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Traditional Approaches to Construction and Building Techniques: A Case Study of the Galo Tribe in Kadu Village, Koyu Circle, Lower Siang District, Arunachal Pradesh

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Abstract
This study explores the traditional construction techniques of the Galo Tribe of Arunachal Pradesh, Particularly, in Kadu village, highlighting the relationship between architecture, geography, and sustainability. The study examines the materials, methods, and cultural aspects of traditional Galo housing while also addressing the modern influences shaping contemporary building practices. Galo houses, primarily stilt structures, are designed to suit the regions humid subtropical climate, providing protection against floods, pests, and dampness. Constructed using bamboo, cane, timber and toko patta or taek, these houses reflect a deep understanding of local resources and environmental adaptability. The study also explores the role of bamboo and cane-based craftsmanship, linking traditional construction with broader handicraft and handloom culture of Arunachal Pradesh. However, modernization had led to changes, with an increasing preference for more durable construction methods using cement, tin roofs, and hybrid structures, altering traditional architectural practices. This paper examines the importance of preserving indigenous knowledge while integrating sustainable and climate-resilient solutions for the future, and in doing so, provides a comprehensive insight into the architectural heritage of Galo tribe.
Keywords: *Galo Tribe, Traditional Architecture, Construction, Bamboo, Kadu village.*

INTRODUCTION:

Traditional Knowledge System is the body of skills, practices, and experiences pass through generation to generation within an indigenous society. It is deeply connected to the environment, livelihood and cultural values. Among the Galo, an indigenous tribe of Arunachal Pradesh, traditional house construction (Namme Monam) represents an important aspect of this knowledge system. This system shows their expertise in using local materials such as bamboo, cane, timber, and taek, as well as their ability to adapt construction to ecological conditions.[4] At the same time, it reflects strong community participation and the performance of rituals that guide and give meaning to the process. This study is based on a case study of Kadu village. It examines traditional Galo construction techniques as part of the wider framework of Traditional Knowledge Systems. It highlights their cultural importance, ecological relevance, and the challenges they face in the context of modernization.

India is a home to diverse indigenous communities whose cultural tradition and knowledge systems form an important part of the country's heritage. Arunachal Pradesh, the north easternmost state of India, is known for its diverse tribal communities, each with distinct cultural traditions, languages, and architectural styles. The Galo tribe, one of the major Tani tribes of Arunachal Pradesh, primarily inhabits the central and western regions of the state, including Lower Siang District. The Galo tribe has a rich tradition of indigenous knowledge, reflected in their unique construction and building techniques that have evolved to suit the region's humid subtropical climate and hilly terrain.

This research focuses on the traditional construction methods of the Galo tribe in Kadu Village, Koyu Circle, Lower Siang District. Galo houses are primarily built using natural materials like bamboo, cane, timber and thatch, ensuring durability and adaptability to the local environment. These stilt floor/level in these houses provide a natural ventilation system below the house thereby protection the whole structure from pests and dampening. The study aims to document and analyze the construction

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techniques, materials, and cultural significance of Galo houses while also examining the impact of modernization on traditional building practices. Through fieldwork, interviews with village elders, and photographic documentation, this research highlights the importance of preserving indigenous architectural knowledge and its relevance to sustainable development in rural Arunachal Pradesh.

Objectives:
The primary objective of the study is to document the traditional building techniques of the Galo tribe in Kadu Village and the research also examines the impact of modern materials on traditional methods and considers ways to blend both approaches for sustainable construction.

Area of the study:
Kadu village is selected for the present study. Kadu village is a small village located in the Koyu subdivision of Lower Siang District, Arunachal Pradesh. Lower Siang District was officially established on 22nd September 2017, becoming the state's 22nd district. The district was formed by carving out areas from the existing West Siang and East Siang district.[5] The initial proposal for its creation was approved by the Arunachal Pradesh Government on March 21st 2013. Kadu village can be divided into three settlement units; Loglu, Saku and Jate.[6] The unit-wise population of Kadu village as per 2011 Census is as follows:[7]

Sl. No.	Name of villages	Population (2011 census)			
		Household	M	F	Total
1.	Saku	15	83	79	163
2.	Loglu	20	85	70	155
3.	Jate	4	14	11	25
	Total	39	182	160	343

The village's economy is based on agricultural practice and animal husbandry since the period of its early settlement. Agriculture is the main source of livelihood and income. Slash/burn cultivation, papum-pachak (Bamboo basket), cane crafts, hunting and trapping, fishing, rearing of animals etc. constitute the main curriculum of their lives. More recently, the villages have started to opt for gardening, specifically for growing oranges, as alternative source of income.
The majority people of Kadu village follows, the animism combined with shamanism. This however is now collectively called as indigenous faith, Donyi-Poloism. However, few of them practices Christianity as well. The culture of Galo tribe is highly influenced by indigenous traditions, animistic beliefs etc. The natives celebrated the Mopin festival, Mopin festival is considered as major festival among the Galo tribe. This festival is associated with agriculture and celebrated with rituals, sacrifices to appease Mopin Ane (goddess) for a bumper harvest for keeping them happy and prosperous and good life of living beings on the earth. There are various forms of dances performed during festival such as Popir pognam (form of dance performed during Mopin festival).
The staple food of Galo as a whole and people of Kadu village in particular are Rice along with Oyik, bamboo shoot, meats etc. The people of Kadu village are peace-loving and welcoming by nature. The village's diverse flora and fauna is surrounded by rivers, forests, mountains, valleys and small streams.

REVIEW OF LITERATURE:
There are few works that encompasses the socio-cultural and political aspect of the Galo tribe in Aruanchal Pradesd. Some of the notables are, Dunbar's Abors and Gallongs (1916), L.R.N. Srivastava's 'The Gallongs' (1962), Deepak Pandey's 'History of Arunachal Pradesh' (1972), Parul Dutta's booklet **'**Mopin Festival of the Galos of Arunachal Pradesh' (1976), magnum opus of Tai Nyori History and

[5]Arunachal Pradesh (Reorganization of Districts) Amendment Act 2013, [2 OF 2014] Published in AP Gazette EO No. 32, VOL. IV Dtd 3, 1 March 2014.
[6]Earlier Kadu was divided into four small settlement units: Moku, Loglu, Jate and Saku. Currently, Moku existsonly in terms official purposes but is practically void of any settlement and therefore not considered for this research paper.
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Cultures of The Adi's (1993). Cumulatively, these works provide a vivid description of the Galos and caters to the social-religions and cultural aspects of the tribe.

More recent works have come out in the form of Tejum Padu's 'Moopin ` Poopwr poonu Nwwtom and Mvmmen Gore of the Galo of Arunachal Pradesh' (2010), Eli Doye (2018) 'Myths from Northeast India: Functional Perspective of Galo Myths in a Changing Context' and Morge Ete's The Folklore of Galo: An overview (2021). These works provide us a detailed study of social harmony, warding off of evil spirits, existence of human being, importance of myths in shaping identity and maintaining cultural continuity within the Galo community.

However, Galo tribe is spread over an area stretching as far as Himalayas in the north to the plains of neighboring Assam. In terms of administration, they majorly inhabit 3-4 districts in central Arunachal. Hence, the way of living, myths, folklore and traditional knowledge system vary from one locality to the other. Almost all the previous works inherently suffer from this difference in regional variation. For instance, the myths of the origin regarding 'Mopin festival' (harvest festival) differs from region to region in terms of narration and interpretation.

Lifestyle of Galo tribe in Kadu village:

Included as the Scheduled Tribe in the Constitution of India, the Galo tribe is one the most populous among the 26 major tribes of Arunachal Pradesh. They have Galo as their native language and the society follows the common methods of patriarchy. 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 have their own dispute resolving mechanisms, called Keba, that sustains law and order, and supervise the activities for the general welfare of the people.[8] 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. 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.

Collection of Raw Materials:

The construction of a traditional Galo house, known as Namme Monam, generally begins in December with the collection of essential raw materials such as wood, bamboo, taek, and other necessary components. The wood and bamboo are cut down and left to dry for almost a month before being collected between January and February by the entire village community.

A significant belief associated with wood collection is that it should be avoided during the arrival of the first full moon to prevent insect damage and dampness. The quantity of bamboo required depends on the size of the house. For a large house, at least 100 bamboos are needed for making Chikchi and Batak Renam (walls and flooring). Additionally, Kapjen, which involves splitting bamboo into smaller parts to support the Taek (Livistona jenkinsiana) during roofing, requires approximately 85 bamboos.

The entire village helps transport materials from the jungle to the village, as there was no proper road connectivity in earlier times. Taek, used for roofing, is cut down, left to dry, and collected during the construction phase. Since taek must be sourced from distant locations, the number of helpers significantly increases during this stage.

Types of Wood and Bamboo used:

The raw materials collected include various types of wood, such as Koyom, Ensi, Agra, Hika, and Hiri. For bamboo, Homey and Ehjow are commonly used for flooring. While Homey creates aesthetically pleasing flooring, it is not very durable. In contrast, Ehjow is less visually appealing but lasts much longer. For binding, traditional cane rope (Oso taare) is used, requiring approximately 1,200 canes, each sectioned into eight equal parts. These canes, often sourced from distant areas, are primarily used to bind the house posts. However, for binding the roof, traditional rope made of bamboo, known as Taboom is used instead of cane. Arunachal Pradesh's forested landscape allows for easy access to bamboo, which is typically collected within a 1–2 km radius. Presently, many villagers have started to cultivate bamboo, taek trees in their garden for easy accessibility.

[8] *Keba* is the traditional village council of Galo tribe.

Architectural Characteristics and Construction Process:
The construction process in Kadu village starts in the last week of February or the first week of March. Before starting construction, the homeowner goes from house to house to inform fellow villagers about the project, ensuring community participation. This tradition is called Rigae Bonam. Based on the nature of participation, this can be categorized into two: (i) Nyimin Be – here the entire family participates in the construction process, and (ii) Bada be – in which one member from each family takes part in the process.

Dismantling and Rebuilding:
Once the villagers gather, they begin by dismantling the old house. During this time, the homeowner stays with a neighbor or builds a temporary shelter. When dismantling the house, usable materials such as wooden post, bamboo are separated for reuse in the new house. Undamaged taek leaves is often used for farm huts and pigsty, while other unusable materials mostly wood, bamboo are stored as firewood and shared among the villagers. A traditional house typically lasts for a maximum of 10 years and a minimum of 8 years. With maintenance or minor repairs, usually done around the 5-year mark, they can last beyond 10 years as well. Traditional Galo houses are rectangular with long-slanted roofs and an open platform attached to the main structure. The walls are short and lacks window, resulting in dimly lit and smoky interiors.

House Structure and Sections:
The entire process to complete a Galo house in Kadu, starting with the collection of raw materials, approximately takes a duration of four months. However, once all materials are gathered, the actual construction is completed within 5 to 6 days. A traditional Galo house is divided into two main sections: Namra – The inner section and Koda – The outer section. Six knowledgeable village elders lead the house-building process, beginning with measuring the four corners of Namra (the inner section of the house). The size of the house depends on the owner's preference. Wooden posts are placed in holes dug at least one foot to 5 inches deep, with stones added at the base to prevent dampness and insect damage, ensuring durability.

Construction Phases:
After placing the stilts/support pillars, the construction process continues with Rilo, followed by Pura.[9] The wooden framework is installed in six cross-sectional steps, though in some cases, only five steps are followed. In this phase, preference to bamboo is given over the use of wood (see Figure 1).
Next, the flooring process begins with Nyope Poonam and Batak Renam. Nyope Poonam involves controlled splitting of a bamboo tube in the form of interlinked strips that are interwoven in a pattern to create a strong flat structure usually used for flooring as well as house partition. Batak Renam involves splitting of a bamboo into equalized beats, usually 2 inches in breadth, and is mainly laid in the veranda of the house.
Following this, the Naka is constructed. It is a layered section within the house that supports the posts and also serves as a storage area for household items; this resembles a modern-day ceiling. The Naka is also floored with bamboo. Traditional houses in Kadu have layered storage units between the fireplace (mippum) and the ceiling, namely, Kaik, Kame and Rabko. They are positioned one above the other for drying meat, storing items and drying unhusked rice during the rainy season. The fireplaces are square in shape.

Final Construction Phase:
The final stage is Lobu Henam, which involves 4 to 5 experienced villagers specializing in structural reinforcement. Wood or bamboo is arranged in a half-triangle or zebra-crossing pattern (Kesi Lignam). Additional wooden support called Rep are used to strengthen the floor. Bamboo or wood is arranged in opposite sections to ensure stability, a process known as Robe Chirnam.

[9]*Rilo* and *Pura* are cross-sectional reinforcements laid in lower part of a house using bamboos and woods.

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Figure 1: Lower part of a House in

Figure 2: *Akap kabnam* (Roofing)

The roofing process requiring approximately 180 bundles of taek leaves for large houses and 80–90 bundles for smaller houses, with each bundle comprising of 50 leaves. The entire village, including women and children, aged and young, participates in this phase. The process is called Akap Kabnam (Figure 2).

Cultural Aspects and Gender Roles

Traditional Galo houses have two wooden ladders: Nyilo Koba – for males, and Nyim Koba – for females. Women are strictly prohibited from using the male ladder during menstruation, as it is considered unholy.

The house, also, has two doors: Nyim Rabgo – for females and Nyilo Rabgo – for males. The inner part of house that host the fireplace is called Namra. This inner section is further divided into four sections – (i) Bago, (ii) Udu, (iii) Nyode-Chiri and (iv) Nyospenko. Of these, Bago and Udu are considered the 'purest', and hence, women are restricted from sitting there during their menstrual cycle. Instead, women use Nyospenko and Nyode and enter through the Nyiim Rabgo (an alternate door) during their menstruation (Figure 3). Most houses feature two Mippum (fireplaces). While, one fireplace is placed inside the house, the other is built outside the house, namely Namra and Koda, respectively. Earlier, joint families had three fireplaces, but modern houses now use only two.

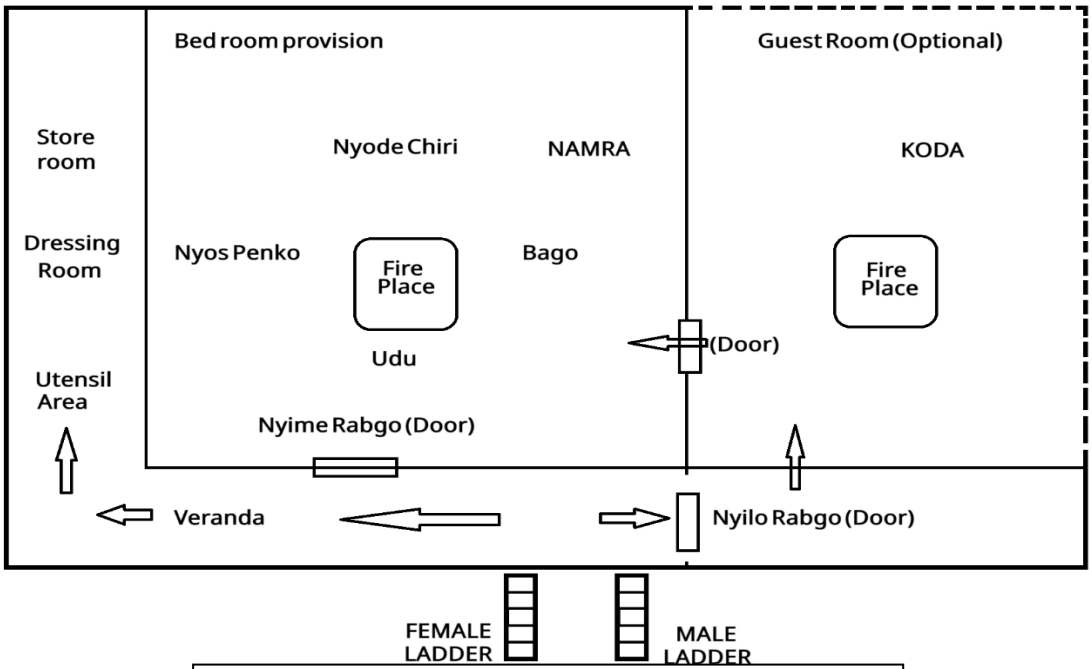

Figure 3: Outline of a Galo house in Kadu village

Rituals and Ceremonies

These rituals are performed only when an individual plans to build a house on a new site. The village priest conducts the rituals using rice as a key element to determine whether the location is suitable. The amount of rice used corresponds to the number of family members. For instance, if a family consists of ten members, ten grains of rice are used. The priest stands in different directions, chanting prayers while placing the rice into the soil at the chosen site. After five nights, the soil is dug up to examine the rice. If even a single grain is missing, it is believed that the site is unsuitable, as one family member may face misfortune or death. If two grains are missing, it signifies that two members may be at risk. To prevent such misfortune, the family relocates to another site. The priest determines the most auspicious direction for the house to be built, ensuring that the structure is aligned accordingly. During the construction, a cow or pig is sacrificed to provide food for the community. Once construction is complete, a celebratory gathering is held in honour of the new house which is called as Naamli Aarum. During this event, the villagers engage in traditional Galo folk dances and songs. It is also believed that certain woods are associated with Yapom (spirits)and to appease them, specific rituals are conducted iti-take (Rice paste and ginger paste) offerings. This is followed by rituals and prayers performed by the village priest, known as Hotu -Hobe, to ensure the well-being of the family.

Role of the Women

Many women respondent in the village revealed that their role in house construction is lesser than that of men. Women primarily assist in roofing by passing taek leaves to men and collecting it from the jungle. They also contribute by gathering firewood. Another significant role of women is serving as Bhaaje, meaning they take charge of catering services, preparing food for the community, and serving it during the construction process. After the house is completed, women actively participate in merrymaking, performing folk dances and engaging in other cultural activities. Another important role of women is Opo monam (which refers to the preparation of rice-wine brewed during house construction to serve the community). It is an essential part of Galo traditional feast and communal gathering. Its preparation begins in October and November, especially for events like house construction.

Challenges and Future Perspectives

There is a noticeable shift towards use of modern building techniques. A village elder expressed his concern that while some wish to preserve their cultural heritage, many of the Kadu villagers are increasingly adopting modern construction methods. He fears that traditional building techniques may disappear entirely within the next two or three decades. He suggests that, alongside modern construction, efforts should be made to incorporate traditional architectural elements using materials like wood, bamboo taek and cane. This approach, he believes, would help preserve the community's cultural roots.

However, villagers face several challenges during collection of raw materials. One major issue is the absence of young, energetic youth in the village, as many have moved away for education or jobs. Additionally, poor road connectivity forces villagers to transport materials manually over long distances.

There is also an increasing shift toward modern building techniques in Kadu village. Since house construction and labour are a form of 'exchange' in Galo set up, this shift has a very strong effect on the existing notion of social solidarity. Once a villager constructs a modern house, he finds no functionality in participating in the house construction of others because he doesn't need the reciprocity anymore. Hence, the willingness to participate in traditional house construction is evidently reducing day by day. As a result, the lack of manpower makes the process time-consuming and difficult. These challenges have led him to favor a blend of traditional and modern architecture.

Government policies have had minimal impact on traditional house construction in Kadu village. The Pradhan Mantri Awaas Yojana-Gramin (PMAY-G) provides approximately ₹1.30 lakhs for rural housing; but this amount is insufficient to build a complete house.[10] As a result, it does not significantly influence traditional construction. However, since financial support is available, villagers could use it to build semi-modern, semi-traditional houses. So far, the people of Kadu village have not availed themselves of these benefits, but there is a possibility of doing so in the future. Despite this, the limited financial assistance of ₹1.30 lakhs under PMAY-G is not enough to construct a proper house, resulting in minimal influence on traditional building practices. One of the village elders stated that they prefer a 'cement' house with semi-traditional elements over a fully modern or purely traditional house. When asked why, he explained

[10] Pradhan Mantri Awaas Yojana-Gramin is a social welfare programme initiated in 2016 under the Ministry of Rural Development, Government of India aimed at providing house to all the rural poor by 2028.

that constructing a traditional house presents significant challenges, from gathering raw materials to completing the structure.

Regarding housing patterns, the people of Kadu village generally follow a uniform style of construction. During the research, many respondents suggested that modern building techniques should be combined with traditional methods to preserve cultural heritage while ensuring durability.

CONCLUSION

The traditional construction techniques of the Galo tribe in Kadu Village, Koyu Circle, Lower Siang District, Arunachal Pradesh provide significant insights into indigenous architectural practices, sustainability, and cultural identity. The use of locally available materials such as bamboo, cane, timber, taek and canes reflects the community's deep understanding of the local environment, ensuring that their structures are well-adapted to the region's humid subtropical climate. The construction of stilt houses is particularly noteworthy, offering protection from pests, dust and damp conditions, showcasing the adaptability of Galo architecture to its surroundings.

Despite the increasing influence of modernization and a shift toward cement, tin roofing, and hybrid structures, traditional Galo houses continue to be an essential part of the village's heritage. The communal nature of house construction, where the entire village contributes to material collection and building, reinforces the strong social bonds within the community. Moreover, the belief systems and rituals associated with construction reflect a profound cultural connection to nature and spirituality, emphasizing the sacredness of traditional practices.

However, modernization has led to a gradual decline in these indigenous building methods, posing challenges to the preservation of traditional knowledge. While modern materials provide durability and convenience, they often lack the environmental harmony and sustainability inherent in traditional techniques. Therefore, it is crucial to document, revitalize, and integrate these age-old construction methods with modern advancements to ensure sustainable and climate-resilient housing for the future.

Recognizing the ecological and cultural significance of traditional Galo architecture can help policymakers, architects, and local communities collaborate in developing housing solutions that respect indigenous wisdom while addressing contemporary needs. Future research could explore how these traditional techniques can be adapted for modern rural development without compromising environmental integrity and cultural heritage. The preservation and promotion of traditional Galo building techniques in Kadu Village are not just about maintaining architectural aesthetics but also about safeguarding an invaluable repository of indigenous knowledge that offers sustainable and environmentally conscious living practices in Arunachal Pradesh and beyond.

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