

NATURE : THE ETHOS OF ARUNACHAL PRADESH ARCHITECTURE

Shreyansh Barua^{*1}, Yashovardhan Sharma^{*2}, Nandini Biswas^{*3},
Achirava Raha^{*5}, Jamyang Katuk^{*5}

^{*1}Graduate, Master of Landscape Architecture, Manchester School of Architecture, Manchester,
United Kingdom – M15 6BR

^{*2}Graduate, Master of Architecture – RIBA II, Manchester School of Architecture, Manchester,
United Kingdom – M15 6BR

^{*3,4,5}Undergraduate student, Bachelor of Architecture, Department of Architecture, Birla Institute of
Technology, Mesra, Ranchi, Jharkhand, India – 835215.

ABSTRACT

This research primarily looks into the architecture of rural Arunachal Pradesh. It primarily talks about the detailed housing of two major tribes of the state - Galo and Singpho. It focuses on the major aspects related including factors like materials, methodology whilst also looking at the modern approach adopted by the tribes. This paper also looks at the major geographical factors of the state and how these subsequently affect the housing of residents living in the highlands. Finally, this paper concludes with a glance at the sustainable aspect of the research. Suitable diagrams and photographs have been attached to support the research.

KEYWORDS: Bamboo architecture, Environmental Design, Sustainable concept, Research, Case study

I. INTRODUCTION

Dedicated research has been carried on the north-eastern States of India. Although few of them involve the architecture of the states. This research paper deeply looks into the geography and architecture of one smallest land locked states in the country- Arunachal Pradesh. Part of the seven sisters of India, Arunachal Pradesh nests entirely in the high lands of India. It also holds the distinction of being home to 26 tribes and over 100 sub-tribes. This paper primarily looks into the lifestyle and the architectural features of two major tribes in the state - Galo and Singpho. Right from the materials to the methods used, both tribes show an immense connect and an even greater respect to nature. Hence their homes are also synonymous with the materials sourced locally. The main objective of this paper is to discover the various features of their dwelling units and to also explore their harmonious relation with the environment while prodding on the paths of implementing the same technologies in the present.

II. ANALYSIS/BODY

1. Arunachal Pradesh

2.1 Geography

The “Land of the Rising Sun,” Arunachal Pradesh, has been a recognized region of the Indian subcontinent. Previously known as the North East Frontier Agency, the area was part of Assam until it was made the Indian union territory of Arunachal Pradesh in 1972, and in 1987 it became an Indian state (Encyclopedia Britannica, Kenneth Pletcher, 2016). The state has a total area of 83,743 square km (Deryck O. Lodrick, 2012).

Most of Arunachal Pradesh’s terrain consists of deep valleys flanked by highland plateaus and ridges that rise to the peaks of the Great Himalayas. The state encompasses three broad physiographic regions (Figure 1). Farthest south is a series of foothills, similar in type to the Siwalik Range (a narrow sub-Himalayan belt stretching across much of northern India), that ascend from the Assam plains to elevations of 1,000 to 3,300 feet (300 to 1,000 meters) (Kenneth Pletcher, 2016). Those hills rise rapidly northward to the Lesser Himalayas, where some ridges and spurs reach 10,000 feet (3,000 meters). Farther north, along with the Tibetan border, lie the main

ranges of the Great Himalayas, where Kangto, the highest peak in the state, dominates the landscape, reaching about 23,260 feet (7,090 meters) (Kenneth Pletcher, 2016).

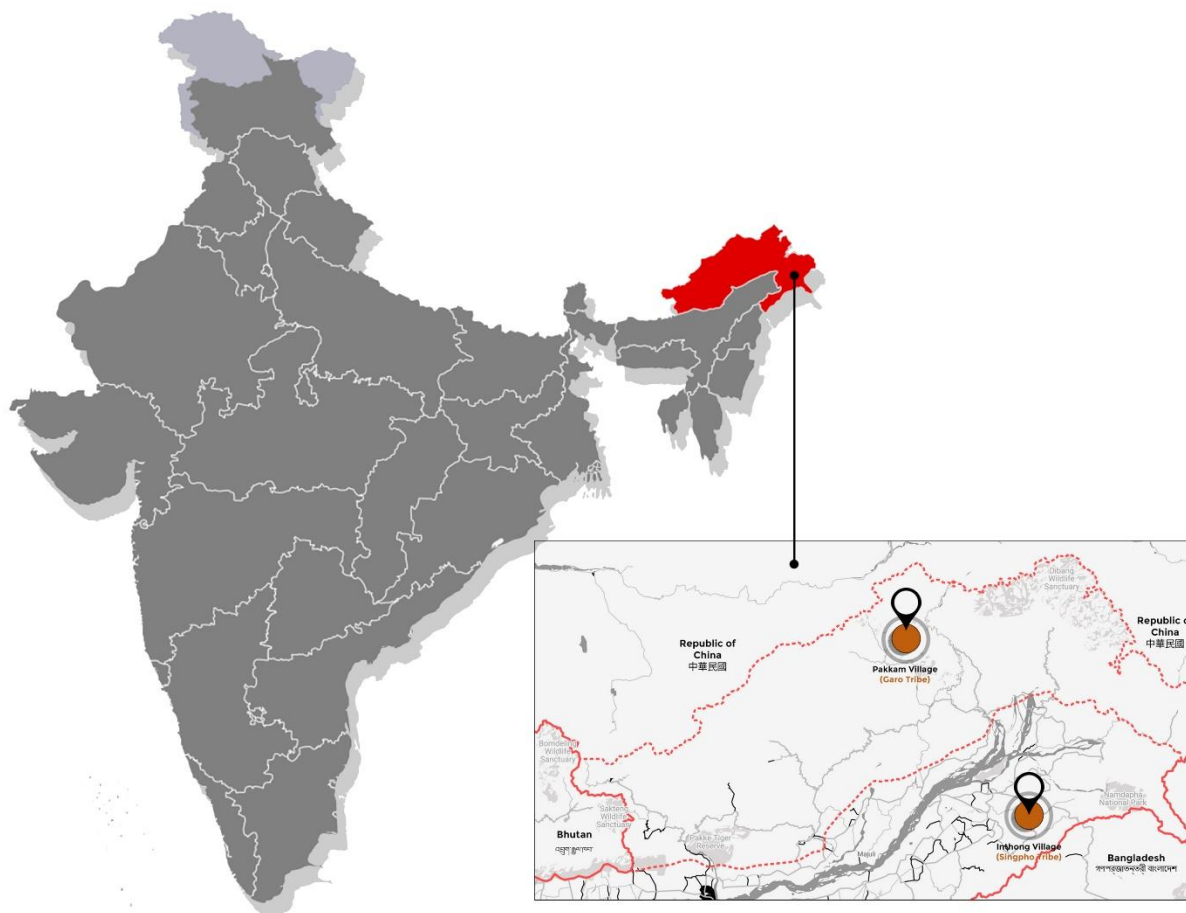


Fig-1: Map showing the two villages along with the boundary of Arunachal Pradesh (Source: author)

2.2 Drainage and soil

The major rivers of the state are the Brahmaputra and its tributaries—the Dibang [Sikang], Lohit, Subansiri, Kameng, and Tirap. The Brahmaputra (known as the Tsangpo in the Tibet Autonomous Region of China and as the Dihang [Siang] in Arunachal Pradesh) flows eastward from Mansarovar Lake in Tibet before dipping south through the Himalayas into north-central Arunachal Pradesh. The river then winds its way southward across the length of the state, cutting a narrow, steep-sided gorge into the mountainous terrain. The Brahmaputra finally emerges onto the northern edge of the Assam plains—a finger of which extends into southeastern Arunachal Pradesh—near the town of Pasighat. It is joined by the Dibang and the Lohit rivers a short distance beyond Pasighat, just south of the border between Assam and Arunachal Pradesh. West of the Brahmaputra, the Subansiri is the only tributary to cross the main Himalayan ranges. The Kameng and other rivers in the area rise on the southern flanks of the mountains. The Tirap River drains the southeastern part of the state.

Soils vary considerably with the terrain. Generally, however, they are acidic and, in mountainous areas, subject to erosion. The major soil types are Inceptisols, Entisols, and Ultisols (Kenneth Pletcher, 2016). River valleys are characterized by rich alluvial soils that are highly suited for agriculture.

2.3 Climate

The climate of Arunachal Pradesh varies with topography and elevation. The foothill zone is subtropical and has a hot and humid climate; in the lower valleys, summer temperatures in June, July, and August typically rise into the mid-90s F (mid-30s C) (Kenneth Pletcher, 2016), while winter high temperatures in December, January, and

February usually reach the mid-50s F (about 13 °C) (Kenneth Pletcher, 2016). Average temperatures decrease as elevations increase in the mountains.

Precipitation in the state generally follows the wet-dry monsoon pattern. Annual totals average about 130 inches (3,300 mm), falling mostly between April and September during the wet southwest monsoon (Kenneth Pletcher, 2016). In the center of the state, however, the precipitation figure approaches 160 inches (4,100 mm) or higher per year (Kenneth Pletcher, 2016).

2.4 Population

Arunachal Pradesh has the lowest population density of any state in India. Most of the populace is concentrated in the low-lying valleys, with the hill peoples living in scattered upland communities. There are no cities and fewer than two dozen towns. Itanagar, in the southwest of Arunachal Pradesh, is the state's largest town. Dispersed villages and isolated farmsteads are typical features of the landscape.

2.5 Tribes of Arunachal Pradesh

India is the harbor of varied tribes and their assorted culture, and in the midst of it lies the unspoiled terrain with speckled Himalayan background, the Land of Rising Sun, Arunachal Pradesh, boasting of its own distinct heritage, thriving 26 major tribes and distinct ethnic groups, most of which are in some ways related to the peoples of Tibet and the hill region of western Myanmar, spread throughout the land. Known for their colorful life, the tribes strive to preserve their century-old tradition with each of them following their own exclusive sets of customs and beliefs.

2.6 Socio-cultural aspects

Said to be very broad-minded, the tribal people are casteless firmly believe and follow their own indigenous religions which are basically disposed towards Mother Nature. They are hospitable and promote the essence of socializing and celebration with family and friends. The major tribes in these areas are the Adis, Aptanis, Sinpho, Monpas, Khamtis, Galo, Tagins, Yobins and many more. In western Arunachal Pradesh the Nissi (Nishi or Dafla), Sherdukpen, Aka, Monpa, Apa Tani, and Hill Miri are among the main tribes. The Adi, who constitute the largest tribal group in the state, live in the central region. The Mishmi inhabit the northeastern hills, and the Wancho, Nocte, and Tangsa are concentrated in the southeastern district of Tirap.

2.7 Economic factors

The tribal mostly indulge themselves in the art of agriculture as the main source of livelihood with skills like handicrafts, handlooms, weaving, pottery, jewelry making, bamboo and cane work, basketry etc. follow as other skills which they expertise in (Figure 3 & 4). Throughout the state, the tribal peoples generally share similar rural lifestyles and occupations; many are subsistence farmers who supplement their diet by hunting, fishing, and gathering forest products. The people follow the Donyi-Polo religion i.e. the Sun and the Moon God, while others preach Buddhism or Christianity.

2.8 Religious beliefs

Some residents of Arunachal Pradesh practice Hinduism, especially those near the lowlands approaching the border with Assam. Tibetan Buddhism is found among groups near the Tibetan border, and some tribes along the Myanmar border practice Theravada Buddhism, which is predominant in Southeast Asia.

2.9 People, language and tradition

Arunachal Pradesh is home to dozens of people. More than two-thirds of the state's people are designated officially as Scheduled Tribes (ST), a term that generally applies to indigenous peoples who fall outside of the prevailing Indian social structure. Aside from the Scheduled Tribes, much of the remainder of the population of Arunachal Pradesh consists of immigrants from Bangladesh, as well as from Assam, Nagaland, and other states of India.

The tribal groups speak about 50 languages and dialects, most belonging to the Tibeto-Burman branch of the Sino-Tibetan language family. They are often mutually unintelligible; thus, Assamese and Hindi, both of which

are Indo-Aryan languages, as well as English, are used as lingua francas in the region. Each of the tribes follows its own social, cultural, and religious practices, and most are endogamous (marrying within the group). Many of the groups practice local religions that involve interaction with various spirits and deities of nature. Ritual sacrifice is common, and a domesticated gaur (wild ox), locally known as a Mithun, is especially valued as a sacrificial animal (Figure 2). Being a patron of Art and Music, the tribal endorse dance, drama, music during various festivals and other private occasions.



Fig-2: A standing Mithun (wild ox) (Source: gettingnowhere.net, 2014)



Fig-3: Collecting firewood and vegetable in traditional bamboo baskets (Source: gettingnowhere.net, 2014)



Fig-4: Weaving as a part of daily activity for a woman (Source: gettingnowhere.net, 2014)

III. GALO TRIBE: PAKKAM VILLAGE

3.1 Lifestyle

Included as the Scheduled Tribe in the Constitution of India, The Galo Tribe is the most populous among all 26 tribes prevalent in Arunachal Pradesh. They have ‘Gallong’ as their native language and the society follows the common methods of patriarchy and primogeniture. They highly regard endogamy and strictly observe the rule of clan exogamy. A family is an important part of their society, while monogamy is prevalent, Polygamy is sanctioned and practiced as a state of well-being and prosperity. The Galo people are exceedingly democratic, and they bear their own organized establishments that sustain law and order, decide disputes and supervise the activities for the welfare of the people. The Galo tribe are worshipers of Mother Nature and regard the nature and its resources as their companion or friends rather than something materialistic over which they can dominate. They wear clothes made of cotton, wool, and bamboo or skin of animals and have specific and exotic colors and patterns for each outfit and accessories (Figure 5). Their food comprises mainly of rice, meat, spices and bamboo powder. They also practice the home-grown art of entomophagy and, entomotherapy i.e. consumption of insects for food and use of insects for medicinal and healing purposes. Music, Dance and Animal sacrifice too play a very important role in the culture.



Fig-4: Traditional handicrafts of Galo tribe (Source: gettingnowhere.net, 2014)



Fig-3: A Galo woman working in Pakkam Village (Source: gettingnowhere.net, 2014)



Fig-5: An old man in traditional Galo attire (Source: sahapedia.org, 2016)

3.2 Socio-economic factors

The Galo tribe are very social people and love celebrating with their family and friends. They tend to celebrate Mopin, their most prestigious harvest festival in honor of Abu Tani and thank him for the basic needs they have attained and also pray for a good harvest in the coming years. Belonging to an Agrarian society, they are master in wet rice cultivation and shifting cultivation which forms the backbone of their economy. Hunting for food and also using the skin for clothing is another form of occupation. The women involve themselves mainly in weaving bamboo baskets, containers, shawls, skirts, drapes or weapons. They also work a lot in making jewelry out of wood, mud, stones or animal bones which attract the tourist visiting these places. Galo tribe expertise in rice cakes, fish curries, meat, and many green vegetables. Boiled rice cakes wrapped in leaves and boiled tapioca are some of the snacks that are consumed on a daily basis. Though Apong – served aesthetically in tumblers made of bamboo – is an acquired taste, the meals, in particular, are simple but full of flavor and taste. There's also Poka, a traditional rice wine, which plays an important role in the socio-cultural life of the tribe in this town of Arunachal Pradesh. Four types of wedding ceremonies are practiced by the Galo tribe of Arunachal Pradesh: Kartv, Karoo, Karmwk, and Karsuk.

3.3 Galo architecture

3.3.1 Architectural character

Houses in a typical Galo village are less and are usually compact. The houses are built while considering the humid sub-tropical climate into consideration. The houses are rectangular in shape, with the long-slanted roof with an open platform attached to the main structure. The main dwelling unit is typically dominated by a slanting roof (Figure 8). The walls of the house are short and most importantly, lacks windows. As a result of which, the interiors are devoid of light along with a smoky atmosphere.

A traditional Galo dwelling place has two distinctly different units. Firstly, there are two different ladders used as a means of entrance to the house. These ladders are purposely placed for the discrete use of the male and the female members of the family. The front portion of the house is mostly used by the menfolk while the rear end of the house is used by the women. The front portion of the house is an open courtyard where the men carry on with their usual business (Figure 9). The house also contains a large hall. This is the main space for all the multipurpose activities. A Galo house is not just a structure to protect the family members from the harsh rains, thunderous storms and the humidifying but for them, it is also an animate entity.



Fig-6: Traditional Galo architecture (Source: gettingnowhere.net, 2014)



Fig-7: Bamboo floored verandah (Source: gettingnowhere.net, 2014)

3.3.2 Materials and methods

As Arunachal Pradesh is a forest land, resplendent with trees all around, bamboo and locally sourced wood are available in plenty. A typical modular unit of the Galo community is made up of wood, bamboo, and cane. Traditional dwelling units have the roof made up of toko leaves. A large amount of wood, bamboo and toko leaves are extremely vital for the construction of the house. Hence, the accumulation of these materials is done for more than a year. Woods of certain specific plants such as the Koraa, Koyom, Agraa, Enci, Korbin are used in the establishment of the house.

Bamboo makes for a great sustainable material. Most of the houses of the Galo tribe are erected on stilts. These stilts are elevated at a height of 1.5 meters to 2 meters above the ground. The spaces below these stilts are used to store canoes, used during the floods. The stilts are made from bamboo posts; diagonal bamboo bracings are tied across the bamboo posts to make the final structure. Horizontal members of bamboo are tied along the bamboo posts with the aid of jute ropes. Spliced bamboo joints are used to make the necessary dowel and tendon joints which hold the bamboo poles together. The floor and the walls are made up of bamboo matting tied with a cane. Bamboo mats are also laid on the floor. Using locally sourced materials to construct a house has its own advantages. One of them is having an extremely low maintenance cost. Also, these houses are termite resistant and also holds a strong aversion to water during the extreme monsoon season.

2.3.3 Sustainable aspects

Sustainable architecture is an architecture that seeks to minimize the negative environmental impact of buildings by efficiency and moderation in the use of materials, energy, and development space and the ecosystem at large. The sustainable architecture uses a conscious approach to energy and ecological conservation in the design of the built environment.

The Galo tribe have been instrumental in maintaining farming systems that are synonymous with sustaining the harmony with the environment. Over the centuries, the Galos have acquired the traditional knowledge on the use of natural resources. It has been observed that their type of dwelling units has been a lesser victim of seismological attacks and are climatologically efficient (Figure 10).

The dense forests of the region are blessed with minor but rich forest produce. The tribes collect firewood for fuel purposes, timber for house construction and making of a wooden equipment. The timber is also used for the making of domestic utensils and also other articles of domiciliary usage. However, as deforestation continues to be a more visible threat in the more recent times, an imbalance is created due to the natural falling of trees. Other than deforestation, industrialization is also a huge reason for this natural imbalance. To find a more permanent solution to this pertinent problem, it is highly recommended that the indigenous tribes are made partners in the re-development, management, and conservation with due credit.



Fig-8: Roof design of a Galo house (Source: gettingnowhere.net, 2014)



Fig-9: Openings of the house to enhance proper wind circulation inside the space (Source: author)

3.3.4 Modern-era approach

In the recent years, a number of changes have been observed in the house construction scenario. The Galos are now opting for modern brick houses or partially brick-built housing units. They are also open to many different modern materials other than bricks for the establishment of their houses. The posts and pillars are now made up of concrete rather than bamboo (Figure 12). Sometimes bricks are also used for the construction of the poles. The Galo tribes are now opting for tin as their roofing material (Figure 13).

Even though the Galo tribe has adopted modern housing material to construct their house, they still have a deep respect for the traditional architecture. Their houses are modeled on the vernacular home plan. A conventional unit of the traditional house is always built within the compound of the modern household. This traditional house, to this day, is used for cooking purposes or for relaxation by the family members.



Fig-10: Building used for storage of granaries and accessories in the village (Source: gettingnowhere.net, 2014)



Fig-11: Modern structures in Ziro Valley (Source: gettingnowhere.net, 2014)

IV. SINGPHO TRIBE: INTONG VILLAGE

4.1 Lifestyle

The Singphos are one of the most important tribes of the Northeastern Region of India. They believe themselves to be descendants of Shapawng Yawng – the first born on earth. They dwell basically in the Tinsukia region of Assam and live on the banks of They are said to be a part of the Burmese tribe named ‘Kachin’. They believe they were the denizens of the Hukang Valley. They speak the Singpho dialect of the Jingpo dialect. They have an opulent traditional inheritance which has worn away slowly in progress of their living in the middle of amalgamated cultures and tribes and communities.

4.2 Socio-economic factors

The Singpho society is famous for its well-organized social nature. The Singphos are divided into a number of clans, each under a chief was known as a Gam. The principal Gams include the Bessa, Tesari, Mirip etc. For the Singpho, all living creatures are believed to have souls. Rituals are carried out for protection in almost all daily activities, from the planting of crops to warfare. The ancestor of the Singphos worshiped spirit or god, is held to be named Madai. Singpho Animists believe that spirits reside everywhere, from the sun to the animals, and that these spirits bring good or bad luck. In their culture, one cannot marry from within the same clan. They are known for their severe individuality, methodical martial art skills, and for their lifestyle where nature plays a major role. In the Singpho society, bigamy or polygamy are allowed though monogamy is a more common norm for an ideal marriage. However, one woman cannot have more than one husband. Given that the Singphos are a patriarchal race, the wife after marriage goes to live with her husband and take up his surname. They use utensils made of cane and bamboo and wear dresses made of animal skin and other local materials found in and

around. The Singpho also depend on yams and other edible tubers as their staple food which provides the warmth.

Singphos belong to an Agrarian civilization but like other hilly tribes don't practice shifting cultivation, (Jhum) as their main. Their economy is focused on the cultivation of paddy and tea. When the British first came to these timbered areas in search of oil and coal, they got familiar with the Singphos living at the foothills of the Patkai mountains. These people lived in "Chang-ghars" (traditional bamboo house with a raised platform). When they cooperated with these people, the Britishers realized that the Singphos was indeed a brave, warrior race. It was from the Singphos that the British discovered the history of tea and initiated the tea industry in Assam. The Singpho harvest their tea by plucking the soft leaves and dehydrating them in the sun and exposing to the night (Figure 14).



Fig-12: Tea gardens in Inthong village, Assam (Source: author)



Fig-13: Bamboo bridge connecting two zones in the village (Source: author)



Fig-14: Interior of a monastery in the village (Source: jungleideas.com, 2015)

4.3 Singpho architecture

4.3.1 Architectural character

The Singphos generally live in the higher altitudes of Arunachal Pradesh. They mostly occupy the dense forest regions. Their main livelihood is agriculture, so they live near the forests for the resource. The Singpho village is a large one and the houses are spread over a considerably large area facing almost all directions.

The common term for the Singpho village, 'miriyeng', named after the founder clan. The Singpho houses are quite large and have various divisions. They are 80-100 feet long and are generally placed on a raised wooden platform. The apartments are arranged in such a way that two identical apartments are separated by a long corridor space that has an opening on either end (Figure 17).

The basic structure of a Singpho house is rectangular. This rectangular block consists of a spacious middle part- a front verandah as well as a back verandah if space allows. The middle part can have two or more rooms depending on the number of family members. The outermost one is a guest room, followed by the parents' room. Others include the sons' rooms and the unwed daughters' room (Figure 18).



Fig-15: Singpho Eco-Lodge, Inthong Village, Assam (Source: author)



Fig-16: Traditional Singpho village houses (Source: author)

4.3.2 Materials and methods

The most abundant local material for the Singpho house includes wood and bamboo for the main construction and thatch is used as the roofing material. The rectangular houses are supported by high poles and the platforms are usually about 2 meters above the grade level.

The main structure of the Singphos is made of wood. The floors are made up of flattened bamboo. The walls surrounding the main structure are constructed of woven flattened bamboo while the roof has a palm leaf cover (Figure 24). A typical house usually takes around 5-10 days to build.

A typical Singpho house is usually 3-3.5 meters above the plinth level with the roof level at another 1.2 meters above the lintel level. The roof is held by a wooden truss system (Figure 25). Some houses also use the purlin-rafter binding technique (Figure 23). The wooden members are interconnected by a local inter-locking system (Figure 20). They also use bamboo to make the stilts on which the house stands. Over the hearth, a hanging-smoking rake is present at a height of 3-4 feet from the floor level. Bamboo shelves are also present on the wooden walls of this component. This space is hence used to store the cooked food and cooking utensils. The furniture inside the apartments is basically small pieces of wood with two legs attached. Some of the furniture is also made up of bamboo. The houses are water and termite resistant and also use a low-cost technique of construction.



Fig-17: Joinery between beam and column (Source: author)



Fig-19: Interlocking members (Source: author)



Fig-18: Fixtures held through members (Source: author)



Fig-20: Floor-column connection (Source: author)



Fig-23: Purlin-rafter binding (Source: author)



Fig-22: Wall-frame connection (Source: author)



Figure:21 Main truss support (Source: author)



Fig-23: Final roof structure (Source: author)

4.3.3 Sustainable aspects and modern approach: Singpho eco-lodge, Inthong village, Assam

Through a relative literature evaluation, and an examination of material-based design approach as an architectural practice in the Singpho Tribe of Arunachal Pradesh, the necessity of shift from existing design and dwelling practices towards a more stable, firm and environmental-friendly design style. The Singphos were already involved in pure vernacular architecture that encompassed of focused on one main thing i.e. bioclimatism. Bioclimatic is the interrelation of climate and the day-to-day activities and distribution of people and living organisms. The socio-economic status and cultural circumstance to the vernacular architecture of the region are highly dependent on the bioclimatic state of the northeast region. In Singpho culture, houses are constructed using locally available materials like wood, cane, bamboo, stone, mud, jute, lime and epitomize exceptional examples towards sustainable building design. In relation to this, different solar passive features are available in most of these houses, related to temperature control and promoting natural ventilation.

The weakness of the existing methods is evaluated according to ever-changing user requirements, increase in population, changing needs and lifestyle and also their availability with respect to the environment (Figure 27).



Fig-24: Typical modern construction (Source: author)



Fig-25: Village entrance gate in modern form (Source: author)

V. CONCLUSION

It can be easily concluded that both the tribes show an immense respect to nature. Their homes are synonymous with vernacular architecture as each of material chosen is used to its full potential. From the roofs to the simple wooden joists, the walls to the stilts; each of them are obtained from their local forests. Each of their houses are an architectural marvel teaching us the simplicity of construction while keeping in check the sustainable feature. Their homes are an example of how simple materials can be utilised to a complete dwelling unit. In this present world, where focus is primarily on the researching for newer materials and techniques, this paper takes us back to the purity of vernacular architecture and sustainable planning.

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