

Learning from vernacular architecture: sustainability and cultural conformity

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Abstract

The paper will illustrate the identification of principles that will provide important insights and lessons for those that are involved in the development of future sustainable built environments. Using a case study of vernacular architecture of Nuristan located in the NE region of Afghanistan with unique geographical and cultural significant, this paper will seek to demonstrate the principles of vernacular design and technologies such as the sustainable performance of dwelling and settlements common in this region. The value of compact townscape and land-use economy, self-help and participatory housing approaches, conservation, and others that help protect the natural environment as well as enrich the cultural heritage will be presented.

Keywords: vernacular design, user participation, cultural heritage, local technology and materials, conservation and density.

1 Introduction

In a period of sumptuous progress and technological advancement that dominates every aspect of our lives, it may be unfashionable, to regress back in time and place and attend ourselves to the cause of vernacular building practices. And yet vernacular architecture represents more than a nostalgic longing for things and ways that have essentially become obsolete, but rather a learning method by which new global challenges can be addressed, challenges such as global warming, housing crises, and economic equality. In his work, Kenneth Frampton made a similar observation, pointing out that the importance of vernacular architecture need not be limited to sentimental regionalism but, when thoroughly analyzed, should yield to responses that are at once balanced and



current [1]. Paul Oliver goes further in his validation of the vernacular as more than a romantic throwback to the past, saying that almost 90% of the world's housing shortages will be met with self-help means, using locally available resources and technologies and not high tech and specialized method [2].

In applying the property of vernacular architecture to our current times and seeing in it a solution for our urban problems is the notion of flexibility and working in traditional ways, vernacular cultures generated buildings and spaces that are accommodating of time and place. Because of the limitation of resources and building technologies, the vernacular used ways and solutions that were inherited to them and were most efficient out of necessity. These conditions resulted in sophisticated and most innovative building forms and design techniques that are environmentally sustainable and culturally adaptive [3]. People dealt with forces of nature and the climate of site in meaningful ways and found a sensitive balance between their needs and aspirations and preserved the nature at the same time. They became part of the equation and took full account of natural processes rather than resisting and fighting it.

The challenging task of resolving the demand of shelter for the growing urban population, and solving the environmental crises of 21st century, it seems more than ever necessary to look into the application of vernacular knowledge in creating the kind of architecture and urban environment that are sustainable and culturally appropriate.

2 Case study: Nuristan

Located in the remote and rugged geographical region of northeast Afghanistan, Nuristan villages are the fine examples of sustainable communities that adopted to the harsh cold climate zone of southern slopes of Hindu-Kush mountain and depended on local resources for building their homes and villages.

Nuristan is inhabited by distinctive population, relatively isolated villages in deep, narrow mountain valleys. The main village in Nuristan is Kamdesh with about 5907 ft. altitude. Villages are surrounded by agricultural land and wooded mountains and valley grazing areas. Land ownership and access to grazing areas is a hereditary right of tribes. They grow wheat, barley, millet, peas, wine grapes, and other fruit and raise livestock (chiefly goats).

A brief historical sketch dates back Nuristan to the times of Alexander the Great, in the 4th century B.C., when Alexander on his way to India besieged this region and was intrigued with cultural and gallant character of its people. He invited the young men of the villages to join his army for the Indian campaign. Many Greek motifs and customs found in the Nuristan culture may well date from this experience. Throughout the centuries that followed, the peoples of these mountains successfully defied conquest and subjugation.

Tamer lane, campaign in 14th century to conquer these mountainous enclaves failed with disaster. At that time the people living in these mountains were known as Kafirs (Infidels) because they worshipped a wide pantheon of nature spirits and practiced other customs incompatible with the Muslim religion. In the late 19th century, an army was sent by the Afghan king; Abdur Rahman finally succeeded to subdue and convert the population to Islam. The



Amir thenceforth announced that the land of this region was to be known as Nuristan, Land of Light [4].

Every Nuristani village has its own artisans called the Bari who keep each village self-sufficient. The Bari carpenters, built houses, furniture and household utensils with much skills and proficiency. They executed the elaborate woodcarvings and decorations on the facade and interior aristocrat's houses with extreme artistic mastery [5].

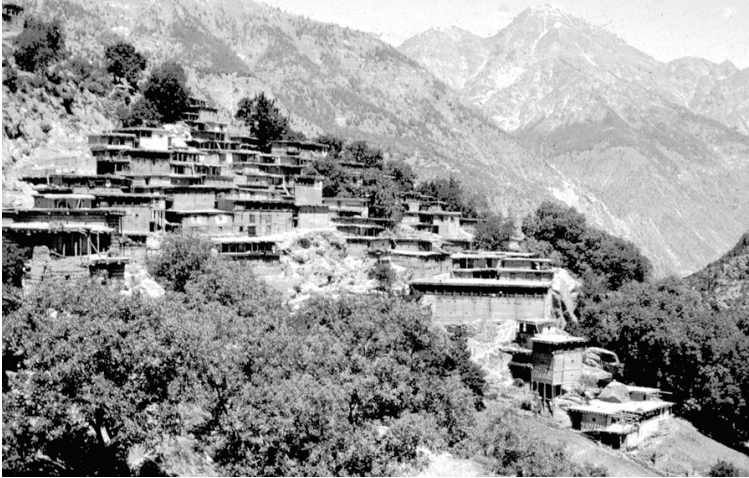


Figure 1: Nested below the top of mountain slope this compact Nuristani village took advantage of logical site topography in exchange for preservation of agricultural land.



Figure 2: Illustrates a two-story Nuristani house with verandah. Notice the horizontal logs and stone fill wall construction.



Nuristani villages are clustered on the steep slopes of the mountainsides, the lower valley and flat land is saved for agriculture and grazing since there are limited amounts of arable land available in the Hindu Kush. This arrangement also helped the defensibility of the village in days when tribal feuds resulted with neighboring villages raiding each other. The roof of the dwellings that are constructed directly above each other, so that one household's flat roof serves as patio for the neighbor above. These stepped roof areas with their verandahs provide the necessary flat exterior space or patios for many domestic and social tasks. The patios are connected to each other with notched logs used as ladders and serve as pathways for the vertical movement of people through the village. Less steep and flat countryside land can be used as terraced fields; so no arable land is wasted.

Homes are generally two or three-stories in height; the lower levels contain storage rooms and stables. The upper floor is a large single family room in which the family cooks, sleeps and receives guests. The access to the room is often from a veranda that runs across the front of the room.



Figure 3: Typical stepping characteristic of Nuristani houses. The flat roof provides for the outdoor family space in summer. Notice the inclined log ladders that provide access to houses.

Houses are of post and beam timber construction. Wood for house construction is maintained from the coniferous forests of the mountains adjoining the villages. The construction of house begins with the preparation of the site, filling, leveling and any digging and cleaning that may require making a satisfactory base floor. The walls of the lower floor, which are usually where the storeroom is located, are always built of stone. Normally this stage of construction is done by the homeowner and the help of the neighbors if necessary. On the upper floor horizontal logs are placed and held by vertical poles on both sides of the wall and secured by means of wooden clamps. The walls may consist entirely of horizontal

wooden logs or cedar timber, but usually in place of every second log the spaces between the timber framework are filled with small stones, and the joints between the stone are filled with clay-plaster coating leaving the timbers exposed [6].

The interior structural columns supporting heavy roof beams are carved with intricate basketry and interlacing patterns and decorated by the Buri craftsman.

Across the beams run the exposed wooden joists planked by solid wood slabs.

The roof is made out of layers of chippings or dried leaf and then a layer of pulverized stone is laid on top of the wood planks. The roofing is finally finished with a thick layer of well-trampled clay.

The exposed timber on the front facade of the houses are elaborately carved and variety of decoration and motifs are applied to the surfaces of the solid wooden beams, window head and posts, and panels fitted between the supporting members. The window posts were often carved in elaborately intertwined designs representing interlacing goat horns. Solid wooden shutters are placed between each window post.



Figure 4: The interior columns supporting heavy roof structure are carved with intricate basketry and interlacing pattern.

Nuristani villages took into consideration the efficient and more logical location of site topography for building their homes in exchange for preservation of agriculture land and wooded forests, which resulted in ecologically sensitive design principles. The village takes a compact form without annexing additional land for development by accommodating growth within the existing structures through the practice of infill and recycling materials, and adaptive-reuse of existing structures for increase capacity without increasing pressure on the surrounding environment.

The south facing terrace houses on the hill respond logically to the climate and solar orientation by taking full advantage of the opportunities to save energy

and create a more comfortable environment for the residents. The exposure to sunny roof surfaces maximizes the required thermal mass and benefit from the warming effect of solar radiation. The compact mass of building increases the effect of insulation against heat loss in winter. The wooded forests around the edges of the villages provide the benefit of windbreak in winter.



Figure 5: The exposed timbers on the façade of houses are elaborately carved and variety of decoration and motifs are applied to the exposed wooden surfaces.

The building orientation makes the best use of the sun's heat and light, which is the central principle in vernacular design. There is no electricity or modern power system available in these villages, therefore all buildings depend on passive cooling in summer and heating in cold weather. Various techniques are employed for using as much daylight as possible. The use of daylight is substantially sustainable while providing a welcome connection to the outdoors. Natural daylight increases working productivity and is essential for the health and well being of the occupants.

The houses are heated in winter by wood. A simple fire pit with a smoke hole is located in the middle of the family room. The hole is over the middle of the hearth which is usually about one foot square and has enclosing boards which projects a few inches above the level of the roof.

The rooms mimic the contours of the hilly landscape and their spatial organization accord to the steepness of the hilly regions. In summer and fall the agricultural produce are spread out on the roof to be dried and stored for winter months. Aside from this, the roof is used for most of the warm season as an outdoor family room. On summer evenings the roof spaces double up into socially dynamic congregation spaces that the families stay there until long hours and families share the news of the day.

The vernacular built environment in Nuristan, demonstrates that the vernacular is important in more than one way and certainly more than that which is limited to final results only, but extends to affect a harmony between one individual and the next but also between people and place.

3 Lessons from vernacular architecture

The following vernacular principles can be sources of inspiration and guidance to solve the housing problems in a particular region as well as saving and enhancing the environment. The design professionals must provide continued leadership in integrating these principles into design where possible.

3.1 Participatory paradigm

The task of providing adequate housing for the growing global population in the 21st century is most challenging, especially in the cities of developing countries. There is no evidence that the problem of shelter will subside any time soon. Squatter and slum settlements will continue to represent the most viable way of defining shelter for the majority of people in the cities. This is so, because squatters use the traditional and vernacular ways to built their shelters. They take advantage of self-help process and participatory mechanisms that is most economical and within their means of affordability, building with local materials and doing so incrementally to improve their houses and to accommodate their growing families [7].

The tradition of user participation in the planning and building process is just beginning to be appreciated and used in many societies. Offering encouragement to the self-help labor force and recognizing the energies and resources that already exist in the skill and determination of people, will lay the ground for affordability and home ownership for the majority of population.

Flexible and adoptable design is another hallmark of the vernacular mode of building. Housing that provides freedom of choice and is easily adoptive to changing needs and desires of the families over time are sustainable. Architects must accept the fact that household economic and social status changes over time and the housing must provide flexible and multiuse spaces as a means of providing opportunities for choice and personalization. As Rabeneck remarks: we must accept the fact that people have the right to their private domain inside which they live as they wish in security and that the housing priorities should reflect the rising expectations of occupants in terms of better designs for choice, durable, resilient housing stock amenable to adaptation [8].

Buildings that can be used for many different tasks and are easily adaptable to be converted to many other uses during their life time, puts less pressure on the environmental and energy resources in contrast to building new structures and demolishing the old buildings. Current building practices are usually designed for single and specialized uses that prohibit the notion of flexible design and choice for change. This is in stark contrast to the vernacular building practices that serve the changing needs of not only the current users but also accommodate the needs of multi-generational users.



3.2 Density and sense of place

In essence the vernacular settlements are characterized by their compactness of form and efficient utilization of land and building ecology which has many environmental, economical and social advantages compared to the dispersed form of settlements which are typical of our modern cities. Land is an important non-renewable commodity and its use and regulation is crucial in the sustenance and health of all ecosystems. Compact human settlements are easy on the provision of services and infrastructure such as roads, sanitary system, piped water supply, electricity etc., and in addition they result in much lower unit cost for the whole development. Higher densities have the advantage to promote walking and cycling as the main mode of transportation for short journeys, while longer journeys can be made by public transportation, which is energy efficient and economical. Denser city environments stimulate the economic and social dynamics that foster growth within the city and allow its population to seek out choices and attractive places to stay and interact.

Towns and villages in vernacular settlements are defined by extremely dense townscapes that are firmly unified buildings and land uses showing a high degree of complexity and cohesiveness. The result is a rich townscape endowed with much aesthetic appeal and distinguished cultural history. Vernacular settlements are cloaked in their simplicity that drive the design and create a place which breeds spontaneity. This quality cultivates an urban cultural fabric that provides its population the opportunity to bond with their communities.

Higher density housing prototypes must be compatible with life styles of people and familiar housing form should recognize traditional values associated with family privacy, and offer the necessary security. Integrity and identity of shelter in the vernacular settlements are atoned to the specific lifestyles and cultural traditions, which is strengthened through family values and sense of community. Traditional vernacular architecture conceived the building as a living architectural entity in its own right, shaped according to the distinct needs of social and cultural requirements [9]. Nuristan houses match perfectly the cultural and environmental condition of this region with higher densities. With many variations these compact terraced houses are instrumental in producing the required density and an interwoven urban fabric. The compact order of this integrated architecture creates a sense of place that celebrates regional character and provides security, peace and delight [10].

3.3 Local materials and regional flare

Vernacular architecture represents the logic of construction in a specific region and it is a literal expression of the materials used and the method of construction employed by the users with skills and competence. The new building practices should take into consideration the use of local technologies and materials. The local materials are less costly and easily available, compared to imported industrial products. They are readily accessible to most of the population who are capable to build their houses through self-help. [Fig. 6] Local builders use adobe brick and rammed earth for building shelter in many parts of the world. The



adobe material proved to have very good insulating quality in hot arid climate and provides protection to the interior living spaces from harsh sun and outside heat. Local material and simple construction techniques are suitable for wide range of people in order to keep housing affordable.

When buildings are constructed the process itself consumes a certain amount of energy. There are many ways to reduce the consumption of energy in construction process. Conserving old buildings and adapting them to new uses a majority of construction save energy because a lot of new materials need to be created and not so many old materials are being discarded. Along the same line is the practice of reuse and recycling of the materials that come off of the old buildings that do get them down. By recycling building materials, it not only gives new life to old products, but it reduces the energy used to remove new materials from the environment. Local materials do not require as much transport and in some cases lower energy inputs for fabrication. They are easily adapted to the site [11].

3.4 Energy conservation and ecology.

The new building activities should recognize the natural energy systems that are at play in the built environment and aspire a symbiotic relationship with its surroundings. Learning and improving on the vernacular building principles that provided sustainable solutions to their energy needs for many generations. These principles can be a good leading point and a recipe for complex design requirements in new construction.

Recognizing the micro climatic factors of a site in which a building is located can enhance much of the building natural energy patterns. Building and site orientation to solar exposure, wind, the effect of vegetation and their arrangement in space create a specific microclimate. An optimum design of open spaces, streets, gardens, and courtyards influences the sustainable energy patterns of a site and buildings significantly. In addition to orientation, building materiality, surface texture, colors of exposed surfaces of the building augment the pattern of energy.

Conservation should be a strategy in all-new building activities. Quality construction, passive solar strategies by providing increased windows, sun space/greenhouses and gardens on the south side of dwellings improve the energy use of the building significantly. Shading southern walls, windows and living spaces by means of overhangs, trellises and or deciduous plants will increase summer comfort. Consider passive cooling methods such as clerestory or attic ventilation, drawing replacement air from the cooler north side in warmer weather.

4 Conclusion

It is evident that throughout the history most of the human settlements were out of necessity sustainable. It is only in the last century that cheap energy and mechanical heating and cooling of the buildings left architecture disengaged. The art of living in harmony with nature and make the elegant use of local



materials and technology decreases our burden on the finite energy resources and saves the environment from further degradation.

To allow the practice of self help housing and participatory modes of development is only sensible and timely for many communities in need of shelter, since the know-how to built shelter effectively with regard to local materials and technology at hand are available to people and are much affordable. Government authorities should set up a self-help building advisory service in the communities to encourage higher standards of construction. The use of sustainable programs, such as the adaptive reuse of structures within the urban environment, the use of flexible designs, regard for optimum passive solar designs along with energy conservation strategies, we can develop higher density dwellings that will lower both infrastructure and public service costs and are much easier on energy consumption.

The vernacular buildings provide us with a large repository of natural and cultural heritage that illustrate a genuine and symbiotic relationship with the spirit of a particular place. This relationship that is mediated through knowledge and values can be valuable lesson for the mainstream architecture of 21st century. We should represent the ecologically sensitive issues of region, climate and culture to achieve sustainable human settlements. Sim Van Der Ryn points out; that ecological design begins with the intimate knowledge of a particular place... it is small-scale and direct, responsive to both local conditions and local people. If we are sensitive to nuances of place, we can inhabit without destroying [12].

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