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Community Climate Vulnerability Assessment (CCVA) to Climate Change of a Hilly Area of Rangamati District in Bangladesh

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ABSTRACT: *The global challenge of Climate change poses a significant threat to humanity, with its impacts already being felt in various parts of the world through unpredictable and severe weather events leading to property damage and loss of life (IPCC, 2014). Community resilience is vital in reducing the losses caused by climate change, and it depends on an understanding of perceived risks, vulnerabilities, and local efforts to mitigate them. The Chittagong Hill Tracts of Bangladesh is one of the regions that is particularly vulnerable to climate change, due to its geography, degradation of forests, sensitivity of livelihoods, and low capacity in comparison to other parts of the country (World bank 2018).Although vulnerability assessments to climate change have been conducted previously, there remains a gap in involving indigenous communities residing in hilly areas of Bangladesh. The recognition of climate change risks as perceived by local communities could serve as a foundation for developing locally-led adaptation plans aimed at building local resilience.The Basonto Mon watershed is located in Rangamati district of Bangladesh, with GPS coordinates of 22˚ 40.218"N 92˚ 16.620" E (GPS coordinates derived from Google Earth) and an elevation of 390 feet above sea level. The area comprises of five villages from varying elevations and is primarily inhabited by the Chakma community. There are 269 households in the region, primarily relying on Jhum cultivation, agriculture on fringe lands, and seasonal labor for their livelihoods, with an average annual household income of BDT 96000 (approximately US$ 1132). About 76% of the community consider themselves under serious threat from the effects of climate change, while 24% have limited understanding of the issue. Approximately 20% of the respondents believe that their livelihoods will be mostly affected by climate change, while 78% identified multiple impacts including health, disaster intensity, family workload, and more. The region is also facing severe soil erosion caused by deforestation, incorrect agricultural practices, and the monoculture of forest species such as teak. The community is at risk from agricultural drought, flash floods, landslides, cyclones, among other things, with the most impacted months being March to August.Climate drivers in the area include*

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erratic rainfall, sudden heavy downpours, increased number of rainless days, and rising temperatures. Acute water scarcity caused by the drying of streams is another major concern for the community and has a widespread impact on women and their families. The most vulnerable sectors identified are the forest and ecosystem, livelihoods, and water security.Approximately 75% of the population is literate and has access to educational institutions and health clinics. However, the environment is fragile. To address this, there are three main priorities: 1) preserving the forests through cooperative efforts, reforestation, and public education, 2) promoting sustainable and climate-resistant agriculture, as well as alternative livelihoods and market access, and 3) improving access to clean water and preserving water sources through community-led management. Key stakeholders, such as the CHT institutions and local government bodies, are crucial in supporting the community in becoming more resilient to the effects of climate change.

KEY WORDS*:* climate change, watershed, vulnerability, ecosystem, climate resilience

INTRODUCTION

The Chittagong Hill Tracts (CHT) is one of the most economically and socially marginalized regions of Bangladesh, with low levels of development in several key areas including income, employment, poverty, health, water and sanitation, education, and infrastructure access (UNDP, 2009). The World Bank has identified 10 hotspot districts those will be heavily impacted by climate change, with all three districts of CHT among the top of the list (World Bank, 2018). The poverty rate in CHT is significantly higher than in other parts of Bangladesh, with 75% of households living below the poverty line of less than US$12 per person per month and 86% living below the upper poverty line of less than US$15 per person per month (NAP, 2022). The total vulnerable population in the region to the effects of climate change is estimated to be 1.33 million, consisting of 12 ethnic groups, including 11 indigenous hill tribes and the Bengali population (Ahmed, M. 2010). These individuals largely rely on natural resources for their daily needs. The growing population in the region has increased demand for food, leading to deforestation and unsustainable use of the hills and other resources. Human activities, such as rampant deforestation and environmental degradation, compounded by the impacts of climate change, are causing significant harm to the lives and livelihoods of the people in CHT. This includes excessive flash floods, landslides, loss of biodiversity, food insecurity, and more. The following sections outline some of the major environmental and climate-related issues faced by CHT.

The primary sources of water in the region are hill springs and dug wells, with 28% and 27% of the population respectively relying on them. However, in recent years, these springs

have been drying up due to prolonged droughts caused by climate change, leading to a more severe water scarcity situation, especially for the indigenous tribes living in remote areas (UNDP, 2008).

Over the past five decades, Chittagong has experienced approximately 12 landslides (BWDB, 2005). These disasters have resulted in the loss of lives, with 17 people dying in 1999, 13 in 2000, 91 in 2007, 54 in 2010, 17 in 2011, and 152 in 2017 (Islam et al., 2017). The most devastating landslide occurred in 2017 and affected several areas in CHT, leading to an estimated 400 deaths over the past three decades and causing significant economic and property damage. The main causes of these landslides include topography, slopes weakened by water saturation, erosion steepening the slope, soil properties (sandy soil), heavy rain, and high-speed surface runoff.

Flash floods are a recurrent natural disaster in the mountainous region of Bangladesh, with occurrences almost every year. This is due to the high levels of rainfall, particularly during the monsoon season, with average rainfall in the hilly region of Bangladesh reaching approximately 2,300mm annually.

The impact of Climate Change is not the same everywhere and is influenced by various factors such as geography, dependence on natural resources, and the physical, economic, and social status of local communities. It is crucial to conduct community-based assessments to identify specific vulnerabilities and shocks, as a macro-level approach may not fully address the needs and weaknesses of local communities. Taking into consideration the variations in natural hazards and socio-economic structures, it is beneficial to focus on place-based vulnerability assessments, as it helps to target the most marginalized groups in the community, even on a small scale. (Turner, 2003; Sharma et al., 2009).

The Basonto Mon area, inhabited by the Chakma indigenous community in the Balukhali union of Rangamati district in Bangladesh, is highly vulnerable. This marginalized and resource-poor community relies on natural resources for their livelihood. The Chakma community was relocated to this highland area after their lowland homes were flooded by Kaptai lake in 1962. Climate change is causing negative consequences and is not widely known or understood in this area (National Adaptation Plan, 2022). It is crucial to allow the community to conduct their own vulnerability assessment in order to identify their potential threats, assess the degree of risk, and be involved in local-level resilience planning. Raising risk awareness and providing support from both government and non-government entities can help to improve resilience at both the household and community level. The key research questions of this study are:

1. What is the understanding of the community people about climate change impact on Basonto Mon watershed?
2. How much vulnerable are these communities and their livelihoods from prevailing climatic stresses, and level of adaptive capacity to climate change?

THEORETICAL FRAMEWORK

2.1 Concept of Climate Change, Vulnerability, and Resilience:

Climate Change is a very popular topic nowadays, but its definition is being updated regularly with the new scientific report by United Nations Framework Convention on Climate Change (UNFCCC). In 2002, UNFCCC defined 'Climate change as a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable periods. According to The5th Assessment Report of IPCC (2014), 'Anthropogenic greenhouse gas emissions has increased since the pre-industrial era, driven largely by economic and population growth, and are now higher than ever. This has led to atmospheric concentrations of carbon dioxide, methane and nitrous oxide that are unprecedented in at least the last 8,00,000 years. Their effects, together with those of other anthropogenic drivers, have been detected throughout the climate system and are extremely likely to have been the dominant cause of the observed warming since the mid-20th century.

The Second Assessment Report (SAR) of IPCC defines climate change vulnerability as the extent to which CC may damage or harm a system, and it does not only depend on a system's sensitivity but also on its ability to adapt to new climatic conditions. The Third Assessment Report (TAR) defines vulnerability as 'the degree to which a system is susceptible to, or unable to cope with the adverse effects of climate change, including climatic variability and extremes'. IPCC 2001 defines vulnerability as 'it is the function of character, magnitude and rate of climate variation to which a system is exposed, its sensitivity, and its adaptive capacity'.

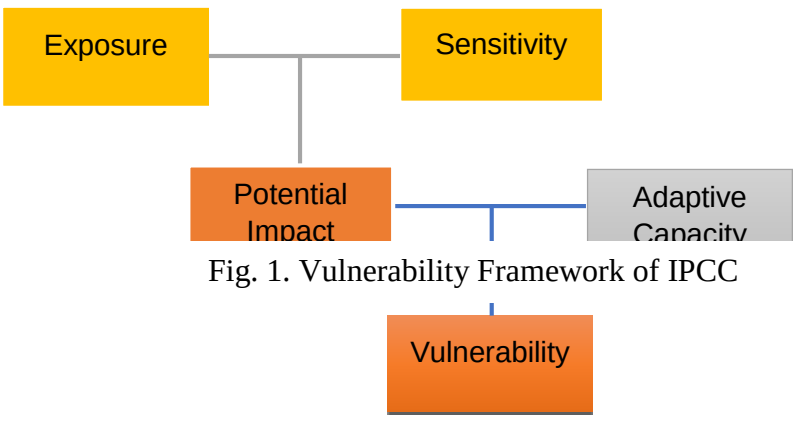

Fig. 1. Vulnerability Framework of IPCC

Vulnerability Assessment to Climate Change

The susceptibility of a community to the impacts of climate change is contingent on the nature and frequency of climate hazards present in that region. The presence of these hazards, combined with the exposure of certain groups or sectors, results in the vulnerability of the area or its inhabitants. Effective measures to address climate vulnerability must therefore encompass a wide range of strategies, including enhancing adaptive capacity, strengthening physical and financial assets, and ensuring food security. To effectively build resilience, a comprehensive approach that integrates multiple interventions must be taken, considering the unique vulnerabilities of the affected communities.

According to IPCC (2014), resilience is defined as the capacity of social, economic, and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity, and structure, while also maintaining the capacity for adaptation, learning, and transformation. The approach to 'resilience' is dynamic and system-orientated and has been considered as a 'function of wealth, technology, education, information, skills, infrastructure, access to resources, and stability and management capabilities' (Gaillard, J. C 2010).

MATERIALS AND METHOD

Methodology for Conducting CCVA

Conducting Community-based Climate Vulnerability Assessment (CCVA) is not a novel concept, as it has been carried out in various parts of the world. However, this is the first time that such an assessment has been attempted in the Chittagong Hill Tracts (CHT) region of Bangladesh. The CHT is unique and requires a tailored approach, taking into account the local community's language, culture, social conditions, customs, natural resources, and secondary scientific data. Engaging the community in every step of the CCVA development was the cornerstone of the methodology. CCVA was developed using various participatory rural appraisal (PRA) tools, including field visits, transect walks, community consultations, focus group discussions, social surveys, and key informant interviews (KII). The following steps were followed to conduct the CCVA:

- Site-specific major climatic hazards were identified and categorized into high, moderate and low climatic extremes.
- Identifying and categorizing the climatic hazards, existing livelihood options were identified and how such options are being affected by the impacts of climate change. Also, exposure and sensitivity to climate vulnerabilities of their respective sites were scored ranging from 0 to 5 (0= No impact, 1- very light impact, 2- Light impact, 3-average, 4-serious impact, and 5-very serious impact. (Linh, V. T., Dung, H. M., Loi, N. K., & (2021))

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Table:1 Exposure and Sensitivity to Climate Vulnerability

Livelihood options	Climatic Hazard-1 (Example: Flash flood)		Total (E+S)	Climatic Hazard-2		Total (E+S)	Climatic Hazard-3		Total (E+S)
	Exposure (E)	Sensitivity (S)		Exposure (E)	Sensitivity (S)		Exposure (E)	Sensitivity (S)	
Livelihood-1									
Livelihood-2									
Livelihood-3									
Livelihood-4									

- The next step was to develop a matrix comprising selected livelihood options and climatic hazards and score them to understand how these climate vulnerabilities are going to have an impact on the selected livelihood options.

Table:2 Impact of Climate Vulnerabilities on Livelihood options

Livelihood options	Climatic Hazard-1	Climatic Hazard-2	Climatic Hazard-3
Livelihood-1	Total score (E+S)	Total score (E+S)	Total score (E+S)
Livelihood-2	Total score (E+S)	Total score (E+S)	Total score (E+S)
Livelihood-3	Total score (E+S)	Total score (E+S)	Total score (E+S)
Livelihood-4	Total score (E+S)	Total score (E+S)	Total score (E+S)

- The next step was to conduct an impact chain analysis of the identified major climatic hazard from the matrix and examine how such climatic hazard is affecting the lives and livelihood of the people. The impact chain analysis was carried out to get the result in the specified areas/issues/sectors that are impacted most by climate-induced extreme events.

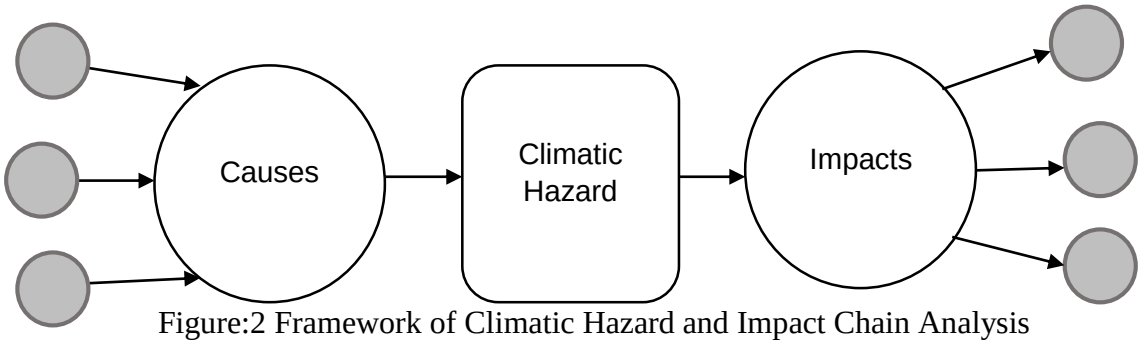

Figure:2 Framework of Climatic Hazard and Impact Chain Analysis

Data Collection:

Primary Data: Primary data like area location was collected via GPS device in the spot.

i)Transect Walk: A transect walk along with community people mostly older people carried out in all five villages from KaindaMukh Para, Indramoni Para, Bosonto NichPara, Boshonto Upor Para and finally Lakkkhanya Para. Transect walk started from community which close to lake and gradually shifted to up the hill towards lokkonnyPara. After the community visit, a social map of five villages was prepared by community people.

ii) Hazard Map: Along with community members, Hazard maps were prepared for individual villages and then prepared one for whole watershed and hazards were ranked based on their exposure, frequency and severity.

iii) Seasonal Livelihood Calendar: To find out the most impacted sector and intersecting the hazards most prominent season and thereby livelihoods i.e as most of the CHT communities are farmers and therefore this tool helps to identify the most impacted agriculture which needs to be resilient in order to minimize the impact. This calendar was prepared along with community members.

iv) **Adaptive Capacity**: It is very important to know the intrinsic capacity of the community for designing the resilience of the community along with implementation capacity, awareness, local practices that are resilient. A series of analysis for probable intervention related adaptive capacity were done along with community.

V) **Impact Analysis**: It is not possible to understand actual impact on different sectors, natural environment and ecology, food security without the deep digging along with community consultation. Therefore, various impact was analyzed with the community.

Secondary Data: Various climate data, socio-economic data, climate model data were collected from the various sources of earlier research, study etc.

Quantitative Data: To assess the climate awareness of the community, a small and short survey was done.

Data Processing, Analysis, and Interpretation

Data collected from different sources were sorted, processed, analyzed, and interpreted through tables, graphs, charts, and statistical tools, and pictorial representation. All the statistical data were analyzed using spreadsheets. Google Earth has been used for map production.

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RESULTS AND DISCUSSION

Community Climate Vulnerability Assessment (CCVA) of Basonto Mon site at Rangamati in Bangladesh

Site Description Socio-economic Setting

The study conducted on Basonto Mon in Balukhali Union, Rangamati Sadar Upazila, Rangamati, has identified 5 adjacent areas, known as Paras, as the most vulnerable to climate change. Out of the five, three Paras, namely Indra Moni Para (32 households), Kainda Mukh Para (56 households), and Basonto Nich Para (88 households), are situated near Kaptai Lake. In contrast, Bosonta Mon Para (66 households) and Lakhyanna Para (27 households) are located on top of a hill, with elevations ranging from 2000 to 2500 feet above the other Paras as per the community perception.

A seasonal livelihoods calendar can help to identify specific vulnerabilities by documenting the timing, duration, and intensity of different livelihood activities, as well as the resources that are required for each activity. This information provides a comprehensive understanding of the livelihoods strategies and livelihood assets that are most critical for the community's survival and well-being, as well as the risks and uncertainties that they face throughout the year. With this information, community can identify the specific periods when are they most vulnerable to climate-related shocks and stresses, such as droughts, floods, or disease outbreaks, and tailor their interventions accordingly. By taking a participatory and community-driven approach to livelihoods analysis, seasonal livelihoods calendars can be a valuable tool for building community resilience to the impacts of climate change.
Table 03: Livelihood Seasonal Calendar

Livelihood Options	Crops	J	F	M	A	M	J	J	A	S	O	N	D
Plain Land Cropping	Paddy												
	Brinjal												
	Potato												
	Tomato												
	Chili												
	Corn												
	Cauliflower												
	Long bean												
Jhum Cultivation	Paddy												
	Turmeric												
	Banana												
	Chili												
	Brinjal												
	Papaya												
	Cucumber												
	Pumpkin												
	Potato												
	Taro root												
Fruit Gardening	Mango												
	Lychee												
	Papaya												
	Banana												
	Jack fruit												
	Grapefruit												
Livestock rearing	Cow												
	Pig												
	Chicken												

According to the seasonal livelihood calendar, winter is a busy time for farmers who cultivate crops in the plains. They are particularly vulnerable to any changes that may occur during this time. For Jhumia farmers, the main farming period is from April to September. Jhum cultivation relies entirely on natural rainfall, so any changes in rainfall patterns or increases in rainless days can have a severe impact on their livelihood and food security.

CHT farmers, on the other hand, rely on fruit cultivation for their income, with crops such as bananas and papayas grown year-round, while other fruits are mainly cultivated from March to July. Livestock is raised throughout the year, and with proper care during key hazardous times, it can provide a year-round production.

Community Perception of Climate Change

According to the questionire on risk perception due to the cliamte change, 76% of the respondents stated that they would be severely impacted by climate change. In contrast, a quarter of the population reported that they would not be affected. Upon further investigation of how the respondents arrived at their answers, those who felt they would be affected cited that they were already witnessing rapid changes in the weather and an increase in unpredictable natural events. Conversely, those who felt they would not be impacted by climate change admitted to having limited knowledge about the subject. Interestingly, members of the community identified climate change based on events such as seasonal droughts, changes in precipitation patterns, frequent flash floods, disruption of jhum cultivation due to untimely rain, landslides caused by erratic rainfall, and an increase in insect infestations.

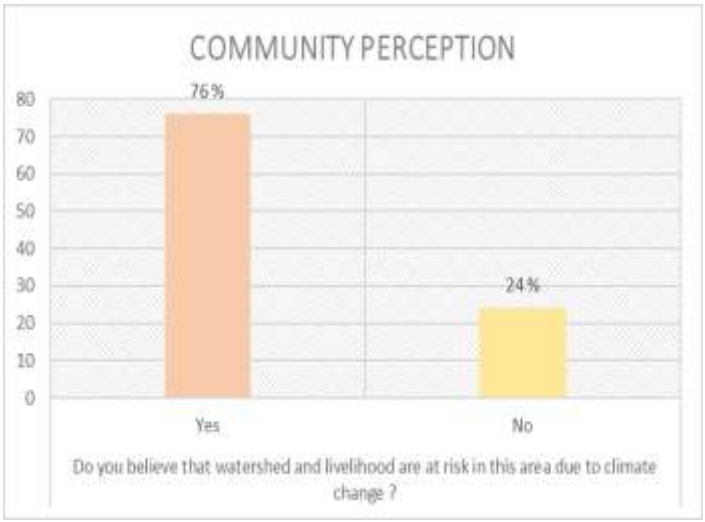

Fig.03: Community Perception regarding Climate Change

About all of the respondents have positively showed that the damage that needs to be identified against climate change is very important. Only 20% of respondents identified livelihood risk exclusively is the main damages associated with few other causes for which they are looking for this estimation but the majority (78%) of them argued that all causes like livelihoods, forest degradation, natural disasters like landslides, soil erosion and other causes like family workload, health nutrition etc. got the similar priority to them.

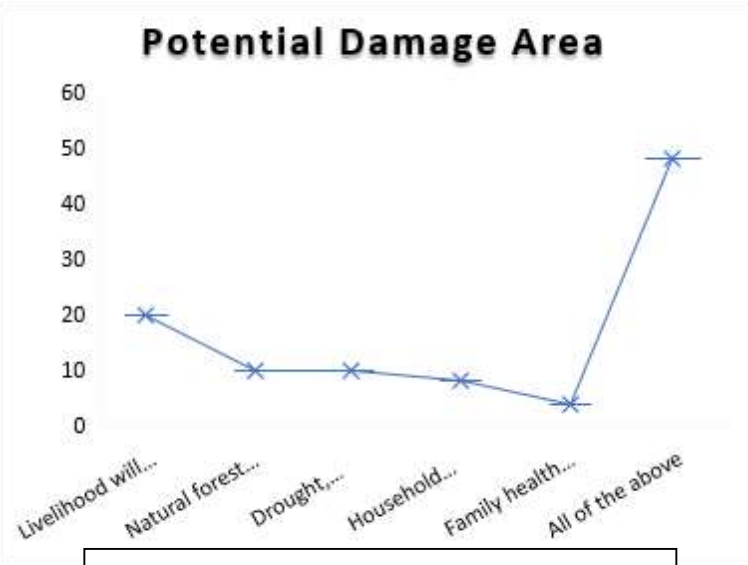

Fig.04. Potential Damages on various sectors

Vulnerability Context of the Site

Changing Climatic Pattern

According to local residents, changes in the monsoon season have resulted in an increased frequency of landslides and flash floods caused by heavy and untimely rainfall. The number of rainy days has decreased, leading to prolonged dry seasons and droughts that negatively impact agricultural activities and shrink local springs. The onset of the monsoon season has also shifted, starting in late August or early September instead of its traditional start in June or July. This changing pattern of rainfall has not only caused negative social, health, economic, and environmental problems but also highlights the importance of addressing the impacts of such changes. Miah, M. R., & Alam, M. M. (2020) found that changes in precipitation patterns have been observed in recent decades in CHT. These changes have been characterized by increases in both the frequency and intensity of rainfall, leading to more intense and frequent flash floods and landslides. At the same time, there has also been a reduction in the overall amount of rainfall in some areas during the monsoon season, leading to prolonged periods of drought and decreased water availability for agriculture and other uses.

Land Cover, Land Use and Spring Flow Degradation

According to the local people, the underlying causes of the drying up or non-functionality of the springs include erratic rainfall pattern, forest degradation through cutting of trees and timber collection, stone extraction from the spring/stream, the introduction of exotic tree species i.e. eucalyptus, rubber, teak etc. which consumes a larger amount of water. From the community consultation, it was found that the rising population increased the demand for food which contributed to cutting down of trees, monoculture plantations, resource logging and increased unplanned Jhum cultivation. Ahmed and Karim (2022) discovered that the pattern of land use and land cover in the Chittagong Hill Tracts (CHT) has undergone changes, which has had a widespread impact on the ecosystem services in the region.

Water Security

The availability of safe drinking water is a critical issue in this region due to the lack of alternative sources besides springs. As a result, individuals are forced to collect water from distant springs, which decreases their work hours. The study area is situated in a remote location with inadequate water sanitation and limited communication, leading to a small portion of the ethnic population having access to safe drinking water. The growing population, increased settlements, and alterations in precipitation patterns are further exacerbating the depletion of the springs. With the rapid transformation in land use, these springs are no longer being replenished, and the long dry seasons are reducing the number and availability of springs. There are several studies highlight the challenges facing communities in the CHT region related to access to safe and reliable sources of drinking water, and the potential impacts of climate change on water resources in the region (Hossain, M. A., & Ahmed, M. S. (2015).

Livelihood Security

The livelihood of the majority of the households is dependent on natural resources. Due to inadequate rainfall, prolonged drought-like situation, deforestation, unplanned and rapid change in the land use pattern are degrading the ability of the existing croplands. According to the local people, the cropland such as turmeric and fruit trees such as bananas, summer fruits and pineapple have been affected due to erratic rainfall and sudden flash flood. Some of the lands are no longer suitable for cropping and currently being used for pasture and grazing livestock. In the lower part of the study area, people mainly depend upon cultivation in the fringe land but

there is a lot of uncertainty due to raining pattern and very often, their cultivation drowned just in 1-2 days raining and flash floods. As the river basin of Kaptai lake has been silted over the last few decades and hence, the carrying capacity decreased. All these are affecting the livelihood of the people. A recent study done by Manusher Jonno Foundation (MJF 2020) found that the main agricultural production in CHT consists of rice, ginger, turmeric, mango, and jackfruit. Besides, they also produce pumpkin, cucumber, chili, pineapple, banana, and pomelo. But due to climate change, agricultural practices have changed drastically.

Health Security

The community in the region is facing a heightened risk of being infected by diseases such as malaria, as a result of the increase in temperature and unstable rainfall patterns. This has led to the invasiveness and proliferation of disease-carrying insects and vectors. The lack of adequate healthcare facilities in the area, with the only available option being a community clinic that doesn't always operate, exacerbates the situation. The clinic, which is primarily equipped to detect and treat malaria fever and dispense basic medicines for minor illnesses, is run by a trained local but is not easily accessible for individuals from other areas. The absence of proper sanitary latrines in the region also contributes to the spread of waterborne diseases, as contaminated water from latrine discharge increases the risk of infection. Through discussions, it was determined that the incidence of waterborne diseases is on the rise in the region. In conclusion, the community is at a high risk of being exposed to malaria and other waterborne diseases. Mahmud, Md & Mahmud, Rayhan. (2020) found that illustrates that the ethnic people in the Chittagong Hill Tracts have limited access to safe drinking water, while their sanitation and hygiene practices were also deplorable.

Community Climate Vulnerability Assessment Outputs

Views of the local people about the major natural disasters during the last 10 years in CHT were stated as landslide, heavy rainfall, flash flood, cyclone and drought. In recent years, flash flood and landslide have captured disaster headlines. Besides, man-made hazards like hill cutting, deforestation, changes in cultivation pattern, alteration in land use and land cover, commercialization of spaces etc. are increasing the risk of people’s lives and livelihoods and have the potentials to result in loss and damage of properties and resources. Mamun, M. A., & Rashid, M. M. (2022) found landslide as one of the key disasters in CHT.

Exposure: Key Hazards- Drought, Landslide, Flash flood and Cyclone

Major Livelihoods Affected: Plain land farming, Jhum cultivation, Livestock rearing, fishermen, small business, day labour and Fruit gardening etc.

Table 04. Vulnerability Matrix (Score: 0-10, 0 = not impacted to 10 = most impacted)

Livelihood Options	**(Exposure + Sensitivity) Score**				**Total Score**
	Drought	Landslide	Flash flood	Cyclone	
Plain land farming	10	8	8	6	32
Jhum cultivation	9	7	8	8	30
Livestock rearing	8	7	8	5	27
Fishermen	4	6	8	4	22
Small business	7	8	6	7	29
Day labour	7	7	8	7	28
Fruit gardening	9	9	7	7	32
Total Score	54	52	53	44	

From the vulnerability matrix, it was clear that plain land farming, fruit gardening and jhum cultivation are the most affected livelihood i.e., agriculture has been impacted mostly by the climate-induced hazards in the area. Also, it is clear from participant scoring that the livelihood in the area is mostly exposed to drought, flash floods and landslides where drought, according to the participant, is the key challenge with the most impacted.

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Climate Change Drivers and its Impacts

Climate change is one of the most significant and pressing challenges facing our world today. It refers to the long-term alteration of temperature and typical weather patterns in a place. However, the changes patterns are different in different regions. CHT is experiencing erratic rainfall, sudden onset temperature and seasonal variations have been identified by the communities. The local population has reported a significant increase in their exposure to landslides in recent years. Uneven seasonal changes and a consistently shrinking winter season were prominently cited as contributing factors (MJF 2020).

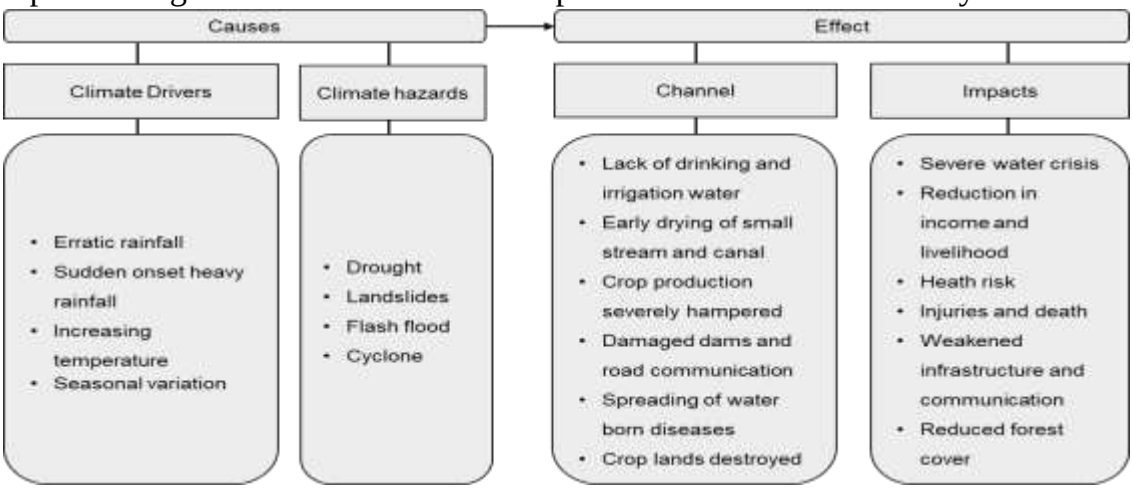

Figure 5 Causes and Impacts of Climatic hazards

Climate Change Impact Chain

The impacts of climate change are naturally dependent on a variety of socio-demographic and adaptive factors, as well as human interference. In the Chittagong Hill Tracts (CHT), specific elements of the human system have been identified as contributing to a higher magnitude of impacts, and an impact chain analysis has

been conducted to identify key impacts on the local community.

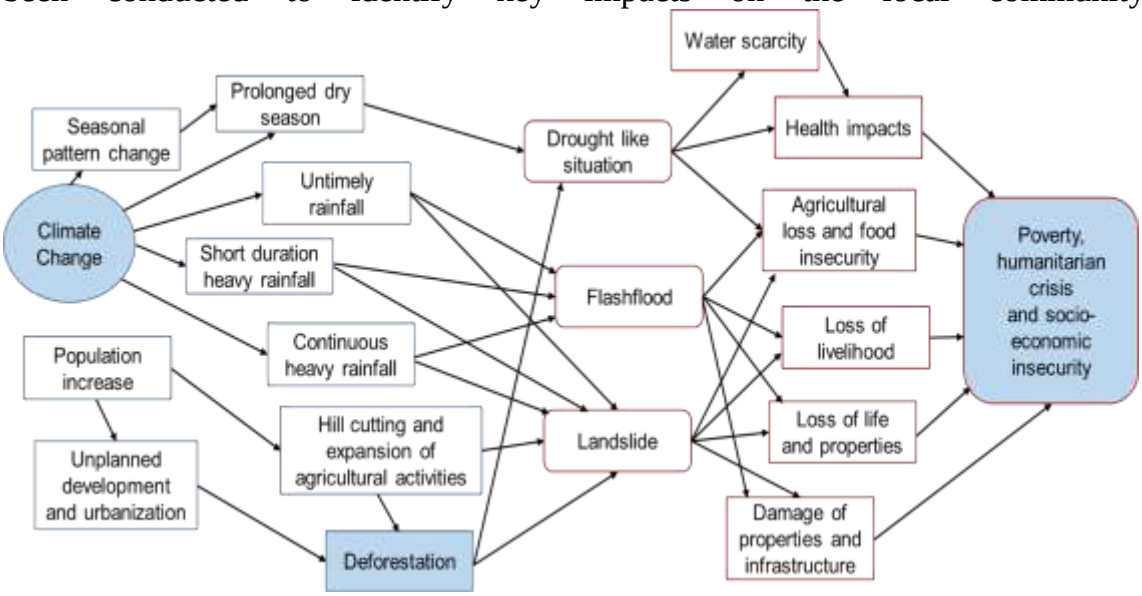

Figure:6 Impact Chain analysis

Based on the impact chain analyses, several sectors where the impact of climate change is felt the most were identified. Based on community discussion and field survey, among others, water security, loss of livelihoods and reduced forest cover had been identified as the sectors being impacted the most and creating negative impact on the lives of people in the area.

Adaptive Capacity Analysis

Adaptive capacity is crucial to know the degree of impact of climate change likely to have on the lives and livelihoods of the community. It encompasses a range of factors, such as access to resources, infrastructure, information, and technology, as well as social and institutional networks and policies that support adaptive actions.

In many cases, the most vulnerable populations are those who have limited access to resources and technology, are socially marginalized, or live in areas prone to natural hazards. Adaptive capacity has been analyzed in the studied area to know the level of adaptive capacity.

Table:5 Adaptive Capacity Analysis

Components of adaptive capacity	Description
Demography and Human Resources	**Population density:** Low **Rate of increase in population:** low, **Education:** About 75% people in the area are educated (can read and sign).
Social status	**Social safety net:** 2 religious institutions 3 roadside passenger sheds 1 union complex **Educational institution:** 1 Junior Secondary School 3 Secondary School 5 Para Kendra **Infrastructure and communication:** Remote and non-paved roads. Communication through water ways and hilly trails. **Health institutions:** 1 Community Clinic **Water and facilities:** Households do not have water facility and have to travel long way to fetch water
Economic status	**Annual income:** Avg. BDT 96000 per capita household **Economic facilities by Government and Non-government institutions**: Widow allowance, disability allowance, elderly allowance, maternity allowance, educational scholarship from government
Natural resources	**Forest resources:** forest cover decreasing, changing land use and land cover **Local species:** Segun, gamar, gorjon, koroi, bamboo, goda, gutia, jarul etc. **Water sources:** Streams, spring flow and ring well
Local government and institutions	**Loan facilities:** Bank loan to limited people **Government initiatives:** "Ekti Bari EktiKhamar" project.

The adaptive capacity of the households to climate change is influenced by the diversity of their livelihood and by the physical, human, financial and information resources that they own and have access to (Gay defiesta 2014).

The adaptive capacity of the site is demonstrated by its demographic condition, social, economic, and natural resources, as well as the support it receives from the government.

However, based on a survey of respondents, it was found that around 65% of them have low adaptive capacity due to their heavy reliance on agriculture. In contrast, 31% of respondents identified themselves as having moderate adaptive capacity due to their access to multiple livelihood options and social support systems. Only 4% of respondents indicated higher adaptive capacity because their primary source of livelihood is not dependent on agriculture. The 5 paras in Basonta Mon site have moderate to low adaptive capacity based on the findings from the community.

This paper has utilized user-friendly tools for assessing localized climate vulnerability in the Chittagong Hill Tracts (CHT) of Bangladesh, which can be applicable in other areas of CHT as well. In contrast to previous research that primarily relied on secondary sources (Haque et al., 2021), this study has employed innovative approaches to facilitate community engagement and inform local adaptation strategies.

CONCLUSION AND RECOMMENDATIONS

The Basonto Mon watershed is one of the many watersheds in CHT which is characterized by difference of its ability to cope with climate change effects. The most common features across the communities that they are much dependent on natural resources. The region is already becoming extremely vulnerable due to population pressure, deforestation, wrong agricultural practices for short time profits like pineapple and spices cultivation in sloppy land causing soil erosion.
Based on the study above, following recommendations are summarized below for long term climate resilience building:

- Most vulnerable hotspots are to be identified and their local community vulnerability could be assessed.
- There is a need of shifting of current practices of forest land and agricultural practices for long term ecosystem restoration.
- Forest or community-based forest or village common forest should be increased, supported and paid for ecosystem/forest conservation to the local community.
- Innovative, resilient and high value agriculture with improved market access is important for livelihoods to be resilient.
- Current acute water crisis should be addressed properly, and forest restoration may help to increase the flow but needs immediate actions for making availability of water easily accessible.
- Local CHT institutions are needed to build capacity in terms of human capital and financial for supporting these vulnerable communities.

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