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CLIMATE INDUCED DAMAGES AND LOSS ASSESSMENT: ADAPTATION STRATEGIES TO ACHIEVE RESILIENCE IN COASTAL COMMUNITIES OF BHOLA IN BANGLADESH

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1. INTRODUCTION

Bangladesh is considered to be the fifth most vulnerable country in the world to natural disasters due to its geographical location (Hoque et al., 2019). Natural hazards and calamities disproportionately affect the poor (Hallegatte et al., 2020). Climate change can cause catastrophic damage and loss to human settlements and the environment as a whole (Ahmed & Tan, 2021). The major threats are land erosion, floods, high levels of salinity, cyclones, drought, heat waves, storm surges, sea-level rise, cold waves, sedimentation, and waterlogging (Rahman, 2023). In Bangladesh, natural disasters are expected to drive 9.6 million individuals from 29 country districts to relocate domestically and internationally by 2050, and among these, riverbank erosion will result in the displacement of 1.9 million people (Malak et al., 2021). This study aims to look into the climate change-related economic and non-economic losses and damages, the challenges faced by the communities to adapt to it, and lastly the adaptation techniques of the riverine communities in the study area. It can be used to make national and international policies.

2. METHODOLOGY

To conduct the study both qualitative and quantitative methods were used. Firstly, the Kobo Toolbox was used to create the survey questions and gather data. Three focus group discussions (FGD) and three key informant interviews (KII) were chosen purposively from the total population for performing this research. Satellite images collected from open-access Landsat imagery services at https://earthexplorer.usgs.gov/ to analyze the riverbank erosion. An analysis of riverbank erosion patterns from 1990 to 2020 is conducted using ArcGIS 10.8.

3. RESULTS AND DISCUSSION

The Meghna River at Bhola Sadar's undisturbed area, accretion, and riverbank erosion are depicted in Figure 1 during the years 1190–2020. About 11431.426 hectares remain unaltered after 30 years, of which 5967.846 hectares and 7994.282 hectares were regions subject to erosion and accretion, respectively.

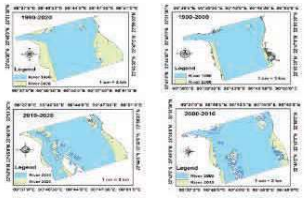

Figure 1: River bank erosion on both sides of the river from 1990-2020

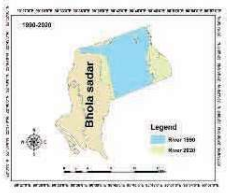

Figure 2: Study area

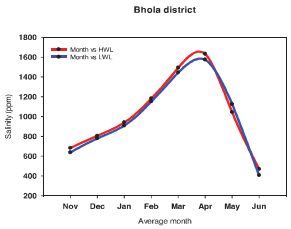

Figure 3: Monthly salinity intrusion in Bhola district

According to a GIS study, Bhola Sadar Upazila was impacted by riverbank erosion where as various regions saw varying levels of erosion and deposition. As the study revealed between 1990 and 2000, the areas along both banks of the river that experienced erosion and accretion were around 11805.774 ha, 5593.498 ha, and 3418.840 ha, respectively. For the years 2000–2010, the comparable unchanging areas subject to erosion and accretion were 11969.698 ha, 6298.486 ha, and 3254.916 ha; for the years 2010–2020, the corresponding areas were 13457.353 ha, 4810.83 ha, and 5968.355 ha and lastly, between 2010 and 2020, there appeared to be less erosion on both riverbanks. Despite this, erosion

happened close to Bhola Sadar, and the rate of accretion is greater than the rate of erosion. The river changes between 1990 and 2020 is represented in Figure 2. The monthly change in salinity in Bhola is shown in Figure 3. Approximately 940.01, 1183.05, 1492.48, 1633.728, 1044.524,469.73, 682.69, and 805.45 ppm for HWL and 909.383, 1152.94, 1445.194, 1575.94, 1125.91, 408.20, 638.31, and 778.53 ppm for LWL were the salinity values for January, February, March, April, May, June, November and December. Both HWL (1633.728 ppm) and LWL (1575.94 ppm) salinity peaked in April.

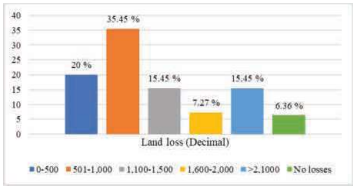

Figure 4: Approximate amount of land loss.

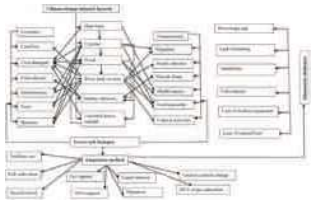

Figure 5: Conceptual framework

Due to riverbank erosion, almost 90% of the respondents lost their land. Other economic losses include decreased fisheries production, trees, businesses, infrastructure, and agricultural output, ranked from highest to lowest. Cyclones, heat waves, floods, saline intrusion, riverbank erosion, and erratic, intense rains all cause crop damage at different phases as highlighted in Figure 5. The noneconomic damages ranked greatest to lowest are food insecurity, health effects, loss of biodiversity, migration, loss of social cohesion, etc. For them, the most important risk is riverbank erosion. A loss of land can be considered an economic loss. The land loss amount of about 35.46% of the respondents is between 501 and 1000 decimals, and its approximate market worth is between 11 and 50 lac BDT. Roughly 15.45% of participants lost 1100–15,00 decimals which is figured out in Figure 4.

4. CONCLUSION

According to the majority of the respondents, riverbank erosion was the most catastrophic event of that locality and about 11431.426 hectares remain unaltered after 30 years due to this event. The land loss amount of about 35.46% of the respondents is between 501 and 1000 decimals, and its approximate market worth is between 11 and 50 lac in BDT. Salinity poses a problem as well; around 40.91% of respondents agreed that they faced food insecurity, economic crisis, and mental stress, and migrated permanently to another place to make new settlements.

5. REFERENCES

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