

# Integrating Vernacular Strategies into Contemporary Architecture (Kerala Building)

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**Abstract** - The purpose of this study is to design the integration of vernacular Architecture into modern contemporary architecture to achive thermal Comfort in warm and humid climate(kerala).

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Because of fast developing of Urbanization the kerala traditional architecture rapidly reduced that Extends to losing its culture and function of the traditional forms and Designs .lack of using vernacular consideration led to poor nature Contexts and creating discomfort to the occupants. And the main intend is To bring back the vernacular stratagies and the sociocultural which Reflects by adopting and considering the local environment planning Principles ,forms ,aesthetics, built forms .

Methodology of this study is by Finding architectural context of the kerala vernacular stratagies that Been played effectively as passive stratagy with detail analysis and Research and identifying the available linkages that can be easily adopted Without eleminating the components of traditional buildings and Interpreted into modern architecture .the study on this paper shows that Detail analysis on vernacular passive stratagies in kerala that can be Adopted which can also create more comfortable for the occupants.

# **1.INTRODUCTION**

'NATIVE', 'MONUMENTAL', 'PRESTIGIOUS', 'PRIMITIVE', 'INDIGENOUS', "TRADITIONAL', 'LOCAL', 'ARCHITECTURE WITHOUT ARCHITECTS', 'FOLK', 'RURAL', 'ETHNIC', 'INFORMAL',.....

There are some common areas of interest, which are common to all these terms or vocabularies. These common areas are making difficulties for the clear distinctions between the terms. Among those, the term which has gained the widest acceptance is 'vernacular architecture' with its linguistic comparison to the common people. Vernacular architecture is composed of local materials and derived from local customs, techniques that have been passed on from generation to generation.

Architecture is the physical manifestation of the needs and aspirations of a society and is determined by the environmental, socio-cultural, and political climate of a place or a region. Each period in history can be associated with a genre of architecture, which is reflective of beliefs and achievements of the society it represents. It includes the inter relationships of the built and open spaces within the larger landscape

### 1.1 **AIM**

Detailed study of traditional built forms and vernacular strategies and adaptation of identified linkages in the design of modern built forms.

# **1.2 OBJECTIVE:**

The objective of the study is to find patterns and sources of settlement, buildings, living cultures and local indigenous knowledge.

Using the understanding of vernacular architecture, the categorization of types are assessed with aspects such as culture, social aspects and geography to interpret from it possible factors that espouse the conceptualization of forms, spaces and the living culture.

# **1.3 SCOPE :**

**1.Identify** To study the traditional buildings and identify the historical concepts and passive strategies that can be addressed through the scope of sustainable architecture.

**2.Formulate** To formulate design brief with a solution for identified studies.

**3.Design** Designing modern built form by adopting the old traditional architecture.



### **1.4 METHODOLOGY :**

#### 1. Introduction to vernacular architecture

Researching of vernacular architecture and knowledge of climatic features of kerala and historical ,environmental ,construction materials ,morphology ,topography and culture.

#### 2. Research in kerala vernacular architecture

The information collected for the purpose of the study is through wide travel and photo documentation of traditional architecture in the area of study where many deviations from the traditional ways of designing and construction of houses are noticed.

Studies of built form in different geographical regions reveal how indigenous technologies evolved to create human comfort conditions in a sustainable manner.

Studies of qualitative approach through explanatory qualitative analysis and comparative synthesis methods for vernacular sustainable strategies used in kerala vernacular architecture at the building scale.

#### **3.Design consideration of warm and humid climate.**

Weather is conclusively warm and humid and that makes shading and ventilation a critical role in dwellings design to provide thermal comfort to the occupants.

Usually in warm and humid are designed with naturally cross-ventilated spaces, with the utilization of louvered doors, windows and openings; angled sunshades and eaves that keep the sun at bay; vertical stilts that elevates the structure and helps to capture higher breeze and prevent flood or soil damage; and steep roofs to shed direct sun and heavy rainfall.

# 4.Detailed research of Kerala traditional architecture.

Case study of Kerala traditional building in detail qualitative analysis ,forms , structures, passive strategies ,materials.

#### **5.Integration as solution to Achive thermal comfort**

The common building materials used for vernacular construction in Kerala are detailed and analysed and simulated

Study and analysis of new innovative concepts or components that adopted from the vernacular architecture and make possibilities to integrate into modern contemporary architecture .

#### **1.5 RESEARCH QUESTION**

Main: why it is needed to design towards contemporary vernacular architecture in relation to achieve human comfort.

What are the design consideration in warm and humid climate?

What are the kerala vernacular features used to achieve human comfort?

Why and how the features are adopted in the design?

Why is integration needed and how does integration improves the living condition?

#### 2.1 WHAT IS VERNACULAR ARCHITECTURE

**Vernacular architecture** is architecture characterised by the use of local materials and knowledge, usually without the supervision of professional architects.

Vernacular architecture represents the majority of buildings and settlements created in preindustrial societies and includes a very wide range of buildings, building traditions, and methods of construction.<sup>[1]</sup> Vernacular buildings are typically simple and practical, whether residential houses or built for other purposes.

# 2.2 VERNACULAR ARCHITECTURE IN KERALA

Building Materials The common building materials used for **vernacular** construction in **Kerala** The masterful joinery and skillful carvings are common in olden are mud, laterite and granite stone blocks, lime mortar, wood, bamboo, clay roofing tile and coconut palm leaves.

Broadly speaking, however, vernacular architecture of a region is primarily influenced by the following characteristics:-

1) Climate.

2) Locally available building materials.

3) Indigenous Construction Techniques.

4) Local customs and Social Traditions also influence and mould vernacular architecture of a region. Thus there is a need to study social and cultural influence on built form.

#### 2.3 HISTORY AND ORIGIN

Kerala gets its indigenous style of architecture from all climatic, geographical, and historical factors.

Favored by generous rains because of monsoon and bright sun, this land is lush green with foliage and rich in beast life. In the uneven terrain of this region, mortal habitation is distributed thickly in the rich lowlands and sparsely towards the hostile mounds. Heavy rains have brought in presence of large water bodies in form of lakes, gutters, backwoods, and lagoons. The climatic factors, therefore, made its significant benefactions in developing the architecture style, to fight the wettest climatic conditions coupled with heavy moisture and harsh tropical summers.

Geographically, Kerala is a narrow strip of land lying in between the seacoast of peninsular India and confined between the towering Western Ghats on its east and the vast Arabian ocean on its west. History also played its benefactions on the Kerala architecture. The towering Western Ghats on its east have successfully averted influences of bordering Tamil countries into present-day Kerala in after times. While the Western Ghats insulated Kerala to a lesser extent from Indian conglomerates, the exposure of the Arabian ocean on its east brought in close connections between the ancient people of Kerala with major maritime societies like Egyptians, Romans, Arabs, and so on. Kerala's rich spice polish brought it a center of global maritime trade until the ultramodern ages, helping several transnational powers to laboriously engage with Kerala as trading mates. This helped in bringing in influences of these civilizations into Kerala's architecture.

#### 2.4 CLIMATE

Through the years, amazing skill has been shown by primitive builders in dealing with climatic problems, and their ability to use minimum resources for maximum comfort. One is repeatedly struck by the knowledge and discrimination of such builders in selection of sites and materials suitable to the specific local microclimate. The traditional requirements for placement on site and form which may sometimes have a climatic rationale often become too rigid, not allowing for adjustments of the model for specific local requirements.



Fig-2.1 - : Location of Kerala in India.

Kerala is situated at the south most tip of India between latitudes 8°.17"30"N and 12°.47".40"N in the northern hemisphere and longitudes 74°.27"47"East and 77°.37".12"East. (**Fig 1**)The mean daily temperature fluctuates from 26 to 27.5 degree Celsius over the course of a year. The mean daily maximum temperature ranges from 29 to 32.5 degree Celsius. Humidity fluctuates through a considerable range. For the same day humidity may range from 70-80% at 9 am and 50-60% at 6 pm. Thereby, humidity plays a major role in determining the strategies for achieving comfort. The tropical heat and humidity are the main guiding factors behind the climate-responsive design of vernacular dwellings.



### 2.5 LOCAL BUILDING MATERIALS

Vernacular builders are able to conserve their materials because they have detailed and precise knowledge of the behavior and characteristics of materials, not just in terms of climatic response and construction, but also in regard to weathering- how the materials and building fabric will stand up to the ravages of time and weather. Vernacular builders always use materials most conveniently available and often the nature of local materials determines form. The availability of granite -a strong and durable building stone is restricted mainly to the highlands and marginally to some hilly zones. Accordingly, the skill in quarrying, dressing and sculpturing of stone is scarce in Kerala. Laterite stone however, is abundantly found Soft laterite available at shallow depth can be easily cut, dressed and used as building blocks. It is a local stone that gets stronger and durable with exposure to the atmosphere. Block of this stone may be bonded in mortars of shell lime, the classic binding material used in traditional buildings. Lime mortar can be improved in strength and performance by admixtures of vegetable juices. Such enriched mortars were utilised for plastering and low relief work.



*Fig-2.2 - : Varied typologies of traditional vernacular dwellings in Kerala.* 

Timber remains the prime structural material abundantly available in Kerala, in many varieties - from bamboo to teak and rosewood. The skilful choice of timber, artful assembly and delicate carving of wood work for columns, walls and roofs frames are the unique characteristics of Kerala architecture, using accurate fit of joints.

Clay was used in many forms - for walling, in filling the timber floors and making bricks and tiles after firing in kilns, tempered with admixtures. Palm leaves are still used effectively for thatching the roofs and for making partition walls and along with mud.

Clay was used in many forms for walling, in filling the timber floors and making bricks and tiles after firing in kilns, tempered with admixtures. Palm leaves are still used effectively for thatching the roofs and for making partition walls. Along with mud walls it is still the poor man's construction material.

#### 2.6 ROOFING SYSTEM

Structurally the roof frame was supported on the pillars on walls erected on a plinth raised from the ground for protection against dampness and insects in the tropical climate. The roof frame consisted of the wall plate which supported lower ends of the rafters, the upper ends being connected to the ridge. The ridged roof pitched at angles between 30degree to 40degree. The roof with intricately carved gables protruding from the roof with overhangs supported by wooden brackets. No nails are used. The roof is kept in position by interlocking with the hole in the rafters.



Fig-2.3 - pitched roof of kerala



#### 2.7 TYPOLOGY OF STRUCTURE

According to structural and spatial arrangements, there are five general types of residential forms (veedu) in Kerala notably:

1. Rectangular hall (I-Shape) type shelter, belonging to ordinary folk and some tribal people (adivasis). They don't necessarily follow any formal treatise.

2. Rectangular single-hall building (I-shape) type, with structural type of: ekasala; and ekasala with extension.

3. Traditional courtyard house, nalukettu ; and their derivative types, e.g.: Great mansion of ettuketu (Malayalam terms for double nalukettu), patinjarukettu (Malayalam terms for double ettukettu). They are characterized by consistency in complying with the prescription of regional vaastushastra.

4. Vernacular courtyard house: kuttikettu (Malayalam term for ekasala with courtyard-like extension). They are practically veedu with small courtyard and their structure contained many exceptions from the regional vaastushastra; Nalukettu with small courtyard and the Muslim's Veedu.

The five general types and their variants could be related to one another with regard to sequential establishment from rectangular hut, rectangular house, and rectangular house with extension, courtyard house and multi-courtyard house.



#### Fig-2.4 - Basic Core-Veranda Structure of Ekasala Fig-2.5 - . A Veedu at Chengganur

# 2.8 TRADITIONAL SPACES IN THE ARCHITECTURAL OF KERALA

Unlike in European cities ,where large public spaces are built into the city road networks, kerala does not have many open spaces for public interaction. Spaces for interaction were restricted to domestic and religious architecture.two such spaces of interaction may be studied here in courtyard of agraharam



Fig-2.6 - A Manna in Pallipuram, not to scale

Kerala had developed its own housing concepts from time immemorial, which is unique in the sense that it is highly scientific, technical and adaptive to the environment. The major styles of Kerala's architecture are classified into two major styles as mentioned below: Chatussala and Thravad style. Agraharams.

The types of Traditional Houses can also be broadly classified into four types depending on The number of blocks contained in the dwelling:

- Ekashala (a single unit block)
- Dwishala (an assemblage of two blocks)
- Trishala (three blocks)
- Chatussala (four blocks with courtyard)

#### 2.8.1 CHATUSSALA.

Chatussala is the most primitive form of Kerala house. Chatussala means the assemblage of four blocks with a courtyard or an edifice of four halls. The four blocks are individually called as Dikshalas, each oriented to a cardinal direction. They join together, enclosing a central courtyard or anakanam or nadumuttam, to form a Nalukettu.

The free flow of air and the pressure system are vital in the designing of Chatussala. Similarly the

triangular shaped roof follows the Pythagoras Theorem, whereby, the 3-4-5 arithmetical systems fulfill it.



Fig-2.7 - Chatusala planning

# 2.8.2 THARAVAD STYLE

The traditional homestead in Kerala is the 'tharavadu', a complex built unit comprising of many sections with specific usages. It has evolved from the basic Chatussala form. The basic units of these houses were square or rectangular structures where four blocks are joined together with a central courtyard open to the sky. The four halls on the sides are named vadakkini(northern block), padinjattini(western block), kizhakkini(eastern block) and thekkini(southern block).



Fig-2.8 - : Different names of the blocks in Thravad Style.

Based on the number of courtyards, the Thravad Style House has been broadly divided into following three types as mentioned below:

1. Nalukettu-one courtyard with four blocks in cardinal directions

2. Ettukettu-two courtyards with eight blocks in cardinal directions.

3. Pathinarukettu-four courtyards with sixteen blocked structure.

### 2.8.3 NALUKETTU.

Nalukettu is the traditional homestead of Tharavadu where many generations of a matrilineal family lived. The four blocks are individually called as Dikshalas, each oriented to a cardinal direction. They join together, enclosing a central courtyard or anakanam or nadumuttam, to form a Nalukettu. The architecture was especially catered to large families of the traditional tharavadu, to live under one roof and enjoy the commonly owned facilities. Among those architectural strategies a few are, as follows

1. That at the middle of the padnijatini(western block), there will be the pooja muri(placeof worship) and 'nellara' (room for keeping paddy).

2. On both the sides there will be two bed rooms Thekkini and kizhakkini are meant for receiving the guests.

3. Vadakkini is for cooking and dinning. (Kitchen and dining room).

4. In the middle of the structure there will be the central yard which will be in arectangular shape. 'Nadumuttam' (central yard) will be useful for getting lightand air into the house.

5. Moreover there will be an underground cave for storing the rain water that falls in the 'Nadumuttam'.



Fig-2.9 - : Section of a typical Nalukettu

### **2.8.4 ETTUKETTU**

An 'Ettukettu' is that which is joined by two 'nalukettu's. An 'Ettuketu' will have two nadumuttams. (central yard)For larger homes and wealthier families, there are more elaborate forms of the Nalukettu, called the Ettukettu (eight halls with two central courtyards)





Fig-2.10 - : : Elevation & Plan of a typical Ettukettu

#### 2.8.5. PATHINARUKETTU

Pathinarukettu is elaborate buildings characterized by sixteen halls with four central courtyards. They belong to the wealthier people of Kerala including the royal families.



Fig-2.11 - Elevation of a typical Pathinarukettu

#### 2.8.6 AGRAHARAMS.

The Agraharams of Kerala is the standing vestiges of the history of a group of people who were basically Brahmins who had migrated to this land and made it their abode. The name originates from the fact that the agraharams have rows of houses on either side of the road and the temple to the village god at the centre, thus resembling a garland around the temple.

According to the traditional Hindu practice of architecture and town-planning, an agraharam is held to be two rows of houses running north-south on either side of a road at one end of which would be a temple to Shiva and at the other end, a temple to Vishnu.

The design and layout of the Brahmin agraharams are in contrast to the traditional architectural style followed in Kerala.



Fig-2.12 Planning of Agraharam. Fig-2.13 View of an Agraharam.

#### 2.8.7 FEATURES OF AGRAHARAMS.

-Followed a Linear Planning.

- Grid Iron Pattern or Concentric Ring- with temple forming the main focus.

-Rows of Houses – single or double storied – with traditional pitched roof form striking a significant profile against the sky.

- Narrow streets forming an integral extension of living space.

-Water bodies were always in the vicinity of the settlements as the Vedic life recommended.

-The spatial planning of the agraharams follows a linear pattern with rooms arranged one after the other. The spaces inside have special purposes, and among them privacy of the occupants is of the least concern.

# 2.9 ELEMENTS OF NALUKATTU AND ETTUKATTU



Fig-2.14 Planning of Nalukattu.

# 2.9.1 NADUMUTTAM (courtyard)

The courtyard of the nalukattu houses of kerala are the heart of the homes. Apart from serving from functional activities like drying rice having a water cistern garden or children playground. The space comes to life during festivals and domestic celebrations. However many cases of the courtyard house do not strictly obey the canonical principle of Vaastu. Some local varieties of nalukettu appear. There is another variation of nalukettu structure that performs more or less open lay-out space around a small courtyard.



Fig 2.15: The influence of internal courtyard of Kerala traditional residential buildings in providing a comfortable indoor environment

The courtyard could be so small that it works better as water cistern. The domestic activities are not necessarily confined inside segmented rooms but mix together in an open layout spaces around the courtyard (nadumutham). Nalukettu of this type could be so small that it only requires single wall-plate (uttaram) to bind the whole structures on which one continuous encircling roof structure rest. The construction of nalukettus of this type is built entirely from wooden structure with fewer openings. This type is found mostly in southern Kerala. In Kanyakumari district there is structure of courtyard Nayar landlord house of this description and it is locally termed as arapura



Fig 2.16. Christian Syrian House, not to scale

#### 2.9.2 PADIPPURA

It's a structure containing a door, forming part of the boundary wall for the house with a tiled roof on top. It's the formal entry to the site with the house.

### 2.9.3 POOMUKHAM

It's the porch of the house led by steps. Traditionally, it has a pitch-tiled roof with pillars supporting the same.

# 2.9.4 CHUTTU GALLERY

In Kerala architecture, the poomukham is accompanied by an open passage, the chuttu gallery.. which leads to either side of the house surrounding it.

# 2.9.5 CHARUPADI

Along the chuttu gallery and the poomukham are traditionally sculpted, rustic, wooden, or cement benches. These benches are called charupadi.

# 2.9.6 AMBAL KULAM

Nearly every Nalukettu has its own Kulam or Pond for bathing of its members. At the end of Chuttu verandah, there is a small pond constructed with debris on sides where lotus or Ambal is planted. The water bodies are maintained to maintain energy flow inside.

# 2.10 SIGNIFICANT FEATURES OF KERALA VERNACULAR HOUSES

Kerala experiences a hot and humid climate and hence the orientation of the building becomes one of the crucial aspects of planning.



The building should face the direction of the prevailing winds rather than the sun. This helps in maintaining cross ventilation in a humid climate. Houses preferably face East direction according to the direction of prevailing winds.

#### 2.10.1 CROSS VENTILATION

The juxtaposition of open-and-closed spaces in a way to allows a continuous flow of air.

Being in a tropical climate, cross ventilation plays an important role in creating comfortable spaces. The presence of high moisture content in hot air causes discomfort for the user.

Courtyard spaces are extensively used in houses of Kerala of all scales. It helps in achieving passive cooling and reduces the dependence on HVAC systems. It also helps to induce continuous air movement.

Openings in walls facing each other and internal partitions help in increasing cross-ventilation. Using vertical louvers and large window shutters helps to reduce thermal discomfort with ample daylight.





#### 2.10.2 SOLAR SHADING

The temperature in Kerala can rise to up to 40 degrees Celsius in summers. Therefore, sun shading strategies and elements become vital. Traditional buildings in Kerala have an internal and external verandah. The external verandah acts as buffer space to reduce direct exposure to sunlight, whereas the internal verandah allows light to enter the building via a courtyard.

The east and west façade should be least exposed to the sun to prevent late afternoon and early morning heat. One way is to have dense tree plantations around these façades. Overhangs, louvers, canopies, and so on are used for shading. Shading devices for doors and windows are also used to avoid solar heat gain.

#### 2.10.3 ROOF INSULATION

The most distinctive visual form of Kerala's architecture is the high, steep sloping roof with eaves constructed to shade the walls of the house and to repel the heavy thunderstorm, typically laid with tiles or thatch, and supported on a roof framework made of hardwood and timber. Structurally, the roof frame is supported on the pillars standing on a raised platform from the ground, for protection against moistness and insects in the tropical climate. Many times, the walls are also made of timber, locally available in Kerala.

Gable windows were introduced at either end of the roof to maximize attic ventilation of the room when the ceiling was incorporated for these spaces. Most structures of Kerala appear to be low height visually, because of high, steep sloping of roofs, which cover walls from rains and direct sunshine

• **PLAN** - The primitive models of circular, square, or rectangular plain shapes with a ribbed roof evolved from functional consideration.

- Traditional architecture is influenced based on the climate of Kerala.

- The natural building materials available for construction in Kerala are stones, timber, clay, and palm leaves

• **ROOF** - long, steep sloping roof built to protect the house's walls and to withstand the heavy monsoon are normally laid with tiles or thatched labyrinth of palm leaves which are supported on a roof frame made of hardwood and timber.

• **GABLE WINDOWS** - were evolved at the two ends to provide attic ventilation.

• WALLS - The southern wall and western wall are 24 centimeters thicker than the rest of walls to protect from



sun



Fig 2.18. Floor plan

**PASSIVE STRATEGY** – Cross ventilation, pond, internal courtyard, dual courtyard

MATERIALS- Abundantly found materials in Kerala – Granite,Laterite soft laterite, Lime mortar , Timber

Timber remains the prime structural material, bamboo

Clay for walls, filling for timber floors

Palm leaves are still used effectively for thatching the roofs and partition of walls along with mud.

**RAINFALL** – Heavy rainfall from south-west and north east monsoons to protect from sun and rain the roofs of the building come down very low.

**VERANDAH** all around the building for protection The width of verandah varies from 2ft to 12ft.

**BEDROOMS** - Window openings were brought in at ground level or which as small windows or jalis to give diffused light without glare.



#### Fig 2.19 Traditional building of kerala

# 2.11 CLIMATE RESPONSIVE ARCHITECTURE OF KERALA

The planning and architecture of the vernacular housing patterns have evolved over time taking into consideration various parameters like the local climatic conditions, availability of local building materials and the skill employed in the construction. The courtyard houses of Kerala show a direct response to the climatic conditions of the place. In the hot humid climatic conditions of this region, the courtyard ensures easy ventilation.

Traditionally, the sloping roof of the houses lets in a little sunlight to the interiors of the traditional Kerala houses; this is compensated by the presence of the large courtyard. The courtyard has some religious association too, as traditionally, the open courtyard in a Kerala house is considered as the 'devasthana' -the most sacred place assigned to the gods and hence construction is not allowed there.

The presence of highly insulative building envelop for thermal protection, provision of verandahs for protection of external walls from solar radiation and the pitched roof for protection from heavy rain together are highly effective for a passive environment control system in Kerala vernacular residential architecture.

### 3. LITERATURE STUDY 3.1 BRICK HOUSE , MUMBAI

The Brick House, situated amidst rural settlements in <u>Wada</u>, near Mumbai,India, is a 2500 sq.ft. farmhouse set within hills and farms. The impact of the architecture of the structure is strong, leading the viewer to a new observation, not allowing him to be complacent about the space which he occupies. The organic form emerges from the ground and flows into the skyline, following curved dips and peaks.



Fig 3.1 Front view

Each space flows into another along curved lines, leading into a seamless space held by the central courtyard. The observer begins his journey along the curved jali brick wall offering tantalizing glimpses of the interior, thus drawing him into dramatic compositions of light and shadows.

As one enters into the structure, one is greeted by the soft sunlight falling to the central body of water and the coolness within the structure. The interior space is dominated by the two huge arches of brick and stone, opening to vistas of farms and hills. The furniture seems to rise and fall from the walls or floor dramatically leading one's eyes to play of materials against each other.



#### Fig 3.3 Floor plan

Zoning of activities responding to the climatic conditions and views was achieved with the use of levels leading to a single yet distinct living room, kitchen and dining. South-west position of first floor bedroom provides shade to courtyard and keeps water body cool.



Fig 3.4 Staircase and court

The positions and sizes of the openings are dictated by climatology, ensuring natural light, cross ventilation and passive cooling.

#### **INSPIRATION**

Taking inspiration from architect Laurie Baker, we used techniques like rat-trap bonds brickwork, filler slabs, brick jalis, brick arches, built-in furniture and use of local material. These proved low cost and ecofriendly technologies, allowing this 2500 sq ft structure to be constructed in INR 20 lakhs due to reduced requirement of steel, cement & bricks. The brick house has been inspired by both the philosophies and the works of Laurie Baker and Nari Gandhi. Each room flows into another, leading into a seamless space held by the central courtyard. Climatology and the solar path, along with jalis and arched openings have played an essential role to introduce light and wind into each interior space. Exposed materials, which give the entire house a very earthy feel and the construction techniques using rat-trap bond, filler slabs, arches have contributed to the low cost of the project.



Fig 3.5 Articulation of forms – the corner opening and louvers that ventilate the bath

#### IMPACT OF ARCHITECTURE

The impact of the architecture of the structure is strong, leading the viewer to a new observation, not allowing him to be complacent about the space which he occupies. The organic form emerges from the ground and flows into the skyline, following curved dips and peaks. Each space flows into another along curved lines, leading into a seamless space held by the central courtyard. The observer begins his journey along the curved jalibrickwall offering tantalizing glimpses of the interior, thus drawing him into dramatic compositions of light and shadows. The House is constructed using brick in its naked form, giving an earthy feel to the built up space. The positions and sizes of the openings are dictated by climatology, ensuring natural light, cross ventilation and passive cooling. The initial lot of quality bricks was called from the neighbouring state of Gujarat, and then we discovered a local brick kiln providing well-finished good quality bricks. Taking inspiration from architect Laurie Baker, we used techniques like rat-trap bonds brickwork, filler slabs,brickjalis, brick arches, built-in furniture and use of local material.

The rat-trap bond for brickwork helped in reducing the amount of material, provided natural insulation and provided for readymade conduiting for electrical work. The depth of the wall remained the 9" since the brick is placed on its 3" facia instead of the usual 4" facia. The brick arches allowed for large openings , which blended into the circular planning of the structure. Strategic use of jalis allowed for cross ventilation without providing for a window or glass shutters. This technique has been adopted from the local age-old custom of using jalis or small openings. These proved low cost and eco-friendly technologies, allowing this 2500 sq ft structure to be constructed in INR 20 lacs due to reduced requirement of steel, cement & bricks.

#### **3.2 CHUZHI HOUSE**

Chuzhi is a project that helps to understand what can be built in odd sites that are generally deemed 'unsuitable' for construction. Situated in a gated community called Sanctity Ferme in a picturesque location called <u>Shoolagiri</u>, the owner was in a fix as there were unwanted obscure plots at the periphery of the community characterized by steep rocky topography, huge trees, and thick vegetation making people reluctant to make homes there as the buildable area seemed less.



Fig 3.6 The home is located in a rocky corner of Sanctity Ferme



# Fig 3.7 The earthy textures of the walls beautifully complement the reclaimed wood floors and furniture

In current times when people are obsessed with achieving beautiful scenic views from their homes and least concerned with how their houses end up looking like unnatural eyesores in virgin beautiful landscapes, our concept of Camouflage architecture, where we want the buildings to stay hidden and merge seamlessly with the existing topography seems apt.



#### Fig 3.8 Longitudinal section

Chuzhi as the meaning suggests in Malayalam, "whirpool" are swirls of precast poured debris earth composite bottle beams, fashioned from 4000 discarded plastic bottles designed around the three large Tamarind trees on site. The idea was to make a subterranean home that would originate from the rock bed, forming multiple whirls around the tree and adjoining to create a secure private space below for the residents and a space around the trees above that ensures that the thick vegetation and ecosystem continues to thrive undisturbed.

The swirls of Chuzhi start as walls and spiral all the way up to form the roof. Perched in between the three trees, the house has been designed with a glass roof to give you the feeling of living underneath the canopy of trees. Although the house has no elevation, it properly defines the public space from the private space with the roof doubling up as a seating area around the tree.



#### Fig 3.9 Floor plan

The swirls of Chuzhi start as walls and spiral all the way up to form the roof. Perched in between the three trees, the house has been designed with a glass roof to give you the feeling of living underneath the canopy of trees. Although the house has no elevation, it properly defines the public space from the private space with the roof doubling up as a seating area around the tree.

The idea was to allow the natural ecosystem of trees and the surroundings to be retained as it is above the house, without compromising on the comfort of the inhabitants. Chuzhi is a two-bedroom residence designed with an open layout and minimalistic interiors and has floors that have been made of reclaimed wood that has been pieced together. But the surprising fact is that the building manages to tuck itself away into the landscape like a snake curling up under a rock on a hot day.



#### Fig 3.10 Living room

Glass walls stretch along the southern and eastern faces of the home in the central living space, allowing clear lines of sight to the building's surroundings from the living area as well as the kitchen and dining spaces. Despite the majority of the open plan configuration adhering to a simple rectangular footprint, the interjection of spiral volumes at three different points in the layout adds a sense of movement and non-linearity to the overall composition, which features very few partitions for programmatic division.

#### 4. CASE STUDY

#### **4.1 THE SKEW HOUSE**

Driving through winding narrow roads in Malapuram district in Kerala, brings us to the site overlooking lush rubber plantation, which is abundantly grown in and around gradual slopes, camouflaging the house from plain view.

Spread over an acre of land is the house which has a modern tropical design amalgamated with traditional architecture. The design of the house utilizes the extents of the plot exceedingly well by having a spread out planning. The Design accommodates the brief of the Family which was to create distinctive guest and family spaces. This clearly leads to the formation of two blocks a guest and family



Connected with each other by a semi-private living.



Fig 4.1 Floor plan

### The house is set in a beautiful natural context. What was your initial approach to this context?

The site was indeed inspirational, located in the middle of a verdant part of Kerala, called Malappuram, with small mountains of lush greenery bounded with several fresh water streams flowing through. In tropical climate, cross-ventilation is a prime determinant for facilitating a comfortable indoor environment, enabling the house free from using any air-conditioning by letting the breeze into the house. This led us to settle on the possibility of a modern tropical design amalgamated with traditional architecture.

The design accommodates the brief, which was to create distinctive guest and family spaces. This clearly led to the formation of two blocks that are connected with each other by a semi-private living area. We wanted maximum use of natural light during the day. Hence, the lighting design is mainly composed of indirect lighting. This prompted a more spaced out planning with rooms having direct cross-ventilation. Function dictates the layout of the house. However, the form is influenced by the traditional architecture of Kerala, (which is) interpreted in a modern aesthetical language. <image>

Fig 4.2 Courtyard and passage view

# Did they take any inspiration from the local traditions and incorporate them into this otherwise contemporary design?

Yes, certainly! Re-interpreting the Kerala architectural tradition, they designed large sloping roofs overlaid with Mangalore tiles. These are sound and heat insulated, with wooden panelling inside. However, since we used a mild steel T section framework, the roof profiles are unusually slim as compared to the thick and heavy-looking Kerala roofs. We also incorporated a double water-cutting detail to make sure the wood inside doesn't get wet.

Again, on the first floor, there is a long series of louvered open able windows with screens, that can double up as a 'balcony' with railings, when left fully open. This helps retain the open feel of the house as a whole, while letting residents control the intensity of light and air from the south.

Regionally, some starkly differentiating features include the large glass walls in the living areas, with their slim 'pivoted windows' that open just enough to let air rush in. The use of exposed concrete is rather unthinkable for most architecture in the region.





Fig 4.3 Bedroom and Staircase

The finishing and construction of the project appear exquisite. What would you say was unique in terms of materials or methodologies while developing it?

Laterite masonry is common here, but its combination with steel, glass and wood makes it not only unusual but also unusually lightweight - yet strong. Steel is used for columns as well, with brackets for wide overhanging roofs that bring shade from the strong southern light. The landscaping uses grass paver that sustainably combines hard and soft elements.

# The plan of the house seems divided into zones with multiple intermediate open spaces.

The need for clearly separate private and guest spaces formed the basis of our planning. So, we designed it as two buildings, a private and a formal/guest block, connected by a wide foyer that became a semi-formal space in itself. The pathways from the gate can lead one into the formal area, or separately, to the private area. The greenery between the spaces appear as subtle but effective spatial separators.

There is a linear arrangement of spaces, which ensures ample light and air into every room. Entering from a wide verandah, the guest zone is divided as the living room on one side, and the prayer hall and guest bedroom on the other. The passage leads to the 'bridge' or wide foyer with a cozy semi-formal living space that leads further to the private block. A wide door separates the entire section when needed.

The private zone has two poles of activity; two bedrooms on the western end, and kitchen and utilities on the eastern end, flanking a rather large living and dining space in the centre, that lead in from the common foyer. Two more bedrooms and an access-controlled, open swimming pool rest on above this space.



Fig 4.4 First floor plan

#### 4.2 NISARGA ART HUB

Nisarga Art Hub is an initiative by a family of musicians to make a community residency where people can interact and congregate for art and cultural events. The site was near a paddy field, with the traditional "Kerala Roofs" being the only feature crowding the horizon around it. Even though these traditional roofs are famous for being the ideal insulators and temperature regulators, it's a waning feature in contemporary architecture today, simply because the darkness they bring is not suited to the modern man's comfort and aesthetics. Thus, the idea to break open the roof to accommodate skylights that stream in the light was conceived.



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Fig 4.5 Roof openings bring natural daylight into the communal space

"Even though these traditional roofs are famous for being the ideal insulators and temperature regulators , it's a waning feature in contemporary architecture today,"



Fig 4.6 Roof plan

The  $35^{\circ}$  angle of the roof seemed to perfectly match the  $30^{\circ}$  angle of an Open-Air Amphitheatre, and the idea for the same skylights to become seating spaces for an audience was born. A series of wooden planks could be set on the swimming pool and immediately double up as a stage for open-air concerts accommodating 75-80 people.



#### Fig 4.7 Floor plan

The walls built with our patented Shuttered Debris Wall Technique, made with construction debris collected from the neighboring town and soil from the site, are load-bearing, supporting even a 4-meter cantilevered recording studio on the first floor.

According to the studio, laterite blocks reclaimed from demolition sites used to form the verandah were intended to evoke the "charm of the traditional Kerala homes".

The roof was made using tiles reclaimed from a local school, while discarded racks sourced from a scrapyard were used as shading on the openings creating dimly lit bedroom interiors complemented by a dark wooden material palette.



Fig 4.8 Section



The strategically designed breaks in the roof allow light to stream in, diffused by Jute Sack rolls, and permit the hot air to escape. Reclaimed laterite blocks from demolished buildings form the verandah in front of the home, reminiscent of the old "Muttams" of traditional Kerala homes.



Fig 4.9 Aerial view



Fig 4.10 the architects drew inspiration from the traditional Kerala roofs that dot the surrounding landscape

Even though these traditional roofs are famous for being the ideal insulators and temperature regulators, it's a waning feature in contemporary architecture today, simply because the darkness it brings is not suited to the modern man's comfort and aesthetics. Thus the idea to break open the roof to accommodate skylights that stream in the light was conceived.



Fig 4.11 First floor plan



Fig 4.12 Living view

"Even though these traditional roofs are famous for being the ideal insulators and temperature regulators, it's a waning feature in contemporary architecture today," the studio explained.

# 5. ANALYSIS

#### 5.1 RELEVENCE OF THE VERNACULAR

The study of the vernacular has been of interest to architects since the last 50 years. The pioneering attempt at recognizing the vernacular architecture was by Bernard Rudofsky in 1964, when he held an exhibition titled 'Architecture without Architects' in New York. More studies and research projects were carried out further in traditional architecture in both the developed and developing world. The publication of the Encyclopedia of Vernacular Architecture of the World in 1977 and the ICOMOS Charter on Built Vernacular Heritage in 1999 have been instrumental in bringing vernacular architecture to the forefront.

The image of any city is defined by its architecture, both in terms of its monumental and iconic buildings as well as the small dwellings and its conglomerations. Vernacular architecture is essentially that everyday architecture which has evolved over the centuries. Essentially civilian, domestic and preindustrial construction, it is built with local materials and knowledge systems and is a fundamental expression of the aspiration and culture of the communities and their relationship with their environment. Having evolved to suit the changing needs of the climate and culture, the vernacular architecture includes not just the buildings and their construction materials but also configuration of urban forms and settlement patterns such as the streets and chowks. These settlements that today form the nucleus of the contemporary city are constantly threatened by the pressures of population, neglect and degradation.

With every passing day globalization and high degree of development are changing the face of our environment. The breakdown of the traditional world and the tendency of cultural homogenization as a result of globalization have brought disregard for much of the traditional environment, often considered to be a symbol of poverty with values and qualities that are far removed from the mediatized concept of modernity. The introduction of new materials and technology has revolutionalised the process of construction and has also redefined the role of the architect, designer and the craftsman. Pressure on the traditional habitat began with the process of industrialization, accentuated by the modern movement and urbanism in the 20th century, seeking new models of dwelling and building cities that could overcome the deficiencies of traditional settlements. The aspirations of the society and the need to 'modernise' are leading to a catastrophic evolution - a mass destruction of our traditional built environment. It is now an accepted fact that the traditional built environment was designed to meet the challenges of the climate and culture using local materials and hence was a sustainable pattern of development. As architects and designers turn to these traditional environments for inspiration, the traditional environment on the other hand, is shunning its knowledge systems and embracing contemporary materials and technologies for the want of the 'progressive and modern' milieu. And, herein lies the

dichotomy which holds the key to the future of our environment.

With an accelerated degree of development coupled with sky reaching land values and a social disconnect with the past, the future of the built environment remains bleak. The economic boom is ensuring that a large section of everyday historic buildings is demolished rapidly to pave way for modern development. The survival of this tradition is threatened worldwide by the forces of economic, cultural and architectural homogenization. How these forces can be met is a fundamental problem that must not only be addressed by communities, but also by governments, and by architects, conservationists planners, а multidisciplinary group of specialists.

# 5.2 THE NEED FOR SUSTAINBLE BUILT ENVIRONMENT

The urban environment in our cities is degrading at an alarming rate. Congestion, traffic, pollution, crime, increasing demand for housing and influx of rural migrants are only adding pressure on the already overburdened infrastructure of cities. The cities in the developing world are constantly mitigating issues of poverty, overpopulation, lack of health care and infrastructure while cities in the developed world are faced with problems of decline of industrial centres, depopulation, economic and social degeneration. In both cases, schemes for urban renewal and re-development are constantly developed to create a better living environment.

Historic city centres across the world, often developed around a royal or religious core, present themselves as good examples of sustainable cities. Most cities have developed habitats of cohesive communities which lived and worked together. The cities were planned considering the environmental concerns of the nature, topography, climate, and culture and advocated an optimum use of the natural resources. With the industrial revolution and the invention of the urban transport, cities began to expand and it created a distinct living and working environment which were segregated from each other. The decline of industry in the developed world and the development of the suburban environments had a detrimental effect on the historic cores resulting in degradation, depopulation, poverty and crime. Achieving sustainable development is dependent on many factors such as efficient ways of urban planning, pollution control, energy efficient management of natural resources, and providing health and comfort conditions in a given context

Considerable research has been conducted in recent times to ensure maximum energy efficiency in historical buildings by the imaginative use of technology and encouraging the use of renewable sources of energy. Vernacular built heritage is now being seen as an economic, social and environmental asset and can form the loci for sustainable urban development Cities and towns are dynamic and continue to adapt themselves to the changing needs and aspirations of the society they house. The skill of the architect and the urban planner lies in resolving this conflict between the available resources and the changing culture.

Therefore, there is an urgent need for sustainable cities to create a balance between the economy, natural resources and the changing needs and aspirations of the society. Initiatives need to be made to include environmental and cultural resource based planning in the developmental plans.

#### 5.3 CONTEMPORARY VERNACULAR

The architecture by the people, for the people today is radically different from the image of the vernacular associated with the community. The change in the economy and social patterns has allowed the availability of manufactured materials throughout the country and has caused a profound change in the vernacular architecture of many regions. The widespread use of cement concrete, corrugated iron sheets, stone and bricks have lent a new meaning to vernacular architecture.

In Himalayas, for example, the rural vernacular has been transformed from slate tiled roofs to corrugated iron roofs across the entire landscape. Flat concrete roofs or pitched roofs in cement concrete are preferred to timber roofing owing to the scarcity and expensive nature of the resource. In Ladakh, the form of traditional buildings has been transformed increasingly by the use of sheet glass to provide sun rooms for winter warmth and plastic pipes have been incorporated into the water supply and drainage systems of the vernacular buildings.

The dichotomy of the situation is in understanding what is locally available? For example, conservationists often prescribe the use of lime as a building material instead of cement. But in reality, lime is not readily available and has to be prepared by a tedious process while cement is available off the counter in the remotest of villages.

The question therefore again is what is locally available, cost-effective and sustainable? A similar situation comes to the forefront with the use of stone. For environmental reasons, the quarrying of stone has been banned in several regions and thus with no locally available stone, the common man resorts to the use of brick or imports stone from another place, the economics of which eventually driving the decision of what does the common man therefore use as his primary building material. In the changing social, economic, political, and natural environment what may be called vernacular of today?

# 5.4 THE FUTURE OF THE PAST: THE ROLE OF VERNACULAR IN THE 21 CENTURY

Rapid development and economic and political globalization have made culture and tradition less 'place-routed' and more 'knowledge-based". In a situation where the world becomes a global village what is the relevance of the local? Will the vernacular survive in the twenty-first century or will it be eradicated and replaced by modern buildings?

Conservation may be defined as the action which is undertaken to prevent decay and therefore includes not only preservation but also restoration, rehabilitation, adaptation, alteration as well as reconstruction of the built fabric. Conservation means all the processes of looking after a place so as to retain its cultural significance.

The physical conservation of the vernacular architecture provides for an increased understanding of the original choices of materials and methods of construction - the primary reason for the destruction and dilapidation of vernacular architecture is the lack of recognition and valorization of the traditional built environment as heritage". Current economic situations where the land prices are sky- rocketing, the survival of the historic built fabric remains bleak. These historic cities are also plagued with issues of lack of urban infrastructure, increasing urban poverty as well as a weak institutional and financial framework. Hence, there is a need for intervention, stressing the need for long term action in the form of education and sensitization measures and promoting traditional architecture. It is therefore important to not only study and document vernacular architecture but to also intervene and ensure its survival into the future. The three approaches enlisted below are that of conservation, rehabilitation, and reuse and reconstruction or development using traditional methodologies.

The approach to deteriorating vernacular has recently shifted from preservation towards rehabilitation using modern materials and technology. For the survival of the vernacular, it has to be relevant to the needs of the contemporary society. Globalization and standardization of cultures has considerably altered the way of life, the domestic routine and images of modernity. Economic and development models from the West have been readily accepted as models for urban development without fully testing its relevance in the Indian context. Hence, it is necessary to successfully catalogue each typology of vernacular architecture in every region and adopt tools of renovation and rehabilitation to improve the living conditions of the community as well as preserve the historical identity.

Rehabilitation is the action taken to create a balance between heritage, economics, and social needs and is an approach that underlines sustainable urban development. The main objective of rehabilitation is to improve the living conditions of the community as well as the quality of the built environment, maintaining and promoting its cultural and heritage values and at the same time guaranteeing its coherent adaptations to the needs of contemporary life.

#### 5.5 DEVELOPMENTAL VERNACULAR

A developmental vernacular is one that uses the characteristics of vernacular architecture to achieve better shelter and settlement. It uses and develops local cultural and material resources. It is small scale, technologically and organizationally simple and inexpensive. It's planning and construction can be controlled by local communities. It expresses value, needs of the local community, and demonstrates continuity with change remaining rooted in the past and the local while incorporating new and the external to meet contemporary needs.

Developmental vernacular is cost effective and economical. Being labour intensive it is job creating as well. It is one of the best forms of architecture as using local resources it plays an important role in generating local income and remains ecologically balanced using renewable resources through community participation.

The work of the famous Sri Lankan architect, Geoffrey Bawa is a mix of modern and traditional The relationship Geoffrey Bawa establishes with the geography of the terrain and the garden has a great ability to fuse man-made with nature.

A similar approach made by Luis Barragan in Mexico, where he fused modern architecture with the local architecture of Mexico. The dominant concerns remain the same- the culture of the place, people, loci and the cultural sustainability. The architecture is highly contextual and uses forms, materials, and construction methods echoing the local vernacular. The design approach engages the study of local culture, buildings and emphasizes the use of local involvement and expertise. Local vernacular mode of building is seen as having authentically emerged as a response to local culture and the genius loci; it serves as a model for new building. The local vernacular inspires the contemporary in the choice of materials, colours and building forms. The work of Laurie Baker is part of this philosophy of building.

The architects of the post-independence architecture in India have been known to be inspired by the vernacular architecture of the country. Raj Rewal for example, used the principles learnt in the urban pattern of Jaisalmer in the Asian Games Village and the National Institute of Immunology, Delhi. The Design Group, by architects RanjitSabikhi and Ajoy Chowdhury used the prototype of the north Indian mohallas for the Yamuna housing in Delhi. The architecture of B V Doshi also exemplifies the learning from the vernacular in the designs for the Indian Institute of Management, Bangalore and the LIC Housing at Biman Nagar. Some of the works of Charles Correa such as the Jawahar Kala Kendra, Jaipur is based on the design of vaastupurush mandala

The other architects whose works include from learning from the vernacular are Kulbhushan and Meenakshi Jain, Vasanth and Revathi Kamath, and Anupama Kundoo to name a few. These are a few contemporary architects who have attempted to incorporate vernacular traditions in creating sustainable contemporary architecture.

The works of architects like Shirish Beri, Revathi and Vasanth Kamath, Anil Laul, Sunil Patil, Jose Mathew are hinged on the concept of ecological sustainability.

The focus of their projects is to design habitats which are in sync with nature and not against it, and in accordance to the sun paths, water channels, existing trees on site, etc. The emphasis has also been on integrating the landscape into the building. The nature of the spaces is such that they have multiple meanings. The materials for construction have been utilized from the site itself. Their buildings are ecologically sustainable as they demonstrate the optimum use of the naturally available resources in a cost-effective, creative and imaginative way.

The works of Anil Laul, Chitra Vishwanath, Anupama Kundoo and Satprem Maini also demonstrate the innovation in technology by using locally available material in combination with the modern technology to create a new typology such as the use of locally available terracotta urns in formwork for the concrete in Anupama Kundoo's work. This concept is also demonstrated in the development of brick funicular shells by Anil Laul and stabilized mud brick blocks by Chitra Vishwanath as well as the Auroville Earth Institute. The buildings are designed in response to the surrounding ecology

The works of Vinod Gupta, Deependra Prashad and Sanjay Prakash have been developed on the concept of solar passive architecture, where technology and a combination of architectural elements such as courtyard planning, sun shading devices, jaalisare used effectively to create buildings which are both contemporary in their use and have incorporated the learning from the vernacular. The works of Benny Kuriakose shows how the vernacular can be used in its pure form in the design of the habitats by using local materials and technology and aesthetically following the traditional idiom. While in contrast, the works of Anagram Architects and Rajiv and Tallulah D'Silva use traditional materials such as stone and brick imaginatively ensuring that the architectural expression of the building is contemporary.

The most interesting among them is the work of Studio Matharoo, which questions the concept of sustainability and the use of natural materials. Gurjit Singh Matharoo highlights an interesting debate as to what is natural and sustainable, when quarrying of stone is banned, is stone genuinely sustainable when it has to be transported from elsewhere? His work is exemplary in using readily available industrial materials such as concrete and steel to create an aesthetically pleasing and comfortable built environment.

# 5.6 ELEMENTS DEFINING CONTEMPORARY ARCHITECTURE:

### **CONTEMPORARY ARCHITECTURE:**

Contemporary Architecture can be defined as the architecture of present day or in other words the architecture of now. The buildings which are a part of contemporary architecture are radically different from each other, they are expressive, having more curves and sometimes gravity defying shapes, also they showcase the use of new building materials and techniques. Contemporary architecture need not be necessarily defined for large scale projects but is also clearly visible in projects as small as an Eco Capsule, a mirrored cube tree house or a cantilevered apartment building. Contemporary architecture also makes use of computer help them aided designs which to design unconventional, nontraditional buildings which can defy gravity logic etc. and act as a showstopper building showcasing hyper realistic and futuristic designs.



Fig-5.1 Cardiff Bay Opera House



Fig-5.2 Design of Eco Capsule by Nice Architects



Contemporary architecture is the architecture of the present day and hence it does not follow any particular style of any era. Contemporary architecture promotes the usage of curved lines, rounded forms, and unconventional volumes. Contemporary architecture not only uses new materials like steel, glass, titanium, aluminum etc. but also used the new technology for its construction

# 5.7 ELEMENTS OF CONTEMPORARY ARCHITECTURE:



#### Fig-5.3 Elements defining contemporary architecture

Though Contemporary architecture does not have a specific definition but certain key elements which help us to identify a contemporary building are:

- Curved Lines
- Rounded Forms
- -Free form shapes
- -Unconventional Volumes
- Asymmetry
- Green Roofs, living walls
- Integrated into the surrounding landscape
- -Open Floor Plans
- Large abundant windows

- Integrated smart home technology

-Integrated customizable LED lighting

# 5.8 SUSTAINABILITY ASPECTS OF A BUILT FORM:

#### **5.8.1 SUSTAINABLE ARCHITECTURE**

Sustainable architecture can be defined as the architecture which aims to increase the energy efficiency of a built form and decrease its negative impact on the environment by moderation in material usage, space development and considering the ecosystem at large. Sustainable Architecture aims to ensure judicious use of resources, is done in such a way that it does not has any adverse effect on the environment, as well as to conserve the resources for the future generation usage. The idea of sustainability is to provide us with a healthy livable environment with built forms using green energy resources which are renewable thus reducing the carbon footprint on the environment.

Sustainable Architecture includes the following principles:

-Maximizing non-renewable energy resource conservation

- Enhancing the natural environment

-Eliminating or minimizing the use of toxic materials.

-Influence of cultural, environmental, and climatic conditions.

- Harmony and consistency with nature and the environment.

- Energy Saving.

-Correct response to operational needs.

-Correct use of material both visually and environmentally.







Fig-5.4 Sustainable high-quality homes for lowincome

# 5.8.2 BENEFITS SUSTAINABLE ARCHITECTURE:

The benefits of Sustainable architecture are as follows:

#### **Environmental Benefits:**

- -Conserve Natural Resources
- Reduce Energy Consumption
- -Improves the air and water quality
- Protects Biodiversity and Ecosystems
- -Uses local materials with low embodied energy
- Reduces the production of construction waste
- Enhances the waste management System

-Improves the green spaces and landscaped areas around.

-Impacts and improves the larger ecosystem as a whole.

#### **Economic Benefits**:

- Expansion of the green products due to more use of green materials

- Reduces the operating cost of the building
- Increases the life cycle of the building
- Increases the property value

-Improves the occupant's productivity by enhancing the surrounding environment.

#### Social Benefits:

- Creates an aesthetically pleasing environment

- Takes care of and improves the wellbeing of humans

- Minimizes strain on local infrastructure.

# 5.9 RELATIONSHIP BETWEEN VERNACULAR TECHNIQUES AND MODERN ARCHITECTURE TODAY

In this era of tremendous technological innovation and urbanization, Traditional vernacularConstruction expertis e still has a lot to teach us. Modern architecture appears to have forgotten about vernacular architecture, which is the most basic form of fulfilling the needs of human settlements. However, due to recent increases in energy costs, the trend has shifted in the opposite direction. Given that all these new-age constructions have shown to be energy efficient and sustainable, architects are incorporating regionalism and cultural building traditions as well. While an architectural representation may vary from place to place to respond to and adapt to a certain socio-economic climate, it must always prioritize human needs. It must safeguard and preserve. This is where the concept of vernacular architectural works arises-creating buildings based on the actual situation, using locally accessible materials to keep residents safe from the outside world. For example, Consider Kutch's traditional Bhunga buildings, Assam's bamboo structures, and Kerala's characteristic clay-tiled, pitched roofs.

### 5.10 COMPARATIVE ANALYSIS BEFORE AND AFTER INTEGRATION OF VERNACULAR TECHNIQUES:

This analysis compares the human comfort levels achieved without the use of mechanical ventilation before and after integration of Vernacular Techniques:

Using Wind Catchers has been extremely successful in hot and arid regions. These Wind Catchers do not require mechanical energy for their operation as they are passive cooling devices.. Thus reducing the carbon foot print, increasing energy efficiency of the building and decreasing the operational cost of the building. Using rammed earth provides thermal insulation, sound and dust protection from the external environment. Due to this thermal insulation requirement of mechanical devices is reduced which results in reducing the operational cost of the building. In Torrent Research Center they have been able to save 200 metric ton of AC Plant capacity by use of PDEC (Passive Downdraft Evaporative Cooling) Technique. Also by providing effective day lighting system they have reduced the cost of artificial lighting thus overall saving an amount of approximately 100,000 dollars per annum.

Locally made refined flooring known as Athangudi is made of natural soil. It adds beauty to the floor as well as gives it a long-lasting finish which makes it sustainable. With growing awareness towards environmental friendly built forms and sustainable solutions architects have been quite successful in creating built forms close to nature which provide warmth and rejuvenation against the madly rush of desires.

In the hot areas of Egypt usage of Rammed Earth, Different sized opening and Vernacular roofing techniques have reduced the energy consumption very efficiently during the summer time. In a survey conducted amongst the people using the buildings 70% were satisfied with the thermal comfort for winter and 85% for summer seasons, 90% with the natural light (visual comfort) and 95% were satisfied with the indoor air quality.

These Vernacular techniques since they are based on local artisans and materials can take a longer duration time period for construction and that becomes a major drawback for their implementation as the continuous increase in housing needs requires a fast paced construction technique and materials. But if standardization of such techniques is done on a larger scale the time duration can be reduced and efficiency increased.

#### 6. CONCLUSIONS

Western modernity is a consequence of western social, economic and industrial circumstances and it has its own shortcomings. It is neither affordable nor relevant to the economic, social and cultural needs of the rest of the world. The architecture coming up in our cities and towns seems to ignore the issues of climate change and global warming. Instead of building too many skyscrapers, we should concentrate on conserving our existing building fabric, which is cheaper and emits much fewer greenhouse gases, thereby benefiting future generations. The greenest building is one which is already existing and has already made its impact on the environment.

The vernacular architecture of Kerala is suited to our climate, culture and society. The relevance of the concepts and techniques from our vernacular architecture had increased manifold in this era where we discuss global warming and climate change. One has to look into the different dimensions that architecture influences, to avoid its failure. Only then can architecture be truly sustainable, and sustainable architecture is the way forward for a better world.

The traditional and vernacular architecture gives solutions that are in perfect harmony with nature. Indoor air quality control inside the building is always an important aspect of traditional architecture. Vernacular and traditional architecture and construction are ecologically responsive and energy efficient. Traditional vernacular way of living was inherently energy efficient. A modern lifestyle with strong connectivity to the environmental and climatic context, all the materials and technologies used, and functional distribution of space clearly says that the energy consciousness prevalent in the society. Many of the traditional design element and features which are replicated sin modern buildings were the functional utility of the buildings are lost while replicating them. Appropriate planning devices and design strategies like courtyards, suitable orientation, internal zoning, passive strategy, envelope design, materials, construction techniques, responsive roof design and appropriate fenestration design should be employed. The traditional architecture styles and construction techniques gives solution which are in perfect harmony with nature.

Considering indoor Air and Light quality the vernacular style are ecologically responsive and energy efficient. Through the given design and technique we are able to connect people with the outdoor space with ecologically responsive aspects. Taken consideration of the climate change the site and blocks are designed for future aspects. Traditional construction techniques are strong and have travelled its ages which are strong example for believe and learn from the old construction method. A modern life style need modern solution therefore clubbing the traditional and modern factors together balancing the traditional values and modern life style. Benefit of cost cutting and nature friendly design has been seen and achieved. Through the design we



were able to achieve both living and giving back to nature aspect are considered. And this will create a great impact in social and ecologically level.

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