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Dynamics and Manifestations of Vulnerability: A Nexus between Riverbank Erosion and Charland Women

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Abstract

The present paper primarily examines dynamics and manifestations of vulnerability on the riverbank erosion affected impoverished, marginalized, and vulnerable charland women in Pal Dangi village, focusing on the unstable Padma riverine habitat in Bangladesh. The affected charland women face vulnerabilities due to their impoverished social and economic status, as well as displacement caused by riverbank erosion, which affects their daily subsistence activities. This study is wedded to clarify the social vulnerability of the charland women as the exposure to harm resulting from demographic and socioeconomic factors that heighten the acquaintance to riverbank erosion. Concurrently, this study tries to categorize the dynamics and manifestations of women's vulnerability into three types: fundamental dynamic of vulnerability; spatial dynamics of vulnerability triggered by recurrent riverbank erosion; and dynamic natures in prolonged vulnerability. This study also attempts to explore the multidimensional vulnerabilities of charland women to riverbank erosion displacement, analyzing its physical, social, and psychological effects on impoverished women's lives. The study uses empirical data from interviews, FGDs, case studies, and stakeholder interviews to analyze charland women in purposively chosen study village.

Keywords: Dynamics and Manifestation, Vulnerability, Riverbank Erosion, Charland, Women.

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Introduction

Climate change represents a critical global challenge, particularly affecting women in low and middle-income countries (LMICs), who are experiencing significant deleterious consequences. The physical and geographical attributes have rendered Bangladesh susceptible to frequent environmental dangers and natural calamities. The recurrent riverbank erosion is adversely affecting impoverished, marginalized women and their livelihoods in charland areas, since the charlands of Bangladesh exhibit a high susceptibility to riverbank erosion. Considering the significance of interactions between humans and the environment in disaster development, vulnerability must be seen as dynamic rather than static and should be evaluated accordingly in the context of charland habitat. Consequently, the charland village of *Pal Dangi* has been designated as the research site which is populated by the most impoverished and vulnerable group especially women, which is yearly impacted by riverbank erosion. Gender roles, along with socioeconomic, cultural, gender-specific variables and environmental factors, intensify

women's vulnerabilities, leading to an increased burden of mental health issues, water insecurity, sanitation challenges, and caregiving responsibilities. Riverbank erosion in Bangladesh causes displacement and long-term consequences for human life. A study in *Pal Dangi* village of Decreer Char Union under Faridpur Sadar Upazila in Bangladesh reveals that the charland women rely heavily on their precarious charland environment for various activities pre-disaster, during and post-disaster period, despite their existing socio-economic, cultural, and gender barriers. Despite these challenges, women build diverse strategies to adapt and influence social transformation.

Recent research risk of disaster studies represent for a paradigm shift that situates disasters within a broader context, encompassing social processes such as inequality, power dynamics, and the political economy of social resources (Rusca et al., 2021; Balch et al., 2020; Moseley, 2022; Raju et al., 2022). The fields of social science have long acknowledged the dynamic character of vulnerability in riverbank erosion (Savelli et al., 2022; Collins, 2008). Nevertheless, the dynamics of vulnerability have yet to be included into catastrophe risk assessments (Hagenlocher et al., 2019) where women are considered more severely impacted by the vulnerabilities brought on by riverbank erosion among the inhabitants of this region. This study aims to reveal the socioeconomic vulnerabilities of the women when the erosion of riverbanks results in the loss of cultivable land and residences, directly affect the lives of charland women. The paper also tries to find out the interrelationships between displacement and the constant socio-economic conflicts and stagnation arise from erosion on the affected charland women's mental health that brings uncertainty, health hazard and psychological trauma in their livelihood confrontation.

Review of Literature and Research Gap

Riverbank erosion in Bangladesh has long been recognized as one of the most severe environmental hazards affecting millions of people living in riverine and charland areas (Islam et al., 2022; Haloy & Das, 2025). It disrupts livelihoods, displaces populations and perpetuates cycles of poverty and marginalization (Evans et al., 2020, Daley & Gupta, 2022; Balch et al., 2020; Collins, 2008). In addition to this fact, the socio-economic and environmental vulnerability of charland women is shaped by multiple factors, including landlessness, climate variability, and limited access to institutional support (CSR Disclosure in Polish-Listed Companies in the Light of Directive 2014/95/EU Requirements: Empirical Evidence, 2017). Scholars have emphasized that women in these regions face a distinct set of vulnerabilities due to gendered social roles, unequal power relations, and restricted mobility (Tanjeela & Rutherford, 2018).

The gender dimensions of vulnerability in erosion-affected areas extend beyond physical displacement. Women access to resources, decision-making power, and social capital are often undermined during and after erosions events (Pande, 2022; Chowdhury, 2021; Ghosh et al., 2020; Haque, 2019; Onwutuebe, 2019; Ni Aolain, 2010). As men migrate for income opportunities, women frequently assume the dual burden of household maintenance and livelihood management under precarious conditions (Chowdhury, 2021). Research also highlights that women's coping and adaptive capacities are mediated by their socio-economic position, education, and engagement with local institutions (Rahman, Hossain & Alam, 2022). While the broader literature examines *char* vulnerability, there is also attention to gendered aspects. Despite this, few studies interrogate how environmentally driven hazard processes (like erosion) intersect with

gendered social roles, power relations and local institutions to shape women's vulnerability and resilience (Bradley, 2022; Huho, 2015; Kvamme & Ytrehus, 2015; Ni Aolain, 2010 & Moussa, 1991).

However, none of the reviewed studies have paid attention on both dynamics and manifestation of vulnerability of the riverbank erosion affected charland women in Bangladesh at a time. On the contrary, a number of studies have given special attention on the different livelihood issues of disaster affected charland dwellers but not focused on women's dynamics or manifestations of vulnerability at the same time. Some scholar's prime concern has been paid to riverbank erosion affected households not to the charland dwellers' livelihood or, charland women or their vulnerability exceptionally. Simultaneously dynamics and manifestations of vulnerability of riverbank erosion affected charland women have acknowledged limited attention at aforementioned studies. However, existing studies predominantly focus on the economic and environmental impacts of riverbank erosion, often treating women's experiences as secondary or peripheral. Despite growing literature on riverbank erosion and displacement, there is a notable gap in understanding the multidimensional and gendered nature of vulnerability among charland women. Existing research seldom integrates environmental and livelihood frameworks to explain how dynamics of charland women's vulnerability is both socially constructed and environmentally induced. This study addresses this gap by exploring the dynamics and manifestations of women's vulnerability in charlands, highlighting their adaptive responses and resilience building processes within complex socio-ecological systems.

Operational Definition of Key Concepts

In this study, the **dynamics of vulnerability** can be defined as the evolving and interrelated elements that determine the susceptibility of charland women or ecological systems of charland to damage from riverbank erosion throughout time. In the context of riverbank erosion, **dynamics** refers to the underlying processes and interactions that drive or influence changes over time and how natural forces, socio-economic structures (like poverty and landlessness), and gender roles interact to produce or intensify vulnerability-especially for women. **Vulnerability** is considered dynamic for the women's livelihood confrontation at charland habitat because it particularly changes in response to social, economic, political, environmental, and physical influences. The **manifestation of vulnerability** denotes here the visibility of vulnerability in charland contexts, particularly when the charland women experience negative impacts from riverbank erosion attack such as displacement, loss of income. Present paper unfolds the manifestation of vulnerability by analyzing the social reality of the riverbank erosion affected charland women's emotional, physical, social, economic and psychological circumstances after disastrous situation. In this study, **vulnerability** is defined as insecurity, or an inverse sense of security, brought on by the low socio-economic rights of the charland women in their unstable environment. The ability of the affected charland women anticipate, manage, resist, and recover from the negative impact of riverbank erosion is reflected in it. The erosion of riverbank is meant here as the natural phenomenon where water exerts force on riverbanks at charland, resulting in the degradation of rock formations and other materials during floods, vigorous currents, or intense precipitation at Padma riverine island.

Women can be referred as adult human females who are affected by riverbank erosion at least once in their lifetime, whose experiences of vulnerability are shaped by gender roles, social norms, and unequal access to resources. Finally, this study defines the Riverbank erosion as a recurring disaster that uproots families, leads to landlessness, food insecurity, unemployment, and displacement from their origin place to here and there, especially for women with limited land control and alternative livelihoods.

Objectives of the Study

Broad Objective

To explore and analyze the multidimensional dynamics of vulnerability experienced by women living in riverbank erosion-affected charland *Pal Dangi*, focusing on how environmental, socio-economic, and gendered factors intersect to shape their lives realities and adaptive reponses.

Specific Objectives

1. To examine the socio-demographic characteristics of women living in erosion-prone charland and how these attributes influence their vulnerability levels;
2. To explore and categorize the principal dimensions in understanding the dynamics of charland women's vulnerability;
3. To manifest the overall vulnerability effects on charland women due to recurrent erosion, spatial change (displacement), and livelihood uncertainty;
4. To recommend policy interventions and gender-sensitive resilience framework aimed at enhancing the socio-ecological sustainability of charland women's lives.

Methodological Investigations

In south-central Bangladesh, *Pal Dangi* is a medium-sized charland village in Decreer Char Union, which is part of Faridpur Sadar upazila in Faridpur district (Figure 1). The research region is acknowledged as one of the riverbank erosion prone sites in Faridpur district thus the study village is selected purposively as study locale. The paper is primarily based on the data gathered through direct interviewing with the purposively chosen 187 women from all of the riverbank erosion displaced households (187) who are affected by riverbank erosion at least once in their lifetime. Both qualitative and quantitative data have been gathered, examined, and evaluated in order to analyze the study's unit. Alongside the social survey, pertinent data are gathered through focus group discussions (FGDs), case studies of selected respondents, and informal interviews with the leader of Decreer Char Union Parishad and the leader of the *samaj* members (an indigenous village social organization). Women are observed with their consent to secure empirical data, which is recorded regularly for systematic analysis. Each FGD comprises 8-12 women aimed at gathering empirical data regarding their perceptions and experiences related to vulnerabilities from riverbank erosion and subsequent displacement. This information is essential for informing future development policies and programs. The qualitative interpretation and quantitative measurement are critically evaluated in relation to their vulnerabilities to riverbank erosion displacement and corresponding adaptive strategies. This study exclusively utilizes primary sources of data for analysis.

The study analyzes riverbank erosion displaced women in *Pal Dangi*, a vulnerable charland community.

These charland women are categorized into single, double, triple, and more than triple displacees. Despite being vulnerable and dependent, they face challenges due to riverbank erosion displacement. Their susceptibility in this study signifies a shortage in resistance capacity to mitigate losses resulting from riverbank erosion relocation. Another significant concept is the manifestations of vulnerability that charland women must acquire to navigate the challenges of the fragile charland ecology. The study highlights their dynamics and manifestations of vulnerability due to annual riverbank erosion attack and the need for adaptive capacity, which includes survival strategies and resorting mechanisms for their livelihood in the precarious charland ecosystem.

Results and Discussion

Socio-Demographic Profile and Manifestations of *Char*land Women's Vulnerability

Understanding the socio-demographic profile of charland women is essential to grasp the multifaceted nature of their vulnerability (Kadir & Naher, 2023; Samanta & Kutala, 2018; Williams & Webs, 2022; Maxmen, 2020). These characteristics of women in *Pal Dangi* charland village significantly shape their exposure and response to vulnerabilities. The riverbank erosion affected women in *Pal Dangi* village embody a silent resilience amid relentless erosion and displacement. Yet, their vulnerability deeply rooted in socio demographic realities demands urgent attention. Addressing these challenges through gender sensitive can transfer vulnerability into resilience and pave the way of sustainable development in study charland region.

Table 1: Socio-Demographic Profile and Manifestations of Vulnerability

Indicators for Socio-demographic Status Measurement		Riverbank Erosion Affected *Char*land Women N=187		
		n	%	Majority
Age	Less than 13	9	4.81	5th
	14-23	13	6.95	4th
	24-33	29	15.51	3rd
	34-43	91	48.66	1st
	44-53	37	19.79	2nd
	54-63	5	2.67	6th
	More than 64	3	1.60	7th
Sex	Female	187	100.00	
Religion	Hindu	8	4.28	2nd
	Islam	178	95.19	1st
	Others	1	0.53	3rd
Level of Educational	Illiterate	19	10.16	4th
	Literate	53	28.34	2nd
	Primary	80	42.78	1st
	Secondary	24	12.83	3rd
	Higher Secondary	8	4.28	5th
	Graduation	3	1.60	6th
Family Size (Number of Members)	Small (≤ l-4)	112	59.89	1st
	Medium (5-9)	68	36.36	2nd
	Large (≥10)	7	3.74	3rd
Occupational Diversity*	Agriculture	146	78.07	2nd
	Pastoral	121	64.71	3rd
	Day Labor	14	7.49	5th
	Tailoring	9	4.81	6th
	House Management	183	97.86	1st
	Maid Servant	4	2.14	7th
	Nut Shelling	23	12.30	4th
	Shopkeeper	1	0.53	8th

**Note: Multiple responses considered only for analyzing occupational diversity*

The study shows the social reality of the *char*land women by describing this profile to manifest vulnerability. From field data it is relevant that the 1st majority 48.66 percent of the respondent are in 34 to 43 age group and 95.19 percent's religion is Islam and others 04.28 and 0.53 percent are Hindu and others respectively (Table 1). Though education is the backbone of a nation and the educational attainment of women is a formidable force for social, economic, and cultural advancement, a disappointing fact has been found that this community is very far from securing quality education besides, very often in securing secondary education too. The field data attest that 1st majority 42.78 percent (n=80 of 187) of the respondents have completed their primary level of education and 2nd majority 28.34 percent are literate, 3rd majority 12.83 percent have secured secondary, 10.16 percent are illiterate. Only a few, 4.28 percent have secured their higher secondary level (Table 1). From the study it is also clear that highest majority 59.89 percent of the respondents are belonging to small family where consist of one to four members in every family.

Their occupational diversity also revealed their socioeconomic vulnerability because it is significant that 1st majority, 97.86 percent of the respondents are engaged in unpaid house management where women with education are needed to more incline to enter the labor, establish enterprises, and enhance the economy of Bangladesh (Pande, 2022; Onwutuebe, 2019). In addition, 2nd and 3rd majority of the respondents' occupation in agriculture (78.07%) and pastoral (64.71%) respectively (Table 1). In essence, understanding the socio-demographic profile and manifestations of vulnerability is not just about academic curiosity it is a prerequisite for justice, resilience, and development. The overall analysis of this table clearly manifests the vulnerable socioeconomic and demographic status of the respondents.

Three Principal Categories in Understanding the Dynamics and Manifestations of *Char*land Women's Vulnerability

Women in *Pal Dangi* village faces unique challenges due to annual and recurrent riverbank erosion compared to a single incident in isolation. As a number of socioeconomic, cultural, gender specific variables that make women especially susceptible to riverbank erosion, there are multifarious dimensions in describing the dynamics of women's vulnerability (Alexander & Siriporn, 2023). In this study, three principal categories have been identified in analyzing the dynamics of charland women's vulnerability: fundamental dynamics of vulnerability; dynamic natures in prolonged vulnerability; spatial dynamics of vulnerability triggered by recurrent riverbank erosion (Figure 1). The following analysis of these principal categories of vulnerability dynamics and manifestations among charland women is highlighting how environmental stressors, displacement, socio-economic conflicts, deprivation, gender inequalities, and gender dynamics that shape or, interact to construct their vulnerable conditions.

A Framework on Dynamics of *Char*land Women's Vulnerability

Raju et al. (2022) stated that "Disasters occur when hazards meet vulnerability." This dimension of vulnerability encompasses many social, economic, and political processes. This paper manifestly delves the multifaceted vulnerability of charland women facing the persistent danger of riverbank erosion. This analysis examines the interplay of environmental hazards with gender, poverty, societal norms, and governmental inactivity, which contributes to the heightened vulnerability of women in Bangladesh (Figure 1).

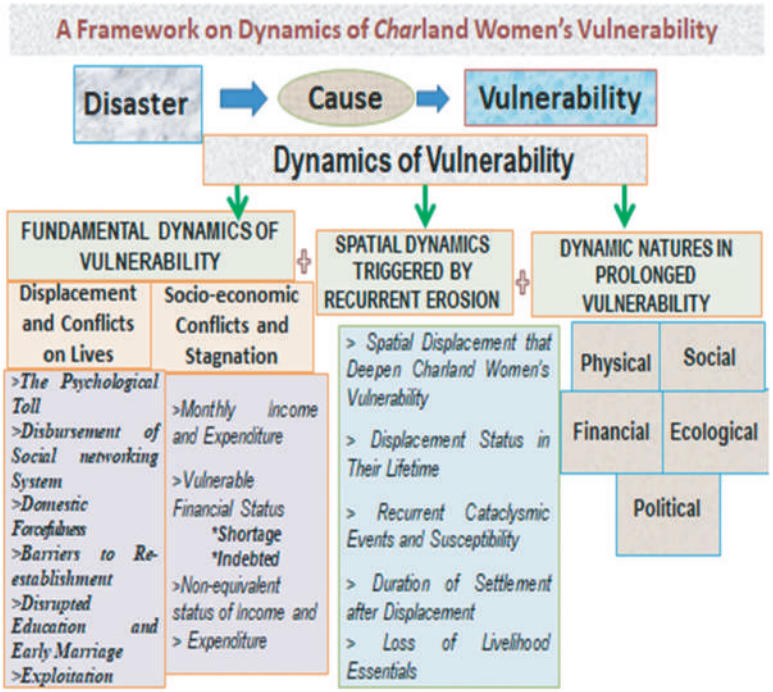


Figure 1: Dynamics of Charland Women's Vulnerability
(Prepared by Researcher based on Study Findings)

The framework illustrates how recurrent riverbank erosion triggers a chain of vulnerability for women, moving from direct displacement to long-term impacts and finally to entrenched socio-economic marginalization. It begins with direct impacts such as loss of land, forced settlement in remote or hazard-prone areas, and overcrowded shelters, which immediately disrupt women's access to livelihood, healthcare, education, and safety. These conditions then produce long-term impacts, including persistent insecurity, asset depletion, psychological stress, social fragmentation, and restricted mobility due to cultural and infrastructural barriers.

FUNDAMENTAL DYNAMICS OF ULNERABILITY

Pal Dangi village, recovering from hazards, is facing numerous challenges due to riverbank erosion, presenting a complex situation rather than a singular event. Understanding the fundamental dynamics of vulnerability especially in riverbank erosion contexts- require a deeper look into its dynamic nature (Lave & Lans, 2025; Saikia & Mahanta, 2023; Kadir & Naher, 2023; Onwutuebe, 2019). As vulnerability is not static, it is shaped by multidimensional processes overt time such as social, economic, political and environmental. It is relational context dependent and structurally embedded in broader systems of inequality in women context at charland precarious and unstable habitat.

Displacement and Conflicts on Women's Lives

Displacement resulting from riverbank erosion constitutes a distinct sort of trauma for the women living in charland precarious habitat due to its geographical unstable condition. In contrast to abrupt calamity, riverbank erosion is gradual, frequent and relentless, eroding not just the land but also the economical, physiological, psychological and social fabrics of its inhabitants (Knops et al., 1999; Maxmen, 2020; Kadir & Naher, 2023). For women in charlands, displacement signifies not just the loss of a residence or agricultural land, but also the deterioration of identity, dignity, safety, and stability. The field data attest that displacement creates multi-dimensional conflicts on women's lives due to recurrent annual riverbank erosion and the following tables (2a and 2b) analyze the conflicts due to displacement and social scenario of the affected charland women.

The Psychological Toll

Repeated displacement engenders profound insecurity and a pervasive sense of hopelessness. The psychological toll on charland women is often exacerbated by their precarious habitat and the responsibility of ensuring family well-being amid deteriorating circumstances. This research in erosion-prone *Pal Dangi* village indicates that women are at a higher risk of developing post-traumatic stress, fear (28.88%), disbelief (6.42%), and anxiety (24.06%), sleeplessness from dawn to dusk (22.46%) due to displacement (Table 2a). Numerous women express a sense of anger (5.88%) as they observe their homes being engulfed by the river, feeling powerless to intervene or halt the devastation. They frequently function as emotional anchors for their families during crises, despite experiencing a decline in their own mental health.

Disbursement of Social networking System

When displacement arises from persistent erosion, these women forfeit not just their houses and means of subsistence but also their established social networks. Notwithstanding these disturbances, they frequently reorganize and redistribute their social networking framework to navigate crises, ensure survival, and reestablish a sense of community belonging (Colenbrander, 2017; Pelling & High, 2005; Kadir & Naher, 2023).

When immediate and extended family members offer crucial support, including temporary shelter, food, and childcare, the disbursement of the networking system and break down of kinship and community support (41.71%, n=78 of 187; 1st majority) temporarily halts any aid, rendering them highly vulnerable (Table 2a). The field data attest that due to networking interruption they fall high dependency on temporary shelter (17.11%, n=32 of 187; 3rd majority) barriers in retaining relationships with relatives (13.37%, n=35 of 187; 3rd majority), gender segregation

(5.88%, n=11 of 187; 6th majority) (Table 2a). Social networks among women affected by riverbank erosion are fragmented, adaptable, and multi-layered, with kinship being the most robust connection (Onwutuebe, 2019). Community reciprocity, NGO affiliations, religious philanthropy, and new internet platforms offer a safety net.

Table 2a : Displacement and Conflicts on Women's Lives

Displacement and Conflicts on Women's Lives		Riverbank Erosion affected Women N=187		
		n	%	Majority
The Psychological Toll	Fear	54	28.88	1st
	Sleeplessness from dawn to dusk	42	22.46	2nd
	Sleeping with anxiety	45	24.06	3rd
	Anxiety	35	18.72	4th
	Frustration	20	10.70	5th
	Disbelief	12	6.42	6th
	Anger	11	5.88	7th
	Irritation	2	1.07	8th
Disbursement of Social networking System	Break down of kinship and community support system	78	41.71	1st
	High dependency on temporary shelter	32	17.11	2nd
	Barriers in retaining relationships with relatives	25	13.37	3rd

Displacement and Conflicts on Women's Lives		Riverbank Erosion affected Women N=187		
		n	%	Majority
	Problems in keeping privacy	22	11.76	4th
	Interruption in neighborhood relation	19	10.16	5th
	Gender segregation	11	5.88	6th
Domestic Forcefulness	Blamed for family sufferings	65	34.76	1st
	Loss of livelihood	41	21.93	2nd
	Economic hardship	32	17.11	3rd
	Accused of mismanaging resource	13	6.95	4th
	Accused of failing to pray enough	9	4.81	5th

Note: Multiple responses considered

Domestic Forcefulness

In this study, domestic forcefulness symbolizes a destructive power of women due to frequent displacement due to annual riverbank erosion, deepening women's vulnerability. Riverbank erosion induced displacement and cycle of poverty at *Pal Dangi* charland village increase women's exposure to domestic forcefulness because of cultural backwardness and lack of knowledge (Dalei & Gupta, 2022). This study finds the fact that in many cases, women are blamed for the family's suffering (34.76%,

n=65 of 187; 1st majority)—accused of mismanaging resources (6.95%), loss of livelihood (21.93%), being unlucky, or failing to pray enough (4.81%) (Table 2a). With no legal or institutional recourse, women endure emotional and physical abuse in silence. This forcefulness also cause their economic stress such as loss of land, livestock, and employment opportunities leads to male frustration, which often results in verbal abuse, physical assault, or neglect toward women.

Barriers to Re-establishment

Once relocated, *char*land women in study village encounter significant obstacles in re-establishing their lives. Access to land for resettlement is less probable due to male-centric inheritance laws and prevailing local power dynamics (Haloy & Das, 2025; Hyton & Dimitriou; 2019; Bhuiyan et al., 2017). Despite the provision of rehabilitation support by NGOs or the government due to lack of access to land for resettlement for male dominated inheritance (10. 16%, n=19 of 187; 1st majority) such assistance is typically registered under the male head of the home, rendering women dependent and marginalized (Table 2b).

Table 2b: Displacement and Conflicts on Women's Lives

Displacement and Conflicts on Women's Lives		Riverbank Erosion affected Women N=187		
		n	%	Majority
Barriers to Re-establishment	Lack of access to land for resettlement due to male dominated inheritance	19	10.16	1st
	Pressure of local power structure	14	7.49	2nd
Disrupted Education and Early Marriage	Results in drop out	87	46.52	1st
	Parents force their female child for early marriage	16	8.56	2nd
	Leads to early pregnancy	13	6.95	3rd
	Early pregnancy leads to health complications	9	4.81	4th
Exploitation	Force displacement disrupts social protection	156	83.42	1st
	Break down of social bonds exposed to harm	87	46.52	2nd
	Economic exploitation	66	35.29	3rd
	Legal and institutional barriers	13	6.95	4th
	Cheap labor and debt bondage	11	5.88	5th
	Asset exploitation and relief discrimination	09	4.81	6th

Note: Multiple responses considered

In addition, pressure of local power structure (7.49%, n=14 of 187; 2nd majority) create barriers in their re-settlements (Table 2b). Furthermore, displaced women frequently relocate to urban slums or newly formed *char*lands, where existence is much more precarious. The cycle of migration persists, and for women, each relocation becomes increasingly arduous—fewer possessions to transport, diminished ties to depend upon, and reduced rights to assert.

Disrupted Education and Early Marriage

Displacement frequently leads to school attrition, particularly among girls. When families relocate, educational institutions are sometimes distant, absent, or prohibitively expensive. In numerous instances, parents arrange early marriages for their daughters to diminish the number of dependents and to provide a measure of protection for the girl in precarious circumstances (Sarker et al., 2019; Susan, 2012; Li & Zhou, 2021). Premature marriage frequently results in early pregnancy, health issues, and a further entrenchment in the cycle of poverty and dependency. The study reveals that 1st majority 46.52 percent (n=87 of 187) and 2nd majority 8.56 percent respondents' education are disrupted by riverbank erosion which results in drop out and parents force their female child for early marriage respectively (Table 2b).

Exploitation

Riverbank erosion displaces women at *Pal Dangi*, depriving them of land, residences, livelihoods, and social security. In this precarious setting, women are particularly vulnerable to various forms of exploitation, stemming from poverty, gender inequality, and social dislocation (Ghosh et al., 2020; Yoshihama et al., 2018; Pachauri et al., 2015; Chynoweth, 2008). The study divulges the reality of

exploitation that force displacement disrupts 83.42 percent (1st majority) women's social protection, 35.29 percent women's economic solvency, 6.95 percent women's legal and institutional rights (Table 2b).

From field observation, it is clear that displaced women are frequently employed as domestic laborers, agricultural day laborers, or textile assistants, earning far lower salaries than their male counterparts do. A multitude of women procures loans from moneylenders or microfinance institutions; inability to repay ensnares them in cycles of indebtedness and reliance. During displacement, in-laws or local elites may appropriate women's dowry assets, relief provisions, or cattle.

Socio-economic Conflicts and Stagnation

Displacement caused by riverbank erosion results in a cycle characterized by various socio-economic conflicts such as poverty, insecurity, and resource scarcity (Dalei & Gupta, 2022; Tanjeela & Rutherford, 2018; Friedman & Desivilya, 2010) for the women living in *Pal Dangi* charland village. Such dynamics frequently contribute to conflicts and stagnation among women, girls, communities, and the larger socio-economic framework, thereby exacerbating the vulnerability.

Monthly Income and Expenditure

This study clearly highlights the socio-economic conflicts, which is created from economic hardship by analyzing their monthly income and expenditure. The field data unfolds that more than half of the population, 56.15 percent (n=105 of 187) and 52.94 percent (n=99 of 187) of the study women are belonging in lower income and expenditure group where their income and expenditure is one thousand (1,000/-) to eleven thousand (11,000/-) taka respectively (Table 3).

Table 3: Monthly Income and Expenditure

Monthly Income and Expenditure Group (in BDT)			Riverbank Erosion Affected *Char*land Women N=187			
			Monthly income		Monthly Expenditure	
			n	%	n	%
Lower Class	Lower Lower	≥1000 - ≤6000	3	2.86	1	1.01
	Upper Lower	≥6000 - ≤11000	102	97.14	98	98.99
Total			**105**	**56.15**	**99**	**52.94**
Middle Class	Lower Middle	≥11000 - ≤16000	67	87.01	73	90.12
	Upper Middle	≥16000 - ≤21000	10	12.99	8	9.88
Total			**77**	**41.18**	**81**	**43.32**
Upper Class		≥21000 - ≤26000	5	100	7	100
Total			**5**	**2.67**	**7**	**3.74**
Grand Total			**187**	**100**	**187**	**100**

Only 2.67 percent (n=5 of 187) of the respondent women have been found who belong to upper class on the basis of their income and expenditure range, 21,000 to 26,000 taka in BDT. The reality to too hard to bear that this salary range is insufficient to support livelihoods and provide basic requirements is a source of considerable sadness. Furthermore, women experience significant hardship when compelled to displace from their places of origin due to environmental factors.

Vulnerable Financial Status and Socio-Economic Conflicts

Riverbank erosion in the *Pal Dangi char*land village devastates land and housing, destroying the economic backbone that supports women. Women, already marginalized within patriarchal frameworks (see Table 2a & 2b), encounter a notably precarious socioeconomic status following displacement. Their financial fragility is influenced by asset loss, limited livelihood opportunities, dependability, and exclusions from resources provided by institutions (Islam et al., 2022; Podder et al., 2022; Sannigrahi et al., 2020; Suryahadi et al., 2000 & Cutter et al., 2003). The study data shows that 16.58 percent of the respondents are in shortage financial status and 21.93 percent are indebted in addition, 57.22 percent have been found as in stable condition where domestic animals are their source of savings and their per week saving is more than 50 taka to less than 550 taka in BDT (Table 4).

Table 4: Vulnerable Financial Status and Socio-Economic Conflicts

Vulnerable Financial Status			**n**	**%**
Shortage	Sources of Finance	Non-Government Agencies	1	3.23
		Relatives	12	38.71
		Neighbors	9	29.03
		Government Agencies	2	6.45
		No Sources	7	22.58
Total			**31**	**16.58**
Indebted	Non-Government agencies		5	12.20
	Relatives		17	41.46
	Neighbors		13	31.71
	Private Bank		4	9.76
	Government agencies		2	4.88
Total			**41**	**21.93**
Equivalent of income and expenditure			8	100.00

Vulnerable Financial Status				**n**	**%**
Total				**8**	**4.28**
Stable Condition	Savings	Domestic Animals		39	36.45
		BDT per week	50 - 150	15	14.02
			150 - 250	22	20.56
			250 - 350	19	17.76
			350 - 450	7	6.54
			450 - 550	5	4.67
Total				**107**	**57.22**
Grand Total				**187**	**100**

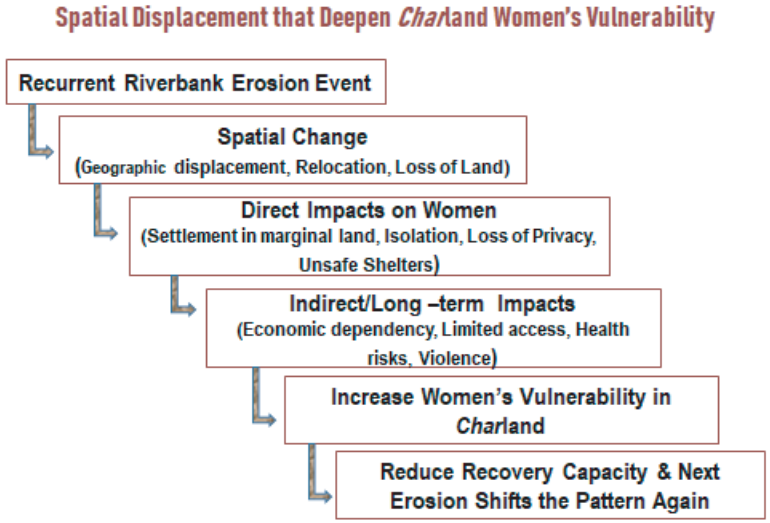
The above-mentioned circumstances generate socio-economic conflicts and impede women's ability to sustain their daily functioning. In addition, socio-economic conflicts and stagnation are interconnected factors that exacerbate the vulnerability of women in study c*harl*and. Conflicts disrupt solidarity between communities, while stagnation hinders opportunities for mobility, thereby entrenching women in a cycle of impoverishment, unequal treatment, and marginalization.

Spatial Dynamics of Vulnerability Triggered by Recurrent Riverbank Erosion

In this study, the spatial dynamics of vulnerability trigged by recurrent erosion involve a set of interacting factors?environmental exposure; socio-economic precarity, gender roles, and institutional neglect?that amplify the risks and particularly reduce the coping capacity of the affected charland women as marginalized group at the study village. Repeated erosion incidents compel households to relocate several times-frequently within a span of several years.

Every displacement causes the forfeiture of housing, agricultural land, economic opportunities, and social connections for the women. By analyzing the recurrent cataclysmic events and susceptibility; dynamics of vulnerability and their displacement status, spatial dynamics of vulnerability can be clearly revealed. The following figure highlights how spatial displacement deepens vulnerability of study charland women (Figure 2).

Figure 2: Spatial Displacement that Deepen C*harl*and Women's Vulnerability



**Note: Researcher based on research findings has created this diagram*

Recurrent Cataclysmic Events and Susceptibility

In this research, the charland women of *Pal Dangi* who are affected by riverbank erosion have been classified as 'displaced once', 'displaced twice', 'displaced thrice', 'displaced fourth', 'displaced fifth', 'displaced sixth', and 'displaced seventh' determined by the frequency of displacement throughout their lifetime (Podder et al., 2022; Islam et al., 2022). The field data also unfold the fact that

the highest number of respondent (43.32%; n=81 of 187) changes their location in different times within *Pal Dangi* from one part to another part. In addition, 17.28 percent, 16.05 percent, 39.51 percent, 13.58 percent, 4.94 percent, 2.47 percent and 1.23 percent respondents' displacement status is once, twice, thrice, fourth, fifth, sixth, seventh and eighth respectively (Table 5).

Case 1

Sonia Pal 33 years old women living in *Pal Dangi.* Her displacement status is thrice. Her family consists of 4 members with 2 children. Agriculture and pastoral are her main earing source. She has given her opinion that due to riverbank erosion they had lost their homestead plot that is why they have to face enormous challenging situation with her little two children. She has got a chance to acquire a piece of land with a homestead under 'The *Ashrayan* Project'. Her elder daughter has been irregular from education and they face problems in securing adequate foodstuff for their children.

Photo 9 of Sonia Pal (33) addressing spatial vulnerability

Table 5 : *Char*land Women's Riverbank Erosion Displacement Status in Their Lifetime

Displacement Status	Charland Women's Places of Origin: Pal Dangi (N=187)												
	Pal Dangi	Wangi Dangi	Balia Ghat	Mominkhar Hat	Vuia Dangi	Majid Munshir Dangi	Munshiganj	Char Tepakhola Mridha Dangi	Hazi Uzir Mahmuder Dangi	*Char* Bahirdia	Vajon Dangi	Byapari Dangi	**Total**
Once	14 (17.28)	1(14.29)	3(60.00)	2(20.00)	2(22.22)			2(10.53)	1(8.33)	5(29.41)		4(44.44)	**34 (18.18)**
Twice	13(16.05)	3(3.70)	2(2.47)	2(2.47)	1(1.23)	3(3.70)	1(1.23)	6(7.41)	4(4.94)	1(1.23)	2(2.47)	1(1.23)	**39 (20.86)**
Thrice	32(39.51)	2(2.47)		4(4.94)	3(3.70)	2(2.47)	1(1.23)	11(13.58)	1(1.23)	6(7.41)	1(1.23)	4(4.94)	**67 (35.83)**
Fourth	11(13.58)	1(1.23)				4(4.94)	1(1.23)		6(7.41)		2(2.47)		**25 (13.37)**
Fifth	4(4.94)				2(2.47)					5(6.17)			**11 (5.88)**
Sixth	4(4.94)			2(2.47)	1(1.23)	1(1.23)							**8 (4.28)**
Seventh	2(2.47)												**2 (1.07)**
Eighth	1(1.23)												**1 (0.53)**
Total	**81(43.32)**	**7(3.74)**	**5(2.67)**	**10(5.35)**	**9(4.81)**	**10(5.35)**	**3(1.60)**	**19(10.16)**	**12(6.42)**	**17(9.09)**	**5(2.67)**	**9(4.81)**	**187 (100)**

In this study, eleven (11) *char* villages have been found which highlight the charland women's spatial dynamics of vulnerability to riverbank erosion and their displacement status. Field observations indicate that the charland women residing in *Pal Dangi* typically relocate between one and eight times due to riverbank erosion, moving from their original location to adjacent chars, including Vangi Dangi, Balia Ghat, Mominkhar Hat, Vuia Dangi, Majid Munshir Dangi, Char Tepakhola Mridha Dangi, Hazi Uzir Mahmuder Dangi, Char Bahirdia, Vajon Dangi, and Byapari Dangi (Table 5 & 6).

Table 6: Duration of Settlement after Displacement and Spatial Vulnerability

Duration of Settlement	Place of Origin	Riverbank erosion-affected Charland Women's Destination: *Pal Dangi* N=187		
		n	**%**	**Majority**
Permanent Displacement	Pal Dangi	64	34.22	1st
	Vangi Dangi	10	5.35	8th
	Balia Ghat	13	6.95	5th
	Mominkhar Hat	18	9.63	2nd
	Vuia Dangi	11	5.88	7th
	Majid Munshir Dangi	9	4.81	9th
	Munshiganj	3	1.60	11th
	Char Tepakhola Mridha Dangi	12	6.42	6th
	Hazi Uzir Mahmuder Dangi	14	7.49	4th
	CharBahirdia	7	3.74	10th
	Vajon Dangi	11	5.88	7th
	Byapari Dangi	15	8.02	3rd
Total		**187**	**100**	**-**

The results (Table 5 & 6) indicate that environmental and climate-related alterations (riverbank erosion), along with economic and social vulnerabilities, profoundly affected the migration choices of charland women. The uncertainties women encounter encompass economic, social, psychological, and health anxieties. Their anxieties arising from displacement lead to hardship, poverty, pain, impoverishment, and heightened vulnerability among the displaced charland women.

Spatial Dynamics of Vulnerability and Loss of Livelihood Essentials

The charland women in *Pal Dangi* face significant threats from riverbank erosion, threatening their livelihoods. Their socioeconomic entitlements and inadequate livelihood assets, both tangible and intangible contribute to the vulnerability and disaster risks they face, resulting in significant losses due to riverbank erosion displacement (Dalei & Gupta, 2022; Podder et al., 2022; Islam et al., 2022; Maxmen, 2020).

The field data attest that the 1st majority and all of the charland women (100%; n=187 of 187) in *Pal Dangi* have lost their homestead land, dwelling house, household utensils and daily necessaries due to riverbank erosion attack (Table 7) that make them vulnerable to continue their livelihood smoothly.

Table 7: Loss of Livelihood Essentials

Loss of Tangible Livelihood Essentials	Riverbank Erosion N=187		Loss of Intangible Livelihood Essentials	Riverbank Erosion N=187	
	n	%		n	%
Homestead land	187	100	Health and sanitation status	187	100
Household utensils	187	100	Social contacts	187	100
Daily necessaries	187	100	Inhabited environment	184	98.40
Dwelling house	187	100	Opportunities of sustainable livelihood	177	94.65
Domestic animals	174	93.05	Employment opportunities	187	100
Furniture	176	94.12	Confrontation to future disasters	174	93.05
Standing crops	156	83.42	Safety and security	187	100
Educational accessories	145	77.54	Recreational facilities	156	83.42
Equipment for cultivation	132	70.59	Samaj networks	155	82.89
Cultivable land	123	65.78	Privacy and security of female	154	82.35
Necessary trees	109	58.29	Nutrition requirements	123	65.78
Garden	87	46.52	Access to education	116	62.03
Chair-table	77	41.18	Social care	122	65.24
Electronics equipment	55	29.41	Familial credibility	34	18.18
Net for fishing	32	17.11			
Boat	38	20.32			
Radio/ television	11	5.88			
Tube well	13	6.95			
Bicycle	3	1.60			

The social reality of the study charland women of *Pal angi* village attest that first majority of the respondents (100%, n=187 of 187) miss health, sanitation facilities and social contacts as their intangible livelihood assets which create vulnerability in maintaining social stability in charland habitat (Table 7). Charland women face continuous poverty due to tangible losses (Table 7) and lack of livelihood opportunities, while intangible livelihood essentials are often emotionally meaningful and unattainable physically (Table 7).

DYNAMIC NATURES IN PROLONGED VULNERABILITY

Riverbank erosion causes annual displacement of women in *Pal Dangi* village, causing significant vulnerability and long-term impact. This vulnerability is dynamic and shaped by various physical, social, psychological, economic, environmental, and institutional forces, affecting their susceptibility from the crisis (UN Women, 2020). The first stage of prolonged vulnerability starts with their displacement. At this point, women become reliant on male members or external aid, reinforcing powerlessness and marginalization. To understand the prolonged and dynamic nature of vulnerability among women affected by riverbank erosion is essential for designing effective interventions (Rahman, 2015; Alam & Collins, 2010). The following tables (8a & 8b) are mapped out for manifesting the dynamic nature of prolonged vulnerability:

Table 8a: Prolonged Nature of Vulnerability (Physical & Social)

Prolonged Nature of Vulnerability		Riverbank erosion affected Charland Women N=187		Majority
		n	%	
Physical	Unhygienic Sanitary System	109	58.29	1st
	Gynecological problems	65	34.76	2nd
	Lack facilities in menstruation time	43	22.99	3rd
	Physical impairments	18	9.63	4th
	Soreness	9	4.81	5th
	Miscarriage of pregnant women	7	3.74	6th
Social	Break down of social structure	123	65.78	1st
	Disintegration of previous relations	96	51.34	2nd
	Impact on neighborhood relations	86	45.99	3rd
	Disintegration of social processes	61	32.62	4th
	Effects on social bonding	54	28.88	5th

Prolonged Nature of Vulnerability (Physical & Social)

A considerable number, more than half of the respondents 58.29 percent from *Pal Dangi* village face

physical vulnerability because of their unhygienic sanitation system. In addition, gynecological problems (34.76%), lack facilities in menstruation time (22.99%), physical impairments (9.63%), are the common physical vulnerability of the study women where most often men don't face these obstacles (Table 8a). Additionally, social vulnerabilities break down of social structure (65.78%), disintegration of previous relations (52.34%), disintegration of social processes (32.62%) make the charland women dependent on others to cope up in precarious habitat (Table 8a).

Case 2

Hajera Begum (58) is a displacee charland a woman living at *Pal Dangi* village and her displacement status is 6 times in her lifetime. She has to face physical vulnerability, including lack of sanitation, gynecological problems, and anxiety that is also a concern. Social, psychological, and economic vulnerabilities are also present in her life for frequent erosion attack. Heavy workloads, unpaid work environments, geographical adversities, and breakdowns in medical and educational facilities further exacerbate these issues and make her more vulnerable to continue her livelihood at this precarious environment.

Prolonged Nature of Vulnerability (Financial, Ecological & Political)

The social reality is that the women living in charland have to face much economic vulnerabilities (Table 8b) due to shortage of money (89.30%), limited access to resources and materials (41.71%), lack of savings (60.43%), unpaid working system (58.29%).

Table 8b: Prolonged Nature of Vulnerability (Financial, Ecological & Political)

Prolonged Nature of Vulnerability		Riverbank erosion affected *Char* land Women N=187	
		n	%
Financial	Shortage of money	167	89.30
	Limited access to resources and materials	78	41.71
	Lack of savings	113	60.43
	Unpaid working system	109	58.29
	Underpaid formal and informal	55	29.41
	Challenges in finding Job	89	47.59
	Inaccessibility to credit facilities	87	46.52
Ecological	Forced Displacement	166	88.77
	Movement for searching food	147	78.61
	Degradation of Environment	79	42.25
Political	No scope for participation	176	94.12
	No access in making decision	99	52.94
	lack of VGD (vulnerable Group Development) program	141	75.40

Forced displacement (88.77%), movement for searching food (78.61%), no scope for participation (42.25%), no access in making decision (52.94%), lack of VGD (vulnerable group development) program (75.40%) are the ecological and political vulnerability respectively (Table 7). The physical, social, and psychological, ecological, political and financial vulnerability assessments show that riverbank erosion affects poor women's life in a number of ways. The family members are strained, and they usually end up caught in a vicious cycle of poverty and this cycle creates multidimensional dynamics of vulnerability.

Manifestations of Women's Vulnerability

The following flow chart illustrates how recurring riverbank erosion induces spatial alterations, resulting in immediate and prolonged gender-specific consequences that eventually exacerbate the vulnerability of charland women over time. The chart on recurrent riverbank erosion and spatial change highlights the continuous vulnerability of women in a complex system.

This also illustrates a stratified process by which women's vulnerability is perpetually repeated and exacerbated. Riverbank erosion directly displaces women from river-adjacent areas to remote or marginal chars, significantly limiting women's access to income opportunities, healthcare, and education. Compulsory displacements result in cultural and physical isolation, exacerbating women's reliance on male relatives and constraining their social mobility.

Chart 1
Manifestations of Women Vulnerability

Recurrent Riverbank Erosion and Spatial Change	Direct Impacts	Long-term Impacts	Overall Vulnerability Effects
Loss of river adjacent land and Displacement to remote *chars*	Displacement to marginal lands farther from socioeconomic facilitiesreducing women's access to income and services Greater physical isolation	Decreased economic prospects; less educational access for females Limited mobility for women due to cultural restrictions and poor transportation	Isolation exacerbates economic and social dependence
Settlement in Hazard-prone Fringe	Prolonged exposure to erosion threats	Asset depletion due to recurrent catastrophes; psychological distress	Persistent insecurity and impaired recuperative capabilities
Overcrowded embankment or temporary shelter	Heightened exposure to gender-based violence Lack of Privacy Unsafe sanitation	Heightened vulnerability to gender-based violence; decline in health	Degradation of dignity, security, and physical health
Fragmentation of Social Networking	Elimination of communal parenting, emotional assistance, and informal lending	Diminished communal resilience and limited access to pooled resources	Social isolation deepens vulnerability

Recurrent Riverbank Erosion and Spatial Change	Direct Impacts	Long-term Impacts	Overall Vulnerability Effects
Relocation far from fundamental services hub	Impeded or absent access to maternal healthcare, potable water, or humanitarian assistance	Increased mother and child mortality; extended recovery	exacerbates susceptibility related to health
Gendered exclusion from public spaces	Restricted involvement in market and decision-making forums	Marginalization in the distribution of aid and policy deliberations	Reinforces systemic inequality and reliance

Note: Based on findings, researcher has developed the above-mentioned Chart

Extended habitation in hazard-prone or marginal regions exacerbates susceptibility, as continual erosion diminishes household assets, undermines stability, and induces ongoing psychological anguish. Distribution—systematically marginalizes women, limiting their influence over decisions that influence their lives. The graphic illustrates that erosion is not only an environmental threat but also a socio-political phenomenon that reinforces structural inequalities and confines women to a cycle of dependency, instability, and prolonged vulnerability. This fragility for women is exacerbated by congested embankments and improvised shelters, which render them vulnerable to gender-based abuse, inadequate sanitation, and a deficiency of privacy—compromising both dignity and health security. The chart-1 also illustrates how erosion-induced movement disrupts social networks, undermining traditional systems of communal care,

informal lending, and collective resilience that women frequently depend upon. This social fragmentation exacerbates isolation, depriving women of supportive systems during crises. Furthermore, moving to remote areas away from service centers hinders access to maternal healthcare, clean water, and humanitarian assistance, hence elevating maternal and child death rates.

Concluding Remarks and Policy Implications

Charland women's susceptibility to riverbank erosion is a result of structural marginalization, patriarchal norms, and policy failures rather than an inevitable outcome. They are survivors, farmers, caregivers, and negotiators so the fragility of women in the study charland village resulting from riverbank erosion is not solely a natural phenomenon; it is systematically generated and perpetuated by gender-specific social structures. Women face significant challenges in their mobility, safety, and access to healthcare, education and humanitarian aid due to cultural norms, infrastructural deficiencies, and overcrowded shelters. They are often excluded from decision-making processes and marginalized in aid distribution, highlighting their vulnerability to riverbank erosion. Addressing this crisis requires gender-sensitive solutions that enhance women's agency, provide fair access to resources, and reconstruct social and economic frameworks to diminish inequality.

Addressing women’s dynamics and manifestations of vulnerability and enhancing resilience to riverbank erosion in *Pal Dangi* charland require gender-responsive and context-specific policies. Achieving sustained resilience and justice for women affected by erosion requires acknowledging and responding to these vulnerabilities. Some recommendations are given below:

- **Gender-Sensitive Disaster Management:** Integrate women's specific need and experiences into disaster preparedness and riverbank management policies to ensure equitable access to relief, rehabilitation, and recovery resources.
- **Livelihood Diversification Programs:** Promote alternative income-generating activities such as homestead gardening, livestock rearing, and small-scale enterprises to reduce women's dependence on erosion-prone agricultural land.
- **Education and Capacity Building:** Provide targeted education, vocational training, and financial literacy programs to empower charland women and strengthen their adaptive capacities.
- **Institutional Support and Social Protection:** Expand social safety nets—such as cash transfers, microcredit, and health services—tailored to erosion-affected women's vulnerabilities and household responsibilities.
- **Community Based Resilience Planning:** Encourage participatory planning involving women in local disaster committees and erosion control initiatives, utilizing indigenous knowledge for sustainable adaptation.
- **Policy Co-ordination and Monitoring:** Foster collaboration among government, NGOs, and local institutions to monitor gendered impacts of riverbank erosion and ensure the inclusion of women in policy evaluation processes.

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