

A STUDY OF VERNACULAR ARCHITECTURE AND SETTLEMENT OF DIASPORIC ‘MANIPURI’ COMMUNITY IN BANGLADESH.

ABSTRACT

This study intends to study a distinct typology of vernacular architecture built by the Manipuri communities of Bangladesh. The Manipuris are one of the ethnic diasporic communities in Bangladesh commonly known for their diverse cultural practice, including their dance form. This research aims to reveal the cultural entity of Manipuri that has been transformed into their living environment and household architecture. Architectural elements adapted by the Manipuris are assessed here as a part of cultural symbols to have a rigorous view of the philosophy of living. This study is a documentation of Manipuri habitat culture through the intervention of their living environment, which will attract any future working on this issue. This research shows that despite a rapid socio-economic change of context, the Manipuri housing practice is deeply connected to their socio-cultural and religious values. As the authors used an observational and ethnographical approach to studying vernacular architecture for this research.

Keywords: Traditional settlement, Vernacular architecture, Manipuri Community, Sylhet.

1. INTRODUCTION

In recent decades there has been a growing interest in the study of vernacular architecture. Vernacular architecture is often called ‘building without architects’, based upon vernacular principles, localized knowledge, and material culture [1]. Vernacular architecture style develops by generations, shaped by indigenous knowledge and experiences. There is no architect involved and very little specialized labor is required, while the planning system follows the traditional pattern. Ethnic groups tend to be closely linked to their tradition, and their cultural ties are excessively expressed through vernacular architecture [2]. Eminent researchers like Amos Rapoport, Paul Oliver, Rudofsky have laid a foundation to study vernacular architecture as a socio-cultural phenomenon [3] [4] [5]. Various research works have also shown that vernacular traditional knowledge can significantly contribute to modern design practice, in terms of sustainability aspects [6] [7].

For a thousand years, Bangladesh has been home to many ethnic communities with diverse races, languages, and cultures. This ethnic diversity of place and culture has also been reflected in the different vernacular architecture of the Bengal delta. The Manipuris are one of Bangladesh's major ethnic races, who migrated in the seventeenth century from the Indian state of Manipur [8]. Over the years since migration, they maintained their integral identity through their cultural practice. Their distinct characteristics, while adapting to the local context, are remarkably reflected in their language, dressing, cultural practices, ritual practices, and architecture. As Rapoport stated, vernacular architecture is a direct expression of society and culture [3]. Therefore, Manipuri traditional architecture as a visual art reflects the cultural identity of Manipuri agrarian society. Tangible material culture has blended to intangible values of ethnicity and religious spirituality. Unfortunately, like most of the traditional houses of Bangladesh, this style is ignored and under extreme threat of extinction.

This research was a preliminary step to reveal the significances of their cultural ethnicity through architectural intervention. This research aimed to conduct methodological research on how the cultural identities of Manipuri communities have been reflected through their traditional architecture. The aim of this research was to determine the architectural, cultural, social, technological significance of vernacular households of the Manipuri community. The authors tried to explore to what extent Manipuri vernacular architecture kept their traditional style while adapting with the Bengal context. Besides, the authors also explained how this indigenous style has been addressing sustainability issues over the years.

2.MANIPURI COMMUNITY IN BANGLADESH: HISTORY AND SOCIETY

The word 'Manipuri' was originated from 'Manipur', which is a Northeastern state of India [9]. Ethnologically, Manipuris are the *Kuki-chin* group of Mongolian race with Aryan mixture [9]. Most of the Manipuris are belong to the '*Meitei*' community, the largest ethnic group of Manipur. However, the term Manipuri is also used to refer to the '*Bishnupriya Manipuri*' community, which is a group of Indo-Aryan people living in Manipur and neighboring states [10] The Bangladeshi Manipuris are diaspora communities migrated from Manipur (Fig .1). Historically, Manipuri migration in Bangladesh is associated with the famous Manipur-Burmese war in the seventeenth century when thousands of Manipuris had to flee and settled into Assam, Cachar, and Bangladesh [11]. However, many references suggest that Manipur

was in good contact with Bengal since the 13th century [8]. Hindu missionaries often visited Manipur to preach Hinduism philosophy in this region. During the 16th century,

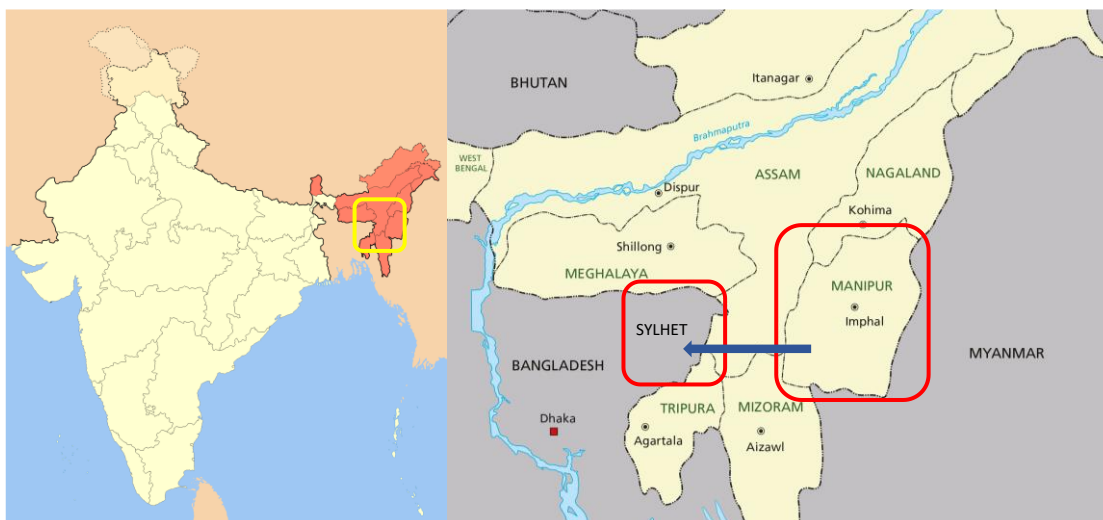


Figure 1 Location of Manipur (India) and Sylhet (Bangladesh) region.

King *Garib Nawaj* declared Hinduism as a state religion by replacing the old Meitei religion, and large no inhabitants were converted [12]. Later the *Chaitanya School Gaudiya Vaishnavism* got immense popularity among Manipuris [13]. The ideology of *Gaudiya Vaishnavism* made a major impact on the development of Manipuri culture by integrating traditional elements of Manipuri into Bengali practice. The Manipuris are descendants of richly varied cultures and customs. Highly inspired by the philosophy of Vaishnavism, art forms and performances show a distinctive expression of their socio-religious life. The Manipuris are probably best known for their distinctive dance style, with a vibrant heritage of martial art, poetry, literature, and theater. The Manipuri Rasa dance, performed at the *Rasalila* festival, is incredibly graceful with its elegance and everlasting beauty. This is one of the major classical dance forms of India.

Most of the Manipuri settlements in Bangladesh are scattered in greater Sylhet. According to Sheram (1996), around fifty thousands of Manipuri people are living in Bangladesh. Most of the Manipuri population is living in rural areas to take agriculture as a primary source of livelihood. Besides, several families are involved with handloom production. Usually, the Manipuris prefer to live together in their territory by making a small neighborhood with 10-20 families [12]. Nearly every neighborhood includes a temple with a large Mandapa, an identifying characteristic of a Manipuri village. The people of Manipuri possess strong traditional knowledge of medicinal plants which can be used for various purposes [14]. They

have a distinct style of building construction methods that they have been practicing for years. The Manipuris are strongly bonded by *kinship*, which regulates their social, spiritual, and family life. Still, a joint family is preferred to a nuclear one. Female members equally take part in both household work and economic activities with males [12]. Over the years, one of the major problems of Manipuri people face is the loss of local character by the infiltration of the non-indigenous culture. Ignorance of traditional knowledge and lack of faith in *kinship* is another reason that is leading the young generation unaware of their tradition and cultural heritage.

3. RESEARCH METHOD

The authors adopted a qualitative and observational research method to study vernacular settlements of the Manipuri community. Not only building elements were observed, but their function as an integral part of the society was analyzed. The inhabitants were studied within the spatial settings, how they were communicating with the spatial settings, how spaces influenced the functional behavior of the community. This research was based on a brief visit in study areas with an extensive survey intervention. Two types of survey techniques were employed, physical measured survey, and semi-structured interviews. Through the survey, two types of relevant information were collected, physical characteristics of dwellings and perception of dwellers. The visual observation data were then used together with the survey data to get the holistic scenario of the settlements. Environmental settings, physical properties, spatial behavior, cultural expression were collected and documented with sketches, drawings, photographs, and texts. So the research method followed the following stages:

i. Documentary research:

First, a set of documents was collected including books, drawings, photographs of the Manipuri community. Limited literary documents are available on Manipuri communities in Bangladesh, mostly related to socio-economic and demographic surveys. A few book chapters included information on the Manipuri housing style [8].

ii. Selection of the study area:

Most of the Manipuri population lives in rural areas. Hence, the authors selected four study sites located in rural countryside which are densely populated with the Manipuri population. The survey was placed in *Vanugach, Konagaon, Shongaon, Dhantila* villages in *Maulvibazar* and *Sunamganj* district. Over 40 structures were visually assessed and photographed. Around 20 inhabitants were interviewed during the survey.

iii. Physical Survey of site and structures:

Site survey and documentation of structures were carried out by a team consisting of the authors and students of architecture. A settlement map was collected from Google earth technology. Individual structures were first visually observed and hand-sketched. Later, major structures were surveyed with hand measuring tools. A good number of photographs were taken during the survey to document architectural details, spaces, activities, landscape elements, infrastructures.

iv. User perception Investigation:

Linda Groat [15] stated that users' participation in the context should be the major source of information. In this research, user perception was collected through a semi-structured questionnaire. This questionnaire included settlement history, occupational information, issues of ownership, use pattern, climatic comfort, religious practice, sociological aspects, and other issues related to the living environment. The collected data from the survey were accumulated to have a brief understanding of the prevailing context on which condition this housing style emerged.

4. RESULT: ANALYSIS OF MANIPURI SETTLEMENT AND ARCHITECTURE SETTLEMENT PLANNING SYSTEM

The survey results show that Bangladeshi Manipuris prefer to live in small clans comprise 10-20 houses. Almost all the settlements are built on flat terrain, avoiding any contoured or hilly surface. Distribution of houses, open spaces, vegetation are not dispersed, rather deliberately planned (Fig. 2). Tiny villages, locally known as *Para*, follow a similar set of spatial patterns and zoning systems. Most of the *Paras* that the authors surveyed have a near-shaped master plan, connected parallel to the main service road. In most instances, a narrow strip of the

household farmland makes a buffer between the road and the *Para* (Fig. 2). Houses are placed side by side by facing a common cardinal direction. Inside the settlement, a linear courtyard connects every individual household of the community [16]. This linear outdoor space gives a unique character to Manipuri *Para*, as this is not very usual in common villages. This linear space functions as a community space and gives a sense of territory inside the community. Besides, this narrow space functions as a buffer between public functions, services, and private residences (Fig. 3). Overall zoning principle of a Manipuri *Para* shows a logical connection of different functional spaces, where individual households are tied up with community functions. A socio-spatial hierarchy is visible from household scale to community scale.

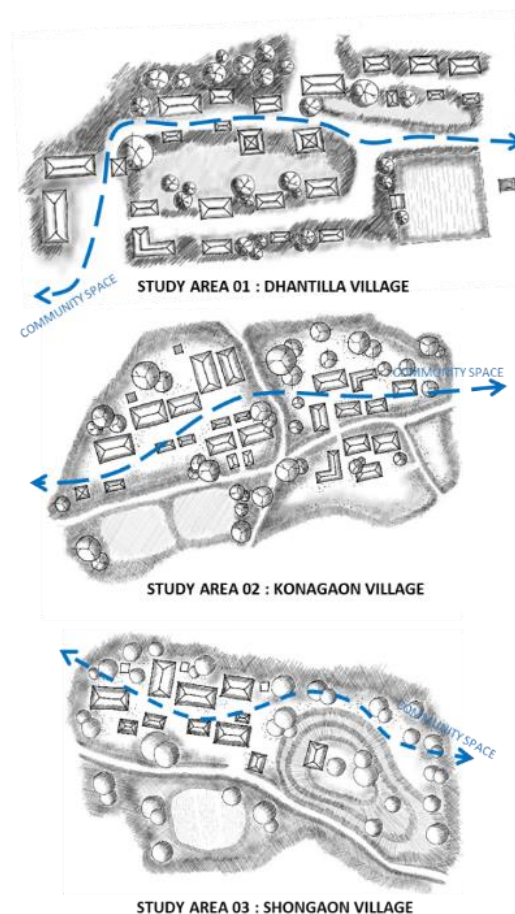


Figure 2 Spatial formation of Manipuri Villages (By authors)

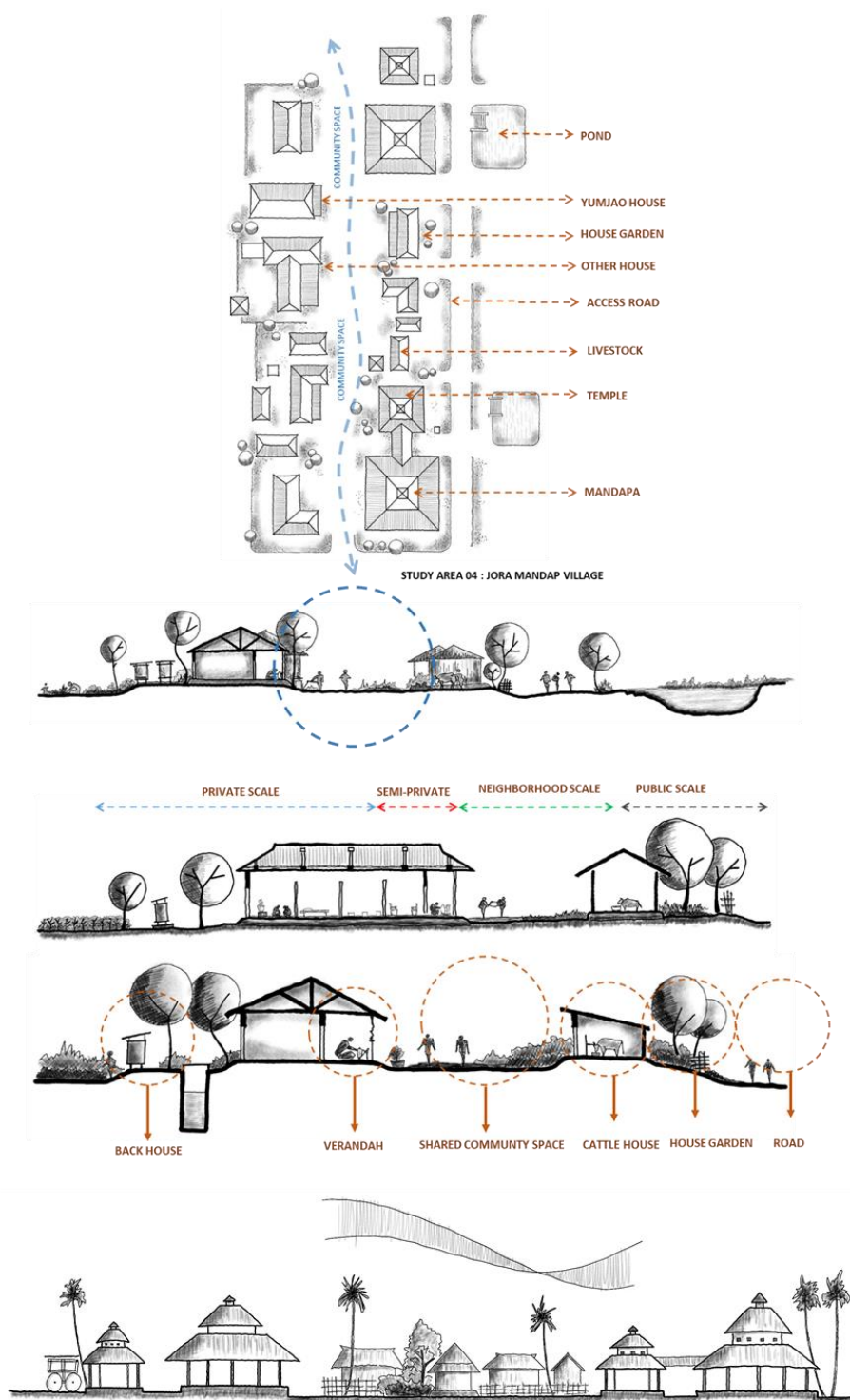


Figure 3 Elements of a Manipuri Settlement (By authors)

4.1 TRADITIONAL HOUSE FORM: THE YUMJAO HOUSES

As a diaspora community, migrant Manipuris introduced a variety of cultural elements to the Bengal context [8]. The *Yumjao* houses are a distinct typology of Manipur traditional housing, which was introduced by migrated communities (Fig. 4). Authors have discovered several traditional *Yumjao* houses in survey areas. Given the fact that, over the years, housing technology and material culture have changed. However, Manipuris are still adopting the basic principle of *Yumjao* houses. Thus, the *Yumjao* houses have become a symbol of the ethnic identity and cultural heritage of Bangladeshi Manipuri communities.

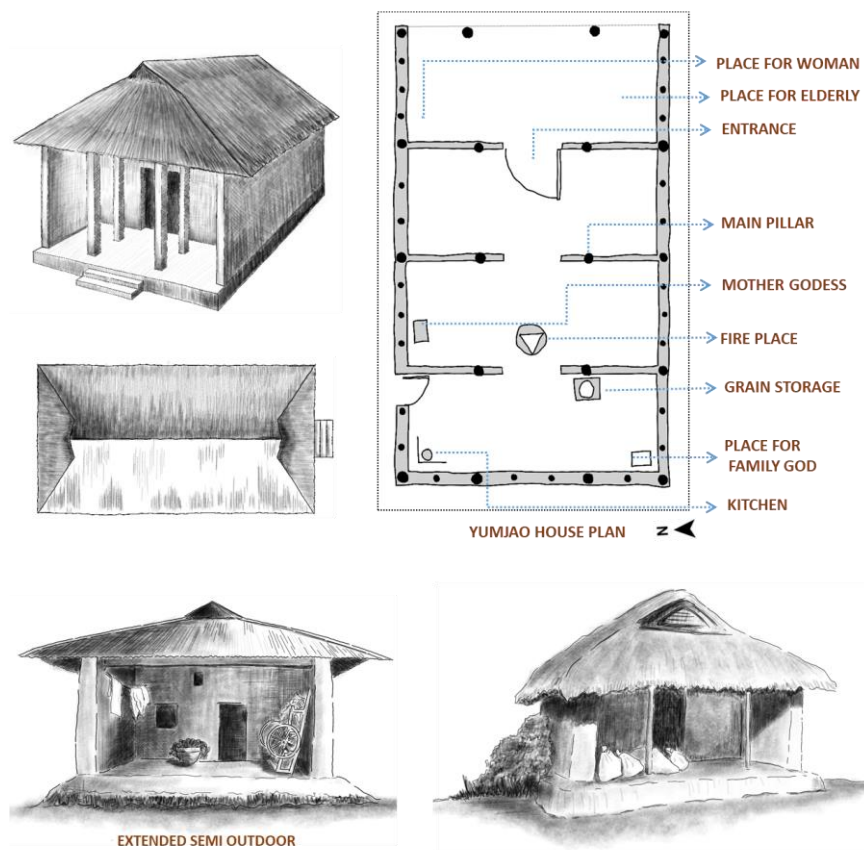


Figure 4 Traditional Manipuri Yumjao House form

The *Yumjao* is a single form unit with a traditional gable end roof on top. The rectangular plan is enclosed by four walls and built on the center of the plot known as *Yumpham* [17]. These houses strictly follow the eastward cardinal direction. This means the entry is always designed on the east side with a wide semi-outdoor space. House forms are elongated to the east-west direction. According to Meitei custom, a person should face the east side to pray and take a

bow towards the morning sun [17]. Houses are designed so they get morning sun in their house and show respect. The house plan is usually divided into four equal parts. The entry part is a semi-outdoor space with *Mangon* (verandah). The *Mangon* is a spacious place to accommodate multiple functions. This is a sitting place for both family members and guests. The *Mangon* also serves as temporary storage of harvested grains. Many families keep their handloom *Iyongkham* in a side of their *Mangon* (semi outdoor). The authors interpret that the Manipuri *Mangon* is a substitute for a typical square courtyard commonly found. Therefore, spacious *Mangon* functions as a shaded multifunctional courtyard.

As internal planning, the *Yumjao* houses contain a single large space inside the house. This space is divided by a fence to create rooms for different functions and maintaining privacy. A narrow corridor connects all the rooms. So the rooms are not entirely physically separated. Traditionally the *Yumjao* houses have specific guidelines to arrange internal spaces. For example, every room dedicated to individual family members is called the father's room, mother's room. The position of the bed in the bedroom should be on the northern Side. The center part of the house is used as family dining. A small fireplace called *Phunga* is placed right in the center of the house. The *Chakhumka* (Kitchen) and the *Sanamahi* (place for family god) are in the corner rooms. Sometimes, the kitchen is separate from the original house [17]. Livestock is kept in a separate place. A storehouse outside the main house is used to store seasonal grains.

4.2 NON-TRADITIONAL HOUSE FORMS

Besides *Yumjao* houses, the authors identified several typologies of residential houses built by rural Manipuris. These houses are highly influenced by typical housing styles widely practiced in the Bengal context. There is no doubt that, with time, these alternative styles have become more popular and mainstream practice. Based on formal patterns, these houses are could be classified into 3 types: I-shaped, L-shaped, and U-shaped houses (Fig. 5). These houses are planned in such a way that they solve the functional problems associated with *Yumjao* houses. For example, linear circulation was replaced with central circulation from semi-outdoor space. These changes ensure better privacy and circulation. Besides, most of the house plans have

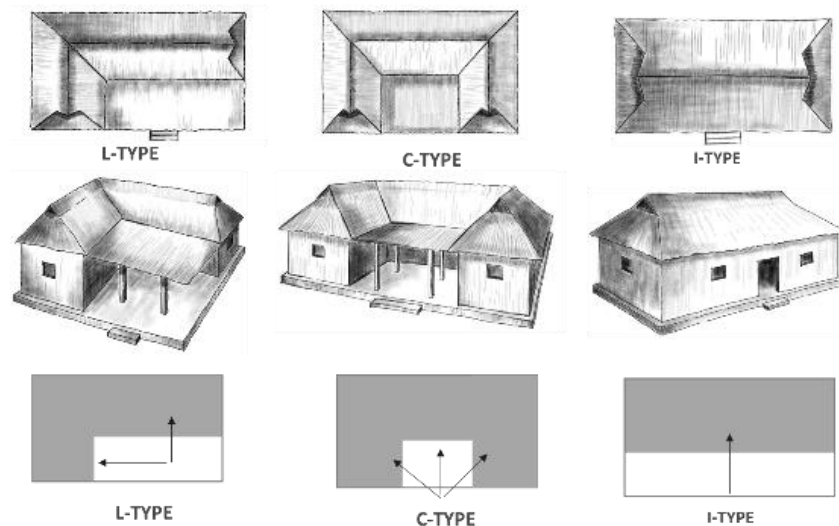


Figure 5 Alternative house forms.(By authors)

attached the kitchen and toilet. Alternative forms are north-south, elongated with the entry on the east side. Still, almost every house has a small semi-outdoor verandah. Most of these alternative forms have pitched roofs on top. However, few buildings have RCC flat roof.

4.3 RELIGIOUS HOUSE FORMS: THE MANDAPA AND TEMPLE

Mandapa is the most iconic element of a Manipuri settlement, which gives a unique cultural identity to the community (Fig.6). Historically, the Mandapa is an essential part of Hindu temple architecture. This is a pillared pavilion hall to accommodate ritual performances or

dances [18] The Mandapa culture prevails in Manipur from the ancient ages, used to perform *Nata Kirtana* ritual. The Mandapa is square-shaped, with pillars holding a traditional *Chala* type pitch roof. Pillars are made out of bricks, wood, or bamboo. The roof is often made with reeds or metal sheets. The central part of Mandapa is *Mandali* where worshipping deity and offerings are placed during the festival [19]. The *Nata Kirtnan* performance is placed in this area. The floor is flat and usually made of mud. The authors have identified two types of Mandapa: 8 pillars pavilion and 12 pillars type. The 8 pillars Mandapa is a simple commonly seen in most of the social and ritual performances. However, 12 pillar pavilions are a special one to accommodate *Rasa Lila* (ritual) and *Nata Kirtana* (spiritual dance).

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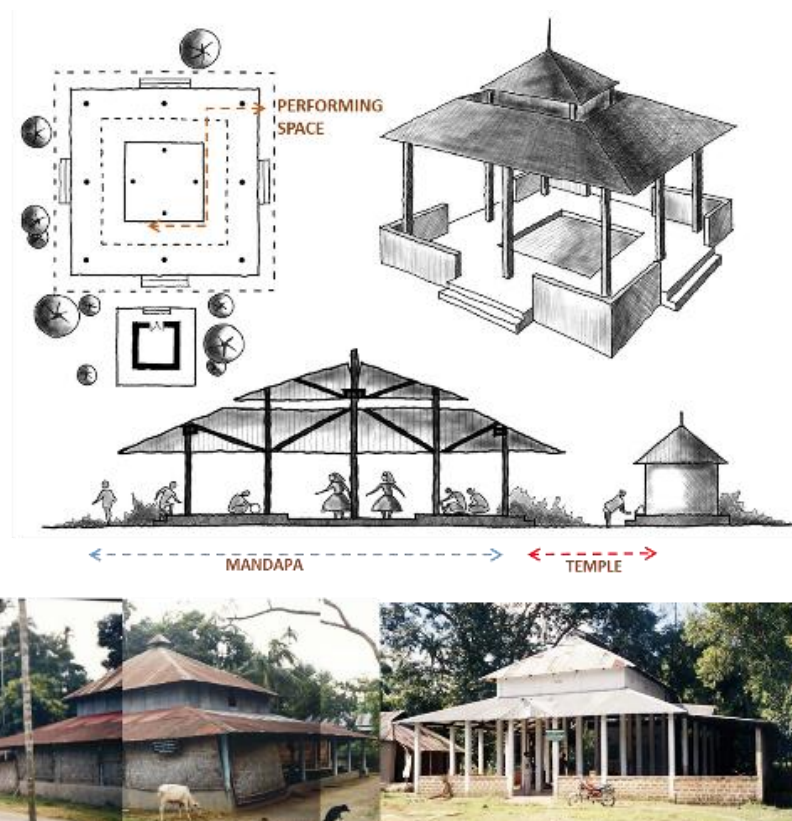


Figure 6 Mandapa in a Manipuri village. (By authors)

Mandapa is used as the religious and cultural festival venue as well as the venue for all community gatherings like weddings, rice ceremony and thread ceremonies [19]. Besides, Mandapa is often used for schoolings like dancing and singing training. The Manipuri temples are much smaller shaped compared to Mandapa. Temples are built south facing and to the Northern side of Mandapa. This contains a square chamber and an ambulatory semi-outdoor surrounding the chamber [16]. The deity of God *Radha-Krishna* is placed inside the chamber.

4.4 CONSTRUCTION TECHNOLOGY MATERIAL CULTURE

For the last 500 years, Manipuris have developed their method of building construction known as *Yumsharol* [17]. *Yumsharol* is a written manuscript describing traditional housing techniques and planning principles. The houses are made by local inhabitants, the owner often uses skilled artisans to assist the construction process. Traditional Manipuri architecture is lightweight and made from easily available materials (Fig 7). Structurally, Manipuri houses follow the



Figure 7 Changing material culture of Manipuri houses over time. (By authors)

principles of post-lintel techniques. The weight of the elongated roof is carried by purlins and rafters made of bamboo, and the bamboo frame is covered by straw. In *Yumjao* house, thick parallel mud walls and bamboo pillars carry the load of the structure. The major construction material is bamboo, straw, mud, and straw. The foundation is made of mud. For wall construction, they use bamboo, mud, cow dung, and rice skin. The wall making process includes stages like building the bamboo wall, covering the bamboo wall with a paste made by mixing mud, cow dung, and rice skin [20] Once it is dried, the walls are painted white color. A hemp type plant *Khakap* is often widely used as a fiber. However, over the years, traditional building construction techniques have been replaced by modern materials. A change in material culture is visible in modern houses. The mud walls have been replaced with brick walls, bamboo posts with narrow concrete columns. Metallic sheets or Tins are commonly used as a roof. Brick, cement, sand have emerged as new building materials.

4.5 CLIMATIC RESPONSIVENESS

Manipuri vernacular houses give due respect to passive and natural environment control measures in buildings. Construction techniques and material culture show a suitable response to the microclimate of the Sylhet region. Sylhet region is classified as a tropical climatic zone with significant rainfall for most of the months in years [21]. A short dry season has little effect on micro-climate. In response to extensive rainfall, compact house plans and sloped roofs are very common in almost every prevailing vernacular architecture in this region. With no exception, Manipuri houses are featured with compact plans and large sloped roofs covering the entire form. The roofs are extended in a way that it can cover most of the exposed mud wall surface. This extension protects the outer surface both from heat and rain.

Moreover, Sylhet is vulnerable as an earth quake prone zone. Construction techniques like bamboo framing, lightweight built materials, and post lintel structural systems have helped Manipuri houses to get subsequent seismic resilience. The parallel thick walls in *Yumjao* house provide excellent support to uphold a heavy elongated roof. For adequate ventilation, windows are set in a way that they get enough wind flow. A triangular-shaped bamboo *Jali* is used for ventilation in the gable ends. This technique allows hot air to circulate outside. For natural lighting, most of the houses are properly oriented to receive enough sunlight.

The Manipuri *Mangon* (large verandah) is an excellent example of vernacular climatic design. The *Mangon* is commonly used for temporary storage and drying of harvested grains. The extra depth of the semi-outdoor provides enough room for storage. Hence, the roof height is extended in a way that it allows enough sunlight to enter. The deeper shade verandah also gives enough barrier against driving rain. Walls are a good example of passive thermal design. Walls are made of bamboo strips and *Khakap* (dried reed plant), with mud plastering on the surface [16]. This trio work as a good insulator against heat. However, old *Yumjao* houses have few climatic problems. Internal rooms do not have cross ventilation for the linear planning system. The thick mud walls prohibit natural adequate lights inside rooms. The authors have found several cases where untreated mud wall and floor caused dampness with no proper maintenance.

4.6 VEGETATION, GREEN AREAS AND WATER SOURCES

Historically The Manipuri society has been developed in the rural context. In Bangladesh, major of the Manipuri population is living in rural or suburban areas [12]. In most of the cases, the Manipuris like to build a settlement near a source of natural water, preferably a lake or river. However, in case of no adequate source of water, the Manipuris prefer to dig large community ponds. Ponds are also a key element for ritual purposes. Vegetation is an important part of Manipuri settlements. Usually, low height green fencing helps to mark individual household boundaries inside community territory. A series of planted green trees are used to define the demarcation of the community. These tree boundaries prevent soil erosion because of excessive rainfall. Almost every single family has a small piece of home garden to grow seasonal vegetables. For architectural construction, a dried reed plant is extensively used with bamboo to make walls. The Manipuris are very skilled to use various medicinal plants that they harvest from nearby forests. Besides, sacred groves or sacred woods have special religious importance in Manipuri culture [22]. They are one of the earliest examples of community conservation of nature. Most of the Manipuri Shiva temples have ancient trees, which are worshipped by the community members.

5. DISCUSSION: INTERPRETATION MANIPURI VERNACULAR PRACTICE

After survey documentation and careful investigation of survey results, the authors have identified several factors that give a unique identity to the Manipuri dwelling culture. Vernacular architecture for the Bangladeshi Manipuri community is a good example of how traditions continue to modernity and social values reflect through form and space. The authors seek to further interpret the dwelling culture of Manipuri by defining socio-cultural, socio-religious, environmental facets.

5.1 SOCIAL ASPECTS OF MANIPURI DWELLING CULTURE

The formation of classical Manipuri settlement does not follow the mainstream courtyard type pattern of Bangladeshi houses. Rather than the individual square courtyard, individual courtyards are jointly shared and form a linear pattern of common outdoor space. This

community space gives a sense of territory and clan identity. Spatial organization, distribution of functional forms shows a logical character of an agrarian society. Linear courtyard for post-harvest crop processing, cattle houses, granaries, seed storage is common elements of every settlement. The large semi-outdoor pavilion-like space in *Mandapa* represents the social inclusion of a homogenous community (Fig. 8).

Manipuri household is a good example of how family structure and values can influence internal planning. The *Yumjao* house form plan is inspired by the joint family concept where every family members have equal prohibition of space. A dedicated position for the elderly and woman is placed in the *Mangon*, semi-outdoor space. As a family sitting space, the *Mangon* also acts as a buffer between a private domain and a community domain.

One of the major facets of the Manipuris is their struggling history as a migrated community. As a diasporic community, the Manipuris very tend to maintain their originality while adopting to Bengal culture. This dual identity is also reflected in its architecture in many ways. The Bangladeshi Manipuri architecture display sign of "creolization", incorporating new cultural elements into the mix of its practices, values, and meanings [23]. Alternative home plans, square courtyards, small houses for a nuclear family, building orientation are examples of Bengal's influence on the traditional Manipuri habitat.



Figure 8 Socio-cultural spaces in Manipuri Settlement

5.2 CULTURAL ASPECTS OF MANIPURI DWELLINGS

The indigenous traditional knowledge system is a major cultural aspect that every ethnic community possesses. Over the years ethnic communities have preserved their understanding, rooted their cultural practices through cultural expressions [24]. Vernacular architecture is a repository of traditional knowledge of certain ethnic communities, where cultural values are preserved in their vernacular technology, material culture, and aesthetic expression. Over the years, The Manipuris are preserving their housing culture through a written manuscript *Yumsarol* (*yum* = house, *sha* = construct, *rol* = method) [13]. Few ethnic communities in the

world have their design manuscript in a written form. The architectural manual has great importance in terms of literature as it contains several vernacular taxonomies of building construction in the *Meitei* language.

The Mandapa holds great significance as it gives a unique cultural identity to the Manipuri community. Throughout the year, Mandapa a learning and practice ground for various performing arts like dancing, singing, community theatre (Fig 9). This is also used for community-based schooling for religious education and craft training. The Manipuri house forms are an excellent source of both tangible and intangible cultural values.



Figure 9 Religious & cultural uses of Mandapa

5.3 HOUSE FORM AS A RELIGIOUS SYMBOL

Manipuri vernacular architecture possesses significant importance from a socio-religious point of view. Here, the Vaishnavism faith of common Manipuris' has been manifested to architectural form and function. Simplicity in form design, semi-outdoor spaces with plenty of light and air, absence of unnecessary details, humanitarian scale entails a transformation of Vaishnavism spirit into form and space. The functionality of form and spaces, the true expression of materials metaphorically symbolizes the life sketch of an ideal Manipuri Vaishnava.

Moreover, in Manipuri culture, household elements are deeply connected with spiritual beliefs and mythical stories. Based on the ancient sect, every Yumjao house is occupied by God

Sanamahi [17]. So a dedicated place, preferably a corner for worshipping the family God, is an unavoidable part of the house plan. There is a custom to place a small fireplace called *Phunga* in the middle of the house to create smoke. It is believed that the fire should be preserved with husk and other material as *Imoinu*, The Goddess of wealth lives inside the burning *Phunga*. Thus, houses have become a direct expression of ritual practices and spiritual beliefs. However, modern house plans no longer include these features, but the still architectural process is a part of religious practice. For example, even now, a ritual ceremony called is arranged after constructing a new house [13]. Through this festival, the house owner through betel nuts to the fireplace of a newly constructed *Sang-kaba* house by chanting *Mantras*. Table 1 shows the summery of how social, cultural, religious aspects have influenced making Manipuri identity in their vernacular architecture practice.

Table 1 Social, cultural, religious dimension of Manipuri habitat and their implication of architecture

Aspects	Values	
	/custom/beliefs	Spatial pattern & Architectural Morphology
Social aspects	Community identity	<ul style="list-style-type: none"> • Compact formation of house forms inside community
	Family values	<ul style="list-style-type: none"> • Sense of territory defined by community spaces • Representation of the clan community
	Age & Gender	<ul style="list-style-type: none"> • Compact planning represent joint family values
	Social Identity	<ul style="list-style-type: none"> • Dedicated sitting position for elderly on the verandah
	Social interaction	<ul style="list-style-type: none"> • Dedicated Space for the woman on verandah • Room for every family member.
	Order and discipline	<ul style="list-style-type: none"> • Hierarchy of outdoor, semi outdoor, indoor spaces • Linear and central spaces

Cultural aspects	Traditional knowledge system	<ul style="list-style-type: none"> • Traditional Yumjao house form as symbol housing culture. • Emphasis on performing spaces. • Space for crafting • Agricultural elements like cattle house, granaries
	Cultural Practices	<ul style="list-style-type: none"> • Mandapa space serves as a traditional school for dancing, crafting.
	Cultural education	<ul style="list-style-type: none"> • <i>Yumsarol</i> manuscript as an accident guide for housing
	Crafts making	<ul style="list-style-type: none"> • Vernacular taxonomy of construction techniques emphasizes the richness of language culture.
Religious Symbol	Symbol	<ul style="list-style-type: none"> • Simplicity & spirituality of space and form
	Religious Philosophy	<ul style="list-style-type: none"> • Building oriented on the East side to respect Sun God. • Presence of Mandapa and temple in every settlement
	Rules & Customs	<ul style="list-style-type: none"> • Water-body as a sense of purification
	Myth	<ul style="list-style-type: none"> • Religious festival on the inauguration of a new building
	Social practice	<ul style="list-style-type: none"> • A dedicated place for God <i>Sanamahi</i> In every house. • Religious festival after new house construction • Orientation toward East direction

5.4 ENVIRONMENTAL SUSTAINABILITY OF MANIPURI SETTLEMENT

Traditional architecture around the world is a significant source of knowledge of environmental sustainability. The concept of vernacular buildings is based upon climatic principles and sustainable use of resources. With no exception, Bangladesh's Manipuri vernacular architecture could be an excellent source of knowledge for architects of today. After the migration,

Manipuris, through their architectural design, adapted a range of place-based solutions to cope with local context. For example, the compactness of settlement plans and house plans shows the intension towards efficient utilization of land and building ecology. Buildings demonstrate effective techniques for passive solar control by selecting sustainable materials, maintaining the orientation of the building and applying shading devices. Jali type high window is used to ventilate the interior space. Bamboo post lintel framed construction gives protection against earthquakes. Extended roof spaces, wide semi-outdoor areas provide protection against driving rain and allow light and air. Multifunctional, open spaces are one of the main strategies of climate adaptation. Mandapa, Mangon, the outer court are multifunctional spaces accommodate various social, cultural, spiritual activities ensuring minimum resource consumption. Culturally, Manipuris prefer to maintain a clean and hygiene lifestyle, so the waste management system is very well managed. Manipuris use few traditional techniques for house maintenance like using smoke to kill insects that can harm bamboo or wooden structures. This is also a good example of using traditional knowledge for preventive conservation. Table 2 represents the summery of findings from environmental perspective.

Table 2 Environmental consideration in Manipuri settlement and architecture

Environmental Aspects	Spatial pattern & Architectural Morphology
Land utilization	<ul style="list-style-type: none"> • Compact planning of settlement • Compact planning of households
Passive Thermal solution	<ul style="list-style-type: none"> • Walls made out of insulating materials • Higher room height • Extended roof for better shading • Mud floors
Ventilation & wind flow	<ul style="list-style-type: none"> • Plenty of semi-outdoor spaces • High <i>jail</i> window on gable end for ventilation • Perforated Bamboo fencing

Earthquake resilience	<ul style="list-style-type: none"> • Post lintel structural principle • Walls are made of lightweight material • Single storied construction • Thick mud wall to carry lateral loads
Natural lighting	<ul style="list-style-type: none"> • Orientation for maximizing natural light • Increased height of semi-outdoor for enough light from the East.
Water and green	<ul style="list-style-type: none"> • Large and extended Slopped roof for precipitation control • Spacious semi-outdoor for controlling driving rain. • Peripheral green vegetation to prevent land erosion
Consumption of resources	<ul style="list-style-type: none"> • Multi functionalism of space • Use of locally available materials • Concept of shared spaces and resources. • Good waste management system
Adaptation to Geography	<ul style="list-style-type: none"> • Adapted to flat land topography.
Sanitation Consideration	<ul style="list-style-type: none"> • Natural Tendency for Being Clean • Outside bath room and toilet • Traditional waste management

6. CONCLUSION

Through this study, the authors attempted several interpretations of how the Bangladeshi Manipuri community's socio-cultural, socio-religious, socio-environmental values were translated into their architecture. This paper uses a systematic approach to examine the interrelationships between communities, society, and buildings. After close analysis of study sites, this is very clear that Manipuri vernacular style in Bangladesh is a geo-cultural fusion of North East Bangladesh and India.

As a diasporic vernacular style, the architectural styles have adapted many elements from the Bengal context but still retained ethnic values. Clan identity and social kinship are major

determinants of spatial organization and architectural morphology. From a religious viewpoint, Manipuri households represent remnants of both the Vaishnavite and the ancient religious belief in *Apokpa*. Spaces are distributed in family, community domains, and still culturally functioning. Multiple functional spaces, community sharing, austerity in a formal expression are major characteristics of the habitats. From environmental concern, sensible climatic innovations and minimum consumption of resources added sustainable value to this vernacular practice. The overall approach is to balance human needs rather than enforcing them. Sustainability has been adapted in the way of life in the Manipuri habitat and has made it an important part of their socio-cultural identity.

The authors also identify that, unlike traditional Manipuri houses like *Yumjao*, *Mandapa* have immense significance in terms of cultural heritage. However, traditional buildings are becoming extremely scarce. So proper steps need to be taken to preserve this unique vernacular heritage. Many Manipuri rural communities live next to natural site-seeing spots like lakes, tea plantation sites, reserve forests which attract many tourists over the years. Sustainable tourism planning by including Manipuri heritage (both tangible and intangible) can improve the socio-economic condition of this population. This is a fundamental right for every ethnic community to be treated sensibly by the state that their cultural identity, traditional knowledge, can be preserved for upcoming generations. The authors expect that concerned authorities will take needful actions.

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CONFLICTS OF INTEREST

The authors declare that there are no conflicts of interest.

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