Sustainable Practices in Vernacular Architecture - Rejuvenating Trends

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Abstract

Background/Objectives: What are the million differences when one steps out of the contemporary architectural style of high rise glass buildings into lush green space with vernacular house? Be it mud/brick walls or flooring like Athangudi tiles, or sloped roof with clay tiles; it all smells like petrichor that brings the environment/building close to heart, adds warmth and our heart says yes we are at home naturally. **Methods:** It is fortunate that our ancestral Architects left us good existing examples of quality sustainable vernacular practices, defining space utilization, usage of locally available material, ease of construction and supply energy to building (i.e. light and ventilation) were all a part of them. The more vernacular it is; it is becoming as one amongst the environment, as a family which survives the happiest as well as difficult natural scenarios. This is to refresh and remind ourselves the need to appreciate the perspective and accumulation of yester year's local terrain knowledge, culture followed, buildings and spaces, material knowledge and the coordinated effort with local residents, to build and create with their practices and skills. **Applications:** This knowledge shared is of great treasure till now to enhance/improve in this creative field. It is cherished moment to learn, practice and experience the process, enabling to touch roots of vernacular practices like making of mud walls, making of mould and brick, cooling the floors with natural colours; the list is endless if one starts counting of those sustaining innovations. Vernacular practices are still sustainable, but the preference of people's choice is varied due to fast pace of life for survival, leaving the art and skilful practices unrecognized and left to perish.

Keywords: Practice, Rejuvenation, Sustainable, Vernacular

1. Introduction

Our society is moving at a faster pace in all terms, due to increase in population, there is demand for everything including living space with furnished elements, there is always a rush to win and own habitable space, as it is a matter of pride for self and amongst peers. Hence, there is a hurry to own one; to accomplish the race of desires and to mark successful venture at the earliest. In this rushing there is no time to concern about the space that is chosen for living; check whether it is sustainable and whether it is one along with natural surroundings. One is satisfied with unit space available for living as long as it is near to all amenities and green spaces which are provided as per norms by developer. One in turn is moving away from nature, natural materials and slowly the vernacular practices which once supported the human basic livelihood of food, cloth and shelter¹.

Shelters in ancient times were built and assisted by neighbors, relatives and communities; they involved themselves mutually to build with natural materials, these materials were collected, prepared, treated, experimented and practiced, only then they were implemented. We presume that the process of vernacular construction practices evolved while constructing humanely habitable space for living and way side shelters for travelers. It is certain that it involves study of geographical and vegetation details of that respective areas that decide the natural materials for construction and technique to be used. Vernacular Practices were constantly upgraded in time with improvements and innovation. Nature gave materials and invoked in nature's vicinity thoughts of ideas to create habitable space. Nature gave response for the good and the bad conditions of climate; even then one is slowly moving away from these practices that taught us to move towards betterment of construction.

Vernacular practices have been sustaining because of the knowledge in, identifying the appropriate natural material, standardizing the material, designing appropriate tools to refine the selected natural material and choosing other natural materials that can be and used to dilute, join, give final finish and rectify the selected natural material. After possessing these details, sheer practice of combining all the aspects improve the practice to perfection. Craftsmen are successful in creating marvelous pieces on possessing these details, thus knowledge gained is shared through generations and is too vast. This is to recollect and refresh some of the practices in India that are still sustaining with this shared knowledge, irrespective of period of evolution. This is to help rejuvenate revive thoughts, renew ideologies and nurture hope of inspiration.

2. Vernacular Practices - Is it a Low or High End Practice?

So many innovations have come up and are still happening, but in the present day scenario it is only the commercially viable businesses which survive and get accepted, whether it is worth or not. It is the intellectual people's choice of selection and thought that prevails to being called as "latest" rather than being called as "outdated". Hence if one chooses vernacular approach and practices they are termed as "outdated" also as "low cost cheaper material" sometimes "nature person"².

At one stage/period larger percentage of houses/shelter were made of these natural materials like mud walls, mud blocks, compacted mud flooring, random rubble masonry, laterite blocks, thatched roofs with straw, coconut fronds, flooring with locally available sand, natural colours made out of coal and shells etc. Space planning was planned based up different functional uses like; space allocated for visitors/travellers was a frontal verandah space, living rooms, a central courtyard surrounded with bedrooms, a space allocated for their profession, kitchen at the rear end of the courtyard, store room for harvested produce and space for cattle. Spaces were planned with optimum lighting and ventilation based on climatic conditions of the respective areas. However when it comes to natural locally available materials, they have to be treated with a process before using them for construction. These constructions with vernacular materials facilitate thermal protection, sound protection and dust protection from

external habitat. These would have been the high end practices at one stage which has been improvised further by skilled craftsmen.

2.1 Mud Walls, Compacted Mud Flooring and Thatched Roof – Preferred Humane Comfort; Local Natural Material, Suitable for Climate and Quality Workmanship – Simple Sustaining Vernacular Practice

Till today, in India many live in houses made of mud which is locally available and is affordable by any hierarchy of people, this seems simple but one has to have sound knowledge of mud that will be used for construction and check whether quality and required stability is obtained. Basically the process of selecting the soil for construction i.e. sand and clay mixture should be appropriate; if it is weak soil, it needs to be stabilised with materials like straw and cow dung which are available within village, this is an indigenous system of construction³.



(a)

The method of constructing mud walls by ramming needs to have parallel wooden planks held apart, tied at both ends with wooden planks and bolts. Mud is thrown into space between the planks and then rammed down with wooden ramrod. Once the layer is completed the next layer is created in the same way is shown in Figure 1(a). Thickness of wall may start from 300 mm to 600 mm. Wooden planks are used as lintels for window and door openings. Traditionally, skilled craftsmen and workers are the fortunate ancestral architects who derived this vernacular practice which is still sustaining. Mud walls possess natural insulating properties suited for our climatic conditions. Completed mud walls were finished with lime wash prepared from shells, which is then mixed with coal to create black color. In South India most of houses had black color coating up till a height of 600-900 mm from the plinth level and above which was the white color coating. Mud is also used for plastering to create uniform surface on the wall. Art forms were painted on these completed surfaces many of which can be found in North India⁴.

Another way of constructing a wall is using weaved coconut fronds, a mud kerb raised to a height of 300-750 mm internally and fronds are tied to wooden vertical supports in 2-3 layers to create a wall. Compacted mud flooring is used in this mud wall construction as a final finish; it is finished with coatings of cow dung mixed with water to paste form which is applied over the surface to get a smooth and even finish. Research shows that this finish keeps away bacteria and insects, so from ancient times till now (in villages in India) the cleaning of the house floor with cow dung is being continued; it is one of efficient protective flooring achieved in a simple way is shown in Figure $1(b)^5$.



Figure 1. (a) Mud Walls, Courtesy: Internet; (b) Applying Cow dung paste, Courtesy: Internet.

Weaved coconut fronds or straw are used for roofing, wooden beams were used as frames arranged in slope to lay the roofing material, coconut fronds are plucked from coconut trees and are immersed in water and weaved. Coconut sheath (spathe) is immersed in water to tenderize, once ready they are used for tying the dried fronds on to the wooden beam, coir ropes were also used to tie the fronds as an alternative. This is a practice in every house hold where woman weave the fronds and men tie prepared fronds to the sloped roof, each family member take an initiative to create their own house. Sometimes straw is used as an alternative to coconut fronds, where these are tied in groups and laid over the sloped roof. Eaves are provided to protect these walls. Overall mud walls with compacted mud flooring with thatched roof are good thermal and acoustic insulators; they protect from weather conditions and are biodegradable shown in Figure Figure 2(a)(b). Though this construction process seems simple, the sequence of process for preparing, laying and completing to perfection requires skill, which is only possible through sheer vernacular practice and utilisation of the knowledge accumulated.



(a)



(b)

Figure 2. (a) Laying dried weaved coconut fronds Courtesy: Internet; (b) Thatch roof and wall Courtesy: Internet.

All the techniques and materials used in the construction of mud houses comply with the green house norms. These green techniques were carried out in effective ways by our ancestors, whereas it is being capitalized on the same today. In the present day scenario; individuals take interest to create their independent house and innovate new techniques and forms in coordination with simple vernacular practices. These vernacular practices are also evident by its usage in different places and forms; apart from usage in rural housing these techniques are used to create hotel resorts, holiday homes, beach shelters in a contemporary way. Some of the fast-track uses of these practices are also observed like coconut fronds as shelter for supply water (during summers), mini pandals which are still used in urban areas.

2.2 Standardizing and Implementation of Mass Structures

One of the successful innovations from the vernacular practices is the mould for making brick. Moulds were made with wooden planks. Brick mould is updated version after rammed mud walls. Major innovation would be of defining standard size of brick to cast mud blocks are shown in Figure 3(a). Mud bricks were handmade, mixed mud is placed in mould and leveled. The bricks were sundried, later burnt to improve the strength. Transitions from brick mould made by the use of wooden planks to factory made bricks are improvements with improved quality in this industrialized era. Different types of bricks were also developed with the same techniques to solve corners or challenging areas.



(a)

Different planning and arrangement of bricks to create wall was experimented, until the appropriate

type of laying is achieved, knowledge sharing of these techniques enabled for mass constructions, thus the best way of laying bricks is noted for reference, which are incorporated in books today. Implementations of these standardized bricks for construction raised the bar of innovation and improved the quality of construction with ease. Large spaces were required to make mud bricks and dry them; this was commercialized and earned quite labor and business. Innovation of laying bricks led to creation of flexible structure in a more convenient form to execute homes or any habitable space as desired. It has set a standard in the way of executing building works; it is utilized as exposed brick construction in the present day scenario with bold forms and shapes.

Stone is another sustaining material which was extensively used in ancient days. Random rubble stone or ashlar masonry when chosen, a standard is created in selection of stone, picking right sizes and laying in layers for creating walls, dressed stone was created to particular size to suit the height and thickness is shown in Figure 3(b). Standardization of both random rubble and dressed stone was introduced and practiced. This might also be one of details which enabled to create massive structures like temples. Special shapes and sizes to suit the plan and design were also standardized and incorporated. Flooring patterns using stone tiles were also standardized and laid in vast open space as seen in temples, steps were created to a uniform tread and riser height.



(b)

Figure 3. (a) Standardized stone Blocks, Courtesy: Internet; (b) Standardized Mud Blocks, Courtesy: Internet.

Standardization was planned, well executed in the vernacular practices; one of the key reasons for sustaining

for longer periods, flexible to create interesting structures. We need to appreciate craftsperson skills for drafting the technique, dedicatedly implementing it in materials in appropriate way for its success in vernacular practice. Quality achieved is very high, that lot of examples are sustaining to present day.

2.3 Stones –Ever Sustaining Materials and Practices-Selection of Right Stone, Right Tools, Technique, Practicing the Technique

One of ever sustaining vernacular practice is structures and sculptures built with natural stone. During ancient period stones were carved for habitable spaces, making sculptures and making blocks of stone dressed or undressed for building construction. Rock cut architecture/Cave architecture is best example which can be seen in Ajanta, Ellora caves. Stone were used for construction where natural stone was locally available and accessible. Stones were used for lintels, beams, roof, flooring, retaining walls, and forts. Random rubble masonry was one of the construction techniques put use, it was largely used for constructing the plinth and foundation, stones of various sizes were laid and gaps were filled with smaller stones, minute remaining gaps were filled with mud mortar.

The ancient practice includes selections of stone; whether it is child, young or old, is identified by a ringing sound and then is specified for its usage. Stones were obtained from hills which are exposed to weather were largely used. Stones were broken in to required size using heating and cooling methods, sometimes heating and cooling with fluids. Defects in stone were identified using herbal paints. Intricate carvings in stone were made possible with tenderizing them with available natural herbs. Special tools were sharpened and made fit by use of bird-animal waste. Natural glues were made by mixing juices of plants for sticking when cement was not used. High end specifications were used in vernacular practices, where in the present day scenario a simple specification is very difficult to write, execute and follow.

Tools like Chisels, axes, wedges, trowels, hammer were used to refine stones. The effective handling of natural stones is achieved by the use of innovative tools; these tools are also used for dressing and carving them. Many of learning's from these sculptured rocks, their intricate carvings, whether they are incorporated on a monolithic or joined stone; their practices contribute to basic aspects to create stone structures in a more innovative way in today's scenario. One can be an expertise on continuous practice and have an accumulated knowledge of stone to execute marvelous stone work. In the present day scenario, improvised tools for cutting, grinding polishing are used to create masterpieces with stone, which are derived from the techniques used in vernacular practices are shown in Figure 4(a)(b).



(a)



(b)

Figure 4. (a) Stone dressing, Courtesy: Internet; (b) Tools used for dressing the stone, Courtesy Internet.

3. Some of the Preferred Vernacular Practices

With the invention of cement and chemical oxides, one of the flooring that was commonly used in all habitable space was the red oxide flooring and Athangudi tiles. Red oxide flooring came with usage of cement mixed with oxides. This was largely found in the houses and public buildings. These floors maintained cool temperature inside on hot summer days. The shine on the floor increases with time and usage. Red color oxide is mixed with cement, water is added to this dry mixture to make cement slurry, this slurry is applied on the cement floor at one stretch, once it solidifies the floor is cured by sprinkling water on the first day, on second day sheet of water is stocked to check for white patches, if white patches were noticed, it was rubbed with cloth and refilled with water, after which four days of watering and waxing is done, once dry, leveling and smoothening is achieved using stone or sand paper. Oxide is mixed with red wax to smoothen the evenness and is allowed to dry, at a later stage; the floor is rubbed with coconut husk for shining shown in Figure 5(a).



(a)

One of refined form of flooring using locally available natural soil is the Athangudi tile flooring made only in the Athangudi, Chettinad region, Tamilnadu. Athangudi tiles created their own brand of local craftsmanship made from the naturally available sand from that place. It is a handmade tile, sand and color oxides are mixed to running paste form, metal frame with glass base is casted, metal partitions are created as per intricate designs of the tile, the color mix is poured into cast, once the layer settles mix of cement and sand is sprinkled, topped by wet mix of sand and cement mix and the mixture is leveled, once partially dried the cast is removed, extra mortar is removed from the edges and the tile is allowed to dry and then the tile is transferred to a water tank for 2 days curing. Usually tiles are 18 mm thick; rice husk is used for polishing the tile and later with coconut oil. This was in tile form flooring unlike the red oxide flooring laid by spreading over the space. We can find Chettinad homes with this flooring more than 50 years old shown in Figure 5(b)(c). One of common aspects of these practices is that the process of preparing and executing takes time, though these processes have also been the source of inspiration for mosaic tiles and industrialized production like ceramic tiles.



(b)

Figure 5. (a) Red oxide flooring, Courtesy: Internet;(b) Patterned metal frames used for Athangudi tiles; (c) Intricate Athangudi tile patterns.

Some of the other materials which are used extensively are Bamboo and Wood and their practices are developed in each and every household. All the above preferred materials in vernacular practices are sustaining even today because of the sequential quality process involved and the techniques adopted for their different applications.

4. Conclusion

One of common aspects of these vernacular practices is that the process of preparing and executing takes time. In this fast pace where finishing is required to be completed in nano seconds these practices are slowly refused by people to implement. The arrival of new material has slightly shifted the direction but still there will be few promising lights to carry out the tradition. We feel satisfied by using vernacular practices because natural materials used are biodegradable without harming the environment. Standardizing sizes for new materials to execute it effectively is one of the practices/ learning still followed today. Structures done by natural materials and vernacular practices set high degree of quality of finishes and workmanship which motivates the present generation to raise the quality quote. Now a day's information on vernacular practices is available and had encouraged modern architects to take their view of vernacular practices to different level.

There are lot of untold specifications and practices that are made simpler for common usage. This rejuvenation of vernacular practices reminds us to search for the more untold details which were once followed, one can take pride of those treasured practices that they were being implemented by our ancestors. There are architects and engineers who are using, experimenting with composition of natural materials and are successful and best is yet to come. Though the fast pace of life guide us to select latest material in the industry, thinking about vernacular practices gives us earthly warmth and brings close to nature; rejuvenates one from the mad rush of desires and motivates us to touch the earth. Vernacular practices are sustainable and will be sustainable in newer forms by using them.

5. Summary

Vernacular Architecture is not new, it has been the most

widespread and indeed most of us were raised in these homes. Rejuvenating these sustainable practices help us to know how well to use the local materials, how the building is created and constructed in their respective places, how well it is suitable for the climate and how it is in harmony with environment by not harming the environment. Best part being the quality achieved through these materials motivates to raise quality quote for present day execution process.

Standardization (e.g. size, techniques), creating and using appropriate tools and techniques are the simple trends being followed even in the present day construction scenario. It is observed that people though they possess urban house for immediate needs they try and manage to have their share of building constructed using natural materials in newer forms to retain and pass on tradition, thus enabling and enhancing value of sustainable practices, also retaining native areas which in turn encourage and help the native profession.

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7. References

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