

# A Study of Vernacular Architecture of Tamil Nadu

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**ABSTRACT-** This research study examines the rich legacy of vernacular architecture in Tamil Nadu, India, with an emphasis on its historical relevance, architectural features, and sustainable practices. Tamil Nadu's vernacular architecture has a wide spectrum of forms, from major Dravidian temples to simple the village houses. These structures provide not just functional needs, but also represent the communities' cultural identity and religious values. Furthermore, vernacular architecture in Tamil Nadu is highly sensitive to the local environment, with buildings planned to maximize natural ventilation, lighting, and thermal comfort. Traditional building materials like lime, timber, and terracotta are supplied locally, reducing environmental effects, and encouraging sustainability. Focusing on historical documents and academic research this study investigates the cultural, socioeconomic, and environmental influences that have impacted Tamil Nadu's vernacular architecture throughout the centuries. It also examines the current relevance of traditional architectural techniques in the context of growing urbanization and industrialization, highlighting the importance of maintaining and incorporating indigenous knowledge into sustainable development initiatives. Through case studies and comparative research, the article emphasizes the adaptability of Tamil Nadu's vernacular architecture, as well as its potential contributions to modern architectural discourse and sustainable design practices.

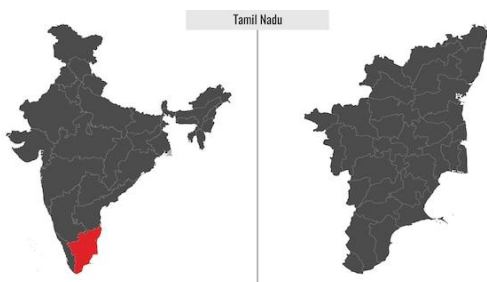
**Keywords-** Vernacular, architecture, climate responsiveness, sustainability, Tamil Nadu, South India, courtyard, Chettinad.

## 1. INTRODUCTION

Tamil Nadu, located in southern India, is known for its rich cultural heritage, lively traditions, and unique

architectural styles. One of the most fascinating aspects of Tamil Nadu's architectural legacy is its vernacular architecture.

Location of Tamil Nadu, India



Vernacular architecture refers to traditional construction styles and techniques that have evolved throughout time in response to the local environment, resources, culture, and lifestyle. In Tamil Nadu,

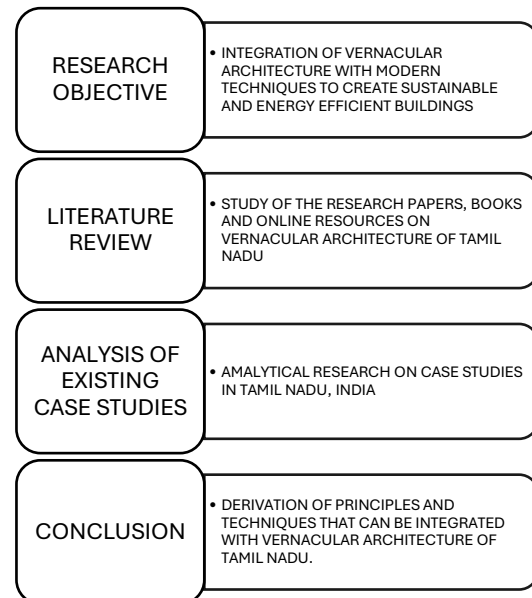
vernacular architecture not only displays the people's creative thinking, but also demonstrates their strong connection to the land and environment. The vernacular architecture of Tamil Nadu is defined by its diversity, adaptability, and sustainability. It includes a variety of structures such as residences, temples, palaces, and public buildings, each built to satisfy the individual needs of its residents while blending in with the natural surroundings. From the beautifully carved wooden cottages of Chettinad to the towering Dravidian temples of Thanjavur, Tamil Nadu's architectural landscape is rich in historical and cultural significance.

Tamil Nadu's vernacular architecture is distinguished by its climatic responsiveness, which includes strategies such as thick walls, high ceilings, and strategically placed vents for natural ventilation and cooling. This creates suitable living areas throughout hot and humid summers, demonstrating a deep regard for the earth and its limitations. Tamil Nadu's vernacular architecture varies by region to represent the different cultural and natural settings, several essential elements remain constant. Courtyard houses provide natural light and ventilation, while verandas and balconies provide additional living space and shade. Spatial organization also reflects social standards and cultural values.

The use of locally available materials like sunbaked bricks, clay tiles, wood, bamboo, and thatch distinguish this architectural style. This not only reduced transportation costs and environmental effect, but also promoted self-reliance and access to local resources. Construction techniques passed down through centuries provide valuable practical knowledge and sustainable practices. Today, as the world faces sustainability concerns and the necessity for climate-

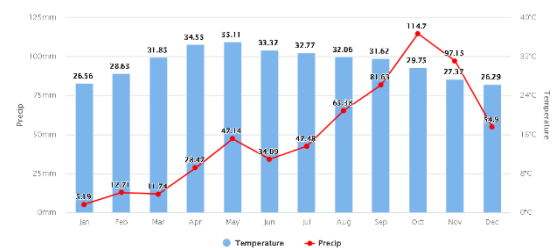
responsive design, Tamil Nadu's vernacular architecture provides useful insights. By learning and implementing its concepts, we may develop resilient and sustainable built environments for the future, while respecting the past.

## 2. METHODOLOGY



## 3. CLIMATE

Tamil Nadu has a tropical climate, which means it is hot and humid for most of the year.



**Figure 1-**The chart shows the mean monthly temperature and precipitation of Tamil Nadu

Source-<https://weatherandclimate.com>

- Average Maximum Temperature- 33.0°C (91.4°F)
- Average Minimum Temperature- 26.0°C (78.8°F)

- The average annual rainfall is approximately 1,000 mm (39 inches).
- Tamil Nadu experiences high humidity levels throughout the year, with an average of 65%.
- During the monsoon season, the prevailing winds come from the southwest, whereas the rest of the year they come from the northeast.

#### 4. TRADITIONAL DWELLINGS OF TAMIL NADU

##### 4.1 CHETTINAD HOUSES-

Chettinad houses are a unique architectural type seen in Tamil Nadu, India. These stately homes, built by the rich Nattukottai Chettiar community, are notable for their blend of Tamil architectural traditions and European influences.

Spatial Arrangement in Chettinad Houses:

- The Central Courtyard (Muttram)- is a wide, open-air courtyard that serves as a social focus as well as a source of natural light and ventilation. Rooms are arranged strategically around it, providing easy access, and building a sense of community.
- Functional Zoning: The spatial organization adheres to a clear functional divide.

The ground floor usually contains public rooms like:

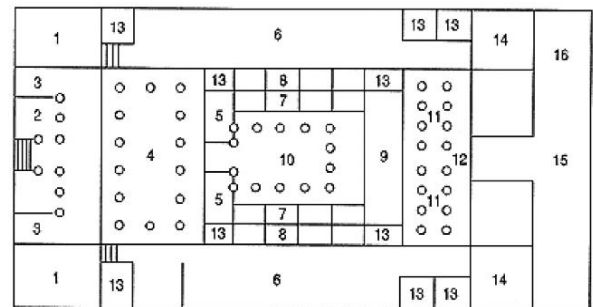
- Maattu Mandapam (Entrance Hall): A majestic entrance that leads to the courtyard.
- Thinai (Verandah): Large verandahs on either side of the entrance provide extra living and lounging space.
- Achchagam (Living Hall): A vast space for gatherings, festivals, and community events.

- Puja Room: A designated area for prayer and rituals.

Upper Floor: Accessed by a grand staircase, the upper floor is frequently used for private dwelling spaces.

This area can include:

- Bedrooms: Each has its own en suite bathroom for solitude.
- Sit-out Balcony: Ornate balconies overlooking the center courtyard provide a spot to unwind and enjoy the fresh air.
- Storage rooms are designated areas for storing valuables and other goods.



**Figure 2-** Plan of Chettinad house

1. Munn arai: front room
2. Muttram: courtyard
3. Talvaram: corridor

#### Central, Ceremonial Section of House

4. Kalyana kottakai: marriage hall
5. tinnai: the "public" room in a house
6. Bhojana salai: dining hall
7. Veliarai: outer room
8. Ullarai: inner room
9. Irantam maiya arai: second central hall

10. Muttram: courtyard, roofed or covered with grill work

#### **Back (Female) Section of House**

11. Muttram: courtyard, roofed or covered with grill work

12. Talvaram: corridor

13. Kalanjiyam: storeroom

14. Samaiyal arai: kitchen ("cooking room")

15. Pin kattu: backyard

16. Keni: well



**Figure 3-** Chettinad palace, Kanadikathan

#### **Materials and craftsmanship:**

- **Local and Imported Materials:** Chettinad houses are made of both local and imported materials.
- **Bricks and laterite** are used to build strong, durable walls.
- **Granite:** Polished granite flooring adds a sense of grandeur.
- **Teakwood,** imported from Burma (Myanmar), is used for doors, windows, furniture, and ceilings due to its durability and beautiful color.

- **Athangudi Tiles:** These handcrafted clay tiles are geometrically patterned and set on the floors to offer a vibrant touch.
- **Ornate Details:** Chettinad homes are famed for their elaborate embellishments.
- **Plasterwork:** Ceilings and walls are adorned with decorative plasterwork, which commonly features floral or geometric themes.
- **Stained glass windows:** (In some homes, European-style-stained glass windows offer color and complex designs.

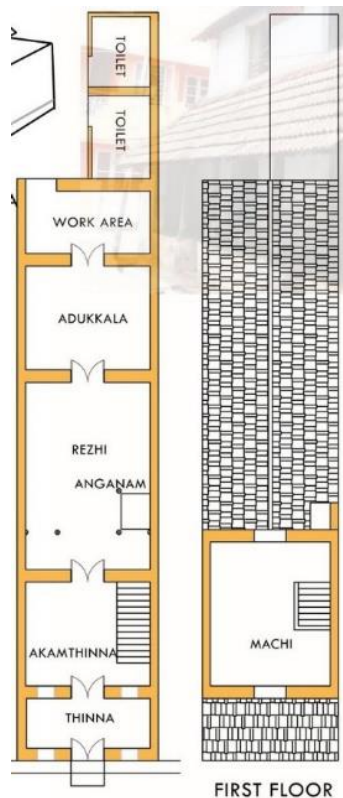
#### **4.2 AGRAHARM HOUSE**

An Agraharam house is a traditional type of residence commonly found in temple towns throughout South India, particularly in Tamil Nadu. These dwellings were typically constructed by Brahmin families, a Hindu priestly caste, and were intended to incorporate religious beliefs, local climatic circumstances, and social norms.

##### **Spatial arrangement in Agraharam house:**

- **Puramthinna-** the long corridor/verandah running in front of agraharams. This space acts as a community gathering place.
- **Akamthinna-** the small room next to puramthinna, this room incorporates the stairway leading to upper storey.
- **Rehzi-** central room acts as a living room, the important religious events are performed in this place.
- **Thalam-** space around the courtyard.
- **Muttram-** the courtyard is a part of rehzi.
- **Adukkala-** this is the kitchen.

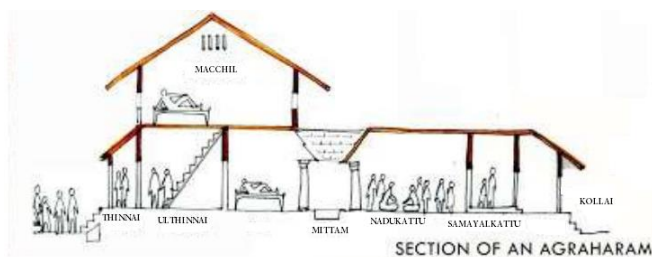
- Kuchil- these are the rooms located at the extreme end.
- Kottil- the independent structure located at the extreme end used for cowshed or a storage



space.

**Figure 4-** plan of Agraharam house

Source- <https://4.bp.blogspot.com>



**Figure 5-** section of Agraharam house

Materials and craftsmanship:

- Agraharam mansions are known for their elaborate woodwork, which includes carved wooden doors, windows, and pillars that display traditional motifs and designs.
- Roof structures might have sloping tiled roofs or flat terraces, depending on regional styles and climatic conditions.
- Decorative elements such as frescoes, murals, and stucco work on walls and ceilings enhance the visual appeal of the interiors.
- Agraharam buildings are frequently built with traditional materials such as locally available wood, clay bricks, lime plaster, and terracotta tiles.
- These materials add to the architecture's traditional appeal while also providing longevity and insulation

### 4.3 UPPUKAR HOUSES

These coastal residences, located in places like Nagapattinam, were designed specifically to withstand strong winds and severe rains. They typically have thatched roofs and high platforms for flood protection.

Spatial arrangement in Uppukar house:

- Central courtyard (muttram):  
The central courtyard is the focal center of the Uppukar house, acting as an open and airy space that connects other parts of the house.
- Verandas and corridors (Thinnai):  
Verandas or Thinnai run around the front and sides of the home, providing shaded outside



space for leisure, socializing, and interacting with neighbors.

- **Living areas (vedu):**  
Uppukar residences usually include several living areas, including a main living room, a dining area, and maybe additional areas for specific purposes like reading or entertaining.
- **Kitchen (Thaligai Veedu):**  
The kitchen, known as Thaligai Veedu, is typically located in the back of the house, away from public spaces, for practical efficiency and privacy.
- **Bedroom (Thirumuttam):** Uppukar houses often have bedrooms on the upper floor or in separate wings to provide isolation and peace. They can vary in size and layout depending on the family's requirements, with space for beds, storage, and personal things.
- **Storage areas (Anjali):**  
Anjali are storage rooms or closets built into the architectural design of Uppukar houses that provide structured storage for household belongings, clothing, and supplies.

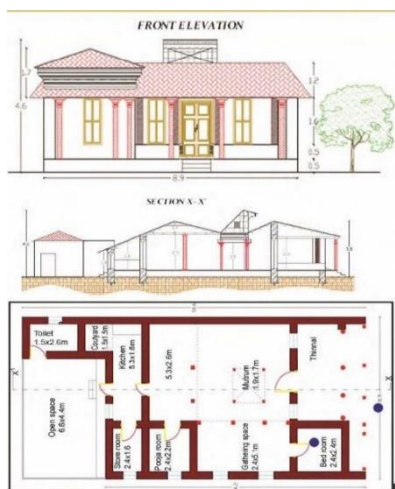


Figure 6 – plan of Uppukar house

Source- <https://www.semanticscholar.org>

Materials and craftsmanship:

- Uppukar houses have typical architectural elements including sloping tiled roofs, wooden beams, and beautifully carved woodwork on doors, windows, and pillars.
- The house's exterior may feature decorative elements, regional motifs, and workmanship, enhancing the dwelling's visual appeal and cultural relevance.

#### 4.4 MUDBRICK HOUSES

Toda is a tribal group located on the mainland of Ooty, also known as Udhagamandalam, in Tamil Nadu's Nilgiri region. The Toda community of Nilgiri's vernacular architecture is influenced by topography, local materials, socioeconomics, and other natural factors. Eco-friendly buildings made of sun-dried mud bricks are ideal for Tamil Nadu's parched plains. They provide adequate insulation and a cool living environment.

SETTLEMENT PATTERN-

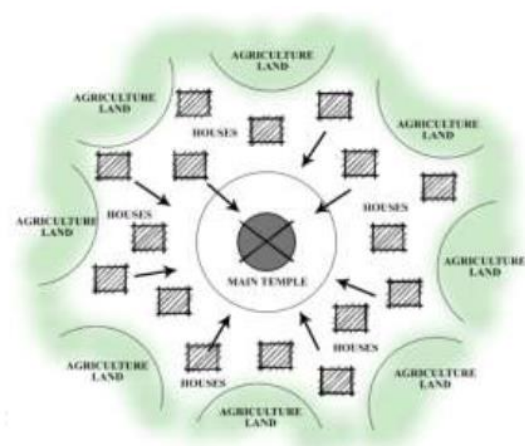
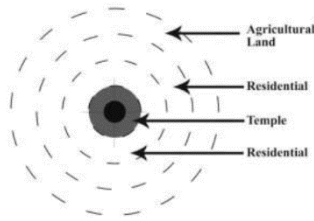


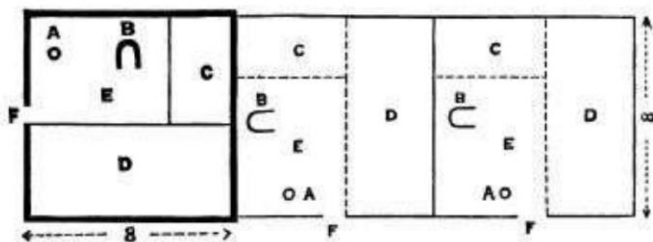
Figure 7- settlement pattern of Toda community



**Figure 8-** conceptual layout of mund

Spatial arrangement in mudbricks house:

- Todas' dwellings are typically made up of single rooms. Some residences are made up of two or three single units arranged in a line.
- The internal space, which is generally a rectangle, is divided into spaces based on practical purposes.
- The segregation of spaces prioritizes the elderly in the community by providing a designated sleeping area.
- Household members use the shared space for activities such as eating.
- Tribal communities rely on outside social connections, making inside common spaces less functional.
- The houses are rectangular, measuring 5.5 meters in length and 2.7 meters in breadth. The house's height is around 3 meters.
- The home is built on level land and surrounded by stone walls ranging in height from 0.9 to 1.5 meters.



**Figure 9-** plan of house of toda community

The three attached units form a larger house. A representing the pestle and mortar known as Kudi, B as the hearth, C as storage, D as a raised bed of clay for elders, E as a vacant space for dining and sleeping, and F as the entrance to each unit.

The structure could be placed at a lower level than its original ground level. The circular stone barrier, with a small entrance for escape and entry, protects the residence from wild animals. The house entrance is typically roughly 0.9m high, requiring occupants to stoop down to enter the complex through the fence opening. The house lacks windows, providing protection from wild creatures and inclement weather. The entryway, located in the center of the gable wall, measures approximately 0.9m (2 cubits) in height and 0.7m (1.5 cubits) in breadth. Designed for multipurpose use, including passages for light, air movement, and smoke.



**Figure 10-** view of toda community house

### CONSTRUCTION TECHNIQUES-

The construction of the house makes full use of locally accessible resources.

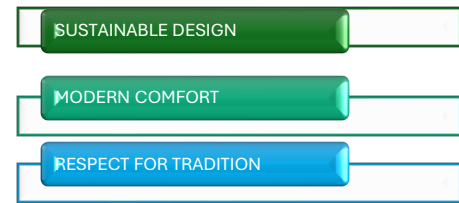
- The roofs are covered with native grass and bamboo, secured with split rattan.

- Roofs are curved or angled at the top, supported by wooden ridge poles.
- The end walls are often composed of sturdy planking, and partition walls for larger houses follow the same pattern.
- Some walls are built from stones, particularly granite.
- The side walls are constructed by lowering the roof to the ground, where the ends of the curved bamboo rafters are all embedded.
- Flat stones are used to fill the gap between the ground and the roof, preventing water from penetrating into the homes. Clay mixed with cow manure covers the crevices between planks.

## 5. A MODERN APPROACH TO TRADITIONAL BUILDINGS

Tamil Nadu's architectural legacy exemplifies innovation and flexibility. Traditional dwellings were not only attractive, but also functional due to the region's hot and humid climate and agrarian lifestyle. Today, a new generation of architects is reinventing this history, developing a distinct style known as Modern Vernacular Architecture.

### CORE PRINCIPLES-



### ADVANTAGES –



#### a. AUROVILLE-

Auroville is an innovative township near Puducherry, Tamil Nadu, India. It was formed in 1968 with the goal of creating a universal community where people of many cultural backgrounds and origins may live in harmony. Auroville's vernacular architecture exemplifies this ambition by combining traditional building techniques with contemporary sustainability practices.

Here are some features of Auroville's vernacular architecture:

- **Natural Materials:** Auroville promotes the use of locally derived and natural materials including soil, stone, bamboo, and thatch. These materials are not only environmentally beneficial, but they also help to create a distinct aesthetic that is rooted in the region's traditional architecture.
- **Earthen Construction:** Many structures in Auroville are built of rammed earth or adobe. Earth-based construction methods provide thermal insulation, which helps to keep indoor



temperatures tolerable in Tamil Nadu's hot and humid climate.

- **Thatch Roofing:** Auroville's architecture frequently features thatch roofs built of locally accessible materials such as palm leaves or grass. These roofs are lightweight, breathable, and provide enough insulation against heat and rain.
- **Ventilation and Natural Light:** Auroville's buildings are intended to promote natural ventilation and daylighting. Large windows, courtyards, and verandas encourage airflow while reducing the need for artificial lighting and mechanical ventilation.
- **Sustainable Practices:** Auroville supports sustainability through its construction, which includes rainwater gathering systems, solar panels for energy generation, composting toilets, and organic farming practices.

### 5.1.1 Earth Institute, Auroville

Satprem Maïni founded Earth Institute, Auroville in 1989 with help from HUDCO (Housing and Urban Development Corporation), Government of India. The Earth Institute is an Auroville-based research and development institution that focuses on sustainable building methods, renewable energy, and environmental conservation.

#### Vernacular Techniques:

- **Earth Construction:** Many structures in the Earth Institute complex are built using rammed earth and stabilized mud blocks, which are traditional techniques that use locally obtained dirt blended with stabilizers like lime or cement.



**Figure 11-** Training Centre of the Auroville Earth Institute

Source -<https://www.earth-auroville.com/>

- **Thatch Roofing:** Thatched roofs composed of local materials, such as palm fronds or grasses, are utilized to give natural insulation and visual beauty.

#### Sustainable Features:

- **Passive Design:** Buildings are built to use passive cooling and heating strategies, such as orientation for natural ventilation and shading to reduce solar heat gain.
- **Rainwater Harvesting:** Rainwater harvesting systems collect and store rainwater for irrigation and non-potable consumption, minimizing dependency on external water sources.
- **Solar Energy:** Photovoltaic panels assembled on rooftops use solar energy to generate power, helping the institute achieve its objective of integrating renewable energy.

- Waste Management: Organic waste is managed using composting toilets and wastewater treatment systems.



**Figure 12-** multi aspects of sustainability

### 5.1.2 WALL HOUSE, AUROVILLE

The Wall House in Auroville, created by Anupama Kundoo, is a prime example of sustainable and indigenous architecture. Anupama Kundoo's Wall House is a model for sustainable dwelling that combines ancient construction methods with modern design ideas. The concept stresses locally sourced materials, passive design principles, and community involvement.

- Passive Design Strategies: The house is ideally situated among deep foliage in all directions. The north-east and south-west orientation optimizes air circulation.



**Figure 13-** wall house

Source- <https://archello.com>

- The western side features balconies with huge transparent fenestrations facing toward the wind.
- Materials & Construction: The Wall House has walls built of compressed stabilized earth

blocks (CSEB), which are formed on-site by mixing earth from the local region with stabilizers such as lime or cement.



**Figure 15-** interior of wall house

- Locally grown bamboo is employed for structural parts and shading devices, demonstrating environmentally friendly alternatives to traditional building materials. The rustic and natural ambiance creates a sense of connection between structures and the surrounding natural environment. The house's interiors feature minimalist materials and lush greenery, creating a serene atmosphere.

### b. ISHA YOGA CENTRE

The Isha Yoga Centre in Coimbatore is a prime example of modern vernacular architecture, combining traditional components with contemporary design and environmental practices. Architect C. N. Raghavendran built the center to reflect the region's traditional legacy while also including new features.



**Figure 16-** Isha yoga Centre, Coimbatore

Source- <https://isha.sadhguru.org>

#### 1. Architectural Design and Layout:

- **Architectural Style:** The center's architecture draws inspiration from traditional Tamil Nadu building types, including sloping roofs, open courtyards, and local materials.
- **Temple Complex:** The area features a vast temple complex with intricately carved pillars that represent traditional South Indian temple design. The design focuses on spirituality and peace.
- **Meditation Halls & Spaces:** Natural lighting, simple interiors, and serene surroundings are some of the factors used to facilitate introspection and meditation techniques.

## 2. Traditional Elements:

- **Sloping Roofs:** The structures have sloping roofs constructed of clay tiles, which are both aesthetically beautiful and useful in diverting rainfall.
- **Courtyards:** Open courtyards and verandas are built into the architecture, giving shaded areas for rest and socializing while allowing for natural ventilation.
- **Local Materials:** Using locally derived materials such as bricks, stones, and wood connects the center to its surroundings while also supporting sustainable construction techniques.

## 3. Functional Spaces:

- **Meditation halls:** The center's meditation halls are vast and created for tranquility and spiritual practices, with architectural aspects that enhance guests' spiritual experiences.



**Figure 17-** meditation hall, Isha yoga Centre

Source - <https://isha.sadhguru.org>

- **Residential quarters:** The Isha Yoga Center's accommodations are meant to give residents and guests comfort and convenience while remaining connected to nature and local architectural traditions.

## 4. Climate Responsive Features:

- **Thick Walls:** Constructed of bricks or stones, these walls provide insulation from Coimbatore's hot summers while maintaining cooler interior temperatures.
- **Deep Verandas:** Verandas that extend from the main building give cover from the sun and nice outdoor sitting spots.
- **Courtyards** are open-air spaces included in the building design that provide natural light, ventilation, and a connection to nature.

## 5. Building Materials:

- **Fired bricks** are a popular and long-lasting construction material in the region, giving excellent insulation and thermal mass.
- **Terracotta** is an ornamental, roofing, or flooring material that is both attractive and heat resistant.
- **Granite** is locally sourced and durable, it might be utilized for flooring, pillars, or countertops.

- Wood is used in doors, windows, furniture, and roofing structures to provide natural insulation and a touch of elegance.
6. Harmony with surroundings:
- Local Vegetation: Landscaping may include trees and plants native to the Coimbatore region, which require less water and complement the natural surroundings.
  - Preserved Waterbodies: Existing streams, ponds, or rainwater harvesting systems could be included in the design to conserve water and provide a peaceful environment.



**Figure 18-** waterbody at Isha yoga Centre

Source - <https://medium.com>



**Figure 19-** Suryakund, Isha yoga Centre

Source- <https://isha.sadhguru.org>

## 6. CONCLUSION-

Even today's generation can benefit from Tamil Nadu's vernacular architecture.

Traditional buildings were constructed with locally available resources such as clay, terracotta, and wood. These are not only environmentally friendly, but also provide natural insulation, keeping homes cool in the summer and warm in the winter. Features like central courtyards, verandas, and sloping roofs improved ventilation and natural lighting, lowering the demand for air conditioning and artificial lighting. The Agraharam design, with dwellings bordering temple streets, created a strong sense of community. Incorporating these ideas into modern designs can result in sustainable, energy-efficient homes that are appropriate for the Tamil Nadu environment. However, directly implementing traditional features may not always be possible. Today's needs differ, with smaller plots and nuclear families.

Vernacular concepts can be integrated with modern construction technologies to create sustainable and energy-efficient buildings-

### 1. Materials Innovation:

- Modernized Vernacular Materials: Create advanced versions of classic materials. Examples include burned bricks with better thermal insulation characteristics and stabilized earth blocks made from recycled plastic combined with earth.
- Bio-composite Materials: Investigate bio-composite materials such as bamboo reinforced with bio-resin for lightweight and robust structural parts that reflect traditional dependence on natural materials.



## 2. Climate-responsive Design:

- **Passive Cooling with Modern Technology:** Combine traditional wind towers and courtyards with strategically placed sensors and computerized ventilation systems to achieve maximum natural cooling.
- **Building Envelopes with Vernacular Inspiration:** Create building envelopes influenced by classical features such as overhanging eaves. Modern materials can be utilized to generate these features, which improve shading and reduce heat gain.

## 3. Energy Efficiency Integration:

- **Solar Integration with Vernacular Features:** Incorporate solar panels smoothly into roofs that have been planned with sun angles, drawing inspiration from ancient methods of maximizing sunlight exposure.
- **Smart Building Control Systems with Vernacular Design:** To maximize energy efficiency, integrate smart building control systems such as occupancy sensors and daylight harvesting controllers into vernacular architecture.

## 4. Water Management:

- **Rainwater Harvesting Using Traditional Techniques:** To gather and reuse water efficiently, combine traditional rainwater harvesting techniques such as cisterns with contemporary filtering technologies.
- **Greywater Recycling Systems in Vernacular dwellings:** Incorporate greywater recycling systems into traditional dwellings, employing

modern technology to treat used water for non-potable use.

5. **Community Engagement:** Local communities should be involved in the planning and building process, with their knowledge of traditional customs and preferences considered. This generates a sense of ownership and encourages culturally suitable and sustainable building options.
6. **Lifecycle Assessment:** Evaluate the environmental impact of buildings from construction to dismantling. Design buildings with materials and technologies that have a low environmental effect during their entire existence.
7. **Education and Awareness:** Educate architects, builders, and all people about the advantages of combining vernacular concepts with modern technologies to create sustainable and energy-efficient structures. Encourage the execution of these practices through public awareness campaigns and policy recommendations.

By combining the knowledge of vernacular architecture with the strength of modern technology, we can design buildings that are not just sustainable and energy-efficient, but also beautiful, culturally sensitive, and well-suited to their surroundings.

## 7. SCOPE OF FUTURE RESEARCH

Tamil Nadu's vernacular architecture has tremendous potential for promoting sustainable and culturally sensitive design methods. Conduct in-depth research into regional variances in vernacular architecture throughout Tamil Nadu. Improve the performance of traditional materials such as burned bricks, earthen plasters, and natural textiles. This could include



increasing their durability, fire resistance, and thermal performance. Compare the energy efficiency and thermal comfort afforded by vernacular construction methods to modern buildings. Examine the natural disaster resilience of traditional construction techniques utilized in vernacular architecture, especially in earthquake- or flood-prone areas.

## REFERENCES

- Anupama Kundoo Architects. (2020). The Wall House at Auroville, by Anupama Kundoo Architects. Retrieved May 19, 2020, from <https://architecturelive.in/the-wall-house-at-auroville-by-anupamakundoo-architects/>
- Anupama Kundoo Architects. (2020). Wall House Plan. Retrieved May 21, 2020, from <https://www.moma.org/collection/works/275238>
- Anupama Kundoo Architects. (n.d.). Wall House. Retrieved May 17, 2020, from <https://www.anupamakundoo.com/wall-house/>
- Barwal, V. (2014, October 7). SlideShare. Retrieved April 27, 2020, from <https://www.slideshare.net/vbarwal/sangath>
- Rapoport, Amos, House, form, and culture, 1969, 2,3, 8,16, 61, Prentice Hall, 1969
- Toda huts Ooty homepage on Holidays DNA. [Online]. Available: <https://ootytourism.co.in/sightseeing-places-to-visit-in-ooty>
- <https://www.scribd.com/presentation/440397158/ISH-A-YOGA-CENTRE-pptx>
- <https://www.scribd.com/presentation/440397158/ISH-A-YOGA-CENTRE-pptx>

<https://www.earth-auroville.com/>

<https://www.re-thinkingthefuture.com/architectural-styles/a2257-10-examples-of-vernacular-architecture-in-south-india/#:~:text=1.,Houses%20%7C%20Houses%20of%20Tamil%20Nadu&text=The%20first%20vernacular%20house%20that,traded%20with%20the%20then%20Myanmar>

[https://www.researchgate.net/publication/369173563\\_Vernacular\\_Architecture\\_in\\_India\\_A\\_Review\\_Article](https://www.researchgate.net/publication/369173563_Vernacular_Architecture_in_India_A_Review_Article)

<https://www.ijcrt.org/papers/IJCRT2005379.pdf>

Al-Tamimi NA. Toward sustainable building design: Improving thermal performance by applying natural ventilation in hot-humid climates. Indian Journal of Science and Technology. 2015 Oct.

Blaser, Werner. Atrium: Five Thousand Years of Open Courtyards.

Lee SH. Continuity and consistency of the traditional courtyard house plan in modern Korean dwellings.

Salama A. A typological perspective: the impact of cultural paradigmatic shifts on the evolution of courtyard houses in Cairo.

Myneni KK. "Courtyard as a Building Component". Its role and application in developing a traditional built form creating comfort: A case of Athangudi Village, India. IJCEBS. 2013; 1[4]:633–9.

Jayasudha P, Dhanasekaran M, Devadas MD, Ramachandran N. A study on sustainable design principles: A case study of a vernacular Thanjavur region of Tamil Nadu, India.

Sanjeev Maheswari, "An Ancient Indian Architecture.", 2001.