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POOR LIVELIHOOD ASSETS AND ADAPTIVE STRATEGIES OF THE RIVERBANK EROSION INDUCED *CHAR*LAND PEOPLE IN BANGLADESH: A STUDY ON THE TEESTA RIVERINE ECOSYSTEM

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ABSTRACT
Riverbank erosion is a significant environmental issue in Bangladesh, leading not only to widespread displacement but also to precarious livelihoods among *char*land communities. This paper examines the poor livelihood assets of the *char*land people of Char Bidyananda village, affected by riverbank erosion, and the adaptive strategies they employ. Both qualitative and quantitative measurements of social reality are considered. This paper is primarily based on data gathered through interview schedules with purposively chosen household heads of the study village, observations, case studies, focus group discussions (FGDs), and informal interviews with some stakeholders. The findings reveal that households face various losses and hardships due to riverbank erosion and displacement. The study highlights that their livelihood assets, such as human (low education levels and few specialized skills), social (absence of voluntary organizations and no government-provided shelter), physical (poor transportation infrastructure and inadequate sewage systems), natural (fragile soil quality and insufficient tree cover), and financial capital (landlessness and reliance on meager incomes), are severely limited, indicating a high level of vulnerability. To cope with these precarious conditions, families resort to adaptive strategies, including unpaid household chores, and engage in diverse income-earning activities (IEAs). The Unsustainable Livelihood Framework (ULF) is employed to assess how their limited asset, lack of institutional involvement, and informal coping strategies shape livelihood outcomes. The study concludes with policy

recommendations aimed at reducing household vulnerability and enhancing resilience based on the findings.

1. INTRODUCTION

Riverbank erosion is a prevalent occurrence and a significant natural hazard globally impacting millions of individuals annually by damaging natural and human-made resources, agricultural lands, transportation networks, and residences (Langović et al., 2021; Naher & Soron, 2019). For example, in the Americas, riverbank erosion negatively affects their cultural heritage and the environment (Das et al., 2014). In Europe, river modifications have harmed river ecosystems, and in Serbia and Croatia, riverbank erosion has caused the loss of valuable cultivated land (Islam & Akter, 2006; Das et al., 2014). In Australia, people have concerns about river erosion due to its impact on the quality of drinking water, loss of property, and degradation of aquatic habitats. In Africa, riverbank erosion has reduced agricultural land and productivity (Ahmed & Fawzi, 2009). The rate of riverbank erosion and the displacement of households is highest in the Asian continent. Asia was the most affected region in terms of disaster-induced displacement, and Oceania was the least affected globally in the years 2010 and 2011 (Das et al., 2014). The rate of displacement caused by weather-related events was 85% in 2010 (IDMC, 2011), and the rate exceeded 71% in 2011 (IDMC, 2012). In Bangladesh, during 1970 and 2000, two major rivers (the Padma and the Jamuna) eroded 180000 hectares of land, and about 200000 people were displaced (Islam, 2012).

Bangladesh is undeniably one of the world's most vulnerable countries, facing frequent natural disasters like floods, earthquakes, droughts, cyclones, and riverbank erosion (Mahedi et al., 2025). The inhabitants of river regions endure annual hardships, with thousands displaced due to the recurring impact of riverbank erosion. Between 2008 and 2014, an estimated 4.7 million individuals in Bangladesh were affected by natural disasters, according to a 2015 report by the Internal Displacement Monitoring Centre (Daily Sun, 2018). The Intergovernmental Panel on Climate Change estimates that by 2050, around 50 million individuals will migrate due to climate change (Amin et al., 2025). Riverbank erosion compels individuals to relocate from their native regions to other locations. Approximately 3,000 families experience homelessness annually due to the relentless erosion of the Teesta, Brahmaputra, Dharla, and Dudhkumer rivers in Kurigram and Lalmonirhat, according to sources from the Kurigram Relief and Rehabilitation Centre (The Business Post, 2022). River erosion poses a substantial threat to displacing communities, damaging infrastructure, and affecting agriculture, intensifying vulnerability, food insecurity, malnutrition, and poverty (Alam et al., 2020; Hutton & Haque, 2003; Lein, 2000; Khatun et al., 2025).

Vulnerability is a burgeoning concept across various fields that aids in recognising and assessing individuals' circumstances in relation to natural hazards (Sarker et al., 2019; Ado et al., 2020). The fundamental characteristics of vulnerability are intricate and influence individuals' social and biophysical processes and frameworks. To formulate effective adaptation plans, substantial mobilisation is required from the government, non-governmental organisations, researchers, and farmers (Alam et al., 2020). Livelihood encompasses a range of activities that enable individuals to sustain their existence and support their daily needs. Rural livelihoods are heavily reliant on natural resources, diverse income opportunities, access to financial, social, human, and physical assets, as well as effective governance (Sarker et al., 2019; Mahedi et al., 2025). Livelihood assets, including financial resources, education, skills, social networks, and access to basic services, are crucial for

families to cope with shocks and stresses, whether economic, environmental, or social in nature (Mahedi et al., 2024). But the conditions of those assets in Char Bidyananda are very poor and limited; as a result, the households of the village are more susceptible to various difficulties.

Numerous studies have addressed the coping strategies employed by households displaced due to riverbank erosion (Haque & Zaman, 1989; Barua et al., 2019; Rahman & Gain, 2020; Islam & Hossain, 2020; Paul et al., 2021; Podder et al., 2021; Tähtinen, 2024). Several studies have been conducted on the livelihoods of marginal people, particularly char dwellers in different parts of the country (Islam et al., 2006; Paul et al., 2021; Hossain, 2015; Das et al., 2014; Rana & Nessa, 2017; Rahman & Gain, 2020; Chowdhury et al., 2022). However, the authors were unable to find any research on the *char*land area of the Teesta River, particularly regarding the poor livelihood assets of displaced households. However, limited research has been conducted on the *char*land areas of the Teesta River, especially concerning the poor livelihood assets of displaced households in these regions (Islam et al., 2006; Rahman & Gain, 2020). Additionally, the study aims to understand the survival strategies employed by households in *char*land areas to mitigate immediate losses and minimize their vulnerability to riverbank erosion displacement.

Thus, the present study aims to assess the poor livelihood assets of households displaced by riverbank erosion and seeks to understand the survival strategies used to mitigate immediate losses and minimize vulnerability among those residing in *char*land areas affected by such displacement. By addressing the unique challenges faced by these communities, the study hopes to offer valuable insights into effective adaptation strategies for households coping with riverbank erosion in Bangladesh's *char*land regions.

2. METHODOLOGY

Char Bidyananda is a village located in Bidyananda Union, under Rajarhat Upazila, of Kurigram District, Bangladesh. This village was purposefully selected for the study due to its distinct geographical characteristics. The main channel of the Teesta River flows through the centre of the village, making it highly vulnerable to annual riverbank erosion. As a result, households must cross the river to access the union office and other essential services.

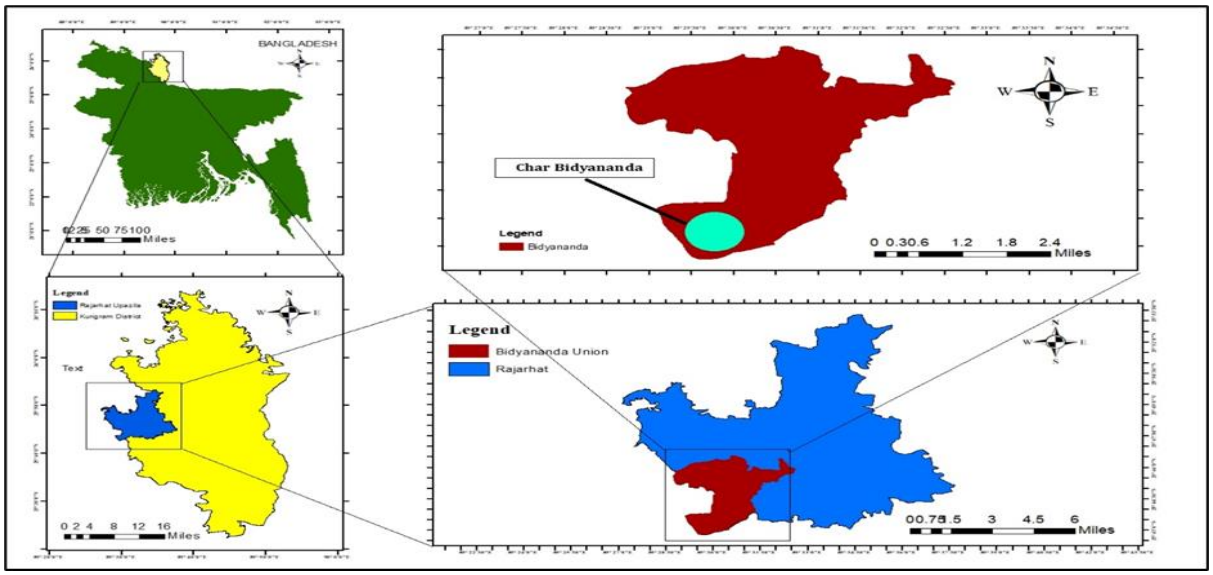

Figure 1: Study Area Map (Developed by authors)

The present study adopted a mixed-methods approach, incorporating both qualitative and quantitative methods to ensure a comprehensive and grounded understanding of the research objectives, as well as to reflect on the actual scenario of displaced households' livelihood assets and their adaptive strategies in response to riverbank erosion. A total of 107 household heads were purposively selected from a sample of 431 households (Union Parishad Report, 2018) in this village for data collection through face-to-face interviews using a pre-tested, structured questionnaire. The study considers the head of each displaced household as the primary representative and unit of analysis. In the absence of male household heads, female members provided relevant information. In many cases, both male and female heads, along with their children, participated jointly in the interviews, enriching the data with detailed insights. To capture deeper insights and lived experiences, two Focus Group Discussions (FGDs) and Case Studies (CSs) were conducted. Additionally, informal interviews were conducted with elected union members, students, and respected community figures. Observation methods are utilized to discern the social realities of vulnerability and survival strategies among the charland inhabitants, and follow-up queries were conducted via mobile phone calls and text messages using the respondents' contact numbers. Before data collection, respondents were thoroughly informed about the purpose of the research, and data were securely stored to maintain confidentiality and privacy. For comparative analysis, only empirically sourced data were used. Quantitative data were analyzed using IBM SPSS software, while qualitative data were interpreted following an explanatory design approach. In this study, the SLA (Sustainable Livelihoods Approach) framework has been utilized to assess the vulnerability conditions and livelihood outcomes of the village. All relevant data tables, figures, and descriptions were prepared and presented using Microsoft Word for clarity and structured presentation.

3. RESULTS AND DISCUSSIONS

3.1 Socioeconomic Profile of *Char*land Households

A household's socioeconomic profile provides a detailed understanding of its living conditions, income, education, and access to necessary services. Such data helps in assessing their vulnerabilities and needs (Blaikie et al., 2014; Smith, 1997). It helps identify disparities and establish priorities for social and economic development (Handmer & Dovers, 2013).

In Char Bidyananda, there are clear differences in access to education. The Illiteracy rate among them is approximately 77.5%, with a significant gender disparity: 50.5% of males and 27.1% of females are Illiterate. This figure is significantly higher than previous research, where Podder et al. (2020) found that one-third (33.33%) of parents were illiterate. Only 1.9% of the households have finished postgraduate studies, and both are male. 1.9% are men with secondary and higher secondary education. The primary education completion rate stands at 16.8%, with a higher rate among males (11.2%) than females (5.6%). Poverty, lack of access to schools, severe weather, family attitudes, and inadequate field assistance by children were identified as factors contributing to educational deprivation in the study area (Table 1). These findings are consistent with previous research. Islam and Nurullah (2021) reported that 76.4% of *uthuli* and *chukani* displaced parents were illiterate. Additionally, Rahman and Gain (2020) found that 42.63% of their respondents had a primary level of education. Hossain (2015) also reported a high percentage of illiteracy (44%) among his respondents. Char Bidyananda addresses the issue of grotesque land inequality and poverty. Only 0.9% of households are considered rich with land (more than 7.50 acres), while 51.4% are landless due to river erosion displacement. The significant proportion (37.4%) fall under the marginal group which have

less than 1 acres of land and often depend on other's land for sustenance by *Adi* (*Adi* is a land leasing system where the tenant agrees to give a fixed portion of the harvest or its value to the landowner in exchange for using the land for a set period), contact (The Contact system is a land exchange method where the tenant pays a set amount to the landowner for the right to use the land for a fixed time. After this period, the tenant returns the land without receiving the payment back, and a *Bondhok* (a temporary land transfer) is used, where the tenant pays the landowner a set amount, gaining the right to use the land until the landowner repays the loan. A major contributor to the village's socio-economic problems is this unequal land distribution.

Table 1: Socioeconomic profile of displace households

Educational status			**Total Households = 107**	
			(N)	**(%)**
Illiterate			83	77.5
Literate	Primary		18	16.8
	Secondary		2	1.9
	Higher Secondary		2	1.9
	Graduation		2	1.9
Landownership Pattern				
Category	**Land (in acre)**			
Rich	>7.50		1	0.9
Average	>2.50 - ≤7.50		5	4.7
Poor	>1.00 - ≤2.50		6	5.6
Marginal	≤1.00		40	37.4
Landless	With Homestead		55	51.4
Monthly household income				
Lower	1000- 8000		84	78.5
Lower middle	8001-14000		13	12.1
Middle	14001-20000		6	5.6
Upper	>20000		4	3.7
Pattern of residence	**Housing materials**			
	Rooftop	Wall		
Non-concrete (*Katcha*)	CI Sheet	CI Sheet	106	99.1
Semi-concrete (*Paka*)	CI Sheet	Bricks	1	0.9

(Source: Field survey 2023)

The majority of households in the flood-affected village (78.5%) earn between 1000 and 8000 BDT per month and are dependent on agriculture (88.6%). Approximately 79.4% of them have less than one source of income, and a few (2.8%) have an income above 10,000 BDT. Some sections (12.1%) belong to the lower middle class, with an income of 8,001-14,000 BDT. They received a small amount of income due to their lower socio-economic status, river erosion, underdevelopment, limited educational and health opportunities, limited income, and environmental constraints. Their unhealthy financial situation is exacerbated by limited access to credit schemes and low interest rates. These results are consistent with another study by Mandal et al. (2024) in which the average monthly household income was approximately 8977 takas. In the study village, 99.1% of households use CI

sheets (corrugated iron) for roofing and walls, indicating a strong preference for flexible and easily replaceable building materials, mainly due to the risk of riverbank erosion. Only 0.9% of households have semi-concrete structures, and it has been observed that some households construct traditional kitchens with thatched roofs and walls, using homemade or low-cost materials.

3.2 Displacement Status of Charland Households

Riverbank erosion in Kurigram District has reached a critical point, forcing many families to relocate to protect their livelihoods and way of life. In Char Bidyananda, displacement of households occurred even more frequently by erosion of the riverbank, at 1-5 times for 56.5% of households, 6-10 times for 24.1%, 11-15 times for 9.3%, and more than 15 times for 10.2% of households (Table 3). This finding aligns with Islam's study, which reported that nearly 52 percent of respondents indicated they had been displaced 7-8 times, while 38 percent reported being displaced more than 9 times, both within Char-Janajat and beyond the Char areas of the Ganges-Padma basin (Islam, 2010). These displacements have resulted in the loss of homes and arable land, leaving families in vulnerable situations in the *char*land areas. Mohiuddin (2024) further emphasized that 96% of local inhabitants had lost their cropping land, with 40.5% completely washed away and 55.5% covered with sand and clay due to riverbank erosion. The repetitive riverbank erosion and flooding led to a colossal loss of crops, land, animals, and earnings to the people of the char. Several studies have emphasized that these events are catastrophic and hurt society (Blaikie et al., 2014; Smith, 1997; Handmer & Dovers, 2013; Paul et al., 2021; Brammer, 1990; Rasid & Mallik, 1994; Few, 2003; Zaber et al., 2018; Islam & Nurullah, 2021). Char Bidyannanda is also deprived of both government and non-government dwelling facilities, and the displace families are being compelled to spend more money on new habitations. This cycle of displacement not only affects them economically but also damages their crops and causes them mental stress.

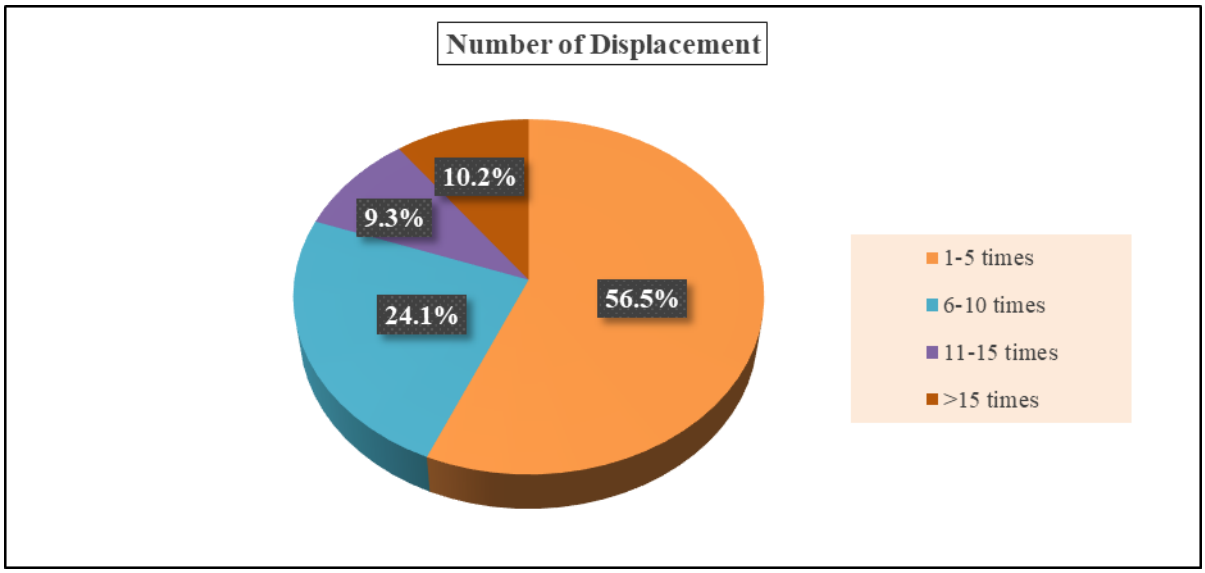

Figure 2: Number of displacements of *char*land households

3.3 Catastrophic Effects on Displace Households

Catastrophic effects refer to the severe and often irreversible consequences resulting from specific events, actions, or situations that cause widespread harm, disruption, and damage. In the context of climate disasters, these effects often include loss of life, destruction of infrastructure, displacement of

populations, and significant ecological damage. Climate disasters such as floods, cyclones, and riverbank erosion can have catastrophic effects on communities, leading to long-term social, economic, and psychological distress (Blaikie et al., 2014; Smith, 1997; Handmer & Dovers, 2013; Brammer, 1990; Few, 2003).

Table 2: Catastrophic effects on displace households

Type of Loss or Damage	Frequency (n)	Percentage (%)	Hierarchical Status
Homestead Land	107	100	1st
Crops (nuts, potatoes, pulses, etc.)	99	92.5	2nd
Trees	96	89.7	3rd
Damage to Natural Beauty	84	78.5	4th
Agricultural Land	69	64.5	5th
Psychological Damage	61	57.0	6th
Community Cohesion	59	55.1	7th
Social Network and Bonding	54	50.1	8th
Child Dropout	37	34.8	9th
House Material	33	30.8	10th
Animals (sale of cows, goats, chickens, etc.)	9	8.4	11th
Fishing Grounds	6	5.6	12th
Cultural Heritage	6	5.6	12th
Road (unpaved village road)	6	5.6	12th
Furniture (tables, chairs, parts of a bed)	4	3.7	13th
Culvert	2	1.9	14th
Jewellery	1	0.9	15th

(N. B, Multiple Responses)

The study highlights the catastrophic effects of riverbank erosion on *char*land households, detailing both tangible and intangible losses. Riverbank erosion has profoundly impacted *char*land households, both physically and emotionally. All families (100%) have lost their homestead land, with 92.5% also losing crops such as nuts and potatoes. The loss of trees (89.7%) has further heightened vulnerability to ongoing erosion. Additionally, significant losses include damage to the natural landscape (78.5%) and agricultural land (64.5%), leading to landlessness and poverty. The psychological effects have been significant, affecting 57% of inhabitants, with 55.1% experiencing a loss of community cohesion. Social networks have been disrupted for 50.1% of households, and 34.8% of children have dropped out of school due to displacement. Homes (30.8%) have also been destroyed, and many families have been forced to sell livestock and other assets to survive. Other minor losses include fishing grounds, cultural heritage, and roads.

3.4 Poor Livelihood Assets of The Households by Riverbank Erosion

Pentagon Assets that sustain the livelihood including human, natural, physical, social, and financial capital, constitute the basis that individuals and households utilize for sustaining their living (DFID, 1999). The (SLF) framework shows how access to these assets influences resilience and adaptive capacity (Scoones, 1998; Ellis, 2000). In risk-prone conditions, as in conditions of erosion and flooding, these resources are degraded, weakening household security and long-term welfare

(Chambers & Conway, 1992).

*3.4.1 Assessment of Physical Capital of char*land *Households*

Physical capital is a key to community resilience through its impact on vulnerability and capacity (Füssel, 2007). Numerous studies have highlighted the impact of physical capital on the resilience and vulnerability of communities. Berkes and Ross (2013) argue that diversified assets, such as roads and water systems, can contribute to adaptation, whereas Cutter et al. (2003) emphasize the connections between infrastructure quality and coping capacity. Fankhauser and Tol (2005) state that advanced infrastructure conveys a greater adaptive capacity, resulting in lesser climate vulnerability. So, Physical capital influences a community's vulnerability or capacity to adapt to natural disasters by enhancing infrastructure and resource availability (Füssel, 2007; Berkes & Ross, 2013; Cutter et al., 2003; Fankhauser & Tol, 2005).

Table 3: Use of physical capital of the families

Physical Capital	Category	Frequency (n)	Percentage (%)
Electricity	Yes	100	93.5
	No	7	6.5
Transportation Medium	Bicycle	100	93.5
	On Foot	5	4.7
	Motorbike	2	1.9
Sanitary Napkin Usage	Reusable Cloth Sanitary Napkin	104	97.2
	Disposable Sanitary Napkin	3	2.8
Quality of Sewage System	Paved or Modern	2	1.9
	Semi-paved (Unhealthy)	66	61.7
	Unpaved (Unhealthy)	39	36.4

(Source: Field survey, 2023)

In the study, table 3 presents data on the use of physical capital within households, specifically focusing on assets such as electricity, transportation, sanitary napkins, and sewage infrastructure. The majority of households (93.5%) have access to electricity, but only a small proportion depend on motorbikes for transportation. Most households rely on bicycles and walking as their primary means of transportation. A high percentage (97.2%) of families use reusable cloth sanitary napkins, which they use at no cost, and this can be a cause of infectious disease. Regarding sewage infrastructure, 61.7% of the households are connected to a semi-paved (unhealthy sewage system), and 36.4% to an unpaved, unhealthy system, indicating a potential public health problem in these areas.

Table 4: Assessment of physical capital of *char*land households

Capital Component	Existing Condition	Capacity	Vulnerability
Physical Capital			
Primary Education Facilities	Two nearby government primary schools are within walking distance.	Available	Not Significant
Secondary Education Facilities	43% of children travel 3.5–6 km, facing road and transport barriers.	Limited	High
Agricultural Technology	Traditional and modern (few) methods are in full use.	Limited	High
Meteorological Services	No local weather offices.	Not Available	High

Government Accommodation	No residential facilities for public service staff.	Not Available	High
Afforestation Initiatives	No seasonal afforestation activities.	Not Available	High
Transport Infrastructure (Bridges)	No communication bridges in the locality.	Not Available	High
Rail Connectivity	No railway access in the area.	Not Available	High
Cottage/Handicraft Industries	No small-scale or cottage industries exist.	Not Available	High
Water Treatment Facilities	No existing plants, though implementation is feasible.	Not Available	High
Community Health Services	The nearest clinic is located 2–3 km from most households.	Partially Available	Moderate

(Source: Field survey, 2023)

The sector exhibits a medium capacity in primary education, as there are two nearby public primary schools; however, secondary education is challenged due to the fact that 43% of school children travel between 3.5 km and 6 km, often through poor roads, requiring river crossings, and experiencing low availability and high vulnerability. In the agricultural sector, both traditional and modern farming practices are observed, which indicates some level of presence, but the reliance on modern methods is limited, and the area lacks meteorological services due to the absence of branch meteorological offices, thereby increasing vulnerability. Public service workers do not have access to government accommodation facilities, which has forced most of them to live and work outside the area. Additionally, there are no Afforestation Initiatives, making the area ecologically unsound. The absence of Critical Transport Infrastructure, such as bridges, makes moving and accessing markets difficult. The lack of rail connections restricts movement and access to markets, thereby increasing their vulnerability. Cottage Industries or small businesses do not exist, which is detrimental to the local economy. Additionally, the lack of wastewater treatment facilities is a challenge, although this could be addressed through development. Community health services are partially available, with a clinic located 2–3 km from most households, which limits access to healthcare and contributes to the moderate vulnerability status of the area in terms of health services (Table 4).

3.4.2 Assessment of Natural Capital of the Displacees

Natural capital is crucial for sustainability and promoting good livelihoods, as it provides essential ecosystem services, including freshwater, food, and energy, that support economic growth and human welfare. Protecting and managing these natural resources sustainably provides a buffer against climate change, aids in poverty alleviation, and ensures that the images children see in storybooks of beautiful landscapes will remain for future generations (Daily, 1998; Costanza et al., 1997).

Table 5: Natural resources utilization of households

Utilization of Resources for Cooking		**Total N =107**	**(%)**
Hays	Potato stalks	87	81.3
	Nuts	97	90.7
	Wood	65	60.7
	Corn chalk	107	100
	Bamboo	51	47.7

Liquefied Petroleum Gas (LPG)	2	1.9
Jute straw	107	100
Cow dung	11	10.3

(N. B, Multiple Responses)

The data shows that the households mainly use biomass and agricultural hays (waste) for cooking. All households use corn chalk and jute straw, while many also use nuts (90.7%) and potato stalks (81.3%). A good number of families also use wood (60.7%) and bamboo (47.7%). This indicates that the community effectively utilizes the resources available locally. Cow dung is used by only 10.3% of households, and access to LPG is extremely low at just 1.9%, reflecting infrastructure and affordability challenges (Table 5). The FGD participants reported that cooking with straw in clay stoves under hot weather conditions is a complex process. Some families have stoves placed in open courtyards without a top cover, which means they have to cook under the sun, during the rainy season, many of them have to cook under a shed.

Table 6: Social and natural capital of the *char*land families

Capital Component	Existing Condition	Capacity	Vulnerability
Natural Capital			
River Fish	Diverse fish species present	Available	Not Significant
Crops and Vegetables	Seasonal crops and vegetables are cultivated	Available	Not Significant
Fruits	Limited variety due to geography	Not Available	High
Soil Quality (Homestead & Agricultural)	Predominantly sandy soil	Not Assessed	High
Forest Cover	No forest cover	Not Available	High
Mineral Resources	No mineral resources	Not Available	High
Water Quality	River water for bathing	Available	Not Significant
Tube Well Water	Tube well water contains iron	Not Available	High
Social Capital			
Cultural Participation	Active community involvement	Available	Not Significant
Voluntary Organizations	No active organizations	Not Available	High
Conflict Resolution	Traditional leaders mediate conflicts	Available	Not Significant
Mutual Aid and Support	Informal sharing, psychological and emotional support	Available	Not Significant
Shelter After Displacement	Shelter taken on relatives' or neighbours' land	Available	Not Significant

(Source: Field survey, 2023)

The river water is clean enough for bathing (In the slow current) but not safe for drinking. A significant 96.3% of respondents report that tubewell water contains iron, and there are no government deep tube wells in the community, aside from those associated with schools. This lack of resources further reflects the vulnerabilities faced by the region. In that area, the river is home to various types of fish, including Broad-mouthed fish, Mullet, Snakehead, Zebrafish, Olive barb, Ticto

barb, Spotted snakehead, Wallago, etc. The region also produces crops such as rice, maize, potatoes, wheat, and almonds, along with various seasonal vegetables, indicating a natural abundance of agricultural resources. However, the availability of standard fruits like mangoes, bananas, jackfruits, and lychees is limited due to several factors, including riverbank erosion and the absence of mature trees, which present additional threats to the environment. The soil type in the village is exclusively sandy (100%, which highlights its susceptibility to erosion. There are very few trees left in the region, with only a handful of vulnerable species, such as mango, banana, eucalyptus, jackfruit, and mahogany, still present. The area is entirely devoid of forest cover (100%) and lacks mineral resources (100%) like oil, coal, and natural gas further indicating its vulnerability. A significant 96.3% of respondents report that tubewell water contains iron, and there are no government deep tubewells in the community, aside from those associated with schools. This lack of resources further reflects the vulnerabilities faced by the region (Table 6).

3.4.3 Assessment of Social Capital of The Displacees

Social capital is essential for building sustainable communities by fostering trust, collaboration, and social networks. It promotes social cohesion, improves access to resources, and enhances collective problem-solving, which in turn supports economic growth and social stability. Investing in social capital ensures resilience in addressing challenges such as inequality and health disparities, ultimately benefiting future generations (Putnam, 2000; Woolcock, 2001).

In the area, cultural participation is almost universal (all respondents engaged in cultural activities like Eid, Puja, and *Nabanna*). Village problems are settled by the *Matabbars* (village heads), and there are hardly any reports of thefts, brawls, property disputes, or social problems. FGD participants reported a range of social problems faced by households, including family conflict, divorce, marital conflicts (for example, failure to pay dowries), theft and other petty crimes, and land disputes. These issues are largely addressed through local informal mechanisms for resolution, such as village elders mediating conflicts, family debates, social bargaining, community reporting, and informal Matabbar mediation, indicating an adherence to traditional processes rather than the formal justice system. None of the active voluntary organizations (100% of respondents said that they are not) are involved in the welfare program and activities. Additionally, 98.1% of households use hay for cooking, and the hay is abundant in the region, which suggests that the area has considerable potential. Afterward, in times of displacement, people take shelter on the land of nearby strangers or relatives, as there are no government shelters available, and borrow small amounts of money and daily necessities, such as *Haloat*, from neighbors. Displacees also receive mental and emotional support, primarily from family and relatives, reflecting the region's substantial social capital, which refers to the value of social networks and relationships within the community (Table 6).

3.4.4 Assessment of Human Capital of The Charland Inhabitants

Human capital is crucial for addressing climate change through innovation and policy development (Mahedi et al., 2025). Skilled individuals drive the creation of new technologies, the implementation of sustainable practices, and the design of climate policies. A well-trained workforce is essential for advancing renewable energy solutions, managing resources efficiently, and leading global climate negotiations, all of which are key to effective climate action (Allan et al., 2023; Masson-Delmotte et al., 2021).

3.4.4.1 Occupational Status of Charland households

In Char Bidyananda village, occupational diversity among household members is notable. 88.6% (62/70) of male household heads rely on agriculture due to various challenges like limited education and resources.

Table 7: Occupation of the *char*land households

Occupation	Male Heads (n=70)	(%)	Female Heads (n=37)	(%)
Agriculture	62	88.6	2	5.4
NGO Workers	1	1.4	-	-
Imam of Mosque	1	1.4	-	-
Shopkeeper	1	1.4	2	5.4
Unemployed (Disabled)	1	1.4	-	-
Service (Military)	1	1.4	-	-
Garments/Industry Workers	3	4.3	-	-
Housewife	-	-	31	83.8
Service (Elected Member)	-	-	1	2.7
Begging	-	-	1	2.7

(Source: Field survey, 2023)

Children often assist in household and agricultural tasks. Limited opportunities for further education exist, with only a small percentage of workers employed in non-agricultural sectors. Female household heads (83.8%) are predominantly homemakers, facing challenges such as reluctance to educate women and early marriage. Some engage in agriculture, hold elected positions, work as shopkeepers, or resort to begging due to economic constraints (Table 7).

Table 8: Human capital of *char*land households

Capital Component	Existing Condition	Capacity	Vulnerability
Human Capital			
The capacity to make local tools and equipment	Only 6.5% of respondents can make local tools and equipment	Limited	High
Can cross a low current in the river	100% of respondents can cross low currents, but many face difficulty after the age of 50	High for younger individuals	Reduced with age
Weather and Sky reading skill	About 56.1% of household heads reported accurately predicting the weather by observing the sky.	Partially Available	Moderate
Occupation	88.6% of males are involved in agricultural work, and 83.8% of females are housewives	Predominantly agriculture	Limited occupational diversification
Graduated Members	Only 1.9% of respondents are graduates	Low proportion of graduates	The education level is limited

(Source: Field survey 2023)

3.4.5 Assessment of Financial Capital of The Displacee Families

Financial capital is probably the most versatile of the five categories of assets, as it can be used to acquire human, social, physical, and natural capital (DFID, 1999). Its accessibility provides an opportunity for families and communities to invest in education, health, infrastructure and responsible management of resources. It is, therefore, an important indicator for combating poverty and building resilience, contributing to long-term development.

Table 9: Financial Capital of The Displacee Families

Capital Component	Existing Condition	Capacity	Vulnerability
Financial Capital			
Income	The monthly income of 78.5% of respondents (household heads) ranges from 1000tk to 8000tk.	Available	Moderate
Expenditure	The monthly expenditure of 87.8% of respondents ranges from 4000tk to 8000tk.	Available	Moderate
Amount of Land	51.4% households are landless, and only 4.7% households own 2.50 to 7.50 acres of land.	Limited	High
Earning People	79.4% households have one income earner, while 12.1% households have two.	Available	Moderate
Recovery Economic Fund	No recovery economic fund exists.	Not Available	High

(Source: Field survey 2023)

In Table 9, economic capital is measured based on the capacity and vulnerability of the people under their economic conditions. Approximately 78.5% of families (household heads) have a monthly income ranging from Tk. 1,000 to Tk. 8,000, while 87.8% of respondents' monthly expenditures fall within the range of Tk. 4,000 to Tk. 8,000. These figures indicate vulnerability among the people due to the frequent absence of work during flood seasons. Additionally, 51.4% of households are landless, and only 4.7% of households own between 2.50 and 7.50 acres of land in the riverine area, further highlighting their vulnerability. About 79.4% of households rely on a single earning member, and only 12.1% have two earning members. The average monthly household income is Tk. 32,422 at the national level, Tk. 26,163 in rural areas, and Tk. 45,757 in urban areas (Household income and expenditure survey (HIES), 2022). Generally, a single income earner in a household cannot fully support the family, leading to issues like child labor, early marriages, and children dropping out of school, which are indicators of vulnerability in the village. Furthermore, 100% (107/107) of respondents stated that there is no recovery economic fund for the households.

3.5 Survival Strategies of Displacee *Char*land Households

After displacement (as illustrated in Figure 1) due to riverbank erosion, the *char*land households of Char Bidyananda have to use different strategies to adjust to the challenges of their new life. These include intensified participation in the community, increased effort, saving time through work, mobilizing further support from close family members, combining income and unpaid agricultural labor, seeking jobs in GOs and NGO sectors, finding shelter here and now, and concentrating on

livestock. They also try to acquire new local competencies or to improve their skills to find a good job.

It is noted that when it comes to riverbank erosion displacement, families in Char Bidyananda are involved in various income-generating and unpaid activities, both within and outside their homes, to meet the challenges. Their work is essential to their subsistence and to the stability of their families. In a family, support comes mainly under three categories: the household head (typically the father), Women (typically the mother), and Children (sons and daughters). These patterns of support are also evident at the household level in Char Bidyananda village.

Table 10. Adaptive strategies of *char*land households

Adaptive Strategy	Male Heads (n=103)	(%)	Female Heads (n=107)	(%)	Children (n=97)	(%)
Unpaid Familial Works						
Helping in Housework	103	100	107	100	97	100
Child Caring	98	95.1	104	97.2	97	100
Providing Mental Support	103	100	107	100	97	100
Shopkeeping (Daily Essentials)	2	1.9	2	1.9	-	-
Agricultural Work	99	96.1	40	37.4	86	88.7
Animal Husbandry	91	88.3	101	94.4	32	33
Fishing	7	6.8	-	-	-	-
Handicrafts	4	2.9	-	-	-	-
Income Earning Activities (IEAs)						
Agricultural Work	77	74.8	5	4.7	10	15.6
Government Jobs (Military)	1	1.0	-	-	-	-
Non-government Jobs (Garments, Imam, etc.)	6	5.8	-	-	9	9.3

(N. B, Multiple Responses)

The study highlighted the multifaceted contributions of male heads to domestic and economic responsibilities. They universally assist with housework (100%), offer crucial mental support during crises (100%), and engage in childcare duties in the majority of instances (95.1%). Furthermore, they are engaged in agricultural labor (96.1%), animal husbandry (88.3%) and fishing (6.8%) to support their families. Moreover, a small percentage of male heads are also engaged in the sale of dry and daily need products (1.9%) and handicrafts (3.9%), like bamboo articles, in the village markets. They generate an important household income by engaging in income-generating activities, primarily working on the farming (74.8%). A smaller proportion have government-based employment (1%), while some are working in non-government organizations or NGO positions (5.8%). At the household level, female heads are responsible for all unpaid family tasks, especially housework (100%), which women predominantly perform. They are also heavily engaged in raising animals (94.4%), cultivating vegetables (92.5%), caring for children (97.2%), and looking after the elderly (85.0%). Moreover, these female heads offer vital psychosocial support in times of crisis, a role that was evident for all the households interviewed (100%). Few (1.9%) female heads are shopkeepers who sell daily necessities at their homes. Participation in income-generating works, mainly in agriculture, accounted for 4.7%.

Children play a vital role not only in household chores but also in unpaid familial work. This involves doing housework (100%), farming (88.7%), caring for younger siblings (100%), and offering important emotional support for their family (100%). Meanwhile, sons, in other words, boys, are engaged in income-earning activities to support their households, primarily in the agricultural sector (15.6%) and 9.3% of children (six boys and three girls) accept short-term paid garment jobs to support their households. Moreover, some children move to cities to work after finishing school and leave their families behind, and then also leave their homes on their own. These results are consistent with previous investigations, such as those by Rasid & Mallik (2011), which have recorded increasing participation rates among women and children during harvesting seasons. Notably, 41% of 6- to 12-year-old were involved in domestic animal husbandry to help feed their families.

Case Study-1

> Farhana (Pseudonym) who is 65 years old and a grandmother, said, "The little girl helps her mother in cooking, plays with the boy on her mother's lap, takes care of the child every day after coming home from school, collects hay from the neighboring land and arranges it, and helps her mother with handwork. Sometimes, when her mother goes out, she makes the bed and washes the clothes. By doing many small chores at home, the mother can use the time she has for other work."

Case Study-2

> Riajul Islam (12 years) said, "My brother (18 years) has gone to Narayanganj in Dhaka to work after finishing his secondary examination. He has also been admitted to a government college in the nearby upazila. He works there and sends some money to his family at the end of the month. When the examinations start, he will come home to take the exams."

3.6 Livelihood Outcome of *Char*land households

The sustainable livelihood framework emphasizes that having sufficient livelihood assets is crucial for achieving positive and healthy livelihood outcomes (Ashley & Carney, 1999). Livelihood outcomes are influenced by both assets and external factors, such as structure and processes (Scoones, 1998; DFID, 1999).

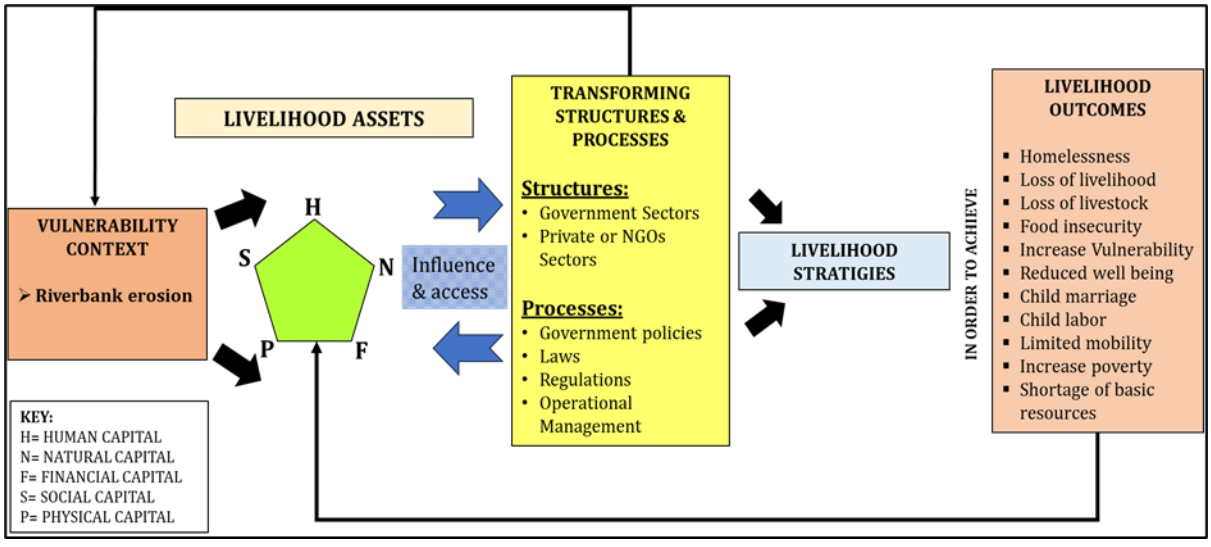

Figure 3: Unsustainable livelihoods framework (Source: Authors)

Riverbank erosion is a common and high-risk natural event for the households in Char Bidyananda village. The findings highlight that these families, due to their insufficient livelihood assets, such as physical, natural, social, human, and financial capital, are unable to cope effectively with climate-related disasters, including riverbank erosion. Riverbank erosion is a common and high-risk natural event for the households in Char Bidyananda Village. The findings show that the residents of the area have limited livelihood assets, such as natural, physical, social, human, and financial resources. As a result, they cannot cope effectively with climate-related disasters like riverbank erosion. This vulnerability increases when the response of local government remains delayed and inadequate. Households of the village also mentioned the lack of timely support from non-governmental organizations and the private sector.

This vulnerability is further exacerbated by the inadequate and often delayed response of local governance structures, coupled with the limited engagement of non-governmental organizations (NGOs) and private sector actors. The failure of institutional frameworks, including local authorities and development agencies, to adopt timely, coordinated, and effective interventions has repeatedly exposed *char*land populations to climate-induced disasters, particularly riverbank erosion. Additionally, process-related weakness, such as the poor enforcement of policies, lack of enforcement of laws and regulations, and deficient operational management, further exacerbate the situation. These interrelated structural and procedural limitations critically undermine the resilience of affected communities and hinder the development of sustainable adaptation strategies. As a result, the coping strategies employed by the families are minimal and ineffective in addressing the widespread impacts of disasters. Consequently, affected households experience a range of severe livelihood outcomes, including homelessness, loss of livelihood and livestock, food insecurity, health risks, mental distress, social instability, child marriage, child labor, reduced mobility, worsening poverty, and shortages of essential resources.

4. CONCLUSIONS AND RECOMMENDATIONS

This research examines the livelihood assets and adaptive strategies of *char*land households in Bangladesh, with particular emphasis on households affected by riverbank erosion and susceptible to climate-related disturbances, including floods and heatwaves. The findings indicate that these communities are particularly vulnerable to natural disasters and ecosystem degradation. This vulnerability is exacerbated by considerable shortages in various asset categories, including physical, financial, social, natural, and human resources. Many households have access to basic amenities like electricity; however, there are significant deficiencies in transportation, sanitation, and sewage infrastructure. The community demonstrates robust cultural ties and informal support networks; however, it is deficient in formal organizations that could improve collective welfare. The region possesses agricultural resources, including river fish and seasonal crops, but encounters challenges such as poor soil quality, limited fruit diversity, and insufficient forest cover, which heighten its vulnerability to environmental changes. Human capital is characterized by a significant dependence on agriculture, accompanied by restricted occupational diversification and low levels of educational attainment, thereby diminishing the community's ability to adapt to evolving conditions. Consequently, numerous households experience ongoing losses due to climate-related events such as river erosion, flooding, and heatwaves. The study emphasizes the deficiency of critical livelihood resources in *char*land regions, specifically insufficient physical infrastructure, inconsistent financial assistance, and restricted access to essential public services, including healthcare and education.

In response to displacement caused by riverbank erosion, residents in Char Bidyananda implement several adaptation tactics to navigate their altered conditions. This encompasses heightened community engagement, as families rally assistance from relatives to address issues. Households integrate income from agricultural labor with unpaid domestic work to sustain subsistence, while some pursue employment in government and NGO sectors for supplementary financial assistance. Others concentrate on livestock and skill development to enhance their economic circumstances. These techniques highlight the community's resilience and capacity to adapt to disturbances from climate-related occurrences, ensuring sustained existence and stability.

Effective policies at both national and local levels are essential to mitigate the challenges posed by riverbank erosion and its socio-economic consequences. The government and NGOs must cooperate on systematic interventions, such as dredging, constructing embankments, afforestation, and limiting development in erosion-prone regions. Resettlement initiatives must prioritize the provision of stable housing and employment opportunities, bolstered by enhanced transportation infrastructure to promote mobility and access to markets. Furthermore, advocating for diverse income-generating activities (IGAs) can significantly contribute to the reduction of child labor and the promotion of uninterrupted education for youth. Health services, together with initiatives focused on hygiene, maternity health, and sexual education for women and children, are essential for improving community well-being. Furthermore, technical innovations, including early warning systems, emergency assistance centers, and vocational training for women, will enhance community resilience and promote gender parity. The long-term resilience of *char*land communities depends on integrated efforts that address both immediate needs and future development goals. Emphasizing the development of critical infrastructure, broadening economic opportunities, and empowering local communities will be crucial for establishing a sustainable and resilient future amid persistent climate problems. A comprehensive, multi-faceted strategy is essential to disrupt the cycle of vulnerability and foster sustainable development for these communities.

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CONFLICT OF INTERESTS

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