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# THE PROSPECTS AND LIMITATIONS IN SUSTAINING VERNACULAR ARCHITECTURAL PRACTICES CASE OF KANALKADU

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**Abstract:**

Vernacular architecture is the architecture that is typical for a given region, having evolved through generations of accumulated knowledge, in response to social, cultural, environmental, and technological factors among others.It isoften the most sustainable and low-cost solution for a given context, despite which,vernacular architecture is slowly being replaced by modern materials and technology. But does it mean that vernacular architecture is no longer relevant?

A case study of the vernacular architecture of Kanalkadu – a rural settlement located in the Palani Hills of Tamilnadu – was undertaken to betterunderstand the relevance of vernacular architecture, and the challenges in sustaining the traditional building practices associated with it.The study revealed the multiplicity of factors that influence material choices in today's rural communities. The knowledge may be useful in creating alternative solutions that combine the merits of vernacular architecture while circumnavigating the barriers.

**Keywords:** Vernacular architecture, building materials, traditional materials, Rural architecture, Traditional architecture, Climate-responsive architecture

## Introduction:

Vernacular architecture may be defined as architecture that has organically evolved over time in a given region through knowledge accumulated over several generations, (Oliver. P. 2006, Brown and Maudlin, 2012) in response to local climate, culture, economy, availability of building materials and technical knowledge(Jayasudha, 2014; Srikonda, 2015). as a product of accumulated knowledge referred to as 'architecture without architects' by Bernard Rudofsky.Vernacular architectureis ingeniously crafted out of minimal resources, in the absence of advanced technology, to help mankind survive extreme weather conditions and other adversities, while fulfilling his social and cultural needs.

Studies indicate that the vernacular architecture of a place eventually makes way to modern materials and technology, owing to various factors ranging from cost, issues with the availability of resources, to man's changing needs and aspirations.

Shaped by indigenous knowledge and wisdom, vernacular architecture is now being recognized as an embodiment of sustainable building practices. The growing energy crisis and increased environmental awareness have elevated the value for vernacular architecture and the lessons it can offer in low-cost, energy-efficient, climate-responsive, eco-friendly solutions for a given place (Golden, E. 2017; Sayigh, A. 2019; Osma, M.M, 2019).

However, further studies are necessary, to understand the specific prospects and challenges in sustaining the vernacular architectural practices for any given region. In this paper, we share the results of a study undertaken to study the vernacular architecture of Kanalkadu – a rural settlement located in the Palani Hills of Tamilnadu – to understand the benefits of sustaining these building traditions and the barriers in doing so.

## Research questions:

1. What are the traditional building materials and methods practiced in Kanalkadu?
2. What are the prospects and challenges in sustaining these building traditions - based on the current and future needs of the community?

## The Study Area:

Kanalkadu is located on the slopes of the Palani Hills, which is part of the Western Ghats in the Kodaikanal block of Dindugul district in Tamilnadu. It is located 19 km away from Kodaikanal at 10.3022° N lat.

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and 77.6911° E long between the contours 1110 m and 1140 m above mean sea level. The climate is subtropical, with temperatures ranging from a maximum of 35°C in summer to a minimum of 8°C in winter.

The settlement is made up of 147 houses and has a population of 441 people. It is surrounded by coffee and pepper plantations and forms the primary source of income for many members of the village who own or work in these plantations. The younger generation prefers to move out of the village in search of an urban life and better opportunities, while the older generation show a greater attachment to the place and its values.

**Data collection – Methods:**

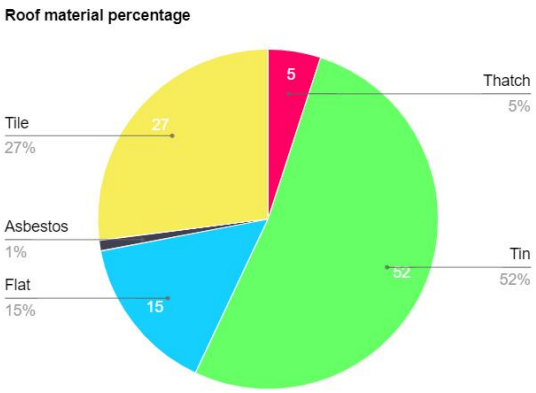
Primary surveys were conducted by a group of 11 architecture students (3 boys and 8 girls) from School of Architecture and Planning, Anna University, between 22nd February to 28th February. It was carried out as part of their fourth semester Rural Habitat Design Studio. A combination of methods was used for data collection, which included the following:

(i) Mapping of building materials used in the construction of walls and roofs
(ii) Primary documentation and analysis of housing typologies
(iii) Unstructured interviews and household surveys.

**Building materials used for construction of walls and roofs:**

Mapping of materials used in the construction of walls and roofs of buildings was carried out at settlement level in order to obtain a general overview of material usage.

**Fig 1.Roof material mapping** **Fig 2. Wall material mapping**



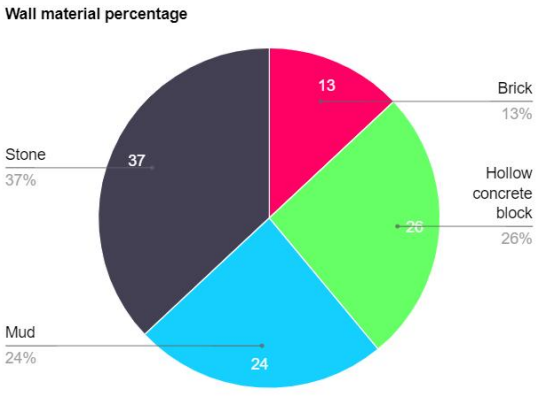




**Fig 3.Roof material percentage** **Fig 4.Wall material percentage**

It is found that the houses of Kanalkadu were traditionally constructed using mud or stone. Even today over 60% of the houses are still made of these materials. However, brick or hollow blocks seem to be increasingly preferred over the traditional materials for the modification or extensions of old houses and the construction of new houses.

Vernacular houses in Kanalkadu were found to have sloped roofs made of thatch or terracotta tiles supported on timber or bamboo. Over 25% of the roofs are tiled even today, however thatched roof has been almost

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entirely replaced by tin sheets with the exception of five poorly maintained structures. 15% of the houses have flat, concrete roofs, signalling an emerging trend.


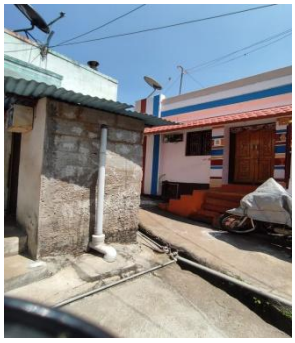

**Fig 5 .Thatch roof** **Fig 6. Flat roof** **Fig 7. Mangalore tiles** **Fig 8. Hollow Concrete block**



**Fig 9. Mud wall** **Fig 10. Stone wall with tin roof** **Fig 11. Brick wall**

**Factors affecting choice of building materials:**

| MATERIALS | FACTORS AFFECTING CHOICE OF BUILDING MATERIAL | LEVEL OF PREFERNCE |
|---|---|---|
| MUD | • Necessary skills are available within the community.<br>• Can be locally sourced and brought to site. Easy to handle.<br>• Prone to weather damage, requires constant maintenance.<br>• Affordable, no funding/incentives. | Medium |
| STONE | • Necessary skills are available within the community.<br>• Easy to source but may be difficult to transport and handle.<br>• Highly durable, requires less maintenance.<br>• Not affordable by all sections of the community, No funding/ incentives. | Low |

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| | | |
|---|---|---|
| BRICK | • Necessary skills are available within the community.<br>• Easy to source, but transport costs higher. Small in size, easy to handle.<br>• Durable, requires less maintenance.<br>• More expensive than mud, funding may be obtained | Medium |
| HOLLOW CONCRETE BLOCKS | • Necessary skills are available within the community.<br>• Easy to source and transport to site. Light-weight, easy to handle.<br>• Durable, requires less maintenance.<br>• Cheaper than brick, funding may be obtained. | High |
| THATCH | • Necessary skills are available within the community.<br>• Easy to source and transport to site. Requires skill to install.<br>• Highly prone to weather damage, requires frequent maintenance and replacing. Highly affordable, no funding/ incentives | Very low |
| MANGALORE TILES | • Necessary skills are available within the community.<br>• Easy to source and transport to site.<br>• Easy to install.<br>• Less prone to weather damage than thatch but may require occasional maintenance.<br>• Affordable. | Medium |
| TIN SHEETS | • Necessary skills are available within the community.<br>• Easy to source and transport to site than tiles.<br>• Very easy to install. Requires very less maintenance, easy to replace if needed.<br>• Economical, funding/ incentives may be available | Very high |

The study revealed that traditional building materials such as mud, stone and thatch were locally sourced from nearby forests and quarries, and the houses were usually self-built with help from the community. With improved road access over the last few decades, materials such as tile, brick, hollow concrete blocks and tin sheets have become easily available, although transportation and handling costs, which varies based on weight of material and travel distances, can significantly add to the cost of the material. The community is found to be equally skilled in building with the newer materials.

There seems to be an increasing aspiration to build brick, concrete, and hollow cement blocks – which are perceived as being maintenance-free, or 'more durable' compared to houses built of traditional materials. Lack of government support for building with traditional materials seems to influence this notion.

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While cost and availability of funding/incentives can be a driving factor behind the choice of building materials, factors such as disaster resilience and durability of material, the time, energy, and resources that go into maintenance, repairs, and replacement, and the ease of handling the materials at site are also considered.

Unstructured interviews revealed a strong inclination towards reinforced cement concrete (RCC) framed structures, especially for additions or newly built houses. The following reasons were frequently mentioned:

1. It is easier to negotiate the terrain; requires less cut and fill at the site,
2. It is easier to build raised structures to keep flood waters out,
3. It is easy to modify or add extra floor space when the need arises.
4. The flat roof provides the open space necessary for drying coffee/pepper/clothes.
5. It is easy to integrate the kitchen, toilets and running water.
6. It meets the aspirational needs of the younger generation.

However, it must be noted that amongst the older members of the community there seemed to be a greater preference and attachment for traditional houses, which they attributed to the following reasons:

1. They offered familiarity and comfort,
2. They were a lot cozier on cold nights and during winters.
3. They were simple, flexible, and suited their way of life better.
4. Traditional elements such as the *thinnai*served their social needs better.

**Climate responsiveness and disaster resilience of vernacular houses:**

Based on the survey results, it was found that houses built of traditional materials such as mud or stone walls were thermally more comfortable, especially during cold nights and winter season. This may be attributed to the following reasons:

(i) Walls built of mud or stone are thicker and have greater thermal mass compared to brick walls. They are thereby able to retain warmth inside the house better.

(ii) The walls are typically of lower height with minimal window openings, which further helps to retain heat.

(iii)The houses often have an attic space which lowers the ceiling height, making it cozier and warm.

(iv) The heat from the kitchen is retained within the house.

In recent times, it is found that hollow concrete blocks are preferred over brick in these regions, because they are not only lightweight and easy-to-handle, but also have a better thermal performance owing to their thicker sizes and air pockets.

In our study we find that a considerable number of vernacular houses – built of traditional materials have withstood the test of time. It was, however, noted for the materials in their ability to withstand natural disasters, and the amount of care and consideration needed in their design, construction, and maintenance.

Heavy rains and flooding are said to be a cause for concern in our study area. The increasing number of houses, and alteration of natural drainage patterns have caused flooding in low-lying areas. It was found that houses with mud walls can be especially prone to water damage if not placed on raised stone plinths or protected by deep overhangs on the windward side. Mud walls are said to need regular maintenance to increase its strength and durability.

Cyclones are yet another concern in the study area. Most of the thatch roofs in the area were heavily affected during cyclone ‘gaja’ in 2018. Few tiled roofs were also damaged. These have all been replaced by tin sheets with government aid.

**Conclusion:**

The study indicates that vernacular architecture not only lends a special character and identity to rural settlements, but it is also closely connected to the culture of the community. This can be inferred from the large number of houses in the study area that retain their vernacular character. This is possible because the community continues to hone the skills necessary to build and maintain these houses. These houses offer valuable lessons in sustainability and climate responsiveness, which are especially relevant in the context of climate change and energy crisis.

The study reveals the web of factors that influences the decision of whether to go for vernacular architecture or a ‘modern’ house. Though the community acknowledges the many advantages of vernacular architecture, the younger members of the community show a strong inclination for modern materials. They find that

it is better suited to meet their practical needs and aspirations. This shift is further influenced by government aid for 'pucca' houses or lack thereof for 'kuchcha' houses.

The study was successful in highlighting some of the prospects and challenges in sustaining vernacular architecture, particularly in the hilly regions of Tamil Nadu. We hope that it may help future researchers in identify ways to combine the merits of vernacular architecture with the practicality of modern technology.

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