh's climate vulnerability in detail, with special regard to different regions and sectors (The World Bank, 2010). Indeed, vulnerability assessments can help estimate the characteristics of future threats to a given human or ecological system, and they can provide the basis for devising measures to minimize or avoid harm. Despite existing advances towards implementation of sustainable development, Bangladesh's potential for sustainable development has been significantly challenged by climate change (Ahmed and Haque, 2002). However, people strive to return to their normal lives following any extreme climatic event. The study attempts to explore how the people of the area of Kalaskati coped with and recovered their livelihood in response to abnormal weather conditions. Given its determination to achieve upper middle-income status by 2030, the Bangladesh government is taking a proactive approach to addressing major experiments related to climate vulnerabilities and development (Ministry of Finance, 2014).

To rationalize the activities of the government of Bangladesh towards assisting adaptation to climate change, the Climate Change Cell (CCC) has been established under the guidance of the government as the principal point on climate change problems. The governance mechanism for all these strategies, policies, plans, and funds is going to be a major concern. Responsibility, accountability, and transparency of key stakeholders, as well as the extent of participation of affected stakeholders will be among the key issues.

## **METHODOLOGY:**

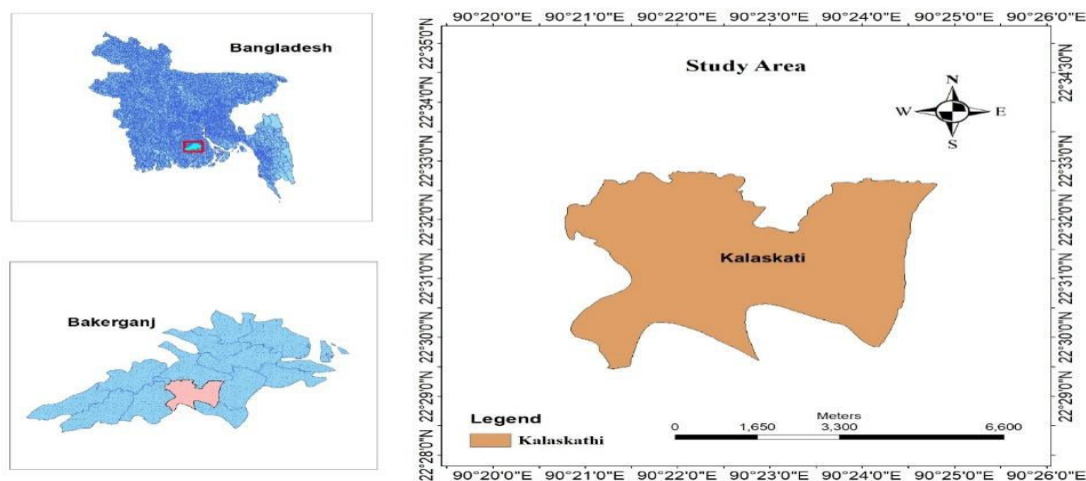
### **Study area and selection**

Barishal district is situated in the southern part of Bangladesh (Fig. 1). There are ten (10) upazilas in the Barishal district. Bakerganj upazila is located in the southern part of the Barishal district. There are fourteen unions in Bakerganj upazila (BBS, 2011), and the Kalaskati union selected for the study area is more vulnerable to climate vulnerabilities. The area faced common climatic vulnerabilities like river bank erosion, floods, and excessive rainfall in the rainy season, droughts, abnormal weather conditions, seasonal changes, and so on. The area's latitude and longitude are 22° 31' 0" N, 90° 21' 0" E (BBS, 2015). The Kalaskati union covered 24.63 sq.km with three rivers named Tulatoli (west), Angaria (south), and Pandob (east) and eight canals. The area adjacent to Bakerganj by the Tulatoli River causes the most vulnerable conditions for river bank erosion every year. Because of its geo-graphical location and climatic condition, it becomes vulnerable to different natural calamities and climatic hazards.

### **Research methods**

This study engaged both qualitative and quantitative research approaches to analyze and define the perception of assessing climate vulnerability and resilience practices in the context of disaster management in Kalaskati union in Bakerganj. For better consideration of a social problem, this approach will guide the means of investigation and understanding the research topic. Qualitative research design, broadly defined, means any type of research that has not been found through statistical measures or other means of measurement. A quantitative survey approach was used to regulate the perception of respondents. This study began with a semi-structured interview questionnaire about disaster management policy and practice in disaster-prone areas, which led to an in-depth examination.

**Data collection** To accomplish the research, data was collected in different ways. There are basically three types of data that have been collected: the primary data through house-hold surveys, key informant interviews, and focus group discussion (FGD). The secondary data comes from various literature, journals, articles, and online sources.



**Fig. 1:** Location map of the Kalaskati Union, Bakerganj, Barishal.

### Household survey

From information gathered from the relevant literature, discussions, and feedback from field visits, the questionnaire for the household survey was prepared. 100 households were involved in collecting data through a structured questionnaire.

### Key Informants Interview (KII)

Key informants were interviewed to receive specific, specialized knowledge for a better understanding of assessing climate vulnerability and building community resiliency practices in Kalaskatiunion, Bakerganj. The 10 Key Informant Interviews (KII) were directed at relevant officials and stakeholders who were directly related to the application process and a massive part of the disaster management committee of the Bangladesh government.

### Focus Group Discussion (FGD)

Using a qualitative approach, five focus group discussions were accompanied by community members. In a relatively short time, a focus group helps to gather an inclusive variety of data. Five FGD involves the participants being comprised of 5-7 members, including both men and women.

### Sources of secondary data

Academic research works, books, journals, short communication and online sources.

### Data analysis

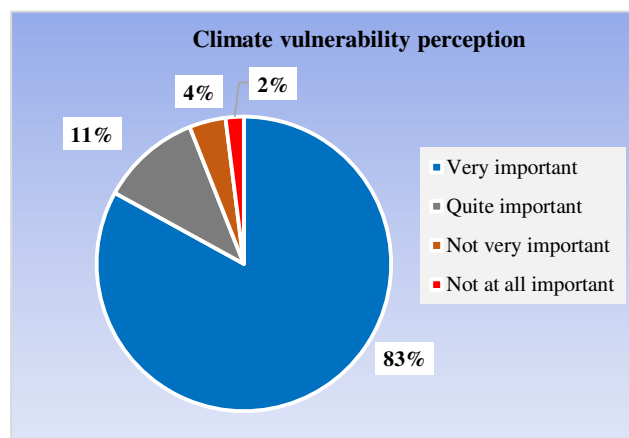
A comparative analysis was conducted to vary responses from all participants to understand their perception and understanding of climate vulnerabilities,

their roles in decreasing risk, and their participation gaps. During data analysis, respondents' answers were analyzed according to direct questions and percentages were calculated. After collecting the data, I used ArcGIS 10.3 software and Microsoft Excel to analyze the collected primary data. GIS has been used to develop more maps for research purposes, and different charts (pie chart, bar chart) have been generated using Microsoft Excel.

## RESULTS AND DISCUSSION:

### Perception on climate vulnerability

Participants have different views about climate change. Some respondents directly comment that it's God-gifted and normal.



**Fig. 2:** Perception on climate vulnerability at Kalaskati Union.

People are not alarmed by climate vulnerability because they think every year or season, they face disasters and they learn to live with the situation.

They are probably 2%. They argue that these are common phenomena for them. But when total data is collected and calculated in Excel to make a graph, the real scenarios found about climate variability show that most of the respondents agree that climate vulnerability is very important and alarming for them 11% argued that climate change is quite important for socioeconomic conditions. Only 4% comment that it is less significant but has some implications directly or indirectly on their lifestyle (Fig. 2).

### Climate vulnerability situations

Various points of view on how recent and previous natural disasters have impacted the community. People point out some common disasters resulting from climate change, such as cyclones, floods, increased temperatures, thunderstorms, and so on. They classify these calamities based on intensity and frequency in nature as very low, low, moderate, severe, and very severe. River bank erosion is the more frequented climate phenomenon in the study area (Fig. 3 & 4).

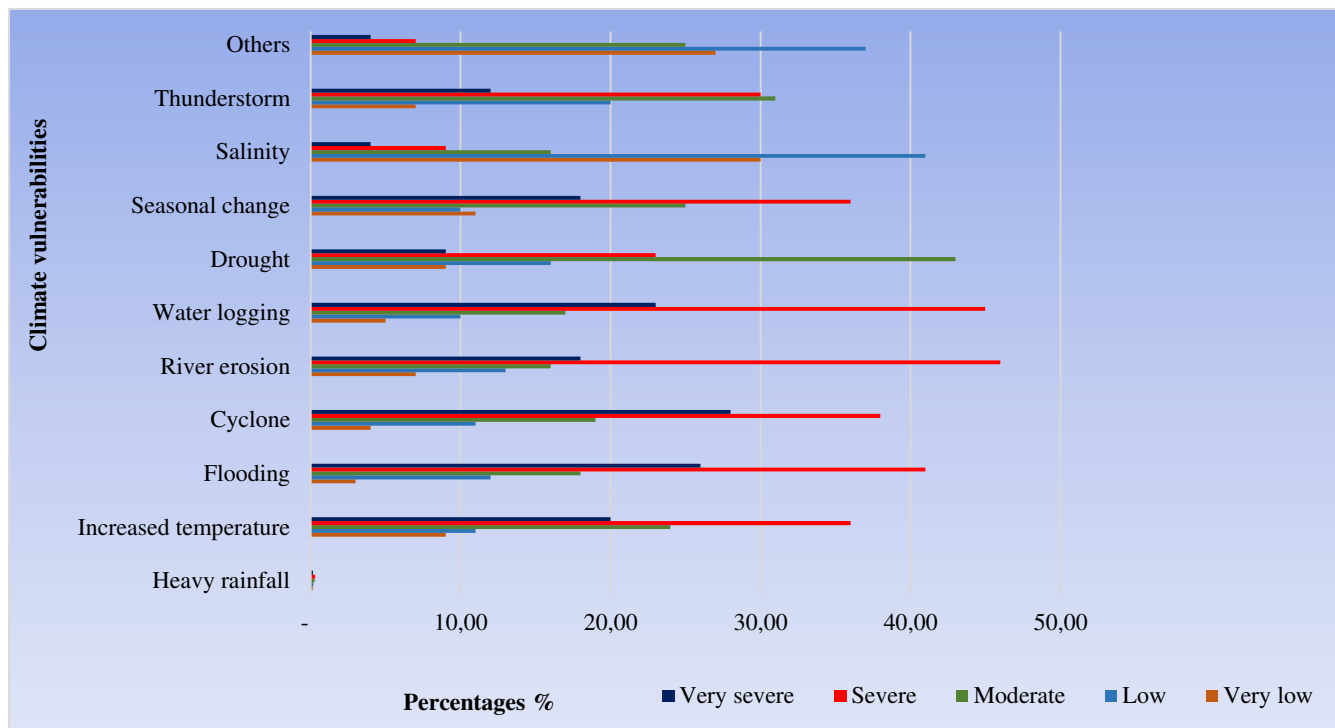


Fig. 3: Climate vulnerabilities at the study area.

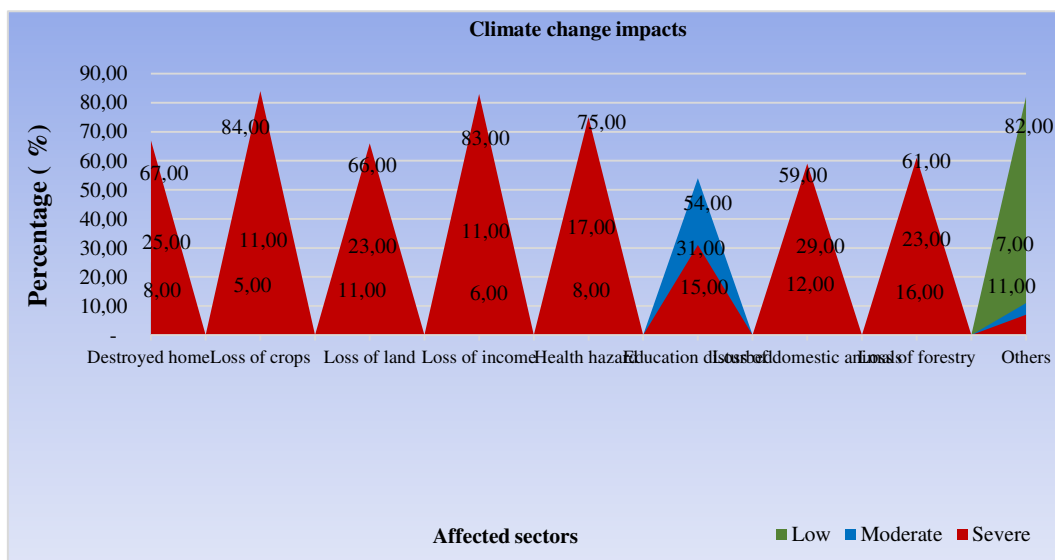


Fig. 4: Sector wise climate change impacts at the study area.

### Migration due to climate vulnerability

Due to Tulatoli river bank erosion, community migration is the most visible climate change impact. Respondents in the affected area express their sorrow about their conditions. Two villages are already destroyed by river bank erosion, as explained by the Union Parishad Chairman, and many people have lost their settlements and shifted outside of the village. Local people migrated mainly to Barishal and Dhaka, and some others settled in their relatives' homes outside of the village. The following graph indicates that 61% of people were evacuated in 2009–2012. In 2013-2016 the number of migrants decreased, but in 2017-2019 there was again an increase in migrated people in 5 wards, Kalaskati union basically. The graph also represents the total study area's immigration features. Some landless farmers depend on agricultural activities shifting to other places due to crop failure and searching for another business to survive in another location (Fig. 5).

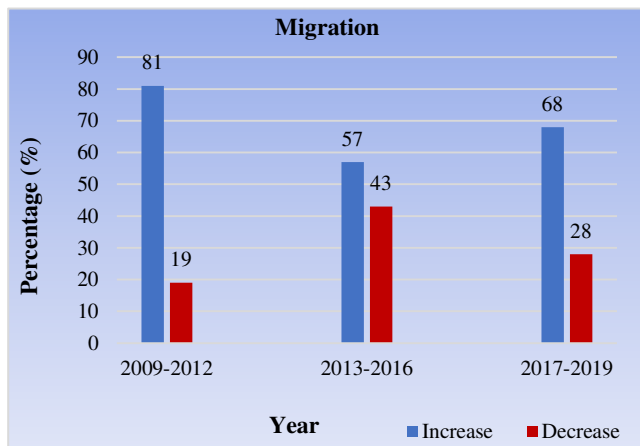


Fig. 5: Migration in the study area.

### Climate change resiliency measures

Respondents share opinions on how to minimize or reduce climate vulnerability. They have no or little institutional knowledge about climate change adaptation practices and how to control climate change and its impacts. People strongly believe that brickfields are the key reason behind climate vulnerabilities in the locality. The following graph shows that 45% of respondents express their opinion on controlling brickfield activities. 5% of respondents argue cyclone shelters can protect them from calamities. 18% of people near the Tulatoli River thought that river dam construction could save them from river bank erosion. 4% of respondents argued that stopping wood cutting and

tree planting would reduce extreme weather conditions 7% of the respondents believed population growth should be controlled and a formal or non-formal awareness program should be organized periodically by the public or NGO officials. Rivers and canals were considered polluted by 5% of respondents. Land management approaches are needed. 3% of respondents believed it. Only 2% of respondents recommended other options to protect the community from climate vulnerability (Fig. 6).

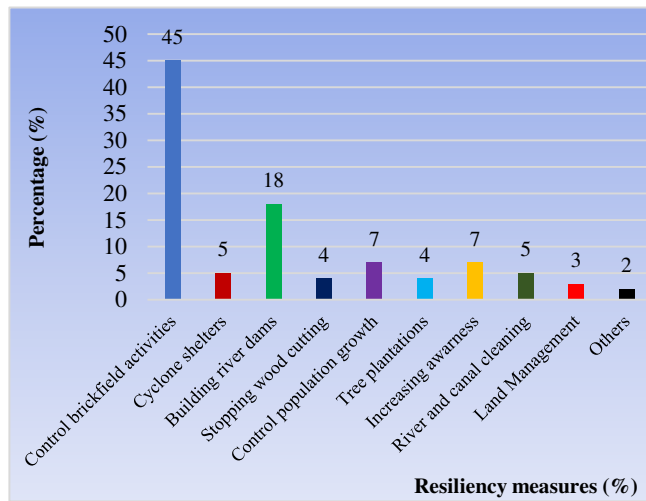


Fig. 6: Resiliency measures against climatic events.

### CONCLUSION:

The nation-wide Climate Vulnerability Assessment (CVA) is a key step in reviewing, summarizing, and understanding the climate change vulnerabilities that people in different regions of Bangladesh face. The analysis of the area-wide climate vulnerability assessment indicates that the study area is more susceptible to the effects of weather irregularities across the selected sectors. Water resources are fast depleting through river erosion, agriculture and livestock sectors are heavily affected, and people, especially in coastal areas, are highly disaster prone. Heat stress will be a major issue in the coming months. The research highlighted differences in climate vulnerability and its influences, giving an outlook towards the future of building community resiliency. Despite these positive developments, the fact remains that Bangladesh is persistently exposed to probable disasters, and the intensity and frequency of these events will rise as a result of climate change. Besides investments in more obvious measures to reduce exposure to hazards, the

study emphasizes the importance of increasing the adaptation capacity of the region. The adaptive capacity of people and sectors can be increased through education, technology, access to water, electricity, healthcare, and so on. Investing in increasing the country's adaptation capacity is important for minimizing vulnerabilities and reducing gender imbalances and poverty. The climate vulnerability assessment identified climate vulnerable scenarios and sectors. This information can support the government of the country in making the region more climate resilient and addressing current and future climate irregularities. The challenges are complex, and sustainable solutions that contribute to climate resilience and the ambitious development goals of the locality are required. Sound information about climate vulnerability, obtained in a clear process, is needed to support decision-making for adaptation planning.

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#### CONFLICTS OF INTEREST:

This paper has not been submitted to, nor is it under review at, another journal or other publication site.

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