

# Building Energy Conservation and Green Architecture

Chaya Chavan Tirvir

*Padmashree Dr.D.Y. Patil College of Architecture, Akurdi, Pune  
E-mail: sanskrutichaya@yahoo.co.in*

---

**Abstract**—Green building is about making the best use of resources during the all stages of construction. The building sector is growing very rapidly with different reasons. It is one of largest consumers of energy and it will cause environmental degradation. This indicates the need for green architectural development with the help of environment friendly, energy efficient, materials and technologies. Today a large number of advanced materials and techniques are available which can be used in construction of green buildings but on the other hand we have cost effective, environmental friendly, energy efficient traditional building technique.

Green architecture or sustainable architecture in current scenario can not be completed without traditional architecture discovered by our ancestors. Hence vernacular architecture suggests the solutions, techniques, strategies to save energy & environment to achieve ultimate goals.

Present paper highlights some of vernacular techniques and materials which contribute in construction of green buildings. It presents an in depth study of a planing, materials and technologies which are available in our country and can be used for creation of a green architecture.

**Keywords:** Traditional, Vernacular, Settlement, Spaces, Culture, environment.

## 1. INTRODUCTION

Culture and built environments are two interlinked concepts which act as a medium for the well being and survival of man. Together, they help man enjoy and make the most of his living environment. They spread a sense of belongingness among the members of a community. In today's fast-growing world, many processes have been modernized in order to increase efficiency and drive down costs. In the construction world, there's still a place for traditional methods and techniques, often yielding higher quality, more unique results than those achieved with modern construction processes.

The Traditional Architectural forms the back bone of social and culture set up of the place. It is essential for this architecture to retain its integrity. So the Traditional Architecture should not be disturbed, rather the contemporary architecture should be integrated well with the traditional architecture. In the Traditional architecture, buildings were designed to achieve human comfort by using locally available

building materials and construction technology which were more responsive to their climatic and geographic conditions. The tradition space have proven there inputs with modern architecture.

Architecture evolved not only meet the needs of the people and their activities but also to provide them safety and security. Architecture is said to be sustainable only when it fulfills its functions factoring in the dynamic of the environment, its users and their activities as well as technologies. It is sustainable when it provides psycho-physical-physiological comfort.

The following study was conducted to explore the knowledge and wisdom from the local masons, the village people and their life style and shaping their built environment, indoor and outdoor spaces, as response to the local climate conditions and available local materials.

## 2. AIM

To understand Green architecture and building energy conservation with the help of vernacular architecture

## 3. OBJECTIVES

The objective of the study of rural settlement can be summarized as follows:

- To understand the planning aspect with respect to the surrounding spaces, climate, locally available materials, local construction techniques
- To understand the materials and construction techniques used for the house with respect to the building energy conservation.

## 4. STUDY AREA

The aim was to find out the silent vernacular architecture features of rural settlement. The Dhamapur village, Taluka Malvan, Maharashtra was selected for the study.

The climate of Malvan can be generally classified as warm and moderately humid.

Average temperature range between 16-33deg C. While relative humidity ranges from 69 to 98%. The annual average rainfall of Malvan is 2275mm.

The settlement got more than 350 years old dwellings. Dhamapur village in Malvan Taluka, (Maharashtra) boasting of a sociocultural mix of major three groups, with their own traditions, customs and lifestyles.



**Fig. 1: Google map shows the location of Dhamapur**

The housing pattern is based on various factors like position of temple, climate considerations. Social interaction among the community members is of prime importance. Hence, the street acts as an extension to the leaving space, which also determines the housing pattern. Its typology changes with respect to the caste, class, occupation



**Fig. 2: Konkani architecture**

### Architectural features of the dwellings (Architectural typology)

It is found that the houses were constructed with locally available mud, timber and laterite stone, having high thermal capacity and low ductility. Traditional houses in the settlement are being constructed on the basis of functional requirements of the users and the availability of the suitable building materials and construction techniques developed.

The house planning is simple and functional. Spaces are designed into Maajghar (living), bed rooms. Kitchen. Kitchen

is divided into two parts vegetarian and non vegetarian kitchen with separate store room. Detached toilet is provided in the back yard with cowshed. All the houses are having high plinth due to heavy rain. Most of the houses got seating place in front of the houses. The settlement is divided into three types of houses higher income group, middle income group and lower income group.

### Location, orientation and Principles

The traditional architecture was based on the principles of Vaastushastra, right from the selection of the site to the building construction techniques. The character of the building was related to domin, Vaastupurusha, The strategic location of the settlement was decided by the religion and occupation. For example, the location of the Brahmins are near temple, Konkani Maratha near agriculture land, maratha's near agriculture land and Buddha near their location of occupation and normally surrounded by the village.

### Site planning

The was divided into three parts aagan (Front yard), which is normally provided with a Tulsi vrundhavan, and area for drying the various agriculture products. Main house and the Paaras (back yard) with cow shad, storage for fodder, water well, area for gobber storage, kitchen garden and coconut, mango, suparri plantation.



**Fig. 3: Typical site plan of Konkani house**

### Cluster planning

Architecture of the Konkani is not monumental or iconic. One can always see clusters of houses standing adjacent to each other as if they are integrated. It's interesting to see different patterns of configuration of laterite sometimes mud even modern brick with Mangalore tiles on top. If you will over view, you will find it similar but great fun is to travel and take closer glimpse. Each of these houses has its own touch, its own unique combination of colour, Customized space allotment. After all its architecture for the people by the people.



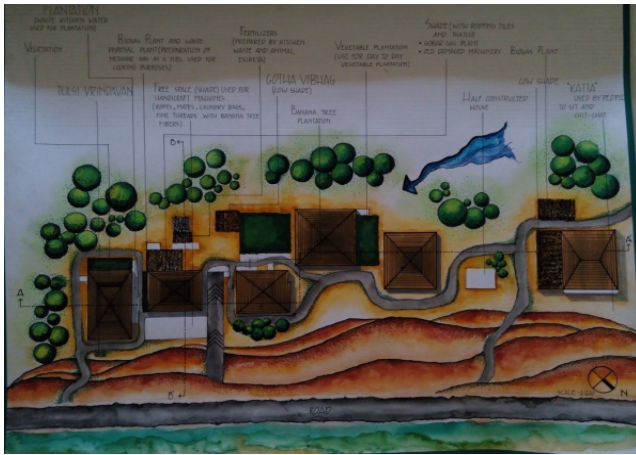


Fig. 4: Cluster planning of Konkan house

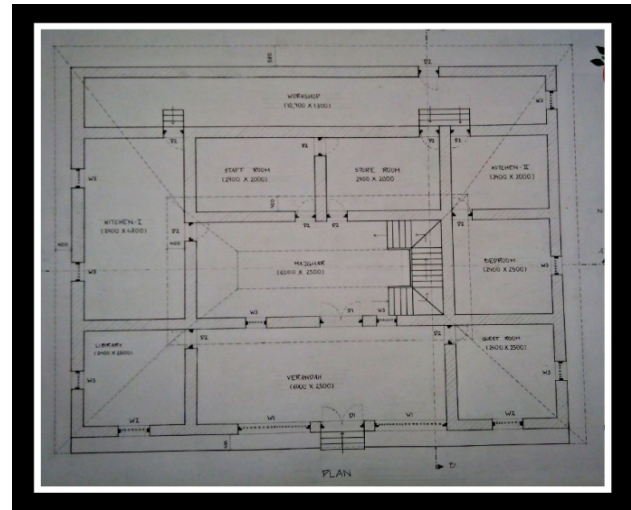


Fig. 6: Plan of higher income group

**Building Planning**

The building was planned around a Maajghar (Living room) and room were positioned according to Vaastu Mandala. This kind of layout ensured climatic comfort in warm and humid regions. The building was divided into public, semipublic/semiprivate and private spaces, ensuring the required level of safety, security and privacy for the spaces.

**Form and typology**

This is determined by the social needs of the inhabitants. In the Brahmins residential unit's big otti (Entrance verandah) are provided to cut off the direct entry for non-Brahmins. Big library, pooja room and vegetarian and non-vegetarian kitchen are provided.



Fig. 5: Brahmins residential unit's with big entrance verandah



Fig. 7: House at Dhamapur village

**House form**

The house forms are mostly rectangular with a maajghar (Living) at the center. Spatial arrangements are based on the culture needs of people.

**Climatic Responsiveness**

The traditional buildings were always climatically sustainable. They made use of local materials, such as laterite masonry, stone, wood carpentry and mud. The technology and method adopted were passive. Slopped roofs were appropriate for heavy rains. The use of wood regulated humidity. The use of terracotta roof tiles allowed infiltration of air. Attic spaces helped regulate the temperature inside and at the same time, provide storage space too.

**Aesthetics or Beauty**

Beauty refers to the psychological comfort of the users. Traditional buildings were carved beautifully in teak wood, and used traditional proportion systems, leading to the creation of a very healthy environment and equally healthy users. For this we can refer "medicinal houses" for them.

### Social interactive space

Aagan, temple surrounding, chowk is the prime interaction space .



Fig. 8: Temple surrounding area.

### Symbolic significance

The Tulsi platform is a symbol commonly seen in the Aangan.

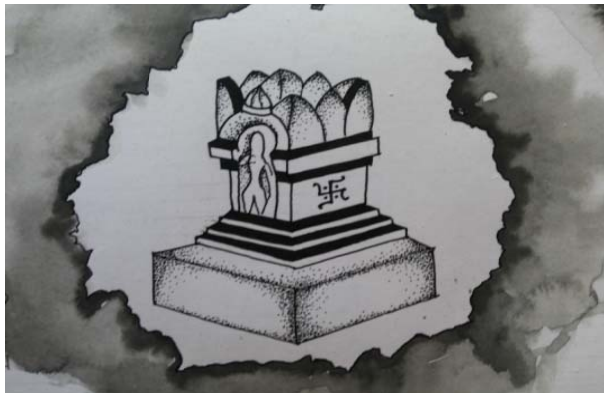


Fig. 9: Tulsi vrundhavan

**Civic Interventions:** Building bye-laws and regulations were limited. This gave more freedom to the designer.

### 5. WALLS

The houses built earlier used mud walls of 450-600mm. thickness. These heavy walls allow a very good thermal insulation keeps the interior of the house cool in summer and warm in winter.

### 6. ROOFING

Pitched roofs were common features in Dhamapur village due to heavy rain. Pitched roofs were provided with rafters and purlins made of locally available timbers. Roof covering was done with Mangalore tiled roof. Below the roof, a ceiling was constructed with timber. The attic was normally used for storing food.



Fig. 9: Roofing details

### 7. RAIN PROTECTION

Dhamapur receives heavy rain, hence the steep sloped roof was a very good solution to drain of the rain water from the house. Also large overhang of the roof protects the wall against heavy rain.

### 8. FLOORING

In the ground level, mud, cow dung, red oxide flooring was used. Plinth made from random rubble masonry. The upper floors are made of timber planks and timber joists. The use of timber prevents or reduces heat gain and heat loss to a great extent.

### 9. PUBLIC BUILDINGS

Dhamapur village has schools, temples with traditional vernacular style with steep sloped roof and mud walls. This temple played an important role in the evolution of village.



FIG. Shree Bhagavati temple at Dhamapur

### 10. CONCLUSION

The solutions, in the past were simple. Today, the solutions are highly technological and infinitely complex. The roots of

---

the problems are often ignored. It is not about going back to the old systems. However there is a requirement to adopt the intelligent use of present technologies. A bird makes its nest within few days, with the resources available and within reach, without creating much impact on the environment. Nothing can stand in the way of time, even architecture. But it is true that some of the principles of traditional architecture were able to withstand the test of time. It is definitely possible to use those principles to create a sustainable modern architecture.

The Dhamapur village study & documentation really helped to explore the wisdom of vernacular architecture of Konkan area (Sindhudurg district) in Maharashtra. Due to impact of urbanization the village lacks the traditional style of architecture. If this trend continues then this traditional village may lose its character.

## **REFERENCES**

- [1] Time Space & People–November 2014, Vol14, Issue 11