

**Combining Traditional  
Adaptability with  
Modern Construction for  
Sustainable Housing in  
Sylhet, Bangladesh**

**Research Plan 2024-2025**

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**Global Housing Graduation  
Studio:**  
Architecture of Transition in  
the Bangladesh Delta  
AR3AD105

**LIVING  
MARKETS**

# Colophon

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Research Plan  
TU Delft | Faculty of Architecture and the Built Environment  
MSc3/4 Graduation studio (AR3AD105)  
Architecture of Transition in the Bangladesh Delta  
2024/2025

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# Background

## Keywords

Sylhet, Traditional Housing Design, Vernacular architecture, adaptability, Community-driven design, Durability, Cultural flexibility

## Context

Located around the intersection of 90°E Meridian and the Tropic Cancer i.e. approximately between 20°N and 27°N latitudes, Bangladesh has an area of 148,460 km<sup>2</sup>. Lying south of the Himalayas, it is the fertile extensive deltaic plain and its southern shores are washed by the Bay of Bengal. With around 170 million inhabitants Bangladesh is the most densely populated country in the world (Landenweb.nl, n.d.).

With about 75% of the surface of the country below sea level, Bangladesh is described as a delta or as a flat alluvial plain. Geographically speaking the land can be divided into three broad categories of physiographic regions as Tertiary Hills, the Pleistocene Uplands and the Recent Plains (Hasan, 1985).

Sylhet, a city situated in northeastern Bangladesh, located along the right bank of the Surma River. Sylhet has its own distinctive architectural and urban characteristics (Sylhet Townscape, n.d.). The region's architecture reflects its history, cultural influences, and evolving urban development. Sylhet's architectural landscape is characterized by a mix of traditional homes, colonial-era buildings, and modern constructions, each contributing to its distinct urban identity.

Traditional Sylheti homes often feature a raised mound called a 'vita'. This 'vita' holds more cultural significance than the huts themselves, symbolizing a place to live and a sense of identity (Haq, 1992). The huts are made of wood, and thatch, adapted to the region's monsoon climate and flooding risks. These dwellings emphasize natural ventilation and locally sourced materials, offering a sustainable approach to building that has been used for generations.

In recent years, Sylhet has undergone rapid urbanization, with the construction of modern residential and commercial buildings. The city's skyline now includes concrete apartment blocks and high-rise structures, reflecting the demand for housing due to population growth and the influence of the Sylheti diaspora. However, this shift towards more contemporary architecture presents challenges, such as the loss of traditional building techniques and a strain on natural resources. Traditional building techniques may not have the stylistic sophistication of formal architecture, vernacular buildings remain deeply meaningful to the communities that inhabit them, embodying the values and traditions of the region (Haq, 1992).

The integration of traditional design principles into modern architecture has become a point of interest, as architects and planners seek to balance the preservation of Sylhet's cultural identity with the need for urban development. Architecture in Sylhet is marked by a fusion of styles and an adaptation to the unique natural conditions of the region. This blend of styles can be seen in the use of local materials, the incorporation of water management features, and the design of spaces that harmonize with the region's tropical climate.

Sylhet is a region highly vulnerable to natural disasters, which pose significant challenges to its architectural development. Floods and earthquakes are the most frequent rapid-onset hazards, causing immediate and severe impacts on housing and infrastructure (Oliver, 2007).

That is why there is a growing awareness of the importance of sustainable architecture, using modern materials alongside traditional methods to create structures that are resilient, environmentally friendly, but also give the people flexibility in the form of adaptable housing designs.

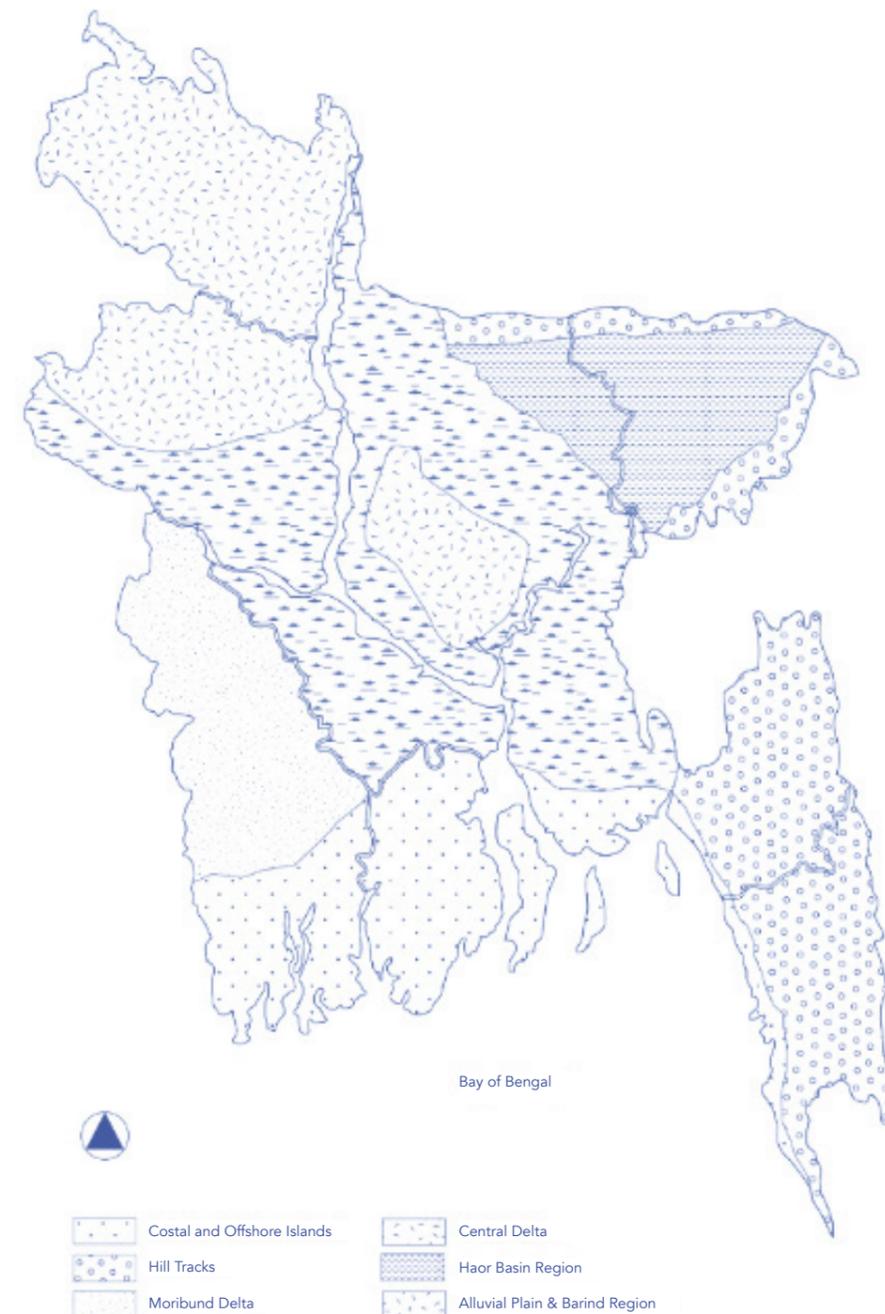


Figure 01: Physiographic regions on the basis of settlement patterns, Source: Das et al., 2021

# Literature review

## Vernacular Housing in Bangladesh: Cultural and Environmental Context

Vernacular housing in Bangladesh is deeply shaped by cultural and environmental factors, providing more than mere shelter; it embodies social values and adaptation to place. Stone defines settlement as “the distribution of buildings by which people attach themselves to the land,” emphasizing that these structures are integrated with their landscape, especially in flood-prone areas like Sylhet, where housing design reflects local interpretations of protection and communal identity (Stone, 1965). However, modern housing approaches often overlook these culturally embedded aspects, which can lead to dissonance between design intentions and local needs (Hasan, 1985).

While research highlights the socio-cultural relevance of “felt need” (user-defined needs) in rural Bangladeshi housing, contrasting it with “perceived need” (as assessed by external designers), there is limited focus on how these traditional housing forms have evolved to address environmental challenges (Hasan, 1985). Much of the literature neglects the adaptive processes of vernacular housing, which could offer valuable insights into integrating modern construction techniques with local practices in environmentally sensitive areas like Sylhet (Stone, 1965). This gap restricts the applicability of design models to specific contexts, often failing to achieve both cultural flexibility and resilience against climate stresses.

## Adaptability in Traditional Housing

Adaptability is a key feature in traditional Bangladeshi housing, where transformable spaces, modularity, and adaptable layouts contribute to both social functionality and environmental resilience (Das et al., 2021). These features support the community’s ability to adapt housing to seasonal flooding and changing family needs, embedding flexibility into the home’s lifecycle (Schnädelbach, 2010). Multifunctional spaces, for instance, allow residents to modify internal configurations as needed, a core aspect of vernacular design that enhances resilience to shifting conditions (Schneider & Till, 2005). However, despite these advantages, high upfront costs and specialized skills required for some adaptable features limit their feasibility in low-income areas (Schneider & Till, 2005).

In contrast, modern housing approaches often impose rigid structures that lack the user-driven flexibility inherent in traditional homes. This issue is compounded by limited research on how adaptable features found in Bangladeshi vernacular housing could be implemented within contemporary housing projects. The integration of these adaptive principles, found in projects by architects like Alejandro Aravena, who emphasizes partial builds that allow for resident customization, is often suggested but rarely applied in flood-prone areas of Bangladesh (Amini et al., 2019). Additional studies are needed to evaluate how these concepts could be effectively implemented within Bangladesh’s low-resource, high-density contexts, combining resilience with cultural continuity (Das et al., 2021).

## Integration of Modern Construction Techniques

Modern construction techniques, such as modular building systems and Open Building frameworks, have emerged as potential complements to traditional methods in enhancing housing adaptability. Prefabricated and modular approaches, for instance, offer rapid assembly, resilience to environmental impacts, and cost efficiency, all essential in flood-prone areas (Danko, 2013). Yet while modular construction can theoretically support adaptable layouts and rapid assembly, the literature notes that these systems often require more specialized skills and resources than are locally available, which may hinder their integration into traditional contexts (Estaji, 2017).

The Open Building framework, which separates the primary structure from adaptable internal infill, resonates with vernacular design by allowing residents to alter internal spaces without changing the main structure (Evenko & Doroginin, 2020). This approach aligns with the user-driven flexibility seen in traditional Bangladeshi homes, yet few studies address its practical application in flood-prone and resource-limited settings like Sylhet. Projects like Apto Ontario illustrate how adaptable systems could benefit low-income communities by allowing for flexible configurations over time, yet this approach has not been widely explored in Bangladesh (Danko, 2013). The limited focus on how cost-effective modular techniques and open frameworks can be adapted for local contexts leaves significant gaps in the literature, particularly concerning their cultural acceptance and alignment with traditional practices.



**Figure 02:** Traditional rural house construction with bamboo, tatch, wood and tin, *Source: Das et al., 2021*



**Figure 03:** Traditional urban houses, made of brick and plaster, *Source: Das et al., 2021*



**Figure 04:** Contemporary rural houses, made of brick and concrete, *Source: Das et al., 2021*



**Figure 05:** Use of heavy equipment in contemporary house construction, *Source: Das et al., 2021*

# Problem Statement

Bangladesh, like many countries in the Global South, faces the challenges of rapid urbanization. As people leave rural areas in search of better employment opportunities in larger cities, the demand for housing in urban centers grows significantly. This urban migration is compounded by the country's exposure to disruptive climate events and the limited availability of suitable land for development. As a result, Bangladesh experiences a progressive imbalance between its rapidly expanding population and the land available for housing, creating a situation of acute "land hunger." Few countries face such a pressing need to optimize every acre of land, making efficient use of space a critical concern (Hasan, 1985).

To meet the rising demand for housing, modern construction practices have emerged as a popular solution, offering advantages in terms of speed and affordability. These methods are particularly attractive to the government as a way to quickly address housing shortages. However, this shift towards mass-produced housing has significant consequences for one of the most important characteristics of traditional housing in Bangladesh: adaptability. Historically, traditional housing models have demonstrated a high degree of flexibility, using locally sourced materials and construction techniques that respond effectively to the region's unique environmental conditions (Das et al., 2021). These homes could be adapted over time to meet the changing needs of families and communities, making them well-suited to the dynamic environmental challenges of the region.

In contrast, current trends toward modern, multistoried residential buildings do not allow for the same level of modification or personalization (Das et al., 2021). Built to standardized plans, these structures limit the ability of residents to adapt their living spaces to evolving family needs or environmental conditions. This loss of adaptability is a growing concern, particularly in regions like Sylhet, where the population has surged from around 350,000 in the early 2000s to nearly 1 million today (MacroTrends, n.d.).

Sylhet, a rapidly growing city in northeastern Bangladesh, faces acute challenges when it comes to developing sustainable and resilient housing. The region is highly vulnerable to natural disasters such as flooding and earthquakes, which frequently threaten housing stability, leading to displacement and damage to infrastructure. These rapid-onset events place immense pressure on existing housing models, underscoring the need for structures that can withstand severe environmental conditions while remaining habitable and adaptable for the communities they serve.

The adoption of modern construction techniques, such as modular and prefabricated systems, could offer potential solutions by supporting rapid, cost-effective builds that also provide resilience against environmental impacts (Danko, 2013). However, this shift to standardized, inflexible designs poses challenges for meeting the social and cultural needs of residents, which were historically supported by the adaptability of traditional housing (Hasan, 1985). Contemporary housing solutions often fail to integrate cultural dimensions, resulting in homes that may be

less accepted by residents and less sustainable over time. The limited personalization in these structures can weaken social cohesion, which is critical for community resilience during crises.

The solution, therefore, lies in exploring ways to combine the benefits of modern construction techniques with the adaptable qualities of traditional housing. Lessons from traditional architecture emphasize the importance of flexibility and user-driven adaptability, qualities often overlooked in standardized modern housing. Although modern construction offers essential benefits for addressing urgent housing needs, techniques such as modular design and Open Building frameworks, which allow for user modifications, show promise in reconciling these approaches (Estaji, 2017). By

blending the adaptive capabilities of traditional housing with the efficiency and resilience of modern techniques, a more holistic approach can be developed, one that addresses natural disaster challenges while fostering community cohesion and cultural continuity.

This integrated approach has the potential to create housing solutions that are both resilient to environmental pressures and reflective of the social and cultural needs of local communities. It offers a path forward for Bangladesh, ensuring that new housing developments do not merely provide shelter but also contribute to the preservation of cultural identity and social stability in the face of an uncertain and changing climate.



Figure 06: Urbanization in Asia, Source: Asia Pacific Foundation of Canada, 2019

# Research Question

Continuing the focus on traditional adaptable housing, the research question gives a separation between the material durability and the spatial/cultural flexibility which those adaptable design should result in, which therefor contribute to sustainable housing solutions.

**“How can traditional adaptive housing features be combined with modern construction practices to create durable, flexible, and culturally responsive housing solutions for flood-prone areas like Sylhet?”**

The research question can be broken down into several sub questions.

- Traditional housing in Sylhet possesses unique characteristics that enable it to withstand frequent flooding and natural disasters. This sub-question examines the adaptive features of these homes, including material choices, architectural designs, and construction methods that respond effectively to seasonal changes. Understanding these features is essential for evaluating their role in enhancing the resilience and sustainability of traditional housing. This leads us to ask: **What are the key adaptive features of traditional housing models in Sylhet that make them well-suited to flood-prone environments?**

- Modern construction techniques offer innovative solutions that can enhance the resilience of traditional housing features in flood-prone regions. This sub-question investigates how contemporary materials, structural systems, and construction methods can be incorporated into traditional Sylheti housing to improve durability and efficiency while retaining its adaptive qualities. This prompts us to consider: **How can modern construction techniques be applied to enhance the material durability and resilience of traditional housing features in flood-prone regions like Sylhet?**

- The long-term sustainability of housing solutions in Sylhet is significantly influenced by the cultural and spatial flexibility of traditional housing models. This sub-question investigates how these homes accommodate changing family needs and strengthen community bonds. Understanding these social dimensions is crucial for designing new housing models that resonate with local communities while withstanding environmental pressures. This leads us to explore: **In what ways can the cultural and spatial flexibility of traditional housing models contribute to the long-term sustainability of housing solutions in Sylhet?**

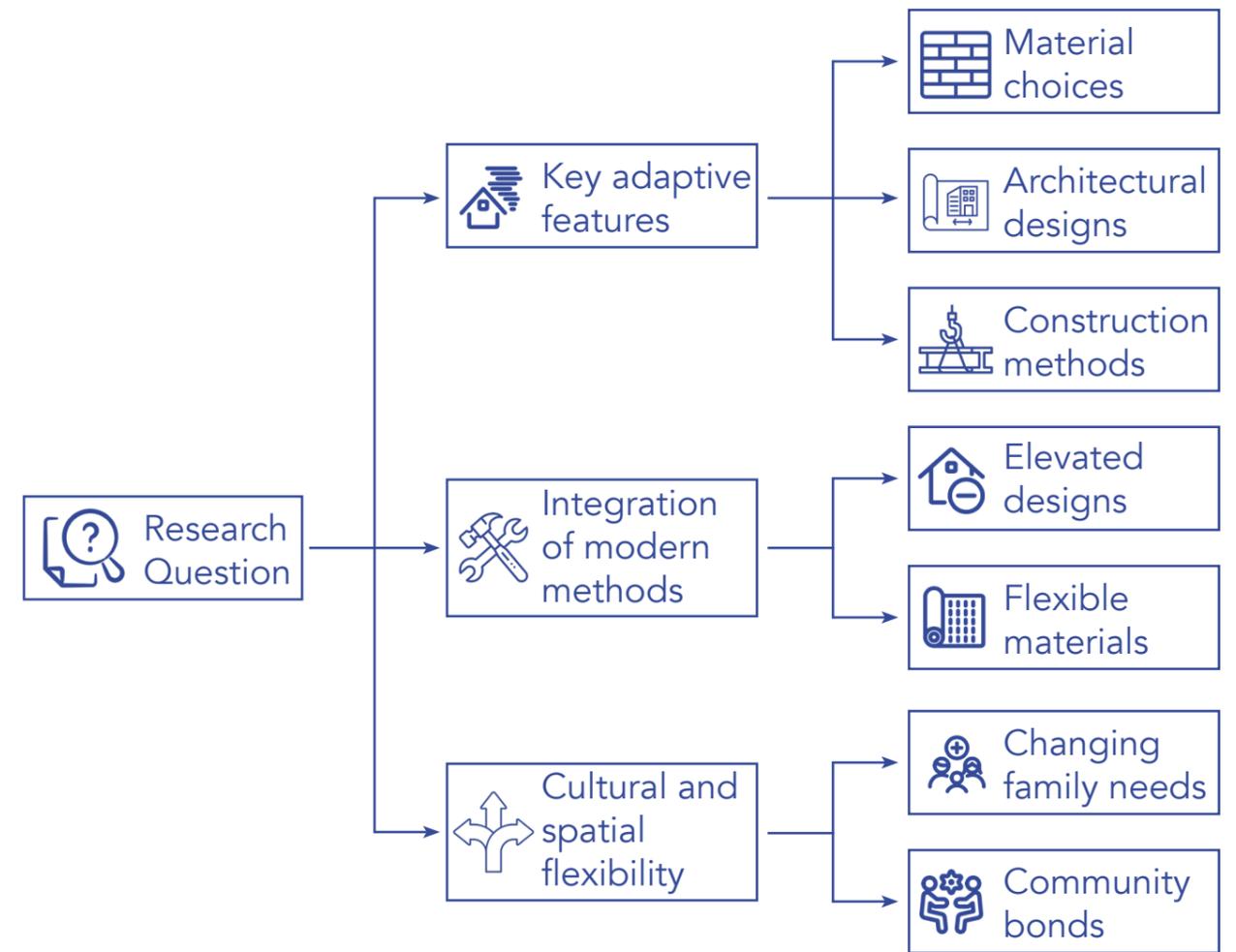


Figure 07: Research question figure, Source: Own figure

# Theoretical Framework

This theoretical framework establishes the conceptual basis for investigating how traditional adaptive housing features can merge with modern construction practices to create durable, flexible, and culturally responsive housing for flood-prone areas like Sylhet, Bangladesh. It synthesizes three primary theoretical themes: Settlement and Cultural Context, Adaptability in Architecture, and Contemporary Construction Techniques. Through these lenses, the study aims to bridge resilience, adaptability, and cultural relevance to address the needs of vulnerable regions.

## Settlement, Shelter, and Cultural Context in Bangladesh

The concept of settlement provides a foundation for understanding the cultural bases of traditional housing in Sylhet. Kirk H. Stone's definition of settlement as a spatial and cultural process emphasizes that settlements are not incidental but a direct manifestation of how people organize and anchor themselves to the land over time (Stone, 1965). This idea is particularly relevant to the first sub-question, "What are the key adaptive features of traditional housing models in Sylhet that make them well-suited to flood-prone environments?" Exploring this question requires a framework that examines cultural adaptations as essential to resilience.

The study applies cultural landscape theory, which suggests that cultural values shape the ways people interact with their environment and, by extension, their architectural choices. In Sylhet, traditional housing reflects a deep cultural engagement with the environment, embodied in elements such as elevated

structures and weather-resistant materials (Hasan, 1985). Understanding this theoretical perspective helps identify specific adaptive features critical for sustainable housing, offering insights into features that need preservation and adaptation in modern constructions (Hasan, 1985).

## Adaptability as a Key to Sustainable Housing

Adaptability is crucial to sustainable architectural practices, particularly in regions exposed to environmental hazards like Sylhet. This framework draws on resilience theory to explore adaptability as an essential trait that allows structures to respond dynamically to changing environmental, social, and functional needs (Das et al., 2021). Addressing the second sub-question, "How can the principles of traditional housing be integrated with modern construction practices to enhance material durability in flood-prone regions?" the study examines traditional Sylheti homes as inherently adaptable structures designed with locally-sourced, flexible materials (Das et al., 2021). Resilience theory highlights the need for housing to maintain functionality amidst disruptions, which is a critical quality for flood-prone areas.

Further, adaptable architecture theory underscores how flexible design elements, such as modularity and transformable surfaces, can improve long-term sustainability by enabling gradual modifications and repairs. This theory aligns with the goals of blending traditional adaptability with modern techniques, providing a conceptual basis for hybrid models that emphasize resilience and material durability (Schnädelbach, 2010;

Scheinder & Till, 2005). Modern modular construction and prefabricated systems add an additional layer of adaptability, allowing faster assembly, cost-effectiveness, and design flexibility that can complement traditional adaptive features. By using modularity and prefabricated components, these systems offer a framework for modern housing that can align with Sylhet's needs, adding resilience while supporting cultural adaptability (Danko, 2013; Estaji, 2017).

## Use of Modern Construction Techniques and Materials

The third theme of modern construction techniques and materials informs the sub-question, "In what ways can the cultural and spatial flexibility of traditional housing models contribute to the long-term sustainability of housing solutions in Sylhet?" In response to this question, the framework integrates user-centered design theory, which emphasizes the importance of creating spaces that can adapt to the shifting needs of residents over time. This is particularly relevant in Sylhet, where traditional homes exhibit what scholars describe as a "soft use" of space, accommodating changes in family size and structure without the need for significant remodeling (Till & Schneider, 2005).

Incorporating participatory design and flexible design principles, as exemplified by architects like Alejandro Aravena, who involved users in shaping adaptable housing through participatory approaches (Evenko & Doroginin, 2020), offers a pathway for enhancing cultural relevance and user involvement in housing solutions. These theories guide the study's exploration of how modern architectural practices can integrate cultural adaptability—through elements like movable walls, modular components, and Open Building frameworks (Estaji, 2017). Open Building principles allow separation of the core structure from flexible internal spaces, supporting residents' customization of living spaces without compromising durability (Danko, 2013). Such frameworks provide Sylheti residents with adaptable housing while incorporating the speed and efficiency of modern methods,

meeting both environmental and cultural requirements.

## Synthesis of Theories for a Holistic Approach

The overarching research question, "How can traditional adaptive housing features be combined with modern construction practices to create durable, flexible, and culturally responsive housing solutions for flood-prone areas like Sylhet?" requires a comprehensive synthesis of these theories. By combining the cultural landscape theory with principles of resilience, adaptable architecture, and user-centered design, the study seeks to develop a cohesive framework that accommodates both immediate and long-term needs of flood-prone communities. This holistic approach aims to bridge cultural practices with structural innovations to create a model for housing that aligns with both environmental resilience and cultural sustainability.

## Intended Output

The theoretical framework will inform a set of design principles that merge traditional adaptability with modern construction durability. These principles will serve as a foundation for a prototype that demonstrates practical applications of the framework, offering a model adaptable to other flood-prone regions and balancing environmental resilience with cultural continuity.

# (Design) Hypothesis

Integrating modern construction techniques, such as modular and prefabricated systems, with the culturally and environmentally adaptive features of traditional Bangladeshi housing can create a sustainable housing model that is both durable and resilient in flood-prone areas like Sylhet. By embedding user-centered adaptability into modern structural designs, this hybrid model will not only improve material durability and rapid assembly but also enable cultural continuity through customizable, resident-driven spaces.

It is expected that this integration will yield housing solutions that meet the rapid urbanization demands while fostering community resilience, as these adaptable structures will enhance social cohesion and environmental responsiveness. Such a model will be more accepted by local communities and will support long-term sustainability, as residents can modify their spaces to suit changing family needs and environmental conditions, unlike rigid, standardized modern housing alone.

This hypothesis will be verified through the development of a design proposal that demonstrates how these traditional adaptive features can be effectively integrated with modern construction techniques. The design will serve as a practical example, offering a blueprint for creating housing that is both resilient to environmental challenges and adaptable to community needs, thereby validating the potential of this approach in real-world applications.



**Figure 08:** Prefabricated vernacular house in Bangladesh, Source: Asif Salman Photography, 2023

# Goal/Aim

The primary aim of this research is to enhance living conditions in flood-prone areas such as Sylhet, Bangladesh, by developing a housing design approach that combines modern construction techniques with the adaptive, culturally resonant features of traditional Sylheti architecture. This study intends to create resilient and sustainable housing solutions capable of withstanding the environmental challenges of the region, including frequent flooding and earthquakes, while supporting the social and cultural needs of the communities they serve.

## Identifying Adaptive Features in Traditional Housing Models

The goal of the first subquestion is to identify specific adaptive features within traditional Sylheti housing that contribute to resilience against natural disasters. This includes examining design elements such as elevated structures and the use of locally sourced materials, which have proven effective in responding to environmental stresses. By understanding these elements, the research seeks to establish a foundation of culturally embedded adaptive strategies that can inform resilient housing designs. This insight will allow for a detailed understanding of how traditional architectural practices achieve sustainability and can offer guidance for integration with modern techniques.

## Enhancing Material Durability through Modern Construction Techniques

The second subquestion focuses on exploring how contemporary construction techniques, such as modular and prefabricated systems,

can be integrated with traditional adaptive features to improve material durability and efficiency in flood-prone regions. The goal here is to evaluate the potential of modern methods to provide structural strength and rapid, cost-effective assembly, while retaining the inherent adaptability of vernacular architecture. This research aims to bridge the gap between modern and traditional approaches, assessing how new techniques can enhance durability without compromising cultural values or the flexibility required for local adaptation.

## Sustaining Cultural and Spatial Flexibility for Long-Term Viability

The third subquestion investigates how the spatial and cultural flexibility found in traditional Sylheti housing contributes to long-term sustainability. This part of the study aims to understand how adaptable layouts and user-centered design principles can foster a sense of community, accommodate changing family needs, and strengthen resilience. By examining these social and spatial dynamics, the research seeks to demonstrate how modern housing can maintain cultural continuity, thereby supporting community cohesion and reinforcing resilience against environmental challenges.

## Overall Aim of the Research

The ultimate aim of this research is to develop a comprehensive, hybrid housing model that harmonizes the adaptability and cultural relevance of traditional Sylheti architecture with the durability and efficiency of modern construction techniques. Through this integrated approach, the research aspires to create a prototype design that showcases practical applications of these principles, offering a scalable solution for sustainable, resilient housing in disaster-prone areas.

Additionally, this study will serve as a valuable resource, a “toolbox” of adaptable design principles, construction techniques, and material strategies, for architects, designers, and urban planners working in similar contexts. By offering insights and practical strategies that respect both cultural identity and environmental demands, this research aims to promote housing solutions that are not only resilient and economically feasible but also culturally meaningful and supportive of community resilience. The guidance provided by this study will extend beyond Bangladesh, potentially benefiting other regions facing similar environmental and socio-cultural challenges.



Figure 09: Resilient housing design in Bangladesh, Source: Novenario, 2024

# Methodology



## Literature Review

The literature review will focus on analyzing existing research on vernacular architecture in flood-prone regions, specifically traditional adaptive housing in Bangladesh. This review will examine the cultural and environmental aspects that inform housing design, resilience strategies used in traditional housing, and modern construction techniques, such as prefabrication and modular systems, that could complement these traditional designs. Sources will include academic articles, architectural case studies, and construction reports to ensure a comprehensive understanding of both traditional and modern approaches.

## Expected Output

The literature review is expected to provide a foundation of adaptive design principles and resilient features unique to traditional housing in Sylhet. Additionally, it will yield insights into how modern construction methods can enhance durability without sacrificing cultural relevance, forming a theoretical basis for practical integration of traditional and modern approaches in housing.

## Subquestions Addressed

- "What are the key adaptive features of traditional housing models in Sylhet that make them well-suited to flood-prone environments?"
- "How can modern construction techniques be applied to enhance the material durability and resilience of traditional housing features in flood-prone regions like Sylhet?"



## Case Study Analysis

The research will analyze case studies of both traditional and hybrid housing projects that demonstrate resilience in flood-prone regions. These case studies will include successful examples from Bangladesh and other comparable contexts where adaptive, hybrid designs are applied. Each case study will be examined for materials used, structural configurations, adaptability features, and environmental performance, with a focus on transferable insights for housing in Sylhet.

## Expected Output

Case study analysis will provide specific examples of successful integration between traditional adaptive features and modern construction techniques. This analysis is expected to inform a framework for hybrid housing that balances cultural adaptability and structural durability in the context of Sylhet.

## Subquestions Addressed

- "What are the key adaptive features of traditional housing models in Sylhet that make them well-suited to flood-prone environments?"
- "How can modern construction techniques be applied to enhance the material durability and resilience of traditional housing features in flood-prone regions like Sylhet?"



## Field Observation

Field observations will be conducted in selected flood-prone areas of Sylhet. Observations will focus on documenting traditional housing features, including structural design, use of materials, elevation techniques, and any evident adaptability to environmental changes. Additional observations will be made of social spaces and housing layouts to understand how traditional homes accommodate evolving family needs and community interactions.

## Expected Output

Field observations are expected to yield a detailed documentation of traditional Sylheti housing features, including adaptive construction methods and spatial arrangements. This data will serve as a practical basis for identifying which features should be preserved or adapted within modern construction practices to support both environmental resilience and social adaptability.

## Subquestions Addressed

- "What are the key adaptive features of traditional housing models in Sylhet that make them well-suited to flood-prone environments?"
- "In what ways can the cultural and spatial flexibility of traditional housing models contribute to the long-term sustainability of housing solutions in Sylhet?"



## Interviews with Local Residents and Experts

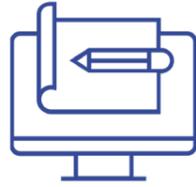
Semi-structured interviews will be conducted with local residents, architects, and policymakers to gather insights on housing needs, cultural preferences, and the community's experiences with traditional and modern housing. Questions for residents will focus on adaptive practices and cultural aspects, while discussions with architects and policymakers will address feasibility, potential constraints, and innovative approaches for hybrid designs.

## Expected Output

The interviews are expected to provide qualitative data on community housing preferences, cultural priorities, and perceptions of adaptability in housing. Insights from experts will help refine the practical aspects of integrating traditional elements with modern techniques, ensuring that proposed solutions are both feasible and acceptable to the local population.

## Subquestions Addressed

- "What are the key adaptive features of traditional housing models in Sylhet that make them well-suited to flood-prone environments?"
- "How can modern construction techniques be applied to enhance the material durability and resilience of traditional housing features in flood-prone regions like Sylhet?"
- "In what ways can the cultural and spatial flexibility of traditional housing models contribute to the long-term sustainability of housing solutions in Sylhet?"



### Prototype Design

Based on findings from the literature review, case studies, field observations, and interviews, a prototype design will be developed. This prototype will incorporate adaptive elements from traditional Sylheti housing, such as elevated foundations and adaptable layouts, with modern construction techniques like modular components. The prototype will be designed digitally or as a physical model, followed by resilience testing using simulation software for flood and structural durability.

### Expected Output

The prototype design will serve as a tangible model that demonstrates the feasibility of integrating traditional adaptability with modern construction durability. It will validate research findings and offer a blueprint for culturally relevant, resilient housing solutions suitable for Sylhet and similar flood-prone areas.

### Subquestions Addressed

- "How can modern construction techniques be applied to enhance the material durability and resilience of traditional housing features in flood-prone regions like Sylhet?"
- "In what ways can the cultural and spatial flexibility of traditional housing models contribute to the long-term sustainability of housing solutions in Sylhet?"

### Problem statement

Bangladesh's rapid urbanization and frequent natural disasters create an urgent need for resilient housing, especially in Sylhet. Modern construction can quickly meet housing demands but often lacks the adaptability and cultural fit of traditional Sylheti homes, which are responsive to local conditions. This research aims to combine the flexibility of traditional housing with the durability of modern techniques, developing sustainable solutions that support community resilience and cultural continuity.

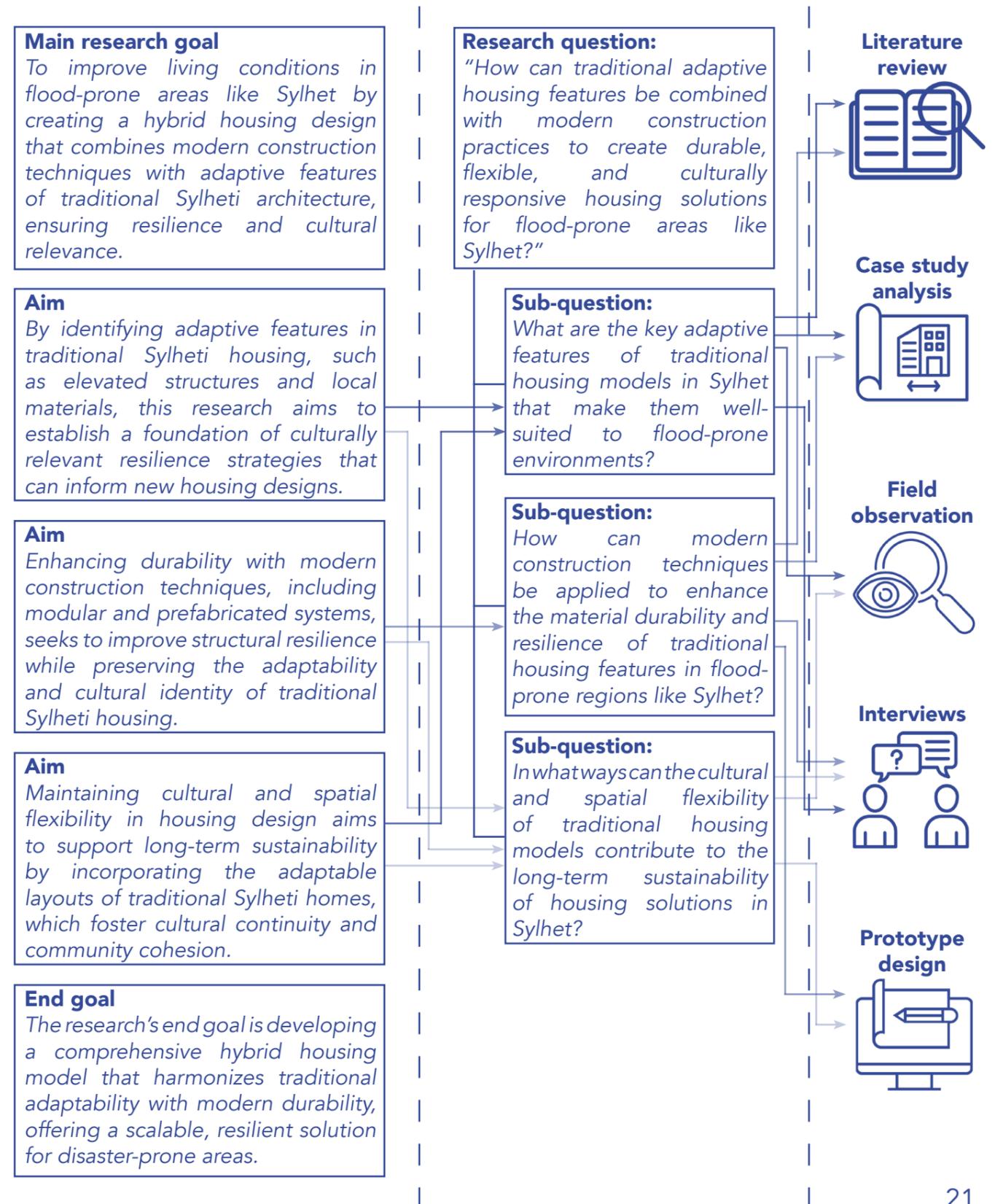


Figure 10: Research scheme, Source: Own figure

# Relevance

The relevance of this research lies in addressing a critical challenge faced by flood-prone regions like Sylhet: the need to develop housing solutions that are both resilient to natural disasters and culturally aligned with the communities they serve. In a region where frequent flooding and other climate-related events threaten housing stability, traditional Sylheti homes have historically provided a model of adaptive design. These homes incorporate locally available materials, elevated structures, and flexible spatial arrangements, making them well-suited to the area's unique environmental conditions. However, rapid urbanization and the shift towards modern construction practices have led to a decline in the use of these traditional methods, often resulting in housing that is less adaptable and culturally resonant (Das et al., 2021).

This research is significant because it addresses the tension between the preservation of traditional architectural practices and the adoption of modern construction methods. While contemporary building techniques offer increased durability (Schneider & Till, 2005), they often fail to accommodate the social and cultural needs of the community, leading to a disconnection between residents and their built environment. By exploring how traditional adaptive features can be combined with modern construction, this study aims to provide a pathway for creating housing solutions that not only meet the structural demands of the region's climate but also retain the cultural and social dimensions that are vital for community well-being and cohesion.

The findings of this research are particularly relevant in the context of climate change, as Sylhet and similar regions face increasingly unpredictable weather patterns and rising sea levels (Landenweb.nl, n.d.). The development of housing models that can adapt over time, rather than remaining static in the face of environmental changes, is crucial for reducing the vulnerability of communities to displacement and loss. Additionally, the research emphasizes the importance of community-driven design, where the lived experiences and cultural practices of residents are central to the development of sustainable housing solutions.

This study also has broader implications beyond Sylhet, contributing to global discussions on sustainable architecture and resilient urban development in disaster-prone regions. By focusing on a context-specific approach that combines traditional knowledge with modern innovation, the research offers insights that can inform housing policies and practices in other areas facing similar challenges, such as Southeast Asia, parts of Africa, and island nations threatened by rising sea levels. The emphasis on both material durability and social adaptability highlights a holistic approach to housing design, offering a valuable model for regions grappling with the dual pressures of rapid urbanization and climate vulnerability.

# Definitions

**Adaptability:** A means to decrease the amount of new construction (reduce), (re) activate underused or vacant building stock (reuse) and enhance disassembly/ deconstruction of components (reuse, recycle) - prolonging the useful life of buildings (reduce, reuse, recycle)

Schmidt, R. (2014). *Designing for adaptability in architecture*. <https://dspace.lboro.ac.uk/dspace-jspui/handle/2134/16211>

**Climate Resilience:** The ability to anticipate, prepare for, and respond to hazardous events, trends, or disturbances related to climate.

Tyler, S., & Moench, M. (2012). *A framework for urban climate resilience*. *Climate And Development*, 4(4), 311–326. <https://doi.org/10.1080/17565529.2012.745389>

**Contemporary Houses:** A home that embodies the architectural trends of the present day.

Andjelkovic, V. (2016). *Transformation principles in the architectural design of a contemporary house*. *Archi DOCT*, 4, 87–107. [http://www.archidoct.net/Issues/vol4\\_iss1/ArchiDoct\\_vol4\\_iss1%2006%20Transformation%20Principles%20in%20the%20Architectural%20Design%20of%20a%20Contemporary%20House%20Andjelkovic.pdf](http://www.archidoct.net/Issues/vol4_iss1/ArchiDoct_vol4_iss1%2006%20Transformation%20Principles%20in%20the%20Architectural%20Design%20of%20a%20Contemporary%20House%20Andjelkovic.pdf)

**Cultural Architecture:** The design and construction of buildings and structures that reflect the traditions, beliefs, and values of a specific culture or society.

Garg, K., & Thussu, M. (2020). *REDEFINING CULTURAL IDENTITY THROUGH ARCHITECTURE*. *Journal Of Emerging Technologies And Innovative Research*, 7(7), 1445–1457. <https://www.jetir.org/papers/JETIR2007178.pdf>

**Flexible architecture:** Buildings that are intended to respond to changing situations in their use, operation, or location.

Kronenburg, R. (2005). *Flexible Architecture: The Cultural Impact of Responsive Building*. *Open House International*, 30(2), 59–65. <https://doi.org/10.1108/ohi-02-2005-b0008>

**Settlement:** The distribution of buildings by which people attach themselves to the land.

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**Figure 02:** Das, S., Rahman, M. A., & Hossain, M. S. (2021). Change in Adaptability of Residential Architecture: Spatial Analysis on Traditional and Contemporary Houses of Bangladesh. *Journal Of Architectural Environment & Structural Engineering Research*, 4(4), 31–47. <https://doi.org/10.30564/jaeser.v4i4.3865>

**Figure 03:** Das, S., Rahman, M. A., & Hossain, M. S. (2021). Change in Adaptability of Residential Architecture: Spatial Analysis on Traditional and Contemporary Houses of Bangladesh. *Journal Of Architectural Environment & Structural Engineering Research*, 4(4), 31–47. <https://doi.org/10.30564/jaeser.v4i4.3865>

**Figure 04:** Das, S., Rahman, M. A., & Hossain, M. S. (2021). Change in Adaptability of Residential Architecture: Spatial Analysis on Traditional and Contemporary Houses of Bangladesh. *Journal Of Architectural Environment & Structural Engineering Research*, 4(4), 31–47. <https://doi.org/10.30564/jaeser.v4i4.3865>

**Figure 05:** Das, S., Rahman, M. A., & Hossain, M. S. (2021). Change in Adaptability of Residential Architecture: Spatial Analysis on Traditional and Contemporary Houses of Bangladesh. *Journal Of Architectural Environment & Structural Engineering Research*, 4(4), 31–47. <https://doi.org/10.30564/jaeser.v4i4.3865>

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**Figure 07:** Own image

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**Figure 10:** Own image