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An Overview Of Vernacular Architecture In India

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Abstract
This paper depicts a vast knowledge on vernacular architecture of India. Vernacular architecture refers to the buildings which are constructed by the knowledge of local technology and craftsmanship, using locally available building materials; simultaneously, ensuring climatic comforts to the users. Thus vernacular architecture is related to the climatic issues, cultural and socio-economic conditions of different regions of any country. Hence, India is a country with diversified climate and socio-cultural conditions. Here, each region has its own unique characteristics of building design in the form of climate-responsive vernacular architecture. The aim of this paper is to assemble all those different types of vernacular practices throughout the different climatic regions of India.
Key words - Vernacular Architecture, tradition, climate responsiveness, Indian vernacular architecture, sustainability.

1. INTRODUCTION:

The term "Vernacular" is derived from the Latin word "vernaculus" which means domestic, native, indigenous [1]. In general, vernacular architecture refers to the buildings which are constructed by using local technology, craftsmanship and locally available building materials ensuring climatic comforts to the users. Thus Vernacular architecture depicts the environmental, cultural and historical features of a particular region as well as a specific time period.

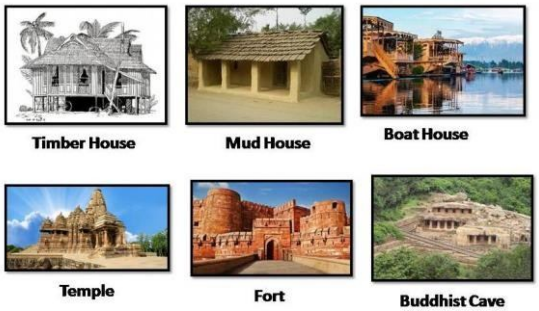

Figure 1: Different forms of vernacular architecture in India

There are different forms of vernacular buildings found throughout India. For Example, Desert mud houses, Cave temples of the Buddhist era, Hindu temples of Khajuraho, Mughal Forts and Palaces, Havelis in Rajasthan, Floating houseboats of Kashmir, Bamboo construction in Bengal and Assam, Chettinad houses from Tamil Nadu etc. So, it is prominent that a particular architectural style is derived in a specific region blending local resources, tradition and climate responsiveness into the buildings.

1.1. BUILDING TYPE:

Vernacular architecture may be described as 'rural' and 'urban' according to the rural and urban settings respectively. Burnskill (1988) proposes a category of vernacular buildings based on their usage. For example, Domestic buildings are designed for living purpose including private houses, rest houses and leisure houses. Whereas, the Agricultural buildings include all the buildings of thefarmstead apart from the farmhouse and its domestic ancillaries; like stables, the cow- house, poultry shed and cart shed. All the buildings associated with industrial activities such as potteries,

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other commercial establishments etc., comes under the Industrial building type. Lastly, Religious buildings include all the temples, churches, mosques, monuments etc. Depending on the structural system, Vernacular buildings may be further divided into three categories, namely Pucca, Semi-pucca and Kuchcha houses. A Pucca structure is made of resistant materials such as stone, timber, brick and mortar is used to bind the building materials. It is more durable, expensive and does not require constant maintenance. On the contrary, the Kuchcha structure is constructed using natural materials like mud, grass, bamboo, thatch and sticks. It does not provide much strength or durability to the structure and requires continuous and heavy maintenance. The semi-pucca structure is a combination of the pucca and kuchcha styles.

1.2. CONSTRUCTION MATERIALS:

The availability of local building materials has a great contribution in the development of vernacular construction. Generally, the following local resources are commonly used for construction: Adobe (mud blocks / whole walls), Timber and Masonry (stone, brick).Mud is extensively used for vernacular construction in rural areas where it is easily available. Adobe stores thermal mass and has optimal heating transfer features for heating in the summer and cooling in the winter. Wood is the most readily available natural materials other than mud. It is has been used extensively in Kashmir, Kerala and many other regions of the country since past. Treated Bamboo is used for construction of house in the form of bamboo mat wallingbetween bamboo columns plastered with cement on both sides. In the hilly regions, stone is the main construction material as it is locally available in different shapes, sizes, colours and textures, highly durable, easy recyclables, requires low maintenance. It is used for floors, walls, arches and roofs. In modern buildings, stones are coming in the form of façade treatment; decorative patterns carved in stones are also used as an aesthetic feature in modern constructions. The use of burnt clay brick is a common practice inthe building construction as bricks are less expensive, lightweight, durable, fire proof and requires low maintenance and easy craftsmanship. Rat trap bond walls and brick arches at openings are used in low-cost building construction. The structure is light and is economical where bamboo is abundantly available. Compressed cement stabilized earth blocks are used for the walls in Bhunga houses of Kutch region, Gujarat. Here, walls are made with Adobe (sundried) mud blocks placed between the fly ash brick columns.

1.3. PLANNING CONCEPT:

The form of a building plan is correlated with the cultural, historical background and planning traditions of a particular region. The concept may be discussed in Macro and Micro level [3].Macro level broadly focuses on planning & architectural aspects. Micro level describes art and architectural detailing. Vastu-purusamanadala is followed generally in case of residential building plan. Generally, Three main types of shapes that has been found in plans of traditional buildings: circular plan, rectangular plan, linear plan. The size of the building is derived by its particular use. The building size is practically related to the population pattern and housing density in a given area. Based on the size of a building, they can also be classified as: single story,multi-story buildings.

1.4. VERNACULAR ELEMENTS:

Certain elements like water, day-light, natural ventilation, local building material and technology are prominent in vernacular architecture. Most of the historical buildings were constructed based on the vernacular principles ensuring day-lighting, natural ventilation and use of water bodies in the form of

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canals, pools or fountains etc. in open spaces like courtyards. This technology helps to modify the harsh climatic impacts in hot and dry climatic regions. Hollow wall construction techniques are adopted to enhance time lags in the fluctuating diurnal cycle. Jalis are used in many religious buildings such as mosques and royal palaces to allow day-light and air movement.

2. VERNACULAR ARCHITECTURE IN INDIA:

Vernacular architecture is responsive to the climate, culture and socio-economic conditions of a specific region. Hence, India is a country with diversified climatic and socio-cultural conditions. Each region has its own identity with climate responsive building design in the form of vernacular architecture.

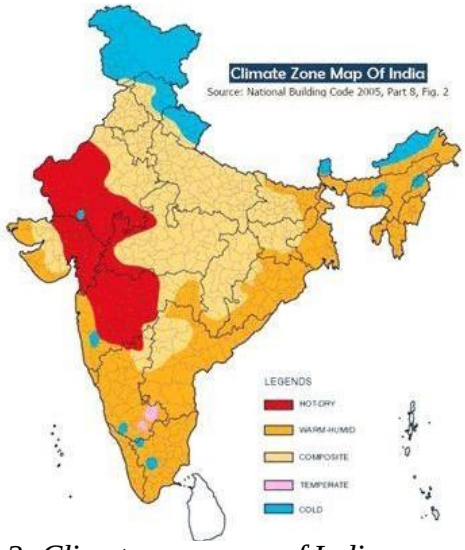

Figure 2: Climate zone map of India

The country has been divided into five major climatic zones:

1. Hot and dry,
2. Warm and humid,
3. Temperate,
4. Cold and
5. Composite.

2.1. VERNACULAR ARCHITECTURE IN HOT AND DRY CLIMATE ZONE:

This zone lies in the north-western part of India, namely Jaisalmer, Jodhpur, the Thar Desert (Rajasthan and partly Gujarat). This region is flat, sandy and rocky; and sparsely vegetated with cacti thorny bushes. Due to low humidity the climate is dry here. During summers, winds blowing are very hot and sand storms are also common in this zone. The Desert architecture has an artistic expression

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of the climate and the culture of the region. There is distinct division between the Kuchcha and Pukka vernacular architecture of Rajasthan. The Pukka architecture is dominated by the haveli type of buildings [4].

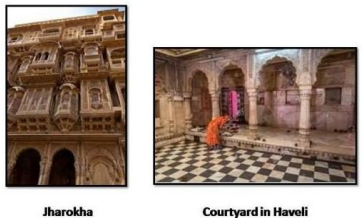

Figure 3: A Haveli of Rajasthan,India

Havelis are generally two or three storied. Those are built around a courtyard which is the nucleus of a house. The rooms are laid around the courtyard which is main source of light and ventilation. Street frontage of each building is narrow to cut the heat gain. As the buildings are clustered side by side, they cast shadow on each other keeping streets cool.

Hot air rises by convection from courtyard and the cool air is channeled from the street ensuring cross ventilation. At the upper floor, Jharokha with an intricate jaali work projects to the street allowing women to observe the street while maintaining privacy. Jharokha and Chajjas are designed to shade the facade. The walls are made of locally available stone and timber as structural purposes. Buildings are constructed by local craftsmen using local material which is cost-effective.

2.2. VERNACULAR ARCHITECTURE IN WARM AND HUMID CLIMATE ZONE:

This region covers the coastal region of India. Cities like Mumbai, Chennai, and Kolkata all comes under this region. The high humidity encourages abundant vegetation here. Under this type of climate Kerala has a very distinct cultural and linguistic identity [2]. Kerala is situated on the south-western coast of India bound by Arabian Sea in west and Western Ghats in the East.

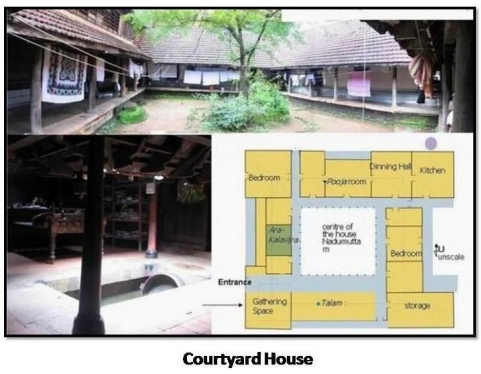

Figure 4: A typical house of Kerala, India

The individual house is isolated from others and self-sufficient with its own source of water, temple, bathing place and agricultural land. Generally, the buildings are one storied high. The planning of house is based on the Vaastu-Shastra. Individual houses are surrounded by boundary wall with entrance gate from street. At entrance courtyard, there is auspicious tulsi plant. The houses are raised on a high plinth with verandah on two sides like semi-private zone. Rooms are aligned around a

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central courtyard. Central courtyard and deep verandas around the house allows cross-ventilation in the rooms. Sloping roof is provided to protect from the heavy rain-fall of the region. The house is blend into the landscape of tree plantations. Basic materials used are laterite, granite, timber, mud, thatch, coconut leaves, bamboo and Mangalore tiles. Granite is used for foundation, laterite is for walls, timber is for wall facing and roof frame, mangalore tiles are for roofing.

2.3. VERNACULAR ARCHITECTURE IN COLD CLIMATE ZONE:

The cold climate is divided as cold & sunny and cold & cloudy. Ladakh experiences cold and sunny type of climate. Cities like Kashmir, Sikkim, Shimla and upper part of Assam, hill stations of south India all experience cold and cloudy climate. Under this type of climate the architecture of Kullu district is discussed [5]. The climate in this area is pleasant in the summers with heavy rainfall and moderate to heavy snowfall during winters.

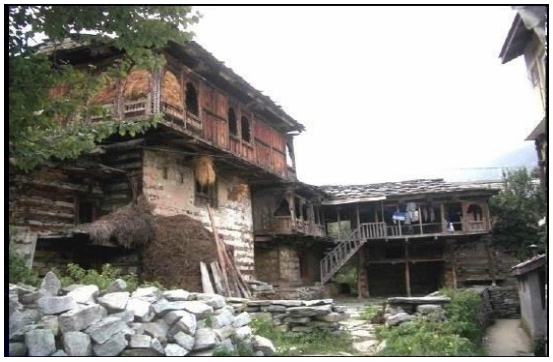

Figure 5: House of Kullu, India

Generally the dwelling unit consists of living area along with their livestock. A typical unit is either square or rectangular in shape. The houses are about two or three storeys high. Each story consists of huge single room without any partitions. Buildings are generally faced on the south or south-west to receive maximum sunlight. Lower floor is allotted for cattle, poultry, or storage purpose. Second floor consists of living area and kitchen. Single flight stair-case is placed in the house. The houses have a paved external courtyard for farm work and rituals. The houses are aligned parallel to the slope of the mountain and never perpendicular to it. Houses are developed along the south slope in keeping with the topography of the terrain to ensure heat gain. The height of the room is low. The upper floors are made of timber keeping the floors warm. The buildings are made from locally available stone and timber packed with clay and cow dung as mortar. The roof is finished with locally available slate.An elaborative study of the typical dwellings of the major climate zones depicts some common features:The buildings are designed in response to the sun paths, wind directions and allows for passive cooling by means of shading devices.The site planning ensures the orientation of the building in such a way that it restricts the harsh sun yet allowing daylight and cross ventilation in hot or warm climate zone.The design of the habitat is followed by the way of life, religious beliefs and customs of inhabitants and optimal use of space. Locally available materials are used along with the modern materials.The use of locally available craftsmanship is encouraged for creating cost-effective sustainable buildings.

3. CONCLUSION:

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Though this form of architecture is lesser found in modern context; practice of vernacular architecture is encouraged presently for sustainable development. As the building industry consumes major part of energy produced in the world and contributes majorly to world's greenhouse gas emissions that leads threat towards sustainability to the human-being. Sustainable development can be achieved by architects, engineers, town planners by working together to produce green buildings.At present architects are focusing on vernacular buildings to make it energy efficient and sustainable. In this time of rapid technological development and urbanization, there is still scope for adoption of vernacular tradition. This tradition may be considered as a model for sustainable development combining lessons from past with modern technology. The study of local vernacular architecture leads to generate an approach towards green building design. It is well known that energy efficiency and sustainability are very well blended in Indian traditional architecture since past. Thus Indian vernacular architecture is the world's one of the most beautiful styles of architecture. Individual vernacular style of architecture from different regions of India may be considered as the future study for better understanding of Sustainable Architecture. Also, it is important to adoptthe vernacular style of architecture for sustainable future.

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