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Article

Climate Smart Disaster Risk Reduction: Indigenous Knowledge Practiced for Agriculture Sector in Coastal Bangladesh

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ABSTRACT

The coastal region of Bangladesh is highly exposed to climate-related natural disasters, with communities facing various hazards almost every year. Over generations, people in these areas have developed local or indigenous knowledge to adapt to their environment and reduce disaster impacts. This study focuses on identify, analyze, improve, and document indigenous knowledge that enhance resilience in the agriculture sector of Dashmina Upazila, Patuakhali District-one of the disaster-prone coastal regions. A mixed-method approach was used to collect data. Fifteen Focus Group Discussions (FGDs) with 6–10 participants each explored community knowledge about agriculture. These were followed by 20 Key Informant Interviews (KIIs) with individuals such as social leaders, NGO workers, and community representatives to validate and expand on the FGDs' findings. Additional data were gathered through direct observations using transect walks, five detailed case studies, and a review of secondary sources such as reports, articles, and research papers. Data were analyzed using Microsoft Excel 2010 for creating tables and summarizing information, while qualitative insights were described narratively. A SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis was used to evaluate the indigenous practices. The study identified several effective traditional practices, including crop selection based on weather observation, raised farming land, planting fruit trees on house plinths, arum cultivation in lowlands, ridge-furrow farming for hydrophobic plants, seed preservation in mud pitchers, and livestock management strategies like using raised platforms (Killa) and jute sack covers. These practices offer low-cost, practical solutions that improve agricultural resilience. The study recommends integrating such knowledge into disaster risk reduction and development planning.

KEYWORDS

Coastal area; disaster risk reduction; indigenous knowledge; agriculture.

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1. Introduction

Bangladesh is one of the most disaster-prone countries in the developing world, with its exposure to climate change amplified by its geographical position and environmental conditions (Dastagir, 2015; Biswas et al., 2015; Saha et al., 2024; Shamsuzzoha et al., 2025). While climate-related hazards affect the entire nation, the coastal region is especially at risk due to its low elevation and proximity to the Bay of Bengal (Biswas et al., 2018; Barua et al., 2016). This region frequently experiences a variety of climate-induced disasters, such as cyclones, tidal surges, riverbank erosion, floods, saline intrusion, droughts, and extreme temperature fluctuations (Mallick et al., 2017; Mukherjee et al., 2020; Faisal et al., 2021; Faisal et al., 2024; Canete et al., 2025). These recurring events severely affect livelihoods, particularly in agriculture, which remains the primary source of income for many coastal residents (Islam et al., 2019; Saha et al., 2019).

Agriculture in coastal zones of Bangladesh is increasingly threatened by rising salinity, erratic rainfall, flooding, and storm surges. These changes lead to significant crop loss, food insecurity, and a decline in farmers' resilience (Yamin et al., 2005; Netz et al., 2007; Biswas et al., 2015; Long, 2016; Kayes et al., 2025). Numerous studies have associated these climatic events with disruptions in agricultural systems, including crop failure and soil degradation (Rojas et al., 2016; Myers et al., 2017; Gould et al., 2020; Meza et al., 2021; Barua, 2023). Among the coastal districts, Patuakhali—especially the Dashmina and Bauphal sub-districts—faces persistent threats from floods, riverbank erosion, salinity intrusion, and cyclones (Biswas et al., 2015; Iva et al., 2017; Rahim, et al., 2019). In this context, Indigenous Knowledge (IK) plays a vital role in sustaining local agriculture and supporting community resilience. It encompasses a body of wisdom, practices, and cultural norms developed over generations and rooted in close interaction with the local environment (Mascarenhas, 2003; Prayoga et al., 2020; Agupugo et al., 2022). Farmers in many developing countries use IK to make agricultural decisions, manage risks, and ensure food production under changing environmental conditions (Nnadi et al., 2013; Swiderska et al., 2022; Imoro et al., 2021). Examples of such practices include crop rotation to preserve soil fertility, composting, organic pest control, and planting decisions based on seasonal patterns. These methods, while often simple, offer environmentally sustainable alternatives to chemical-based modern agriculture (Khursheed et al., 2022; Esan et al., 2024; Saha & Bauddh, 2020).

Despite their importance, indigenous agricultural practices are often undervalued or overlooked by formal institutions (Rana & Moniruzzaman, 2021). However, recognizing the value of traditional knowledge can contribute to more inclusive and resilient agricultural policies. Supporting these practices through documentation, innovation, and education can bridge the gap between indigenous knowledge and modern development approaches (Adefila et al., 2024). Therefore, identifying and preserving IK is essential not only for local communities but also for sustainable development and disaster risk reduction planning. These community-based strategies offer low-cost, nature-based solutions for coping with environmental stress, particularly in disaster-prone coastal regions. This study focuses on Dashmina Upazila in Patuakhali District, aiming to identify, analyze, improve, and document the indigenous knowledge and practices related to agriculture practice utilized by local communities to manage disaster risks associated with cyclones, storm surges, monsoon flooding, and river erosion. The study also seeks to raise awareness and promote the scaling up of these locally developed strategies as part of climate-smart disaster risk reduction (CSDRR). By highlighting real-life examples of how traditional knowledge contributes to resilience, this research encourages policymakers and practitioners to acknowledge and integrate such valuable insights into formal disaster management frameworks.

1.1. Objectives of the Study

- To identify and documenting the existing Indigenous Knowledge (IK) practiced for agriculture sector
- To assess (attribute, SWOT and improvement) the existing Indigenous Knowledge of agriculture

2. Methods

2.1. Study Area

This research was carried out in Dashmina Upazila, which is located in Patuakhali District of southern Bangladesh (Figure 1). The upazila covers an area of approximately 351.87 square kilometers and lies between latitudes 22º02′ and 22º18′ North, and longitudes 90º29′ and 90º40′ East. It is bordered by Bauphal Upazila to the north, Char Fasson Upazila to the east, and Galachipa Upazila to the south and west (BBS, 2012). Dashmina Upazila is administratively divided into six unions: Betagi-Sankipura, Bahrampur, Bansbaria, Alipur, Rangopaldi, and Dashmina. The postal code is 8630. The total population of the upazila stands at 123,388, with a density of 351 persons per square kilometer. There are 28,490 households, with an average household size of 4.3 members. Among the population, 49% are male and 51% are female; religious composition includes 93% Muslims and 7% Hindus. The literacy rate is 29.6%. Major agricultural products include rice, potatoes, pulses, chili, and watermelon, while common fruits grown are banana, jackfruit, and papaya (BBS, 2012).

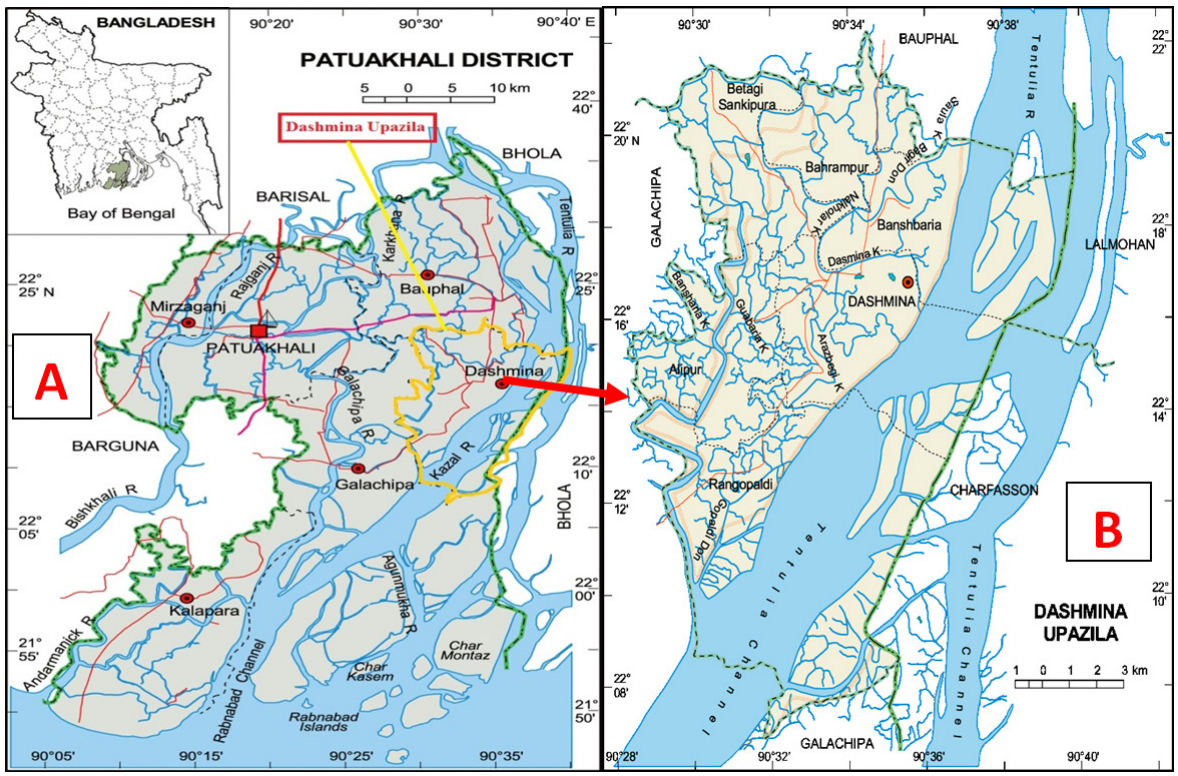


Figure 1. Map (A) shows Patuakhali District within Bangladesh and highlights Dashmina Upazila; Map (B) provides a closer look at Dashmina Upazila (Source: Faisal, M. et al., 2024).

2.2. Data Collection on Indigenous Knowledge

To meet the objectives of the study, both primary and secondary data were collected. Primary data collection methods included Focus Group Discussions (FGDs), Key Informant Interviews (KIIs), direct observation, and case studies. Secondary data were sourced from relevant institutions and literature focused on indigenous knowledge and its application in disaster risk reduction and climate change adaptation.

The collected information was mainly qualitative, focusing on the lived experiences and perceptions of different community members. Participants included general villagers, members of community-based organizations (CBOs), local government representatives, teachers, NGO staff, religious figures, senior citizens, and household heads.

2.2.1. Focus Group Discussions (FGDs):

FGDs were conducted with small groups of 6 to 10 individuals, chosen for their unique insights or lived experiences (Hawkins, 2009). These discussions primarily explored indigenous agriculture practices for climate hazard adaptation. Participants included vulnerable groups such as the elderly, landless, poor, and women over the age of 40. A guideline was used to steer the discussion, which was recorded on mobile devices, with supplementary notes taken in notebooks. A total of 15 FGDs were held for this research.

2.2.2. Key Informant Interviews (KIIs):

Following the FGDs, KIIs were conducted to validate the collected indigenous knowledge on agriculture from FGD and gain deeper insights into traditional agriculture practices and their evolution. Interviewees were selected based on their involvement and expertise in the community, including local leaders, teachers, Union Parishad representatives, religious leaders, and NGO personnel, typically aged between 40 and 70 years who have long time experience in agriculture. Some exceptions were made for female UP members and school teachers. The interviews were guided by structured questionnaires and recorded in notebooks. In total, 20 KIIs were completed.

2.2.3. Direct Observation:

To further verify the findings from FGDs and KIIs, direct field observations were carried out. This included walking through communities (transect walks) to observe traditional housing technologies in practice. Observations were guided by questions addressing what, when, where, who, why, and how (Yin, 2017), allowing researchers to understand the context and details of indigenous practices. Photographs were taken during these visits to visually document the technologies and housing designs.

2.2.4. Case Studies:

Detailed case studies were conducted to provide in-depth understanding of the benefits and effectiveness of indigenous housing during disaster events. These case studies highlighted personal experiences and local histories of housing evolution in the study area (Hawkins, 2009; Cavestro, 2003). A total of four case studies were included in this research.

2.2.5. Secondary Data Review:

Secondary data were gathered from a wide range of sources, including published books, journal articles, scientific papers, project reports, maps, NGO baseline reports, academic theses, and online resources. This helped contextualize and support the primary data with existing knowledge and documentation.

2.3. Assessment of Indigenous Knowledge

2.3.1. Attribute Assessment:

This part of the research assessed how communities have adapted to live with disasters such as cyclones, tidal surges, waterlogging, and riverbank erosion. The focus was on understanding the use of traditional housing technologies as a coping strategy and their role in enhancing resilience to such hazards.

2.3.2. 2.3.2 SWOT (Strength, Weakness, Opportunity, and Threat) Analysis:

To analyze the collected information, a SWOT (Strengths, Weaknesses, Opportunities, and Threats) framework was applied (Chang & Huang, 2006; Gurl, 2017). This method, widely used in various research fields (SAARC Disaster Management Centre, 2009), helped identify internal strengths and weaknesses of indigenous practices and external opportunities and threats to their sustainability. The resulting strategies included: SO Strategies (Strengths-Opportunities): Using existing strengths to take advantage of external opportunities, WO Strategies (Weaknesses-Opportunities): Reducing weaknesses by leveraging external opportunities, ST Strategies (Strengths-Threats): Using internal strengths to minimize external threats, WT Strategies (Weaknesses-Threats): Tackling both internal and external challenges simultaneously (Sevkli et al., 2012).

The SWOT analysis followed a structured process: conducting a group session, defining objectives, identifying SWOT elements through brainstorming, formulating strategy options, and creating a SWOT matrix that was updated as needed.

2.4. Improvement of Indigenous Knowledge

After documenting indigenous practices, discussions and community consultations were held to explore ways of improving or scaling up these techniques. Brainstorming sessions were conducted with community members to enhance these practices for Climate-Smart Disaster Risk Reduction (CSDRR) in the local context.

2.5. Data Analysis

Data collected from different sources were organized and analyzed using various tools. Field notes were maintained throughout to record observations, insights, and reflections. A reflective journal was updated daily to assess the quality of data, monitor progress, and track any personal biases that could influence interpretation. Microsoft Excel 2010 was used for organizing and presenting data in tabular form, while qualitative data were interpreted descriptively. Final summaries and the research report were prepared using Microsoft Word 2010.

2.6. Documentation

Each data collection method involved multiple techniques such as note-taking, audio recording, and photography. Before leaving the field each day, researchers ensured that all necessary data had been properly gathered. Documentation was done daily during the data collection period to prevent data loss and maintain accuracy.

3. Results

3.1. Crop Selection Based on Weather Pattern Observations:

Farmers in Boro Gopaldi village of Dashmina Upazila utilize indigenous knowledge to select crops for cultivation by closely observing local weather patterns, including cloud formations, temperature fluctuations, and wind direction. When they detect significant changes in the expected weather conditions, they adapt their crop choices accordingly, opting for varieties that are more resilient under the altered conditions, rather than strictly following traditional crop cycles.

For instance, if farmers observe a delay in the onset of winter or experience relatively warmer temperatures preceding the winter season, they prefer to cultivate crops such as mosuri (lentil), kheshari (grass pea), and other pulses instead of wheat or maize. Similarly, in the absence of

pre-monsoon rainfall or under conditions of reduced rainfall, they choose to grow traditional local varieties of Aus and Aman rice, which possess greater drought tolerance, rather than high-yielding but water-dependent rice varieties.

Case Study 01: Adapting Agricultural Practices through Indigenous Climate Observation — The Experience of Md. Dulal Gaji

Md. Dulal Gaji, a 45-year-old farmer from Gosani village in Bashbaria Union, has inherited the farming profession through generations—his father was a farmer, as was his grandfather. Farming is deeply rooted in his family's heritage. Over the years, Dulal has observed noticeable changes in seasonal weather patterns. He notes that the weather is no longer consistent: some winters are extremely cold while others are relatively mild; some monsoon seasons bring heavy rainfall, whereas others experience very little precipitation.

Drawing from his indigenous knowledge and long-term experience, Dulal realized that adhering to the same cropping pattern each year does not always guarantee a good harvest. Instead, he began observing prevailing weather conditions more closely to make informed decisions about crop selection for upcoming seasons.

In last year, for example, Dulal noticed a significant lack of rainfall prior to the winter season. Based on his observations, he predicted a relatively warmer winter and decided to cultivate pulse crops instead of the more commonly grown boro rice. This adaptive strategy proved beneficial, yielding better results than traditional practices. According to Dulal, such weather-based decision-making has often helped him avoid crop failure and optimize agricultural productivity.

Source: Md. Dulal Gaji; Age: 45; Village: Gosani; Union: Bashbaria, Dashmina, Patuakhali.

3.1.1. Assessment of the knowledge

a. Attributes: This is a traditional, experience-based agricultural practice that has evolved over generations. The method involves anticipating upcoming weather conditions based on long-term observation, experience, and indigenous knowledge, and selecting crops accordingly.

b. Resource needs: The primary resources required for this practice are the farmer's experiential knowledge and observational skills developed over time.

c. Why this technology?

This technique is employed to select crops based on anticipated weather conditions in order to minimize potential crop damage and enhance the likelihood of a successful yield.

d. SWOT analysis:

Strength	Weakness	Opportunity	Threat
Relies on farmer's indigenous knowledge and experience Requires no additional financial or material resources	Highly dependent on the individual's ability to accurately interpret weather patterns Lack of standardization	Potential to integrate with scientific weather forecasting and advisory services Opportunity to enhance community-based knowledge sharing	Increasing unpredictability of weather due to climate change Risk of incorrect weather predictions leading to crop failure

3.1.2. Improve the knowledge

Proposed Improvements to Existing Knowledge and Practices:

- Establishment of Community Information Centers: Community-level information centers should be developed to provide farmers with easy access to weather forecasts, agricultural advisory services, and expert consultations. These centers should be linked with national

meteorological agencies and agricultural extension offices to ensure timely dissemination of climate-smart agriculture services.

- Use of Simple Technological Tools: Local farmers should be encouraged and trained to use simple, user-friendly tools such as mobile applications for weather monitoring and analysis. Regular consultations should be facilitated between farmers, meteorologists, and agronomists to bridge the gap between traditional practices and scientific knowledge.
- Capacity Building and Training Programs: Training programs should be organized to enhance farmers' knowledge and skills in weather assessment, crop planning, and climate-resilient agricultural practices. This will enable them to make more informed decisions based on both indigenous and scientific inputs.

3.2. Raising Cultivable Land for Year-Round Vegetable Cultivation

Raising the elevation of cultivable land has emerged as an effective indigenous strategy to protect crops from high tides and tidal surges in the study area. Although this measure is relatively costly, a small segment of farming households who are heavily dependent on agriculture have implemented it on portions of their land to safeguard their agricultural production and household income.

During focus group discussions, participants reported that most agricultural land in the area is cultivated twice a year—once for Aman rice and once for winter crops such as vegetables, pulses, wheat, maize, and pepper. Typically, the land remains fallow during the Aus season. However, farmers also noted that a portion of the winter crops is often damaged by tidal water during the maturity stage, leading to yield loss and forcing farmers to depend on alternative livelihood options such as fishing or day labor for subsistence.

Due to regular tidal surges and normal tidal inundation, cultivating dry-season crops becomes increasingly challenging. In response, some farmers have raised the level of select plots of cultivable land to prevent tidal water intrusion and subsequent crop damage. This adaptation has enabled year-round cultivation of vegetables and other crops, resulting in significantly improved agricultural productivity and household resilience compared to earlier conditions.



Figure 2. Raised cultivable land for vegetable cultivation

Case Study 02: Land Raising and Integrated Farming — A Path to Resilience for Abul Hossain Hawlader

Abul Hossain Hawlader, a farmer from Soyed Jafor (Saijjapur) village, owns three acres of farmland. His five-member family relies entirely on agriculture for their livelihood. He cultivates two crops annually—Aman rice during the monsoon season and various winter crops, including vegetables, pepper, pulses, maize, and groundnuts.

However, during the Aus season, most of his land remains fallow, as it lies outside the protective embankment. In the winter season, he is also unable to use those lands outside the embankment due to the risk of tidal water intrusion. Although he cultivates winter crops on land located inside the embankment, these crops are frequently damaged by high tides, especially at the maturity stage, leading to repeated losses.

Recognizing the need for a sustainable solution, Abul Hossain decided to raise the elevation of a portion of his cultivable land. To finance this effort, he took a loan of BDT 50,000 from two microcredit NGOs. He selected 35 decimals of land near his home. A pond was excavated on one part of the land, and the soil from the pond was used to elevate the rest of the plot.

The total land development and initial investment cost approximately BDT 40,000. The remaining funds were used to begin fish farming in the pond and to cultivate vegetables on the raised land. By the end of the first year, Abul Hossain earned BDT 50,000 from these 35 decimals—enough to repay the entire loan. Previously, this land would yield only around BDT 3,000 annually.

Encouraged by this success, he now plans to rebuild a new house within two years using the additional income. Observing his achievements, other farmers in the community have begun to adopt similar practices—raising land and digging ponds to combine crop and fish farming for improved resilience and income.

Source: Abul Hossain Hawlader; Age: 53; Village: Soyed Jafor (Saijjapur); Union: Dashmina Sadar, Dashmina, Patuakhali.

3.2.1. Assessment of the knowledge

a. Attributes: This practice represents a form of technological indigenous knowledge. It can also be considered an economic indigenous knowledge system because, when properly implemented, it allows farmers to significantly increase their income and savings—both of which are critical for disaster risk reduction. The approach combines two income-generating activities: vegetable and crop cultivation on raised land, and fish farming in adjacent ponds. This integration promotes economic diversification and enhances livelihood security.

b. Resource needs:

- Basic materials and tools: soil, labor, spade, khonta (local digging tool), bamboo baskets, and financial capital
- The estimated average cost for raising 35 decimals of land is approximately BDT 40,000

c. Why this technology?

The primary aim of this technology is to protect crops from tidal surges and seasonal flooding while enabling year-round cultivation. It contributes to improved food security, economic resilience, and overall livelihood development for smallholder farmers

d. SWOT analysis:

Strength	Weakness	Opportunity	Threat
Although initially expensive, the measure is cost-effective in the long run Converts single-crop farming into multi-crop systems Enables year-round cultivation Yields significantly higher income than conventional land use	The average platform height (5–6 feet) may not withstand extreme storm surges Soil erosion over time may reduce platform height	Transition from two to four cropping cycles in a year Easy dissemination due to visible benefits Accessible credit support from banks (e.g., Krishi Bank, Janata Bank) and NGOs Supports integrated farming (crop + fish)	Severe storm surges may still submerge and damage crops Ponds may overflow during floods, causing fish loss Risk of fish and vegetable theft

3.2.2. Improve the knowledge:

Recommendations for Improvement:

- Promote integrated farming systems by including poultry (e.g., ducks, hens) alongside vegetable and fish farming
- Introduce high-yielding and climate-resilient crop and vegetable varieties
- Encourage cultivation of high-value fish species such as white fish or curb fish
- Where feasible, construct protective concrete boundaries to reduce soil erosion and protect elevated plots from storm surges

3.3. Planting Fruit Trees on House Plinths as a Climate-Smart Practice

In the study area, local residents commonly plant various fruit-bearing trees—such as jackfruit, papaya, eggplant, bombe pepper, and custard apple—on the earthen plinths (raised platforms) of their houses. This practice is based on their observation that these trees often die when water accumulates around their roots during the rainy season. By planting them on higher ground, such as the house plinths, waterlogging is avoided, and the trees are able to survive and produce fruit throughout the year.

Another advantage noted by community members is that dew or rainwater runoff from rooftops falls directly near the base of the trees. This natural water source is sufficient for their growth, reducing or eliminating the need for additional irrigation. Moreover, the roots of jackfruit trees help stabilize the soil, thereby reducing erosion of the earthen plinths during rain or storm surges.

Additionally, these trees provide shade, which helps to keep homes cooler during the hot summer months. The fruit harvested from these trees supports household nutrition needs, and in many cases, surplus produce is sold in the local market, generating supplementary income for the family.



Figure3. Planting fruit tree (jack fruit, papaya) on the mud plinth of the house

Case Study 03: Home Garden on the Plinth – A Path to Empowerment for Jahanara Begum

Jahanara Begum, a housewife from Bogura Village in Bohorumpur Union, has transformed her home plinth into a productive garden. She has planted a variety of fruit trees, including jackfruit, papaya, bombe pepper, and custard apple. In front of her house, she planted four jackfruit trees, while along the other three sides she planted 15 papaya trees, one custard apple tree, and five bombe pepper plants.

According to Jahanara, her plants are healthy and produce an abundant amount of fruit. The papaya trees, in particular, yield fruit almost year-round. After meeting the needs of her family, she sells the surplus papayas in the local market and earns a good income.

In addition to growing fruits, Jahanara also raises livestock. By selling fruits and eggs, she has managed to save a significant amount of money. This financial contribution has increased her influence and decision-making power within the family, enhancing her sense of empowerment.

Source: Jahanara Begum; Age: 42; Village: Bogura; Union: Bohorumpur, Dashmina, Patuakhali, Bangladesh.

3.3.1. Assessment of the knowledge

a. Attributes: This is a form of technological indigenous knowledge rooted in traditional agricultural practices. It is widely applied across Dashmina Upazila. The practice reflects local adaptation based on lived experience, observation, and resource availability.

b. Resource needs:

- Saplings of jackfruit, papaya, custard apple, bombe pepper, and eggplant
- Basic gardening tools and minimal space around the house plinth

c. Why this technology?

- To protect the earthen plinth of houses from erosion
- To keep the house cooler during the summer
- To provide an alternative source of livelihood through fruit production
- To support women's empowerment through income generation and active participation in household economy

d. SWOT analysis:

Strength	Weakness	Opportunity	Threat
Helps reduce erosion of the house plinth Prevents water stagnation at the base of the trees, reducing tree mortality Meets the household's fruit requirements Provides shade, helping to cool the house in hot seasons	Falling leaves may damage tin roofs In houses with straw roofs, large raindrops falling from jackfruit tree leaves may cause roof damage	Dew or rainwater run-off from the roof irrigates the trees naturally, reducing the need for extra watering Offers alternative livelihood options through sale of surplus fruits Promotes sustainable home-based agriculture	During cyclones or nor'westers, trees may break and fall on the house, causing structural damage

3.3.2. Improve the knowledge

Recommendations for Improvement:

- Apply organic fertilizers around the base of trees to promote healthy growth
- Tie the trees securely to the house structure to prevent them from falling during strong winds; the house can act as additional support
- Raise awareness among community members about the benefits of planting fruit trees on house plinths and promote this practice as a sustainable livelihood option

3.4. Planting Arums in Low-Lying Lands

In the study area, there are several low-lying lands that remain waterlogged for most of the year. Due to prolonged waterlogging, farmers have traditionally been unable to grow regular crops on these lands, leaving them fallow year after year. This led to continuous losses, as the land remained unproductive.

To address this issue, some innovative farmers have started cultivating water arums (locally known as "kochu") in these waterlogged areas. Arums grow well in such wet conditions, making the land suitable for this type of cultivation. These farmers now produce large quantities of water arums, which are popular vegetables with high market demand.

As a result, farmers are now earning better profits from cultivating arums compared to traditional rice farming. This practice has turned previously unused lowlands into productive agricultural areas, improving income and food security for the local farming community.

Case Study 04: Turning Waterlogged Land into Profit – Azahar Munsi's Arum Farming Success

Azahar Munsi, a 45-year-old farmer from Hazir Hat village near the launch ghat, owns a 10-decimal plot of low-lying land beside the main road. This land remains waterlogged for most of the year. Due to its shallow depth, it is unsuitable for fish farming, and the constant water makes rice cultivation impossible.

Faced with this challenge, Azahar decided to try cultivating water arums, a crop well-suited for waterlogged conditions. His decision proved successful. In just one season, he earned 7,500 BDT from arum cultivation—an income higher than what he previously earned from rice farming.

Encouraged by his success, other farmers in the area have also started utilizing their unused lowlands for arum cultivation. As a result, many previously fallow lands are now under productive use, contributing to better income and food security in the community.

Source: Azahar Munsi; Age: 45; Village: Hazir hat; Union: Dashmina Sadar, Dashmina, Patuakhali, Bangladesh.

3.4.1. Assessment of the knowledge

a. Attributes: This is a traditional agricultural practice, based on indigenous knowledge. It has been developed over time by farmers through observation and experience in waterlogged conditions.

b. Resource needs: Saplings and planting materials of water arum

c. Why this technology?

This practice helps bring waterlogged, fallow land under productive use. It reduces land waste, increases food production, and enhances household income.

d. SWOT analysis:

Strength	Weakness	Opportunity	Threat
Improves family nutrition by providing a vegetable rich in iron and vitamins. More profitable than rice cultivation in lowlands. No need for ploughing or soil tillage. Requires minimal care once planted.	Sometimes the market price of water arum drops, reducing profit.	Farmers can cultivate short-term fish species like tilapia by fencing the area with nets, allowing integrated farming. The success of this practice can be shared through community awareness programs, motivating others to utilize fallow lowlands.	If this model is applied in normal lands, it may reduce traditional rice cultivation.

3.4.2. Improve the knowledge

Suggestions for Improvement:

- Promote integrated farming by cultivating small fish species such as tilapia, puti, or koi alongside water arum, using nets to enclose the area.
- Raise awareness in the community about the benefits of water arum cultivation on waterlogged land through courtyard meetings, training, and demonstrations.

3.5. Ridge and Furrow Cultivation for Hydrophobic Trees

In the study area, some farmers have converted their plain croplands—especially those located near homesteads—into areas for cultivating wood and fruit trees. These lands typically produce lower crop yields due to shading from large trees planted along the house boundaries, which blocks sunlight from reaching the crops. Over time, this leads to reduced productivity and frustration among farmers.

To make better use of these less-productive lands, farmers have started cultivating banana trees and timber trees such as mahogany. However, planting these trees directly on flat land leads to problems during the monsoon season, when rainwater accumulates and submerges the base of the plants. This prolonged waterlogging often results in the trees dying.

To solve this problem, farmers have adopted the ridge and furrow cultivation method. In this technique, trees are planted on elevated ridges while furrows (small channels) run between them to allow water to drain. This ensures that the base of each tree remains above water level during the rainy season, preventing root rot and plant death. This method has proven to be highly effective and is now widely practiced across the entire Dashmina Upazila.



Figure 4. Ridge and furrow cultivation for hydrophobic trees

3.5.1. Assessment of the knowledge

a. Attributes: This is a traditional agricultural technique commonly practiced in the study area. It is considered a form of indigenous knowledge adapted to local environmental conditions.

b. Resource needs:

- Basic tools such as labor, spades, bamboo baskets, and some financial investment
- For implementing this method on 10 decimals of land, the estimated cost ranges from 8,000 to 10,000 BDT

c. Why this technology?

This technique is specifically used to cultivate hydrophobic (water-sensitive) trees on low-lying or plain lands that experience seasonal waterlogging. The ridge and furrow method prevents the base of the trees from being submerged during the monsoon, thus improving tree survival and productivity.

d. SWOT analysis:

Strength	Weakness	Opportunity	Threat
Makes previously unproductive land more beneficial than traditional crop cultivation Enables cultivation of a variety of trees and vegetables, such as bananas or timber species like mahogany, rain tree, and koroi	Reduces overall cropland availability Benefits from wood trees are long-term; financial returns take time Once the land is modified for ridge and furrow, reverting to conventional use is difficult	With proper management, farmers can cultivate fish in the furrows during the monsoon (3–4 months)	Deep-rooted trees like mahogany, koroi, or rain tree are vulnerable in this system as their roots can't spread, making them prone to uprooting during moderate cyclones

3.5.2. Improve the knowledge:

Suggestions for Improvement:

- Focus on planting shallow-rooted crops such as bananas and various vegetables to reduce cyclone-related risks
- Introduce integrated farming by cultivating small fish species (e.g., tilapia, koi) in the furrows during the monsoon
- Promote an alternative model: dig a pond on one side of the land and use the excavated soil to raise the other side. This creates opportunities for year-round vegetable or tree cultivation on the raised land ad fish farming in the pond
- Conduct community awareness and training sessions (e.g., courtyard meetings) to promote this technology and share best practices

3.6. Pruning Tree Branches to Reduce Wind Pressure

In the study area, certain trees such as rain tree, chambul, banyan, koroi, and mahogany develop large and dense branches. During cyclones or nor'westers, these trees experience significant wind resistance due to their widespread canopies. This wind load can create excessive pressure on the tree trunk, often resulting in uprooting or breakage.

To address this, some local residents have adopted an innovative indigenous practice: pruning or cutting down the branches of structurally weaker trees. This is done to reduce wind resistance and minimize the risk of tree collapse. Based on local knowledge, most residents prefer to prune

trees in the late monsoon season (August–September), as severe cyclones typically occur during the post-monsoon period.

Similarly, farmers growing bananas also adopt a related technique. When banana trees bear mature fruits, their stems struggle to support the increasing weight. If large leaves also catch strong wind at this stage, the tree becomes more prone to toppling. To prevent this, some farmers remove banana leaves before the fruit fully matures, reducing wind resistance and preventing the tree from collapsing.

Although this practice is not yet widespread in Dashmina Upazila, it is gradually gaining popularity. With increasing awareness and visible success, it is expected that more people will adopt this measure in the coming years as a low-cost method to improve resilience to storms.

3.6.1. Assessment of the knowledge

a. Attributes: This practice is a form of technological indigenous knowledge developed through local experience in managing tree vulnerability during cyclones.

b. Resource needs: Basic tools: Axe, chopper, Labor for cutting and handling branches

c. Why this technology?

The primary objective of this practice is to protect large, vulnerable trees from being uprooted or broken by strong cyclonic winds. By reducing the canopy size, the wind pressure on the tree is minimized, thus enhancing its stability.

d. SWOT analysis:

Strength	Weakness	Opportunity	Threat
Effectively reduces wind pressure on trees during storms Low-cost and easy to implement	Excessive branch cutting can reduce photosynthesis and overall food production for the tree	Provides an additional source of fuelwood from cut branches Potential to scale this practice in cyclone-prone areas	Cutting branches of young or small trees may lead to tree death If applied near homesteads, reduced canopy may expose houses to direct wind, increasing their vulnerability

3.6.2. Improve the knowledge

Recommendations for Improvement:

- Avoid cutting more than 70% of the tree branches, as leaves are essential for photosynthesis. New branches typically regrow within 2–3 months.
- For banana trees bearing mature fruits, tie the plant to a nearby strong tree or pole using rope to prevent it from toppling due to wind pressure.
- Organize awareness campaigns in cyclone-prone communities to promote this simple, cost-effective risk reduction technique.

3.7. Use of Mud Pitchers for Seed Preservation

In the Dashmina region, farmers preserve various types of seeds such as rice, pulses, vegetables, and pepper using traditional methods. They are well aware that exposure to air and moisture can lead to seed spoilage. Therefore, they follow a preservation method that minimizes contact with both air and moisture.

Seeds are primarily stored in traditional mud pitchers. There are two types of pitchers used locally: small pitchers known as kolosh and large pitchers called motka. Farmers use motka for preserving large quantities of seeds, such as rice, and kolosh for smaller quantities like pulses or vegetable seeds.

The seed preservation process involves several steps:

- Sun-Drying: First, seeds are dried under direct sunlight for 3 to 4 days to remove moisture.
- Cooling: After drying, the seeds are placed in a shaded area to cool down to room temperature. Storing hot seeds directly in containers is avoided, as it can lead to spoilage.
- Filling the Pitcher: Once cooled, the seeds are placed into a clean and dry pitcher until the container is nearly full, up to the neck.
- Compaction: The pitcher is gently shaken or tapped to compact the seeds and remove air pockets.
- Ash Sealing: The remaining space at the top of the pitcher is filled with dry ash. The ash is gently pressed down by hand to eliminate voids and further protect the seeds from air and moisture.
- Sealing the Pitcher: Finally, a mud lid is placed on top, and the joint between the lid and the pitcher is sealed with soft clay. This creates an airtight and moisture-resistant environment.

This indigenous technique is widely practiced throughout Dashmina Upazila and has proven effective in protecting seeds for the next planting season. It is a low-cost, sustainable method that aligns well with local environmental conditions and traditional agricultural knowledge.



Figure 5. Mud pitcher for preserve seeds

3.7.1. Assessment of the knowledge

a. Attributes: This is a traditional seed preservation technology, considered a form of indigenous technological knowledge. It has been practiced in rural communities for generations to safely store seeds for long-term use.

b. Resource needs: Mud pitcher (motka or kolosh), Sunlight for drying seeds, Dry ash, Mud lid, Soft clay for sealing

c. Why this technology?

This traditional method helps preserve seeds for a long time without damage. It protects seeds from air and moisture, which are the primary causes of seed spoilage.

d. SWOT analysis:

Strength	Weakness	Opportunity	Threat
Low-cost technique Easy to implement; mostly managed by women All required materials are locally available The method is air- and moisture-resistant	Mud pitchers are fragile and may break during transportation	Plastic containers can be used as an alternative to reduce breakage risk	The pitchers may break during floods or storm surges Children may accidentally break the pitchers

3.7.2. Improve the knowledge

Recommendations to Improve the Knowledge:

- Plastic containers may be used as an alternative to mud pitchers to reduce the risk of breakage.
- Preserved seeds should be stored in a loft or raised platform, safe from flooding and out of reach of children.
- Organize courtyard sessions to raise awareness and educate the community about proper seed preservation techniques.

3.8. Preservation of Livestock Feed for Year-Round Use

In the Dashmina area, local people preserve livestock feed throughout the year to prevent shortages during the rainy season. During this time, most agricultural fields are used for rice cultivation, making fresh grass and straw unavailable for livestock. Additionally, heavy rainfall, tidal surges, and flooding often lead to waterlogging, further worsening the feed crisis for livestock.



Figure 6. Preservation of livestock food

To address this issue, the community widely practices traditional techniques for preserving dry straw and grass, especially using raised platform methods that protect stored feed from water and moisture. Two main types of raised platforms are commonly used:

1. Earthen Platform Dome:

- A soil platform is constructed, typically 5 to 7 feet high.
- A bamboo or wooden pole is placed in the center, and dry straw is stacked around it in layers, forming a dome-shaped structure.

- Sometimes, instead of building a full platform, people use the sloped sides of roads or embankments to construct these domes, reducing the need for additional labor or resources.

2. Bamboo Structure ("Matcha"):

- A bamboo platform (locally known as matcha) is built about 4 to 5 feet above the ground.
- This structure is used primarily to store grasses.
- The height of the matcha protects the feed from tidal and floodwaters, and it also prevents animals from reaching and consuming the feed in the absence of their caretakers.

These traditional methods are highly valued in the area for their effectiveness in ensuring a steady supply of livestock feed, especially during natural calamities or seasonal food shortages.

3.8.1. Assessment of the knowledge

a. Attributes: This is a form of technological indigenous knowledge. It is a traditional technique widely practiced in the community.

b. Resource needs:

- Building a raised soil platform requires 2–3 days of labor by one person.
- Constructing a bamboo or wooden matcha (parquet) typically takes one day of labor.
- Essential materials include bamboo or wood, and rope—all of which are locally available and affordable.

c. Why this technology?

The main objective of this technology is to protect livestock feed from tidal surges, heavy rain, and floods, thereby ensuring feed availability during crisis periods and securing the food supply for livestock year-round.

d. SWOT analysis:

Strength	Weakness	Opportunity	Threat
Cost-effective and simple construction techniques. Requires only soil, bamboo/wood, rope, and labor. All materials are locally available.	Rainwater may enter the straw dome and cause rotting. Strong winds may damage the central bamboo pole.	Widely recognized and accepted by the local community. Easy to implement, encouraging broader adoption.	Risk of arson by miscreants can destroy straw domes.

3.8.2. Improve the knowledge:

Suggestions for Improvement:

- The base platform can be made of concrete (brick and cement) to ensure durability and stability.
- Space should be left around the base to allow livestock to access the straw directly.
- The central bamboo or wooden pole can be replaced with a concrete pillar for added strength.
- The matcha (raised bamboo platform) can be constructed with concrete supports and higher-quality wood for longer lifespan.
- Straw or grass stored on platforms can be covered with polyethylene sheets to prevent water ingress and rotting.

3.9. Killa (Raised Platform) for Livestock

In Dashmina Upazila, some households construct raised platforms, locally known as killa, in front of their homes to protect livestock during natural disasters such as cyclones, floods, and storm surges. These platforms are built with the intention of safeguarding valuable livestock, which are critical assets—especially for ultra-poor families.

There are two types of killa commonly found in the area:

1. Private Killa: Built by economically solvent families for personal use.
2. Shared or Communal Killa: Constructed with the joint effort and financial contribution of 4–5 neighboring families to reduce individual costs.

Some killas are built in common areas and referred to as communal killas. These are strategically located so that many families can access them easily during emergencies. In certain cases, communal killas are constructed adjacent to cyclone shelters. This allows people to take refuge in the shelter while keeping their livestock safe nearby on the killa.

The practice of building killa became more prominent after Cyclone Sidr, when people realized the importance of protecting livestock, particularly among ultra-poor families who depend heavily on these animals for their livelihoods. Losing even one animal can mean significant economic loss for them.

Communal killas are cost-effective, widely accepted, and considered a vital component of local disaster preparedness strategies.

3.9.1. Assessment of the knowledge

a. Attributes:

This is both a technological and social form of indigenous knowledge. The construction of communal killa reflects strong community cooperation, involving shared financial contributions and labor support among neighboring households.

b. Resource needs:

- Approximately 15 days of labor (involving two persons) is required to construct a household-level killa.
- The average estimated cost is 15,000 BDT, based on a labor rate of 400 BDT per person per day. However, if family labor is used, the monetary cost can be minimized or eliminated.
- The soil used for construction is usually sourced from nearby locations, making it readily available.

c. Why this technology?

The primary purpose of this measure is to protect livestock from storm surges, high tides, and floods, which are common in coastal areas like Dashmina Upazila.

d. SWOT analysis:

Strength	Weakness	Opportunity	Threat
Highly effective in protecting livestock during storm surges and floods. Cost-effective in terms of household income, especially when using family labor.	Typically constructed from soil with a fixed height; in the event of an exceptionally high storm surge, the killa may be submerged, resulting in loss of livestock.	In Dashmina, women play a significant role in livestock care. This measure directly supports and benefits them. Promotes and encourages livestock rearing, improving livelihoods.	Since the killa is made from soil, it is vulnerable to erosion or complete washout during severe storm surges or high tides.

3.9.2. Improve the knowledge

Recommendations for Improvement:

- To enhance durability, the slope of the killa should be reinforced with concrete (brick and cement) or surrounded by a retaining wall to resist erosion from strong water flow during storms.
- A protective shed made of tin or other materials should be built over the killa to shield livestock from heavy rain, flying debris, and wind-driven hazards during cyclones.

3.10. Releasing Livestock during Cyclones or Storm Surges

In the study area, it is a common practice among farming communities to tie livestock such as cows, buffaloes, and goats to posts or pillars to prevent them from wandering. At night, animals are typically tied inside livestock sheds for safety and control.

However, during group discussions, community members identified this practice as a major cause of livestock mortality during cyclones and storm surges. Past experiences from major cyclones—such as Sidr, Aila, and especially the devastating Bhola Cyclone—revealed that livestock that were released by their owners before the disaster had a much higher survival rate. In contrast, tied animals were unable to escape rising floodwaters or collapsing structures, leading to mass deaths.

As a result, many local residents have adopted the practice of releasing their livestock during severe weather events, allowing the animals to move to higher ground or safer locations on their own. This simple yet life-saving practice is now increasingly recognized as a critical strategy for reducing livestock loss during coastal disasters.

Case Study 05: A Lesson in Survival – Husneara Begum's Experience During Cyclone Sidr

Husneara Begum, a 40-year-old woman from Hazir Hat village in Dashmina Sadar Union, shared her harrowing experience during Cyclone Sidr. At first, she and her family assumed the storm was just strong wind. However, when the livestock shed collapsed, she realized it was a severe cyclone.

Soon after, storm surge water began flooding her homestead. In a moment of panic and urgency, she managed to untie and release three of her cows. However, due to the rapidly rising water and limited time, she could not free the remaining four cows. Prioritizing her family's safety, she took her children and rushed to the embankment, eventually reaching the cyclone shelter.

When the cyclone had passed and she returned home, she found the dead bodies of the four cows that had remained tied inside the livestock shelter. In contrast, the three cows she had released survived. Reflecting on the event, Husneara believes that the cows died because they were unable to move to safety as the water rose gradually. She is convinced that if she had been able to release all of them, they might have all survived.

This experience deeply affected her and taught her the importance of freeing livestock during cyclones to give them a chance to survive.

Source: Husneara Begum, Age: 40, Village: Hazir Hat, Union: Dashmina Sadar, Upazila: Dashmina, District: Patuakhali, Bangladesh.

3.10.1. Assessment of the knowledge

a. Attributes: This practice is based on traditional indigenous knowledge, primarily influenced by the awareness and preparedness of local people. It is a community-learned behavior developed through past disaster experiences.

b. Resource needs:

- No financial investment is required.
- Only a timely and sensible response is needed from livestock owners.
- Women's involvement is vital, as they are usually responsible for managing and caring for livestock within households.

c. Why this measures?

This measure is crucial for protecting livestock from the adverse impacts of strong cyclonic winds and rising storm surge waters. Releasing livestock during such events significantly increases their chances of survival.

d. SWOT Analysis:

Strength	Weakness	Opportunity	Threat
No cost involved. Very simple and can be performed by men, women, children, and the elderly. Does not require physical labor.	Freed animals may drift away to other areas due to water current or wind. Risk of livestock theft after being released.	Raised earthen killas can be constructed to provide safer shelter for released livestock during disasters.	Released livestock may be injured or killed by falling trees or flying debris. Animals can be washed away into ponds, canals, or rivers and drown.

3.10.2. Improve the knowledge

Suggestions for Improvement:

- Apply a hidden identification mark (e.g., paint, tag, or branding) on livestock so that they can be identified and recovered if found in other areas after a disaster.
- Tether livestock in such a way that they can be quickly and easily released in emergency situations.
- Conduct awareness-raising programs in communities to educate people about the importance of timely livestock release during cyclones and storm surges for better disaster preparedness.

3.11. 3.11 Covering Cows with Jute Sacks during winter

In the study area, cattle rearing are common due to the easy availability of cow fodder, such as green grass and rice straw. During the winter season, especially when cold waves occur, the temperature drops significantly, causing discomfort and illness among both humans and animals. People often suffer from cold-related diseases such as coughs, colds, and pneumonia during this time.

Similarly, cattle are also vulnerable to cold-related illnesses during extreme winter conditions. In some cases, cows may become seriously ill or even die due to prolonged exposure to cold temperatures. To address this issue, local farmers have developed an indigenous practice of covering cows with jute sacks during the winter months. This low-cost, locally available method helps insulate the animals against the cold and reduce the risk of disease and death during extreme weather.

This traditional measure is widely practiced in the area and contributes to the well-being and productivity of livestock during the harsh winter season.



Figure 7: Cow covered by jute sacks in winter season

3.11.1. Assessment of the knowledge

a. Attributes: This is a traditional and culturally embedded practice used to protect cattle from extreme cold during the winter season.

b. Resource needs: Jute sacks, Twine or rope, Needle (for fastening, if required)

c. Why this technology?

The primary aim of this practice is to protect cattle from the harsh effects of cold weather. Covering cows with jute sacks helps reduce cold-related illnesses and minimizes the risk of livestock mortality during winter.

d. SWOT analysis:

Strength	Weakness	Opportunity	Threat
Cost-effective and simple to apply Materials are easily available Can be implemented by anyone in the household	The measure may not fully prevent cold exposure	Farmers are generally motivated to protect their cattle Jute sacks are commonly available in rural households	If jute sacks become wet from dew or fog, they may worsen the cow's health condition

3.11.2. Improve the knowledge

Suggestions for Improvement:

- After covering the cows with jute sacks, they should be kept inside the cow shed to prevent the sacks from getting wet due to dew or fog.
- The cattle shed can be enclosed with plastic sheets to block the entry of cold winds.
- Fodder should be provided inside the shed to reduce the animals' exposure to outdoor cold.
- The shed must be cleaned daily to maintain hygiene and reduce disease risk.
- Community awareness should be raised about cold-related diseases in cattle and their prevention methods.

4. Discussion

The coastal areas of Bangladesh are frequently affected by extreme climatic events such as cyclones, storm surges, droughts, and salinity (Saha et al., 2019). This study was conducted in Dashmina Upazila under Patuakhali District in the southern coastal region of Bangladesh, where storm

surges, cyclones, riverbank erosion, floods, storm winds, high tides, pest attacks, irregular rainfall, and hailstorms occur regularly (Faisal et al., 2024). The increasing frequency and severity of these extreme climate events have caused significant economic losses and damage to agriculture (Paudel et al., 2025). The study aimed to identify, analyze, and improve the indigenous knowledge and practices related to agricultural activities among local communities. Findings revealed that farmers in the study area use indigenous knowledge to select crops by closely observing local weather patterns such as cloud formations, temperature fluctuations, and wind direction. For example, when farmers notice the absence of pre-monsoon rainfall, they choose traditional local varieties of *Aus* and *Aman* rice, which are more drought-tolerant than high-yielding but water-dependent varieties. Similar findings were reported by Islam et al. (2019), Behera (2021), and Paudel et al. (2025).

The study also found that raising the elevation of cultivable land has become an effective indigenous strategy to protect crops from high tides and tidal surges while enabling year-round vegetable cultivation. Saha et al. (2019) similarly noted that coastal farmers in Bangladesh cultivate vegetables on elevated pond banks to protect them from high tides. Local residents commonly plant various fruit-bearing trees—such as jackfruit, papaya, eggplant, bombe pepper, and custard apple—on the earthen plinths of their houses. This helps prevent waterlogging and allows the trees to survive and bear fruit throughout the year. This practice is based on the observation that these trees often die when water accumulates around their roots during the rainy season. Similar results were also reported by Barua (2023). Additionally, farmers have started cultivating water arums in low-lying areas that remain waterlogged most of the year. This shift has increased their profits compared to traditional rice farming. Many farmers have also adopted the ridge and furrow cultivation method, in which trees are planted on elevated ridges with small drainage channels (furrows) running between them. This ensures that tree roots remain above water during the rainy season, preventing root rot and plant death—an approach also noted by Saha et al. (2019).

Another innovative indigenous practice involves pruning or cutting down the branches of structurally weaker trees to reduce wind resistance and minimize the risk of collapse during cyclones or nor'westers. Based on local experience, residents typically prune trees during the late monsoon season (August–September), before the post-monsoon cyclone period. Farmers in the study area also use traditional methods for seed preservation. They store rice, pulses, vegetables, and pepper seeds in mud pitchers to protect them from air and moisture, which can cause spoilage. Saha et al. (2019) found that the use of plastic bags and glass bottles was ranked as one of the most important adaptive strategies for seed preservation among farmers, while Nnadi et al. (2013) reported similar findings in other regions. Some households have developed additional adaptation strategies for livestock management. They construct raised platforms, locally known as killa, in front of their homes to protect livestock during natural disasters such as cyclones, floods, and storm surges. They also store dry livestock feed, such as straw and grass, on raised platforms to protect it from water. Normally, livestock such as cows, buffaloes, and goats are tied inside sheds at night for safety, but during cyclones with storm surges, many residents release them to allow the animals to move to higher ground or safer locations. In winter, farmers cover their cows with jute sacks to protect them from cold stress and reduce the risk of illness or death.

Overall, the people living in the coastal areas of Bangladesh have developed numerous innovative and adaptive strategies to survive frequent natural disasters. Over time, they have created coping mechanisms that are well-suited to their environment, economy, and cultural practices. As Bangladesh is highly disaster-prone, its people have accumulated a rich body of indigenous knowledge and practices through generations of experience, enabling them to endure and recover from climatic challenges (Haque, 2018). Although much of this knowledge has been lost due to a lack of proper documentation, many communities in disaster-prone areas still preserve it through their stories, beliefs, and traditions.

5. Conclusions

People in Bangladesh, particularly those in coastal areas, are highly vulnerable to the impacts of natural disasters and climate change. Every year, they face various hazards, such as cyclones, storm surges, riverbank erosion, and monsoon floods. This study documented a range of indigenous knowledge and practices used by local communities in Dashmina Upazila, Patuakhali District, to reduce disaster risks in agriculture and livestock management. Key agricultural practices identified include: selecting crops based on weather patterns; raising land for vegetable cultivation; planting fruit trees like jackfruit and papaya on the house plinth; growing arums in lowlands; using ridge and furrow techniques for water-sensitive crops; trimming tree branches to reduce wind damage; and storing seeds in earthen pots. For livestock, the practices include: preserving animal fodder year-round; constructing raised platforms (known as killa) for livestock safety; releasing livestock from being tied during storms; and covering cows with jute sacks during cold weather. These practices are deeply rooted in local knowledge, cultural traditions, and community cooperation. They are low-cost, use locally available materials, and can be easily implemented by both men and women. Such methods are especially important for poor and vulnerable households that rely heavily on agriculture and livestock for their livelihoods. A major challenge is that this valuable indigenous knowledge often remains undocumented and confined within small communities. As a result, many effective techniques are unknown to policymakers, researchers, and practitioners. Therefore, the first step toward integrating indigenous knowledge into disaster risk reduction (DRR) strategies is proper documentation—covering its technical, social, cultural, and economic dimensions. In summary, indigenous practices offer practical, low-cost, and sustainable ways to reduce disaster risks in coastal regions. By promoting these local solutions through training, small-scale investment, and policy support, we can help rural communities become more resilient to climate change and future disasters.

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