

Case Study

December 2025

Image: Rural woman engaged in small-scale dairy work, supporting household nutrition and income
Source: Sustainedge, 2025

Living with Uncertainty: Climate Resilience Pathways in Char Majhardiar, Rajshahi, Bangladesh

Key Findings

- Char Majhardiar's year-round groundwater reliability and widespread adoption of solar home systems enable households to meet their water and lighting needs despite the absence of grid electricity.
- Farmers depend on Tomato, Chilli, wheat, and Mashkalai, but low farm-gate prices driven by intermediary-controlled markets limit household income and hinder long-term investment.
- As a riverine char, the area is exposed to flooding, erosion, and seasonal shifts, threatening land, housing, crops, and mobility.
- Women contribute significantly to household resilience through dairy production, food management, and domestic resource responsibilities.
- A single under-resourced community clinic and limited transport between the ghat and village create barriers to healthcare, markets, and emergency services.

1. Char Majhardiar: An Overview

Char Majhardiar is located on the banks of the Padma River, approximately 12 km southwest of Rajshahi city. Its geographical position along one of Bangladesh's largest and most dynamic rivers makes it highly exposed to seasonal flooding, erosion, and sediment shifts, with a population of 4,000. The settlement comprises dispersed homesteads, one primary school (Char Nur Nobi), and a small vendor-run bazaar near the riverbank. Agriculture is the primary livelihood: farmers grow tomatoes, chilli, wheat, and mashkhalai, a drought-resistant pulse well-suited to the changing climatic conditions in Bangladesh.

Women play a vital role in maintaining food security and household resilience. They manage dairy production by rearing cows and buffalo, preparing food, collecting water, supporting farming activities, and caring for children and the elderly. Their labour aligns with national trends, in which roughly 60% of employed women work in agriculture, underscoring their essential yet often undervalued economic contributions.

Despite this agricultural base, household incomes remain fragile. Middlemen dominate the market, offering prices often below production costs. National research confirms this pattern: smallholders are “the most significant losers... often selling at remunerative prices (FAO)”, despite high retail prices in urban markets. Majhardiar's farmers echo this challenge, noting that fair pricing remains difficult to achieve.

Transport constraints worsen the situation. Only motorbikes and a locally operated power trolley connect the village to the ghat, limiting trade and increasing dependence on middlemen. These conditions reflect broader inefficiencies in Bangladesh's rural markets.

2. Approach

2.1. Climate-Resilient Housing and Infrastructure

Majhardiar's location on a riverine char places it squarely in the path of climate-related hazards. Chars are inherently unstable landforms shaped by seasonal floods, sediment deposition, and erosion. The Green Climate Fund describes them as “ever-changing river islands”, noting increasing



*Image: Deepwater pump in Char Majhardiar.
Source: Sustainedge, 2025*

vulnerability due to intensified flooding and land loss.

During the field survey in November 2025, residents reported that several neighbouring chars had eroded entirely over the years, demonstrating the rapid pace of landscape change. Housing structures in Majhardiar are particularly vulnerable because they are built on low-lying, soft alluvial soils. While national programmes in other char regions have begun implementing raised plinth homes, elevated communal infrastructure, and improved flood-resilient designs, these innovations have not yet been introduced in Majhardiar. Such interventions, along with riverbank protection, could significantly reduce damage from seasonal flooding and storms.

Despite these vulnerabilities, important resilience assets exist. Groundwater availability is stable year-round, which helps protect households from dry-season water scarcity.

The lack of access to grid electricity has prompted the widespread adoption of solar home systems. Bangladesh's national off-grid solar initiative, one of the world's largest, has also reached Majhardiya; nearly every household uses solar lighting and small home appliances.

This decentralised renewable energy source allows children to study at night, farmers to extend work hours, and women to manage domestic tasks more safely. Opportunities also exist to expand solar power for irrigation, business development, and community services, strengthening long-term resilience.



Image: Solar home system supporting energy access in an off-grid char settlement
Source: Sustainedge, 2025

2.2. Inclusive Community Livelihoods and Social Dynamics

Agriculture in Majhardiya focuses on climate-adapted crops. The presence of mashkalai, a pulse known for tolerance to drought and poor soil conditions, is an asset for climate-resilient farming. With proper training, farmers could further diversify into other resilient crops,

improve soil management, or adopt water-efficient practices.

Women's role in livelihoods extends far beyond household chores. Their dairy production activities generate small but steady income streams and enhance household nutrition. Through targeted interventions such as training, milk-collection systems, microfinance, and women-led producer groups, women could play



Image: Farmers transporting tomatoes to market
Source: Sustainedge, 2025

influential roles in strengthening community food systems. Experiences from other regions show that when women gain access to capacity-building, they often emerge as local leaders in water management, hygiene promotion, or resource governance. Majhardiya could replicate similar approaches to support women's leadership in climate resilience.

Social services, however, remain limited. The lone community clinic struggles with staffing, supplies, and community trust. Although it serves a population smaller than the national average (12,000 per clinic, according to WHO guidance), service quality remains low. Improved health services, particularly maternal care, emergency response, and climate-sensitive disease management, are urgent needs.

Education access is also limited. While primary school provides basic education locally, secondary education requires travel, which is difficult due to costs, distance, and limited transport options.

Market access remains a central challenge. The small local bazaar cannot absorb the community's agricultural output. Farmers rely on ferrying goods to larger markets by boat or motorbike- an expensive and time-consuming

process. The resulting low farm-gate prices reflect systemic issues in Bangladesh's agricultural value chains. Strengthening market access through cooperatives, farmer groups, transport improvements, or digital price information services could help farmers retain more value.

3. Outcomes

The survey conducted revealed a mixed picture of resilience, resourcefulness, and vulnerability in Char Majhardiar. Several key outcomes emerged:

- **Renewable Energy Adoption:** Solar home systems are now integral to daily life. In an off-grid setting, solar panels enable families to light homes, charge phones, and meet basic needs, such as children's evening study and mobile communication. This decentralised energy system reduces dependence on unreliable external infrastructure and can serve as a stepping stone for solar-powered farming tools, cold storage, or micro-enterprises.
- **Livelihood Stress:** Despite strong agricultural skills, households struggle with low profitability. Middleman-controlled prices suppress earnings, leaving farmers unable

to invest in improved seeds, irrigation, or climate-resilient technologies. This income fragility is compounded by transport constraints, leading many to sell produce at the lowest available price to avoid spoilage or transport costs.

- **Gendered Resilience:** Women's work in milk production, household food management, caregiving, and water collection significantly contributes to family well-being. Their knowledge of nutrition, livestock care, and household resource management forms an often-invisible backbone of community resilience. With targeted support, women could expand into organised dairy groups, handicrafts, or small-scale agro-processing.
- **Service Limitations:** The single community clinic struggles to meet even basic health needs. Residents report shortages of medicines, irregular staff presence, and limited maternal and child health services. Limited mobility, especially during floods, further hampers access to emergency care. Education beyond the primary level also requires travelling outside the community, making it inaccessible to many children.
- **Climate Risk Exposure:** Flooding and riverbank erosion remain constant threats, damaging cropland, weakening housing foundations, and jeopardising transport routes. As a result, households often face repeated repair costs, land loss, and livelihood disruption. These risks reduce long-term stability and increase the community's financial and psychological burdens.

4. Lessons Learned

The case of Char Majhardiar offers several strategic lessons for future resilience-building efforts:

- **Local Natural Assets Can Anchor Climate Resilience:** Reliable groundwater and widespread solar adoption demonstrate how

communities can utilise locally available resources to bridge infrastructure gaps. Water availability and renewable energy systems already serve as vital buffers against climate shocks.

- **Market Systems Determine Livelihood Viability:** Agriculture will remain unprofitable unless market structures are reformed. Even with good harvests, poor transport and middlemen-driven pricing trap families in low-income cycles. Strengthening farmers' bargaining power is crucial for improving economic outcomes.
- **Infrastructure Resilience Is a Prerequisite for Char Settlements:** Without raised housing, erosion control, and flood-resilient structures, families on chars remain vulnerable to repeated shocks. Investment in resilient public infrastructure, such as schools, clinics, and storage facilities, is equally important.
- **Women's Leadership Is an Untapped Strength:** Women already contribute significantly to food security and household stability. Engaging them in decision-making, savings groups, climate committees, and livelihood cooperatives can accelerate community-led resilience.
- **Service Gaps Amplify Climate Vulnerability:** Weak healthcare systems, limited education options, and poor mobility reduce households' capacity to prepare for or recover from climate impacts. Enhancing social services is vital to reducing preventable losses.

5. Way Forward

Building resilience in Char Majhardiar requires an integrated set of community-centred strategies that address infrastructure, livelihoods, health, education, market access, and renewable energy. Strengthening climate-resilient infrastructure is crucial, including introducing raised housing models and reinforced foundations to reduce

damage from floods and erosion, and constructing elevated community structures such as clinics, schools, cyclone shelters, and storage sheds to maintain essential services during disasters. Small-scale riverbank protection measures, such as bamboo piling, geobags, or vegetation-based stabilisation, could further decrease erosion risks.

Supporting climate-resilient livelihoods is equally vital. This involves promoting drought- and flood-tolerant crops, crop diversification, and improved soil and water management practices, alongside training in sustainable farming methods, composting, mulching, and integrated pest management. Expanding women-led dairy groups, community savings schemes, and small enterprise development activities, such as milk collection, processing, or handicraft production, can diversify income sources. At the same time, access to microfinance tailored to char environments can provide the financial foundation for these initiatives.

Health and education services must also be enhanced. Upgrading the community clinic with qualified staff, essential medicines, maternal health support, and regular outreach services, along with training local health volunteers in nutrition, sanitation, and climate-related illnesses, will improve community well-being. Establishing satellite learning groups or community tutoring for secondary-level students can reduce travel burdens and support educational continuity.

Enhancing market access will help stabilise household incomes. Supporting farmer cooperatives or producer groups in negotiating fair prices; improving transport connections between the ghat and the village through community-managed services or upgraded pathways; and introducing digital tools such as SMS price alerts, online marketplaces, or mobile advisory services can enhance knowledge, bargaining power, and profitability.

Expanding the use of renewable energy can further strengthen resilience. Promoting solar-powered irrigation pumps can reduce production costs and enhance crop reliability,

while solar-powered cold storage facilities for vegetables and dairy products can reduce spoilage and increase earnings. Community-scale solar charging stations can support local enterprises, e-learning, and health services, thereby providing vital energy access in regions without grid electricity.

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